INTERROGATING MAJOR DETERMINANTS OF TRADE COMPETITIVENESS FORSELECTED SUB-SAHARAN AFRICAN COUNTRIES

by

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[redacted]

DISSERTATION

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DEDICATION

I dedicate this dissertation to my parents John Sekhipe and Rose Matlale Rachuene, and my family at large. My family has supported me throughout the process and has given me hope and strength, thus this paper is dedicated to them. I truly appreciate the prayers and financial assistance they gave me; they gave me an incredible feeling of perseverance and encouragement. I also dedicate this to God Almighty for He has given me the courage to write this paper.

DECLARATION

I declare that "**INTERROGATING MAJOR DETERMINANTS OF TRADE COMPETITIVENESS FOR SELECTED SUB-SAHARAN AFRICAN COUNTRIES**" is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

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RACHUENE KGOLANE MERCY   **01/17/2024**

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ABSTRACT

Trade in Sub-Saharan Africa has increased and grown significantly despite current account deficits and challenges to maintain global competitiveness. To improve upon and allow more flow of imports and exports within regions, African countries combined to reach a trade agreement, the African Continental Free Trade Area (AfCFTA). The agreement aims to expand trade by loosening trade barriers such as tariffs and ultimatelyimprove trade competitiveness within the Sub-Saharan Countries. To explore major determinants of trade balance, the study analysed investment (GFCF), Real Exchange Rate (RER), tariff (TRWA), and Terms of Trade (TOT) of six selected Sub-Saharan countries for the period 2004 to 2020. The Panel ARDL long run and short run method toinvestigate the impact on trade balance was used together with Panel Levin, Lin and Chu,IPS, Fisher ADF and PP tests for stationarity, Pedroni, Kao and Johansen-Fisher panel cointegration tests to confirms the availability of long run relationship in the model and Diagnostic tests using data from World bank and Federal Reserve Bank-St Louis. The findings revealed that investment, real exchange rate, and term of trade are significant inthe long run and, real exchange rate and term of rate are negatively related to the trade competitiveness while investment is positively related. In the short run, all determinants were found insignificant to trade competitiveness. Accordingly, investment, RER and TOTare essential factors that affect and strengthen trade competitiveness in the long run whenimplemented effectively. The governments should seek to improve further oninfrastructure investment for ease of doing business as this is seen to improve upon the trade balance and drive trade competitiveness. Policies that will lead to an appreciation of real exchange rate will result in term of trade improvement because export will rise, and imports become cheaper than countries become more competitive in the trade industry.

Keywords: Sub-Saharan Africa, Trade competitiveness, Investment and real exchange rate, tariff and term of trade, Panel ARDL.

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ACRONYMS

NAFTA:	North American Free Trade Agreement
EFTA:	European Free Trade Association
AFCFTA:	African Continental Free Trade Area
SSA:	Sub-Saharan African
GFCF:	Gross Fixed Capital Formation
RER:	Real Exchange Rate
FDI:	Foreign Direct Investment
GDP:	Gross Domestic Product
WTO:	World Trade Organisation
USD:	United State Dollar
LDC:	Least Developed Countries
NIPDB:	Namibia Investment Promotion Development Board
AGOA:	African Growth and Opportunity Act
MFN:	Most Favoured Nation
EPAs:	Economic Partnership Agreements
SACU:	Southern African Customs Union
REER:	Real Effective Exchange Rate
SDG:	Sustainable Development Goal
ECCAS:	Economic Community of Central African State
REC:	Regional Economic Communities
SADC:	Southern African Development Community
COMESA:	Common Market for Eastern and Southern Africa
EAC:	East African Community
ECOWAS:	Economic Community of West African State
ECM:	Error Correction Model

PARDL:	Panel Autoregressive Distributed Lag
NARDL:	Nonlinear Autoregressive Distributed Lag
ARDL:	Autoregressive Distributed Lag
LLC:	Levin-Lin-Chu
IPS:	Im Perasan and Shin
ADF:	Augmented Dickey Fuller
PP:	Phillip Perron
AIC:	Akaike Information Criterion
SC:	Schwarz information Criterion

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CHAPTER 1
ORIENTATION TO THE STUDY

1.1 INTRODUCTION AND BACKGROUND

Trade competitiveness is a crucial ingredient that contributes significantly to the economic prosperity of nations (Anderson, 2020). Hence, countries have combined to reach trade agreements that improve economies, such as the North American Free Trade Agreement (NAFTA), the European Free Trade Association (EFTA) and the Asian Tigers. According to Fergusson and Villarreal (2017), these agreements allowed more flow of imports and exports within the countries as the trade agreements also loosened the tariff rates, resulting in one of the world's largest single markets, expanding trade and economic links between countries. The trade agreements created more efficient manufacturing processes, increasing the availability of lower-cost consumer goods and improving living standards and working conditions. This has also maintained an exceptionally high growth rate driven by exports; a turnaround has occurred with unemployment rates declining and rapid industrialisation (ECOFIN, 2017).

In March 2019, Africa also implemented a trade agreement to strengthen Africa's trading position in the global market and accelerate intra-African trade by enhancing Africa's shared voice and policy space in global trade discussions. Thirty-six African countries have deposited their instruments of ratification to the African Continental Free Trade Area (AFCFTA) of development vision (Wamkele, 2021). Trade is, therefore, an important component to the SSA countries because it broadens the market for a nation's production beyond its borders and achieves better pricing through exports. The surge in commodity prices, which began at the start of the previous decade, has been a leading element in African countries' expanding trade openness. It has also improved trading terms with Africa and increased its export and import capacity (UNCTAD, 2016). Keho (2021) states that the depreciation of theactual exchange rates improves the trade balance in the short and the long run, while Suphian (2017) identified investment as the most interesting and effective strategy for improving the trade balance.

In promoting domestic production and investment in the home market, tariffs contribute to a nation's economic growth. However, it is contended that an increase in exchange interest indexes offsets the effect of the tariff. Tariff reductions directly lower consumer prices and increase exporters' competitiveness by lowering their input costs (Gerlach, 2022). On the other hand, SSA countries have the lowest gross fixed capital formation (GFCF), and according to Akobeng (2016), Angola, the Central African Republic, Cameroon, Ivory Coast, Liberia and Nigeria had mean investment percentages below 15%, from 2000 to 2011. Only a few African countries have maintained gross capital formation of 25% or higher (OECD, 2022).

Another economic fundamental also considered in crafting the AFCFTA policy was the issue concerning the currency adopted when countries trade. It can be noted that the value of a nation's currency may be balanced with other currencies in terms of being overvalued or undervalued in comparison to other countries with which it trades the most (IMF, 2022). A rise in actual exchange rates indicates that exports are getting more expensive while imports are becoming less expensive, which signifies a loss of trade competitiveness (IMF, 2022). The exchange rate volatility has a bearing on the country's trade competitiveness, as seen in the terms of trade (TOT). Worsening TOT, due to an increase in import prices over export prices and the deterioration of the country’s balance of payment, causes economic suffering. Trade effects are unequal between primary commodity-exporting countries and industrialised countries with a more diverse and extensive export base (Mohammed, 2013). Its significance arises from the fact that the term trade may be used to measure a country's competitiveness in international trade (IMF, 2022). This study intends to unpack some key macroeconomic indicators of tariffs, investment, RER, and TOT and their effect on the trade performance of some selected SSA countries. This, of course, is motivated by the AFCFTA trade reform while noting the existence of NAFTA and the Asian Tigers.

Different investigations were implemented towards trade competitiveness through trade balance or accounts with other related variables. Researchers like Muluvi, Githuku, Otieno and Onyango (2015) and Gebremariam, Batu and Tola (2018) in their studies clearly stated that a decrease in tariffs has a significant impact on trade competitiveness while a decrease in accurate effective rate results in an increase in the long run of the current account which have a significant impact on trade.

Competitiveness. Gamaliel and Hove (2019) and Cline and Vernengo (2016) on their studies found that the FDI strengthen trade competitiveness through exports and shocks in terms of trade that cause trade imbalances, which becomes an obstacle for other countries to be competitive in the trade industry. This study will further contribute to how the variables employed in other studies have impacted trade competitiveness in recent years while accounting for their fluctuations and their effects on each other. In 2020, global industrial production and goods commerce declined at rates comparable to those seen at the height of the Global Financial Crisis because of the restrictions to curb the spread of the Covid 19 pandemic (OECD.org, 2022).

Trade and regional integration have emerged as critical factors in most contemporary governments' development strategies, which helps explain the current global trend toward more regional integration. However, regional integration would notwould only produce the best results with favourable macroeconomic conditions and significant internal commerce among the integrating countries (Osuji, 2020). *Sub-Saharan Africa has experienced remarkable export growth over decades, which makes up to 3% of world trade of goods and services* (Shabtai, 2020). *Sub-Saharan Africa had a negative trade balance, which shows trade imbalances. (*Moussa, 2016) states that most SSA countries, including Benin, Namibia, Kenya, Madagascar, South Africa, and Uganda, are on trade deficits, which are the main drivers of trade openness, resulting in more competitive countries. Tradeable products and services are the focus of trade policy actions. More precisely, they impact the overall incentive structure in this area, which in turn impacts the relative costs of importables and exportables.

Government investment results in a real depreciation, while government consumption causes a genuine appreciation. These are positive directions and proper magnitudes, but the impacts are not always statistically significant. The real exchange rate will be appreciated in a small two-sector economy due to government spending and the productivity gap, specifically in Sub-Saharan Africa (Ibhagui, 2019). *UNCTAD's (2022) report highlights the significance of market access, particularly tariffs, as a factor influencing exports from sub-Saharan Africa. With the implementation of the Trade Facilitation Agreement (TFA) together with WTO, OECD and WTO (2020) estimate that the full implementation of the TFA has increased global trade by up to US$ 1 trillion annually and lowered trade costs by an average of 14.3%, with the poor countries standing to gain the most* (Hassan, 2020). Erten (2019) *States that in South Africa, tariff rates aim to enable the establishment and growth of domestic enterprises.* (Boungou,

2024) *states that intra-Africa trade stimulates the growth of the financial services sector, lowers trade expenses and builds exporter confidence. Kenya and South Africa, being the countries with high tariffs (*Li, 2023), state that the launch of a new free trade area, known as the China-Africa Continental Free Trade Area (CAFTA), is an adequate strategy to advance China-African economic cooperation.

1.2 STATEMENT OF THE PROBLEM

In all the world's regions, the ratio of exports and imports over GDP to gauge trade openness has increased significantly over the past thirty years, and SSA is no different. SSA's average trade rate has risen from 37% in 1981-1990 to 51% in 1991- 2000 and 63% in 2001-2013, and it's been increasing (UNCTAD, 2016). Despite the increasing trade openness, anticompetitive strategies and organisations are frequently present in markets, primarily in developing countries. Sub-Saharan Africa is hardly an outlier. Monopolies are common, particularly state-owned ones, and in many countries, significant market shares are held by a single operator in vital industries. The potential costs result from a lack of competition, affecting people with low incomes by driving up the cost of necessities and degrading economic development and external competitiveness (Cherif, 2020). A systematic analysis of emerging market economies and developing countries, particularly for sub-Saharan Africa, is still lacking, even though the issue of declining competition and rising corporate market power has recently received much attention in the context of advanced and emerging market economies (De Loecker, 2018). Chronic trade deficits indicate that domestic firms are undersupplied and unable to compete with foreign firms. This limits export capacity and the emergence of industries that compete with imports, rising import reliance, and unemployment and poverty (UNCTAD, 2016). Compared to the rest of the world, competition in the region is still relatively modest. Sub-Saharan Africais comparable to other developing economies, although it lags behind advanced and emerging market countries in domestic and international competition, according to country-level indices. Low levels of competition are caused by a few dominant significant enterprises in the market, lax or non-existent enforcement of anti-trust laws, entry hurdles that are both structural and regulatory, and the distortionary impacts of tax laws. High trade barriers are primarily what prevent domestic competitors from competing abroad. These obstacles can also have an indirect effect by limiting access to intermediate inputs.Fauzel (2022) states that regions merged to advance trade and the development of naturaland human resources to benefit all regional residents and promote regional integration.

Enhancing Africa's competitiveness is more important than ever as the continent grows more slowly after ten years of expansion driven by commodities. Their low competitiveness, a common and enduring issue throughout the area, prevents efforts to industrialise and diversify beyond the extractive sector (Adeleye, 2018). Tanja and Goodwill (2015) stated that there is a high positive correlation between growth and competition due to more significant investment, productivity, innovation, export competitiveness, and more effective resource allocation. Boungou (2024) states that the trade inside Africa benefited from democracy; the African export trade has increased since some African countries experienced democracy. With all the methods implemented, Sub-Saharan Africa still needs to be more competitive. The study aims to bridge any gaps in knowledge by identifying the key factors crucial to raising the region's trade competitiveness. This will reveal which variable needs more investments or policies to grow trade competitiveness in SSA. This study provides a reference to the trade competitiveness of the selected Sub-Saharan African countries and investigates how the gross fixed capital formation, real exchange rate, tariff and term of trade affect the trade competitiveness of SSA.

1.3 RESEARCH AIM AND OBJECTIVES

The aim and objectives of the study are carried out in this section.

1.3 .1 Aim

The study aims to interrogate the determinants of trade competitiveness: tariffs, investment (gross fixed capital formation), real effective exchange rate and terms of trade for selected Sub-Saharan Africa (SSA) for 2004 – 2020.

1.3.2 Objectives

The objectives of the study are:

- To determine the impact of investment on trade competitiveness.
- To establish the connection between a real effective exchange rate and trade competitiveness.
- To examine the effect of tariffs on trade competitiveness.
- To investigate the association between trade terms and trade competitiveness.
- To determine the causality among the determinants and trade competitiveness.

1.4 RESEARCH QUESTIONS

- What is the impact of investment on trade competitiveness?
- What is the connection between a real effective exchange rate and trade competitiveness?
- What is the effect of tariffs on trade competitiveness?
- How is the term trade associated with trade competitiveness?
- Is there causality among the determinants and trade competitiveness?

1.5 DEFINITION OF CONCEPTS

- **Trade Competitiveness**

Trade competitiveness is the calculation of a country's exports minus its imports, which economists and analysts use to understand a country's economic strength in comparison to other countries (Tracy, 2020). Trade competitiveness refers to the region's ability to export more value-added products than its imports (Atkinson, 2013).

- **Gross fixed capital formation**

It consists of additional value produced by producers or institutional investors of non-produced asset entities during a specific period after deducting disposals (Pettinger, 2017). It comprises investment by public non-financial firms and all private sector entities but excludes spending on housing and the expenses of non-produced, non-financial asset ownership transfers (McLaren, 2017).

- **Real Exchange rate**

It is the weighted average of a country's currency concerning an index or basket of other major currencies (Pettinger, 2017). In theoretical and applied economic research and policy analysis, the real effective exchange rate is frequently used. It is utilised for various things, including determining a currency's equilibrium value, price or cost competitiveness changes, trade flow drivers, and incentives for reallocating production between tradable and non-tradable sectors. The RER is determined using the nominal exchange rate (NER) and a measure of the country's relative pricing or cost to its trading partners.

- **Tariffs**

Tariffs are government-imposed taxes on imported products and services (Pava, 2021). Tariffs are established to either create income or protect domestic industries.

However, a tariff placed essentially to produce income may also have a significant protective effect (Pepelasis, 2021).

- **Term of Trade**

Refers to the relationship between the amount of money a country pays for imports and the amount it receives from exports (Francis, 2021). The term trade examines the relationship between imports and a nation's financial position, which can be estimated using export prices. With the same number of exports, a country can purchase more imports if its import prices are a more significant amount of money (Tzanetos, 2022).

1.6 ETHICAL CONSIDERATIONS

This study was carried out with the greatest possible inclusiveness without intentions of harm or misinformation. All sources used or quoted were recognised and credited with thorough references. The university's postgraduate research manual was followed.

1.7 SIGNIFICANCE OF THE STUDY

The study interrogated the effect of terms of trade, real effective exchange rate, tariff, and gross fixed capital formation on trade balance for selected Sub-Saharan African countries. It can be noted that studies could be more detailed in determining the effects of the suggested study model variables on trade competitiveness in the SSA region. It is essential to mention that many studies that have attempted to do so have focused on the impact of the trade balance on GDP for some of the selected SSA countries. Researchers like Mogoswane and Molele (2020), Eita (2018) and Akinwale (2021) considered the trade balance and its effects on economic growth in South Africa. Namibia and Nigeria used different periods and included other variables such as exports, trade openness, and energy consumption.

Zdráhal (2020) conducted a study of trade performance and competitiveness in food items between South Africa (SA), the EU28 and Africa using the 'products mapping' tool based on the trade balance index (TBI) and Lafay index. Therefore, this study sheds light on the dynamics of terms of trade, real effective exchange rates, tariffs and gross fixed capital formation and how they affect SSA trade competitiveness. This benefits the trade industry as it gives a perspective of how each independent variable affects the competitiveness in the trade market and determines which variables play a significant role in creating a conducive competitive World in the trade market. This study makes an additional contribution to the body of knowledge by employing the Panel ARDL methodology on the updated data of countries from 2004 to 2020 to determine the model variable relationships.

1.8 STRUCTURE OF THE STUDY

This study is divided into six chapters that are arranged as follows: Chapter 1 presents the study's primary context, the problem statement, the research aims and objectives, the research questions, the definitions of concepts, ethical considerations, the significance of the study, and lastly the dissertation's structure. This is followed by a chapter 2 that reviews the trends of the significant determinants of selected Sub-Saharan African countries and provides an overview of each selected country. Chapter 3 then reviews the theoretical framework and literature review. The theoretical framework discusses the theories related to significant trade determinants competitiveness, and the literature review analyses the study of trade competitiveness from other authors. Chapter 4 gives the model specification and estimation techniques employed in this study, including data collection. In addition, Chapter 5 presents the interpretation of the results and findings from the estimation technique tests conducted. The empirical results address the above-mentioned research questions and objectives presented in Chapter 1. Lastly, Chapter 6 summarises the dissertation, conclusion and recommendations.

CHAPTER 2:

ANALYSIS ON MAJOR DETERMINANTS OF TRADE COMPETITIVENESS FOR SELECTED SUB-SAHARAN AFRICA

2.1 INTRODUCTION

Chapter 1 introduced the study problem and background, articulated the purposes of the study with aims and objectives, and defined the study variables. This chapter analyses the significant determinants of trade competitiveness in the selected Sub-Saharan African countries. This section looks at the different aspects of trade competitiveness considered in this study and examines their development from the Sub-Saharan Africa (SSA) perspective. It looks at how the following variables have changed over time: (a) trade balance (as a proxy for trade competitiveness), (b) gross fixed capital formation (as a proxy for investment), (c) real exchange rate, (d) tariff, and (e) term of trade.

2.2 AN OVERVIEW PERFORMANCE OF THE MACROECONOMIC PERFORMANCE OF SSA

Despite the recent economic crises, trade has proven to be a significant global development engine. Market concentration has increased over the previous ten years, modern policies to restore competition will need to consider new drivers of market concentration and adapt their toolbox accordingly (Schwab & Zahidi, 2020). Sub-Saharan Africa in 2021 had a trade (% of GDP) of 45.91%, while the European Union and Euro area had 92.83% and 90.265% as the highest regions with imports and exports for 2021 (Macrotrends, 2023). Sub-Saharan Africa underperforms in both volume and content andeven though trade competitiveness has increased over the past few decades, it still represents a small portion of global trade (OEC, 2023).

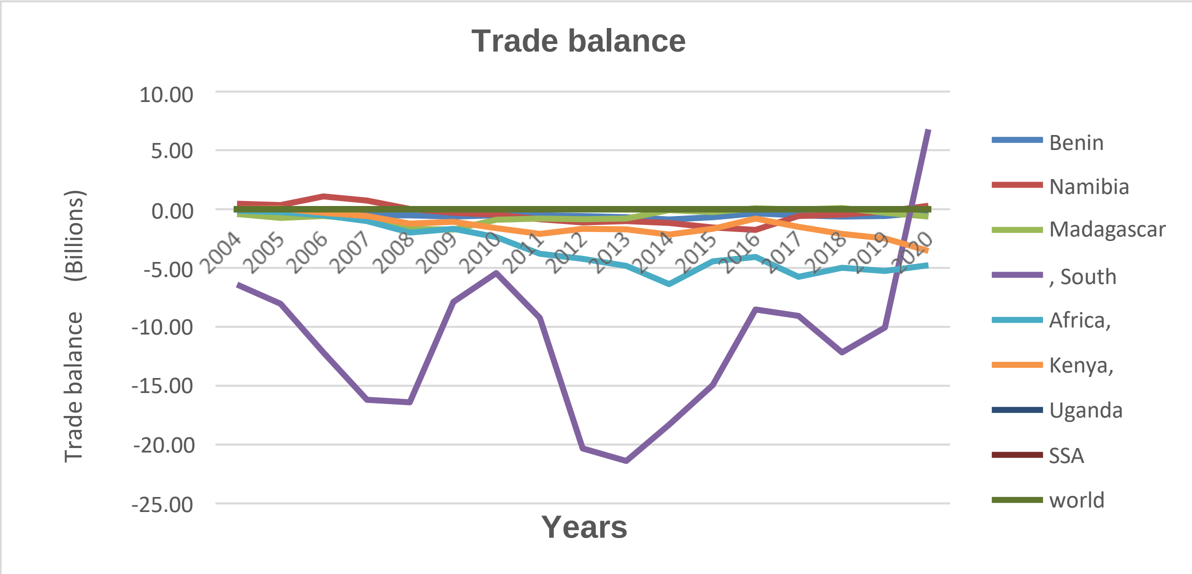
Figure 2.1 and Table 2.2 are used to analyse trade competitiveness among the selected Sub-Saharan African Countries. Benin's domestic market is very small, and the country's economy largely depends on trade between its neighbours, particularly Nigeria (ITA, 2023). In the long run, Benin has a potential for a developing tourism industry; its total exports were $1.24 billion and it had approximately $4.22 billion in imports in 2020. Benin's exports of goods reached a total value of $894 million in 2022. Benin's total commodities exports fell by 12.5% from 2021 to 2022. Benin's merchandise exports recorded a $128 million decline in 2021, with a total value of $1.02 billion (Trend Economy, 2023). Namibia's primary industries are mining, tourism, fishing, and agriculture, irrespective of the fact that the United States is one of Namibia's top 10 trading partners. South Africa, which accounts for 45% of all imports into Namibia, dominates the country's imports (ITA, 2022). In 2021, Namibia was number 124 in total exports, with a value of $4.72 Billion, and number 132 in total imports, with a total value of $5.96 Billion (OEC, 2023). Merchandise exports reached 2.73 billion USD in 2021, while imports reached 4.41 billion USD (OEC, 2023). Despite a continuous increase in exports, Namibia's trade balance has historically been negative, and over the medium term, this pattern is unlikely to change if imports continue to outstrip exports (Bank, 2023). Madagascar has a challenge in the market for US imports, especially for mass-market goods, due to its endemic poverty and low purchasing power (ITA, 2021).

South Africa was included in the Global Competitiveness Report Special Edition 2020 as part of the countries that will rethink competition and anti-trust frameworks needed in the Fourth Industrial Revolution, ensuring market access, both locally and internationally, with a scale of 58.3% (Schwab & Zahidi, 2020). South Africa reports illustrated that exports were valued at R184,162,942,899 and imports at R173,967,307,662 by May 2023 (SARS, 2023). Kenya improved to position 109 in terms of total exports, which were worth $7.15 billion, and was positioned at number 81 out of 226 countries in terms of total imports worth $23 billion in 2021 (OEC, 2023). It can be noted that Kenya has the most robust industrial base in East Africa and has been successful at attracting US exporters. Uganda was ranked 179 in 2021 with a current account of $-3.553 billion in 2021, from -$3.552 in 2020 and $-2.508 in 2019, with exports of $6.172(2019), $5.562(2020), $6.177(2021) and import of $9.795(2019), $10.197(2020), $10,705(2021) (CIA, 2023).

2.2.1. Trade competitiveness trend analysis

Many developing nations have endeavoured to create effective, sustainable exports and maintain competitiveness in the trade market, but these efforts have been unsuccessful (Schwab & Zahidi, 2020). Trade plays a crucial role in the growth and development of emerging nations by facilitating the transfer of capital, information, and technology. Therefore, the expansion of commerce between Africa and other regions like China has been beneficial to the growth and development of Africa (Ngundu & Matemane, 2023). Firstly, this section analyses the trade competitiveness, which is represented by the trade balance, while employing the graphical approach. The graph compares all the selected Sub-Saharan African countries and other regions.

Figure 2.1: Trade Competitiveness



Source: Author's construction using World Bank (2023) data

According to World Bank (2023) data graphed in Figure 2.1, the sub-selected African countries needed to be more competitive in the trade market as they had experienced a trade deficit mostly between the period of 2004 and 2020. Namibia had a trade surplus in 2004 (R446 million), 2005 (329 million), 2006 (108 million) and 2007 (R747 million), which means that Namibia had a trade competitive advantage over all other selected countries. Uganda was less competitive than Benin, Namibia, Madagascar, and Kenya, but it outperformed South Africa. South Africa was the least competitive as compared to other selected countries, and it had its trough point in 2013 (R-21 trillion) and started recovering until 2020 when it experienced its first trade surplus after a long period of 2020 of 6 trillion. SSA, LDC and the World consistently trended positively throughout the period. The regions trended upwards and downwards but maintained an upward trajectory.

2.2.2. Trade competitiveness and statistical analysis

Trade increases when imported intermediate inputs are assembled for home and foreign markets. The improved manufacturing output led to the emergence of global value chain integration analysis is a critical viewpoint on international commerce (Fagerberg et al., 2018). The statistical results shown in Table 2.1 demonstrate another comparison of trade competitiveness using trade balance as a proxy with respect to the selected countries and regions.

Table 2.1: Trade Competitiveness

	Mean	Standard deviation	Sample size	Coefficient of variation
Benin	-511972744.1	184051251.6	17	-35.94
Madagascar	-616398166	531791865.9	17	-202.55
Namibia	-390978351.4	803685264	17	-86.27
South Africa	-11162275066	6729586052	17	-60.28
Kenya	-3321154167	2047435685	17	61.64
Uganda	-1441963062	938106978.6	17	-65.05
SSA	53,29	6,31	17	11.85
LDC	56,19	5,00	17	8.90
World	57,04	2,59	17	4.55

Source: Author’s computations using World Bank (2023) data

According to Table 2.1, the selected countries’ trade balance mean values are unfavorable compared to the SSA, LDC, and the World Trade balance averages. According to the trade balance averages reported in Table 2.1, the world, regions and countries were ranked as world (1st), LDC (2nd), SSA (3rd), Namibia (4th), Benin (5th), Madagascar (6th), Uganda (7th), Kenya (8th) and South Africa was the most diminutive performer. The results indicated that the selected countries are less competitive than the world and regions under consideration. To measure the volatility and hence the stability of the trade balance, Table 2.1 results showed that the coefficient of variation of the World, LDC and the SSA is smaller than that of the selected countries and, hence, much more stable. On the contrary, Uganda, Namibia, and Madagascar appeared to have a more unstable trade balance than Benin, South Africa, and Kenya, although the world and the regions outperformed all. Therefore, trade competitiveness is less predictable within selected countries when the world and regions under consideration are used as thresholds.

2.3 THE ANALYSIS OF INVESTMENT (GFCF) IN THE SELECTED SUB-SAHARAN AFRICAN COUNTRIES.

Investments are generally engines for growth between developed and developing nations and in an inter-trade industry. Investing could be a crucial component of a supply-side strategy (Najabat & Xialing, 2017). However, due to political and security issues in the Sub-Saharan African region, investment has traditionally lagged, and the COVID-19 pandemic caused a sharp decline in investments and trade (White, 2021). The African Continental Free Trade Area and the Sustainable Investment Protocol (phase II of the AfCFTA) have the impetus to boost FDI flows in the long run (White, 2021). Despite the COVID-19 pandemic, Benin's macroeconomic solid fundamentals enabled Benin to grow at one of the fastest rates among developing nations in 2020 (3.8%), aided by public investment, reaching an estimated 5.5%. This was through a robust public investment initiative and constructing a sanitary perimeter of pandemic-prone towns (IMF) (Standard Bank, 2021).

Namibia's private sector is dualistic, with a small, mainly unorganised domestic market segment wholly disconnected from an investment (FDI)- and commodity-based segment driven by exports (World Bank Group, 2020). The Southern African nation founded the Namibia Investment Promotion and Development Board (NIPDB) at the beginning of 2021 to make itself more investor-friendly (Irwin-Hunt, 2021). Nangula Uaandja, who took over as NIPDB's CEO on January 1, 2021, discussed increasing Namibia's competitiveness through FDI (Irwin-Hunt, 2021).

Due to Madagascar's political crisis, FDI inflows have been decreasing in recent years, but the reforms implemented by President Andry Rajoelina's administration are anticipated to reverse this trend. Because of the global economic crisis brought on by the COVID-19 pandemic, FDI inflows decreased from USD 474 million in 2019 to USD 359 million in 2020, according to UNCTAD's World Investment Report (2021). In 2020, the total amount of FDI was USD 8.3 billion (Lloyds Bank, 2023).

Trade and Investment in South Africa are utilising market opportunities to benefit South

Africa's economic development priorities in targeted markets to ensure that South Africa's exports to conventional markets stabilise and that higher export growth to emerging markets is ensured (DTIC, 2022). The surplus on South Africa's financial account, which is dependent on foreign investment inflows, is used to cover the current account deficit (Strauss, 2017). In December 2022, South Africa's investment made up 14.8% of its nominal GDP, a decrease from 17.0% in the previous quarter (CEIC, 2022).

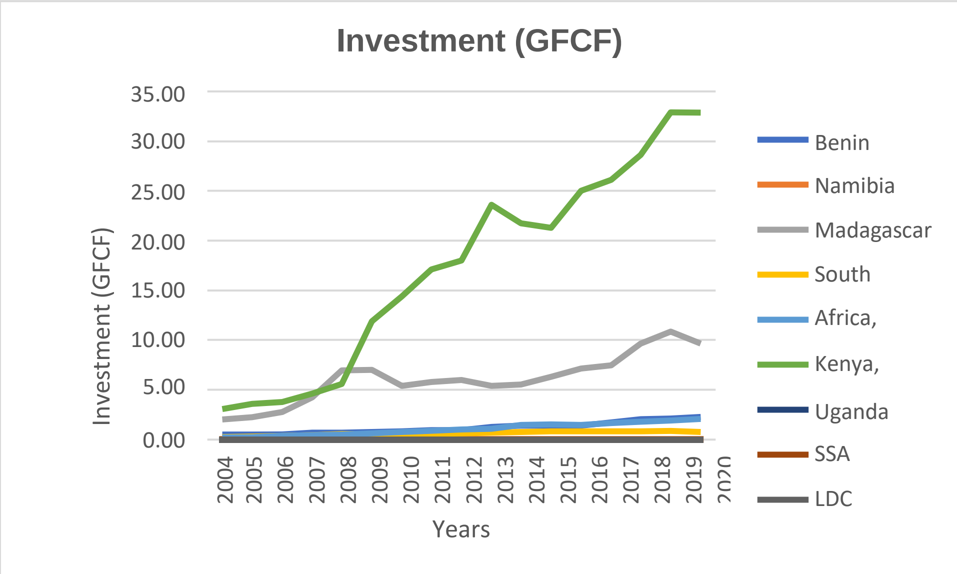
According to the FDI Intelligence Report, Kenya was one of the top destinations for FDI flows and ranked third by project numbers among countries in the Middle East and Africa in 2016 (Ikiara, 2018). China's trade and investment are at a record high, with China's entry point being heavy infrastructural investments in Kenya (Siringi, 2018). Kenyan Government has implemented economic reforms intended to create a level ground for improving competitiveness and productivity for the country in trade and investment (Siringi, 2018). Economic reform includes securing an environment for private sector investment, guaranteeing the government capital repatriation, and remitting dividends and interest to foreign investors (Siringi, 2018).

Uganda is attracting more attention from international investors due to its comparative advantages in agriculture and estimated recoverable oil reserves (ITA, 2022). The African Growth and Opportunity Act (AGOA) made Uganda eligible for benefits in 2022 (ITA, 2022), and Berry (2021), in the EAC Investment 2020 report, states that the EAC Secretariat will collaborate with the Uganda Investment Authority, public and private sectors to promote investment opportunities and job creation by both domestic and foreign markets to advance Uganda's economy.

2.3.1 Investment (GFCF) trend analysis

Across the world, investments are utilised to allocate savings to profitable economic endeavours. They offer long- and short-term funding for projects and the promotion of economic expansion. Foreign portfolio investments are more important to developing economies' financial and economic development than loans from foreign creditors (Edo & Kanwanye, 2022). Figure 2.2 is a line graph which shows investment (GFCF) trends for the Sub-Saharan African selected countries with another region to compare the flows.

Figure 2.2: Investment (GFCF) trend lines



Source: Author's construction using World Bank (2023) data

According to Figure 2.2, the selected Sub-Saharan African countries experienced positive investment growth from 2004 to 2020, which is good for the countries as they become more competitive in the market. On average, Uganda outperformed other selected countries, including the world and other regions, given that Uganda's investment trajectory scales higher than the rest. Madagascar is the second performer, whose investment reached 5.4 trillion in 2010 and increased to 5.7 trillion in 2011, 5.9 trillion in 2012, fell to 5.4 trillion in 2012 and increased to 5.5trillion in 2013 but was still higher than South Africa, Kenya, Namibia, Benin, SSA, LDC and the World. Madagascar's investment line started to pick up in 2014 according to World Bank (2023) data graphed in Figure 2.2 SSA, LDC and the World investment trends line hoovered next to the X-axis, which is close to zero. Regarding investment trends, Namibia comes in last with millions of dollars invested over the study period, followed by South Africa.

2.3.2. Domestic Investment and Statistical Analysis

Keynesians argue that marginal productivity of private capital, public investments in infrastructure (such as roads, highways, and electricity) and health and education may complement private investment (Ouédraogo et al., 2022). Table 2.2 consists of the selected Sub-Saharan African countries and other regions, namely SSA, LDC, and the world, to compare their reliability investment.

Table 2.2: Investment (GFCF)

	Mean	Standard deviation	Sample size	Coefficient of variation
Benin	117599	5,87397	17	49.94
Namibia	25070	11706	17	46.69
Madagascar	613345	249524	17	40.68
South Africa	625956	200608	17	32.04
Kenya	105822	622024	17	58.78
Uganda	173013	104104	17	60.17
SSA	20,72	0.89	17	4.34
LDC	25.24	2.33	17	9.23
World	24.46	0.84	17	3.45

Source: Author's computations using World Bank (2023) data

According to investment averages reported in Table 2.2, the world, regions and countries were ranked as South Africa (1st), Madagascar(2nd), Uganda(3rd), Benin(4th), Kenya(5th), Namibia(6th), IDC(7TH), the world (8th) and SSA was the most diminutive performer. South Africa is the most invested country among all the selected countries, and Namibia is the least performer. The reported averages indicate that the selected countries performed better as individual countries rather than as part of the world's regions. Table 2.2 indicates that the coefficient of variation of the SSA, World, and LDC is smaller than that of the selected countries, indicating a higher degree of stability associated with the investment variable. However, all countries were outperformed by the SSA, the world, and LDC, Uganda and Kenya's investment variable appeared to more unstable than Benin, Namibia, Madagascar and South Africa.

2.4. THE ANALYSIS OF REAL EXCHANGE RATES IN THE SELECTED SUB-SAHARAN AFRICAN COUNTRIES.

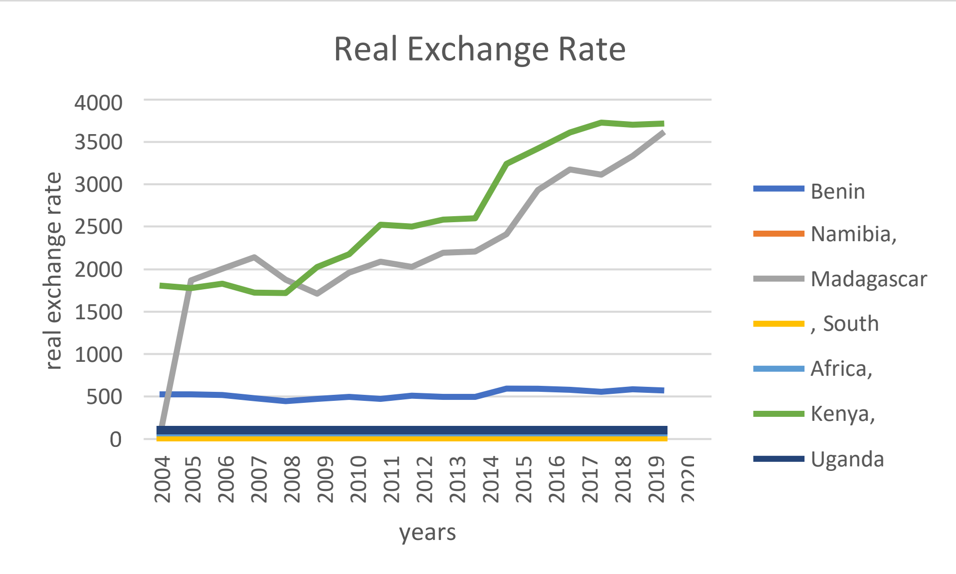
Sub-Saharan African countries are experiencing severe exchange rate pressures primarily due to external factors, such as more restrictive financing requirements and unfavourable terms of trade that are anticipated to last for a while (Kemoe et al., 2023). According to forecasts made by the International Monetary Fund (IMF) (2023), inflation in the eurozone was estimated to be 12.6% in 2022. With this, the American central banking system (the FED) raised its prime rates and its European counterpart. These exchange rate swings have caused the local currencies of Sub-Saharan African countries that have implemented floating exchange rates to lose value, while the Global Economic Report (2023) stated that Russia's invasion of Ukraine made significant currency depreciations in some SSA countries (Dufrénot & Le Clerre,2022). According to SDR (2023) data, the national currency for Benin in 2022 was 834.672 XDR/XOF. This represents an improvement over the 790.044 XDR/XOF figure for 2021. Namibia's competitiveness and economic performance are impacted by the overvaluation and undervaluation of the real exchange rate because it is hard to maintain the real exchange rate and keep it out of equilibrium (Eita & Sichei, 2014).

Eita & Jordan (2007) and Ahmad, Pentecost, and Stack (2023) state that a greater extent of tax reform induces a depreciation of the real exchange rate relating to Sub-Saharan African countries. Real exchange rate depreciation can be caused by the fiscal system, and the severity of this real exchange rate depreciation increases (Gnangnon, 2023). In other words, the real exchange rate depreciation effect is more pronounced in industrialised countries than in comparatively developing countries. The rand to US dollar exchange rate (R/US$) exceeded the R19/US$ mark daily in April 2020 because of several events, including sovereign credit rating downgrades, the COVID-19 pandemic outbreak that prompted the 21-day lockdown, and its extensions (Ndou, 2022). It has been a while since there has been a depreciation of the exchange rate at this level, and theoretical projections indicate that ceteris paribus, the depreciation may increase export volumes (Ndou, 2022).

2.4.1 Real exchange rate trends analysis

In emerging nations, exchange rate shocks harm domestic investment and consumption. It is critical to determine if global, regional, or national forces are responsible for these shocks from the perspectives of risk management and policy (Khan & Ahmed, 2023). Figure 2.3 presents the real exchange rate for the selected Sub-Saharan African countries with other regions.

Figure 2.3: Real Exchange Rate



Source: Author's construction using St Federal Reserve (2023) data

Madagascar and Uganda trend high and away from the X-axis, which illustrates a high exchange rate. This means that the country's exports are more expensive in foreign markets, and its imports are less expensive, while Namibia, South Africa and Kenya show a gradual shift from the X-axis. Hiking exchange rates gives rise to difficulties in trade balance as exports become more expensive and imports cheaper for the countries trading actively (Roy, 2021). The minimum-maximum real exchange rate for Madagascar in Figure 2.3 was 14,77 indexes (2004) and 3618,32 indexes (2020), and Uganda had 1720,44 indexes (2008) and 3718,24 indexes (2020). Madagascar still waved higher than other countries, implying that Madagascar's imports are more favourable in the trade market than the exports. South Africa and Namibia's real exchange rate was found with minimum-maximum values of 6,3593 indexes (2005), 16,4591 indexes (2020) and 6,3771 indexes (2005), 16,4632 indexes (2020), respectively. As the worldwide standard for assessing currencies continues to be the American dollar, the Namibian dollar and South African Rand were identified as one of the strongest currencies in Africa (FXOpen, 2023). Benin was third from the highest trends in Figure 2.3 report. The report shows minimum-maximum rates of 446 indexes (2008) and 592.6056 indexes (2016). According to Fofanah (2020), prices increase, and the currency's value increases when export demand is strong. It can be noted that foreign items become more affordable in the home market when they are exchanged.

As the rate rises, the international demand for domestic items tends to decline as the prices of commodities purchased by foreigners increase.

2.4.2. Real exchange rate and statistical analysis

Relative values are used to quote currency exchange rates. Trade, in turn, influences the demand for money, which in turn affects these principles. A country's currency is in great demand if its exports exceed its imports (Fofanah, 2020). Table 2.3 presents a comparison of the selected Sub-Saharan African Countries and the USA.

Table 2.3: Real Exchange Rate

	Mean	Standard deviation	Sample size	Coefficient of variance
Benin	524,49	47,74	17	10,98
Namibia	10,11	3,37	17	3,00
Madagascar	2275,20	827,55	17	2,74
South Africa	10,09	3,36	17	2,99
Kenya	87,06	12,98	17	6,70
Uganda	2629,97	781,65	17	3,36
USA	106.98	7.53	17	14.19

Source: Author’s computations using St Federal Reserve (2023) data

Table 2.3 presents the mean, standard deviation, and coefficient of variation of the selected Sub-Saharan African countries and the USA. According to Table 2.3 average report, the real exchange rate is ranked Uganda(1^{st}), Madagascar(2^{nd}), Benin(3^{rd}), USA(4^{th}), Kenya (5^{th}), Namibia(6^{th}), and South Africa last. Kilonzo, Muzekenyi, Nheta, and Zuwarimwe (2019) state that goods and services are expensive when a country's exchange rate increases compared to other countries. It lowers import costs and decreases a country's exports. It states improperly handled exchange rates can have disastrous economic impacts, affecting the country's trade competitiveness. Table 2.3 report presents the measure of volatility and stability of the real exchange rate, and it indicates that Madagascar, South Africa, Namibia and Uganda have a high degree of stability. Though all were surpassed by Madagascar, South Africa, Namibia, Uganda, and Kenya have more precarious real exchange rate stability than Benin and the USA.

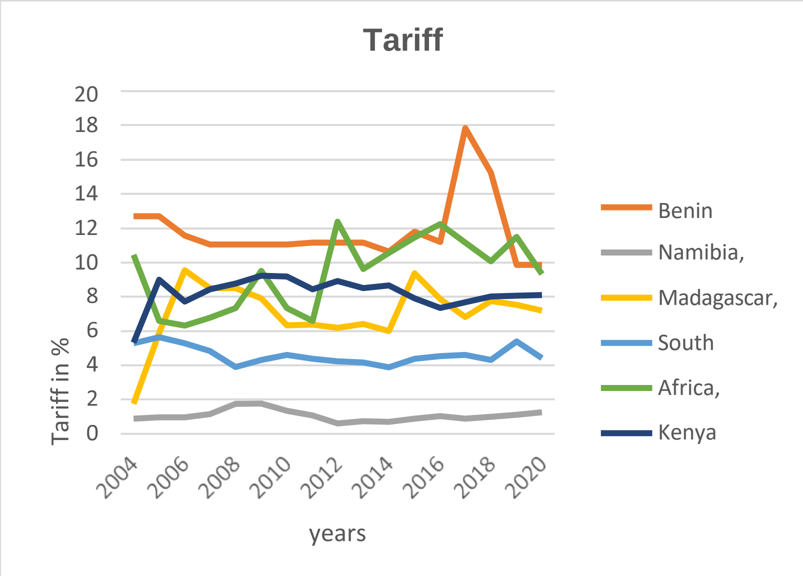
2.5. THE ANALYSIS OF TARIFF IN THE SELECTED SUB-SAHARAN AFRICAN COUNTRIES.

Tariff imposition and elimination of trade restrictions can result in inclusive growth (Iqbal & Olayungbo, 2021). SSA has substantial trade barriers for instance, importing into SSA takes 38 days and nine documents on average, much longer than in any other area in the World (Temesgen, 2016). SSA nations have simplified their tax structures to encourage trade within the area (Temesgen, 2016). To remove the barriers that hinder countries from maximising their trading potential, trade policy initiatives such as reducing tariffs and quotas, granting preferences, and more extensive liberalisation attempts have been used (Bhawsar, 2015). However, even though these steps are required, they probably need to be improved, given that the country's capacity for trade market competition varies (Bhawsar, 2015). To determine commodity categories and import weights, tariff line data were matched to the Standard International Trade Classification (SITC) (Macrotrends, 2023). Specific rates have been practicably converted to their ad valorem equivalent rates and incorporated into the computation of weighted mean tariffs (Macrotrends, 2023). For Sub-Saharan Africa, the Most Favored Nation (MFN) weighted average tariff is 9.41%, and the Effectively Applied Tariff (EAT) weighted average (customs duty) is 7.50% in 2022 (WITS, 2023).

2.5.1 Tariff trends analysis

Bagwell and Lee (2020) state that a country's economy gains by enacting the following policies: (1) a small import tariff, (2) a minor export subsidy in cases where trade costs are low, and productivities are widely distributed, and (3) a suitably integrated small rise in import and export tariffs. The degree of market access could be excessive or insufficient, contingent on a fundamental correlation between model parameters

Figure 2.4: A graphical view of tariff trends



Source: Author's construction using World Bank (2023) data

Figure 2.4 report presents the tariff trend of the SSA-selected countries as an applied weighted mean for all products, as indicated in the Appendix. The minimum – Maximum values are 9,86% - 17,84% (Benin), 6,32% - 12,38% (Kenya), 5,32% - 9,22% (Uganda), 1,74% - 9,54% (Madagascar), 3,87% - 5,64% (South Africa) and 0,61%- 1,77% (Namibia). Namibia is closer to the X-axis than all other selected countries, followed by South Africa, Uganda, Madagascar, and Kenya. Benin trends high and away from other countries, hitting its peak point in 2017 at 17.84%, then starting to trend down to 9.86% in 2020. Benin, trending down in 2017, remains higher than Uganda, Namibia, Madagascar, and South Africa. The trend report presented in Figure 2.4 identifies the stability and reliability of tariff rates in Madagascar, South Africa, Namibia, and Uganda, as there are no excessive trends throughout the years (2004 to 2020).

2.5.2. Tariff and statistical analysis

Higher (optimal) tariffs on finished goods than intermediate inputs are referred to as tariff escalation. They have two sequentially producing sectors, with the downstream sector yielding the best returns when labour is used; the underlying distortion is caused by the markup on domestic inputs (Antras & Davin, 2022). Table 2.4 illustrates the differential that exists through measures of central tendency and measures of dispersion for the selected countries**.**

Table 2.4: Tariff

	Mean	Standard deviation	Sample size	Coefficient of variation
Benin	11.822	1.9825	17	5.9633
Namibia	1.0670	0.3195	17	3.3397
Madagascar	7.0482	1.7795	17	3.9606
South Africa	4.5917	0.5206	17	8.8194
Kenya	9.3670	2.1249	17	4.4081
Uganda	8.1829	0.9199	17	8.8949

Source: Authors computations using World Bank (2023) data

Table 2.4 presents the mean tariff of the selected countries with 17 samples covering the years from 2004 to 2020. Table 2.4 reports ranked the tariff of the selected countries as Benin (1st), Kenya (2nd), Uganda (3rd), Madagascar(4th), South Africa (5th), and Namibia as the least performer with respect to the average tariff. Also, Table 2.4 indicates a wide variation in mean tariff between the countries, especially Namibia (1.0670%) and South Africa (4.5917%) to other selected countries. Table 2.4 reports stability and volatility when the coefficient of variation is considered. In this case, Table 2.4 shows that Namibia, Madagascar, and Kenya possess exceptionally stable tariffs, while South Africa and Uganda appear to be more unstable than Benin.

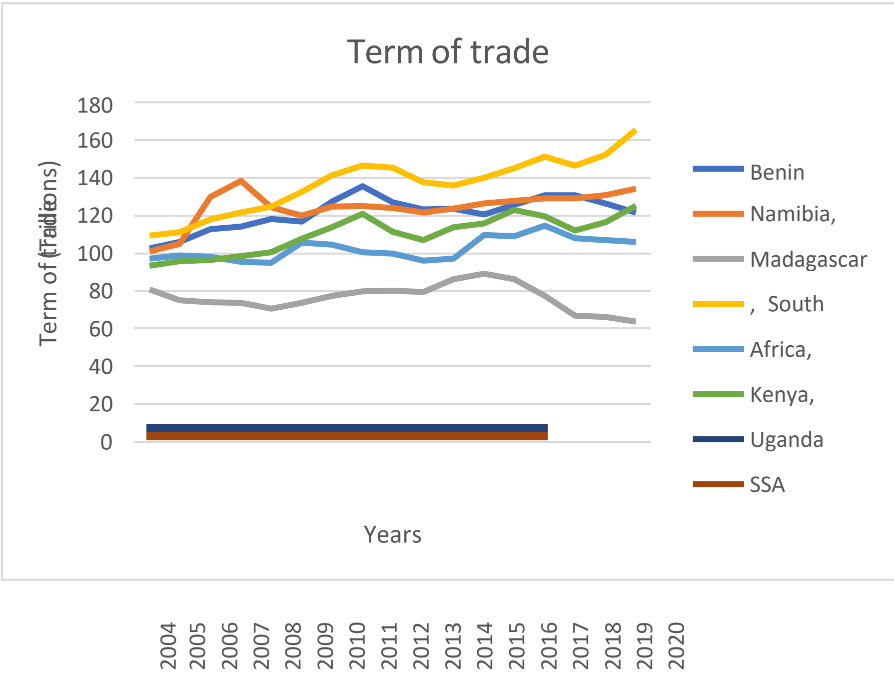
2.6. THE ANALYSIS OF TERMS OF TRADE IN THE SELECTED SUB-SAHARAN AFRICAN COUNTRIES.

Sub-Saharan African (SSA) countries have endured improving terms of trade during the past 20 years despite their continued reliance on exports of fundamental commodities whose prices are extremely volatile on global markets (Nzepang, 2022). Terms of trade significantly impact developing countries' macroeconomic performance and income from commodity exports. Negligent management of external shocks yields negligibly favourable trade-term gains while yielding significantly negative gains (Cashin, 2000).

2.6.1 Terms of trade trends analysis

Open trade countries find that external changes in the prices of tradable products frequently affect their economies. A significant portion of global trade is made up of primary commodities, the prices of which exhibit significant co-movements and variations (Xia & Zhou, 2023). Figure 2.5 presents the terms of trade trends for the selected Sub-Saharan Africa in percentages.

Figure 2.5: Term of Trade



Source: Authors construction using World Bank (2023) data

Figure 2.5 presents the six countries' percentage movements in terms of trade from 2004 to 2020. Figure 2.5 reports the minimum- maximum value for the selected countries, which are: 102,5955% -135,5389% (Benin), 100,8882%-138,3352% (Namibia), 63,7848%-89,1486% (Madagascar), 165,3513%-109,3248% (South Africa), 94,9922% -114,6100% (Kenya) and 93,3977%-125,1415% (Uganda). None of the countries is excessively trending away from other countries, South Africa is trending away and higher than other countries but narrowly from Benin and Namibia from 2008. Compared to the selected sub- Saharan African countries, the SSA and the World trend is closer to the X-axis than all other selectedcountries. All countries display a positive trend line, indicating a competitive regional trade market.

2.6.2 Term of trade and statistical analysis

The ratio of a country's export price index to its import price index determines its terms of trade in a World where commodities are traded in many different commodities ratherthan just two. Typically, this ratio is multiplied by 100 to represent the terms of trade as percentages (Singariya, 2020). Table 2.5 presents the trade terms of the selectedSub-Saharan Africa.

Table 2.5: Term of trade

	Mean	Standard deviation	Sample size	Coefficient of variation
Benin	121,3738	8,8177	17	13,7647
Namibia	124,3475	9,2486	17	13,4449
Madagascar	76,5798	7,1612	17	10,6935
South Africa	136,6213	15,3875	17	8,8787
Kenya	102,5379	5,9549	17	17,2188
Uganda	110,0523	10,0611	17	10,9383
SSA	7,107857	0,512598	15	13,86634
World	3,180714	0,302667	15	10,50897

Source: Authors computations using World Bank (2023) data

Table 2.5 presents an average report comparison of the selected Sub-Saharan African countries, SSA and the world. The average terms of trade reported for the countries and regions in Table 2.5 are ranked as South Africa(1st), Namibia(2nd), Benin(3rd), Uganda(4th), Kenya(5th), Madagascar(6th), SSA(7th) and the world (8th) in percentages. The average terms of trade show a wide discrepancy in terms of trade between the selected countries and comparison regions. Also, Table 2.5 shows the coefficient of variation as a measure of stability and volatility of terms of trade. South Africa's terms of trade are more stable at 10,9383%, and Kenya is more volatile at 17,2188%, as the coefficient of variation measures relatively.

2.7. SUMMARY

This chapter presented the trends of the variables, a comparison of the selected countries using the mean, standard deviation and coefficient variant and the analysis.

It has also shown how Sub-Saharan Africa has been underperforming compared to other regions and the world and how they have been growing individually. The countries also benefitted from other trade agreements. Chapter 3 then brings out the theoretical and empirical literature that supports the inclusion of study variables.

CHAPTER 3

LITERATURE REVIEW

3.1 INTRODUCTION

In Chapter 2, the study analysed trade competitiveness, investment, real exchange rate, tariff, and terms of trade using trends and statistics. This chapter is comprised of a theoretical framework and empirical literature. Under the theoretical framework, an optimal tariff theory, acceleration theory of investment, J curve theory, and Heckscher-Ohlin (H-O) model will be discussed.

3.2 THEORETICAL FRAMEWORK

The theoretical framework is the framework that can support the theory of a research study.

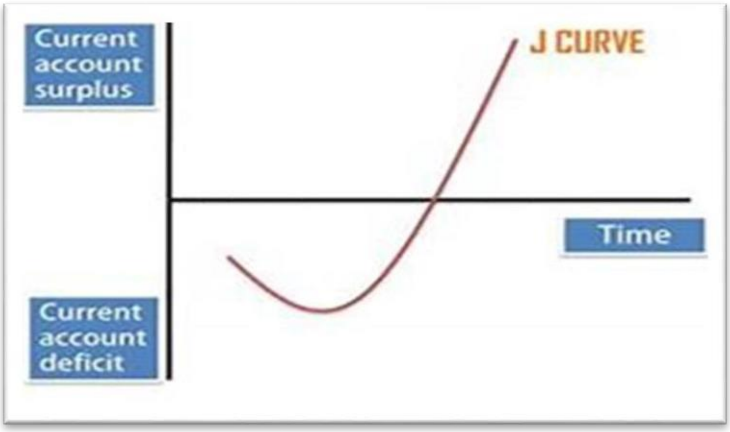
3.2.1 Acceleration Theory of Investment

The acceleration investment theory defines the relationship between increased total output (income) and increased investment spending because of increased output (income). The acceleration principle explains why an increase in national income typically leads to a greater-than-proportionate increase in investment spending and why the amount of investment studied is determined by whether economic activity is expanding or declining rather than its absolute level (Nipun, 2022). Increased investment allows countries to improve their markets and access goods and services that may not have been available domestically. Trade competitiveness improves between countries through increased investment.

3.2.2 The J curve theory

The J-curve theory predicts that the trade balance will initially deteriorate before improving after a currency devaluation. Although there will be improvements in the long run, they may deteriorate at first, following the pattern of a right-skewed J-curve (Matlasedi, 2016).

Figure 3.1: J Curve



Source: Adapted from Lindert and Pugel (2000)

The J-curve is a compelling trajectory for demonstrating the long-term effects of exchange rate fluctuation and indicates that the current account will deteriorate before improving (Melvin & Norrbin, 2023). If the J-curve effect is true, a depreciation in the exchange rate can cause a deterioration of the current account in the short term. However, a deterioration in the terms of trade (i.e., devaluation) leads to a long-run improvement in the trade balance (Pettinger, 2018).

3.2.3 Optimal tariff theory

This theory explains the relationship between tariffs and trade competitiveness. The optimal tariff theory refers to countries that use tariffs to regulate the global pricing of goods, and these countries are often significant, powerful importers of goods (Gaffney, 2018). Large countries have pricing power because they have formed a monopsony comparable to but not the same as a monopoly. According to the optimum tariff theory, countries that import many commodities can improve their trade terms by raising tariffs and forcing foreign suppliers to drop their prices and to other countries (Gaffney, 2018). Optimal tariff theory works best with products with a high degree of demand elasticity, given that customers can switch to a different product if the price of a specific product rises (Gaffney, 2018). Tariffs improve a country's terms of trade and maximise economic well-being, depending on how far it can increase tariffs (Aahana, 2020). Optimal tariff theory enhances trade circumstances for the tariff-imposing home country and, on the other hand, comes with a price in the form of decreased export and import volumes (Aahana, 2020). The welfare of the tariff-imposing country improves if the benefits of tariffs exceed the costs, making it profitable to raise tariffs (Aahana, 2020).

3.2.4 Heckscher-Ohlin (H-O) model

The most widely used model of international trade is the Heckscher-Ohlin model. It substantially builds on the Ricardian model by adding a second production component; its two-by-two-by-two form refers to two goods, two factors, and two countries. It is one of the most basic general equilibrium models that supports concurrent interactions across the factor, sound, and country markets (Britannica, 2021). Using the H-O model, it can be demonstrated how shifts in supply or demand in one market can affect both products and factor markets at home and abroad via factor markets and, with trade and national markets, every market being integrated (Britannica, 2021). The implication is that a component like capital has a sizable relative supply, and consequently, the nation's capital market has a low relative pricing. Capital-intensive goods produced in the nation drop in price, given that the country would enjoy a competitive advantage, allowing for mutually beneficial commerce (Madhuri, 2021).

3.2.5 Mercantilism Trade Theory

The Mercantilism theory advocates for large-scale, aggressive exports over imports to build wealth, maintain a positive balance of payments and commerce, and remain relevant in the modern economy (Chijioke, 2021). Magnusson (2019) portrayed mercantilism as a bold, heretical school that naturally arrived at a logical and clear understanding of economic reality from the past and present. Adam Smith's theory of absolute advantage.

3.2.6 Adam Smith theory

Adam Smith's theory of absolute advantage is the basis of international trade. It states that a country should specialise in producing commodities with a complete advantage and exchange these goods for those it does not have a complete advantage (Voinescu, 2015). This theory was proposed by Adam Smith in 1776 in his seminal work. This theory enhances production through efficient resource allocation by specialising in the production of commodities and services in which they have a distinct advantage, and this will improve the country's economic progress and its living standards, which all improve the country's ability to compete in the trade market (Ansari, 2023). Significant natural resource endowments exist in Sub-Saharan African countries, South Africa included. For the countries of Sub-Saharan Africa, attracting foreign direct investment and making efficient use of natural resources are top concerns. To convert endowments into economic growth, natural resource management must be done properly to grow the trade competitiveness. Makonda and Ngakala (2021) state that the forest resources have a positive but small impact on foreign direct investment inflows in SSA. The study further state that the primary economic policy implications for the growth of the forestry sector in Sub-Saharan Africa are the reinforcement of political stability and anti-corruption efforts in Central and West Africa, as well as the reinforcement of these efforts in Southern and East Africa.

3.2.7 Neoclassical Trade Theory

Neoclassical Trade Theory focuses on how trade market dynamics like supply and demand is impacted by how products are perceived as effective or valuable. It is considered the basis of trade competitiveness as it aims to increase or improve the country's trade according to its specialisation (Helpman et al., 2016). Reinhard (2020) reveals that the theory is based on interpreting growing returns, considering how the trading pattern has evolved. Developing resources into the growth of the economy requires effective management of natural resources.

Providing fair distribution and preventing the resource constraint are important issues. Neoclassical growth theory also points out that changes in labour and capital in the production function led to a short-term equilibrium. Economic growth is significantly influenced by technological advancement. In the absence of constant technical advancements, sustaining expansion becomes difficult.

Adam Smith's theory of absolute advantage and Neoclassical Trade Theory are considered the basis of trade competitiveness because they are the theories of international trade that aim to improve trade between countries, focusing on their capabilities. Fojimo, Shiozawa and Yoshii (2019) argue that Adam Smith developed the absolute advantage theory of international trade, which states that sectors with greater physical productivity abroad inevitably export and recognise the idea of comparative advantage by comparing production costs per unit. Algieri, Aquino, and Succurro (2018) further state that the theories address the potential for international trade under the Ricardian scenario when one country outperforms the other in some areas. Econometric analysis shows that certain factors- proportions of variables and variables associated with the theories play a significant role in explaining international competition. The theories were selected to relate the influence or relationship of the variables to trade competitiveness. Other theories may lay out the principles of the practice to attract or grow trade. Each theory specified how it relates to the variable and trade competitiveness.

3.3 EMPIRICAL LITERATURE

Empirical literature reviews the researcher's studies in relation to the variables and objectives of the study**.**

3.3.1 Investment and trade competitiveness

The costs that businesses experience when operating in a country are captured by the World Bank's Ease of Doing Business ranking. Corcoran and Gillanders (2015) examine the effect that a country's business regulatory environment has on the amount of foreign direct investment from 2004 to 2009 using a GMM approach for Singapore. The study revealed that the Ease of Trading Across Borders component drives the significance of doing business overall. The relationship is noteworthy for middle-income countries but not for the OECD or Sub-Saharan Africa, the world's poorest region. There is no proof that a country's ability to do business with neighbouring countries influence the amount of foreign direct investment it receives. Gamaliel and Hove (2019) examined how foreign direct investment affected export competitiveness in Sub-Saharan African countries, focusing on influencing pathways. It employed the system Generalised Method of Moments (GMM) technique, and competitiveness was measured using the export sophistication index. According to the research results, FDI strengthens competitiveness in exports. The macroeconomic environment, export demand, human resources, and the calibre of institutions are all factors that increase export competitiveness. The study findings indicated that the primary mechanisms by which foreign direct investment (FDI) influences export competitiveness are technical spillovers in the form of forward linkages and enhanced domestic productivity. The study also revealed the potential for FDI to have rivalry and dominance consequences on export competitiveness as foreign firms squeeze out local producers. However, increased unit labour costs and limited access to foreign markets limit diminished export competitiveness.

Characteristics of the current account balance from 1990 to 2015, emphasising 14 economies in Sub-Saharan Africa, were estimated by (Urom, 2018) panel data estimation techniques such as the Pooled OLS, FGLS, LSDV and GMM-IV. Estimates from the GMM-IV relate quite well with those from other estimators. Over a period lag, the study discovered a significant, moderate persistence in the shocks' transmission on current account imbalance. The trade openness index improves the current account balance of our sampled economies. In contrast, the factors that cause the current account deficit in these economies to grow are the level of openness, the rate of inflation, terms of trade, and domestic investment.

The roles of China and Africa as investment destinations and the relisting of significant South African companies globally are among the factors propelling the growth of South Africa's direct investment assets and liabilities. Strauss (2017) attracts attention to the significant role that payments made to foreign direct investors from net investment income contribute to South Africa's current account deficit. Before 2006 and post-1994, South African companies gradually acquired direct investment assets from the South African Reserve Bank (SARB). The study revealed that the country's net foreign direct investment needs to be more balanced due to the slow accumulation of direct investment assets. At the same time, its payments to non-direct investors have decreased because of a shift in the composition of its stock of non-FDI liabilities. Net foreign direct investment (FDI) income contributes less to South Africa's current account deficit if South African businesses. Trade imbalances continue to Be deficit.

3.3.2 Real exchange rate and trade competitiveness

Short-run and long-run analysis effects of the real exchange rate on Vietnam's trade balance from 2000 to 2010 revealed that permanent devaluation, an impulse response function based on the ECM, shows that trade balance takes on a J-curve structure. The results were obtained using the Autoregressive Distributed Lag (ARDL) method and an Error Correction Model (ECM) based on a long run cointegration equation (Pham, 2014).

Alege and Osabuohien (2015) used a panel cointegration approach to examine the international trade of 40 selected Sub-Saharan African nations. They discovered that because of these countries' diverse economic structures and export compositions, exchange rate depreciation might not have a positive impact on trade balances.

To examine the connection between the trade deficit and exchange rate in the Benin Republic from 1950 to 2008, Ogbonna (2016) implemented a study using vector error correction model (VECM) and cointegration to determine the long-run and short-run dynamics. The results revealed that the trade balance and exchange rate for the Benin

Republic has a long-run steady-state cointegrating relationship. The results further indicated that exchange rates and trade do not have a strong causal relationship in the short run, but exchange rates and the trade balance exhibited a substantial long-term causal relationship. The results recommended that changes in the Benin Republic's exchange rate should not be used to adjust the trade balance in the near term but rather that exchange rate variations may be useful in the long-term strategic plan for managing the balance of trade.

Eight Countries (China et al., the Philippines, Russia, and Singapore) were used in a study by Arizea, Malindretos and Igwe (2017) to investigate the impact of the real effective exchange rate on the trade balance. Various nonlinear methodologies were used, including the nonlinear auto-regressive distributed lag model (NARDL) for short and long-run coefficients. The results revealed that each country's trade balance and real effective exchange rate have a distinct, statistically significant long-run relationship. Furthermore, the real exchange rate was found to have a short-term influence. When considered collectively, these results align with economic theory, which supports the accession that a real devaluation in these countries enhances the trade balance over time. The findings also revealed that the nonlinear ARDL specification can be used to estimate a statistically robust connection. This method employed reduced misspecification errors since both long- and short-run cointegration and asymmetries are modelled simultaneously.

The effects of the real exchange rate on the trade balance in East Africa were examined by Fetene and Soyoung (2017) based on the 2010 UN classification. The researchers used the ARDL process and investigated the problem in 10 East African countries. Firstly, the results revealed that both individual countries' estimations and panel estimation showed that real exchange depreciation significantly improves the trade balance for the four nations. Secondly, the results revealed that the trade balance is not elastic in relation to the real exchange rate. Therefore, after exchange rate liberalisation, elasticity increases but remains inelastic. Thirdly, the results showed that there was no discernible short-term decline in the trade balance, which revealed that there was insufficient support for the J-curve relationship.

In 2017, Eita and Jordaan examined the effects of the real exchange rate on Namibia's economic performance and competitiveness from 1970 to 2011. Cointegrated Vector Autoregression (CVAR) techniques were used to quantify the misalignment. The results revealed that there were times when the real exchange rate was overvalued and undervalued. According to the report, misalignment had a detrimental effect on the economy's competitiveness and performance. The results also revealed that maintaining an out-of-equilibrium real exchange rate lowers economic performance and competitiveness.

Using annual data from 1976 to 2015, Gebremariam, Batu, and Tola (2018) examined the connection between Ethiopia's real effective exchange rate and the country's balance of payments. A cointegrated vector autoregressive technique was used in the investigation. The study employed stationarity tests, and the Johansen cointegration test disclosed long-run equilibrium linkages and the fact that real GDP, real effective exchange rate, current account, budget deficit, interest rate, and inflation rate are cointegrated. According to empirical findings, real effective exchange rates appeared to influence the Ethiopian current account's short- and long-run dynamics. The vector error correction model results showed that when the real effective exchange rate declines, the current account first gets worse before getting better, exhibiting the J curve pattern.

Researchers Amusa and Fadiran (2019) used data from first quarter of 1991 to the third quarter of 2016 to analyse the short- and long-term effects of exchange-rate fluctuations on trade flows using disaggregated industry data on bilateral trade between South Africa and the United States. The researchers found evidence of strong J-curve effects from estimates of trade balance models using the autoregressive distributed lag (ARDL) approach, as a depreciation of the South African rand has favorable short-run effects on trade balances for eight industries. For one-fourth of the industries considered in the study, these short-run effects persisted over the long term. The findings also demonstrated that income has critical long-term implications on trade flows in sectors responsible for about 55% of trade flows between South Africa and the US.

ARDL methodology was implemented by Fetene and Soyoung (2020) to investigate how the real exchange rate (RER) affects the trade balances of the three sectors in East Africa. According to the results, RER depreciation enhanced the manufacturing and mining trade balances over time but degraded the agricultural trade balance over time. The asymmetric effect of RER on trade balances, apart from the manufacturing sector, was not present, according to nonlinear ARDL data. The limited impact of RER on the overall trade balance made heterogeneity impacts susceptible to being hidden.

In another study, Keho (2021) investigated the connection between the real exchange rate and the trade balance of the Ivory Coast covering the time 1975 to 2017, which was examined using the ARDL bounds testing approach. The long-run and short-run dynamics of the real exchange rate and trade balance were determined using cointegration analysis and error correction modelling. According to the empirical findings, domestic income was found to have both short and long-run severe and detrimental implications on the balance of trade. Furthermore, the findings showed that the depreciation of the real exchange rate improves the trade balance in both the short and long run.

Ndou (2021) evaluated the long- and short-term effects of exchange rate fluctuations on South Africa's net trade balance and contrasted these effects with those driven by changes in income and price levels at home and abroad. Evidence demonstrating that the long-run elasticities of the exchange rate on the net trade balance were more significant than the short-run impacts is provided using annual data from 1970 to 2019 and the autoregressive distributed lags-bounds testing approach. Empirical results indicated that domestic income is the most decisive influence on the net trade balance over the short and long term, followed by consumer prices and the nominal effective exchange rate. The influence of domestic income over the long term was over two times that of the exchange rate.

3.3.3 Tariffs and trade competitiveness

An investigation of back-and-forth international trade through tariff reduction was conducted by Hayakawa (2014), who estimated modified gravity equations for completed items and intermediate goods individually. The results revealed that the importer's tariff rates on finished machinery products and the exporter's tariff rates on machinery parts are inversely correlated with exports of finished machinery products. Similarly, the exports of machinery parts are adversely correlated with both the importer's and exporter's tariff rates on finished machinery products. The results imply that even a small change in a production process's tariff status within a given industry could significantly impact the trade volume within that sector.

The economic consequences of Economic Partnership Agreements (EPAs) in Kenya were investigated using trade statistics analysis and the partial equilibrium technique implemented by Githuku, Muluvi, Otieno, and Onyango (2016). The study came to the conclusion that a small number of primary commodity exports from Kenya dominate its exports to the European Union (EU) market. The result is supported by the conclusion of the World Trade Organisation (WTO) Doha Round's report, which states that standard EPAs will protect common external tariffs. Particularly in southern and eastern Africa, EPAs will promote intra-regional commerce and industrialisation and provide countries with a degree of greater flexibility than the Trade Development and Cooperation Agreement (TDCA) to implement export tariffs on agricultural products such as flowers, some dairy, fruit and fruit product with some exceptions for exports to the EU and to secure a commitment from the EU to end export subsidies foragricultural products going to Southern African Customs Union (SACU) as well as stronger protections against harmful import surges, will improve Market competition inthe EU while reducing Kenya's capacity for flexibility and change in policy bargained below the EPAs (Gov. za, 2014). Even though the simulation findings suggested that trade liberalisation reduces tariff revenue, it was recommended that Kenya develop its competitiveness to maintain and benefit from trade agreements like EPAs since tariffs and other trade obstacles in international markets are continuously decreasing.

According to the findings of Were and Odongo (2019) on Sub-Saharan Africa's competitiveness in service exports, with an emphasis on the African Eastern Community, SSA has a competitive edge in sectors such as contemporary commercial services, transportation, and travel services lag. The results indicated that SSA countries have a comparative advantage in traditional travel services but are less competitive globally and export fewer services than other regions. Infrastructure limitations, protectionist regulatory structures, and non-tariff impediments were found to affect the spread of the services trade. It was recommended that there is a huge space for service exports to grow.

Examination of the restrictions on the export and import of minerals and metals by Korinet (2019) revealed that high export taxes have a negative impact on the exports of the countries that levy them because the increase in import tariffs in markets forces countries to export mineral ores with a lower value-added rather than processed goods with higher value added.

The gravity model was used to estimate the extent of the contribution of six African trade blocs to the global economy. The gravity model covering the period spanning 1980 to 2018 was implemented by the study of Iqbal and Olayungbo (2021). The estimated gravity model revealed that the long-run estimations showed that the coefficient estimates for SACU and ECCAS are statistically insignificant in the long run. At the same time, SACU, EAC, and ECCAS, as RECs, make an insignificant contribution to exports in the short run. After establishing cointegration, the findings showed that COMESA has the highest contribution to global exports, followed by EAC, ECOWAS, and SADC, with ECCAS and SACU as the lowest contributors. The highest contribution of COMESA, followed by EAC, might have been due to the growing economy of member countries like Kenya and Rwanda. At the same time, the economies of COMESA and SADC might have been influenced by the fact that Nigeria and South Africa are large economies. This study concluded that African countries are emerging with excellent export potential. Therefore, governments and private sectors should create the necessary incentives and export policies to realise these potentials to maximise the global value chain.

A study by Afonso and Vergara (2022) investigated the role of trade costs' role in exporter dynamics in Africa. The study used information from 40 developing and ten developed countries between 1997 and 2014. Two levels of disaggregation were used in this analysis: the country–year level and the country–year–sector level. Sectoral-level information was used at the two-digit Harmonized System (HS) 2002 Classification level for 95 sectors, excluding oil sector exports. The analysis confirmed that trade costs are crucial in explaining exporter performance in Africa vis-à-vis other regions and among African countries. This suggested that Africa's exporting activity is volatile and subject to much experimentation, with exporters need help maintaining trade relationships. Trade costs play a disproportionate role in affecting the size of new exporters and the survival of exporters in Africa. Also, trade cost differences across African countries are relevant in explaining the lower market diversification of exporters from landlocked countries.

Using the modified gravity model, Gulseven, Salam, and Alhadi (2023) investigated the factors influencing trade in goods across African countries. The panel data encompasses all 54 African countries from 2000–2019. The paper enhanced the body of knowledge on trade determinants in Africa, which included economic size and distance in the analysis of bilateral trade. Three alternative estimating techniques are used to apply the gravity model, namely: Poisson Pseudo Maximum Likelihood (PPML), Gamma Pseudo Maximum Likelihood (GPML) and Ordinary Least Squares (OLS). The results demonstrated that intra-African trade is positively impacted by the growth of both exporters and importers and by sharing borders and a shared language. However, the impact of distance is notably unfavourable. Furthermore, the study discovered that membership in the WTO significantly increased trade between partner countries in Africa.

3.3.4 Terms of trade and trade competitiveness

One of the most critical variables in the expansion and development of any economy is the balance of trade. Mutana, Winrose, and Saina (2018) conducted a study on the macroeconomic drivers of the trade balance. The study applied the Vector Error Correction Model to data spanning 54 years, from 1963 to 2016, in Kenya. The study discovers a strong and beneficial long-term correlation between trade balance and terms of trade, trade liberalisation, and foreign direct investment. Furthermore, the study discovered a strong and negative long-term correlation between the trade balance and the real exchange rate.

Using quarterly data from the period 1988: Q2 to 2019: Q3 (Leshoro, 2023) used variance decomposition analysis and the Monte Carlo impulse response function to investigate the pattern of a negative shock to the terms of trade. The results of the study demonstrated that, in addition to having a major influence on trade variables, terms of trade also significantly influence investment, output growth and exchange rates, all of which contribute to the breakdown of commodity terms of trade.

Schmitt-Grohé and Uribe (2017) point out that empirical structural vector autoregression (SVAR) models using data from 38 countries, estimated country-specific SVARs and found that terms-of-trade shocks account for less than 10% of changes in aggregateactivity while Fernández, Schmitt-Grohé and Uribe (2020) used empirical research to examine how the super cycle in commodity prices explains actual activity in both rich and developing countries based on the estimated utilised quarterly and annual data from 1960 to 2018. The study reveals that the global shocks influence global interest rates and commodity prices account forover half of the average variance in output growth across countries. Xia and Zhou (2023) extract the latent components that reflect the co-movement of commodity terms of trade across 93 countries by estimating a dynamic factor model with stochastic volatility, which revealed that the study discovered that the majority of terms of trade changes in commodity non-exporters and fuel commodity exporters can be explained by the global factor. Using Harberger-Laursen-Metzler (HLM) effect, Gumata and Ndou (2017) revealed that an increase in terms of trade leads to agents making significant changes to the capital stock. Different methodologies were used to analyse the effects of term of trade for the above-mentioned period.

Factors that influence trade performance were analysed by Mogashwa and Molele (2023) in the SADC region amid the full implementation of the African Continental Free. Trade Area (AfCFTA) using the Autoregressive Distributive Lag (ARDL) through Foreign Direct Investment (FDI) and Terms of Trade (TOT) on the trade balance was interrogated. The study revealed that in the long run, TOT was found to be an insignificant predictor, while FDI has a positive effect on the regional trade balance, indicating that it stimulates trade in the area. In the short run, the study discovered that TOT and FDI had a detrimental effect.

3.3.5. Causality in determinants and trade competitiveness

Anyalechi, Okereke and Ikechukwu (2020) examined the directional causality between the two concepts to determine the precise causal relationship between currency rates and global trade. Data from Sub-Saharan African nations were used for the Panel Granger Causality tests from 1990–2018. The results showed a two-way connection between actual exchange rate, export, and trade openness. However, only a single-directional relationship between the real exchange rate, imports, and trade openness has a strong contemporaneous causal relationship. The study concluded that each variable's lagged values supported the other's development or behaviour. However, a single line of causality connected imports to real exchange rates. The consequence was that although the real exchange rate promotes import volume, import volume does not sustain the real exchange rate because only the price ratio between countries influences the rates.

Mogoswane and Molele (2020) investigated the connection between trade balance, investment, and GDP for South Africa from 2002Q2 to 2018Q4. The Granger Causality test technique discovered a bidirectional causal relationship between trade balance and investment. Supply-side policies, such as lower taxes or subsidies for domestic producers, should be implemented to balance exports and imports. Results also indicated that technology and infrastructure development should be prioritised to increase total investment, which tends to accelerate economic activity.

3.4 SUMMARY

This chapter reviews the theories that relate the dependent variables: investment, real exchange rate, tariff and term of trade-to-trade Balance measure as current account (% of GDP), which is our independent variable. It further gave a literature review on studies that have contributed to trade competitiveness and how the variables relate to each other using different techniques and for different periods. Chapter 4 below reviews how and which of the techniques the study will employ to meet the study goal and objectives.

CHAPTER 4:

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Chapter 3 reviewed the theories related to the study variables and literature. This chapter explains the research methodology and the steps involved in conducting research, which involves data collecting, data analysis, and estimating procedures that will be used throughout the study, as well as the models employed.

4.2 DATA

The study employed panel data from the selected Sub-Saharan African countries from 2004 to 2020. The panel data relates to the model variables: investment, real exchange rate, tariff, terms of trade, trade balance and interest rate spread as controlvariables are used to estimate the regression model. The investment is the Gross Fixed Capital Formation percentage of GDP, real exchange rate is the real exchange rate index (2010=100), Tariff used is the tariff rate applied simple mean all products (%) focusing on primary goods only, term of trade we used Net barter trade term of GDP, and the Control variable is interest rate spread which is the lending rate minus deposit rate percentages. The data is sourced from the World Bank and the Federal Reserve Bank-St Louis. The model is based on six selected SSA countries: Benin, Namibia, Madagascar, South Africa, Kenya and Uganda due to data availability.

A route to sustainable economic growth is provided by trade and investment. They allow businesses to grow and specialize, which drives down prices. This is particularly beneficial as more will be spend regularly on traded goods. Therefore, investment is expected to improve the competitiveness within the trade market. Prior expectation of exchange rate is deterioration in the short run and appreciation in the long run as J curve theory states that a deterioration in the terms of trade leads to a long-run improvement in the trade balance. According to the optimum tariff theory, countries that import a lot of commodities could improve their trade conditions by imposing higher tariffs, which will force foreign suppliers to lower their prices and export to other countries. Sub Saharan African countries tariff is low-medium rated therefore the countries won’t be able to increase the price which give negative impact on the trade competitiveness. Heckscher-Ohlin (H-O) model, Mercantilism Trade Theory, Adam Smith theory and Neoclassical Trade Theory focuses more on the specialisation of the countries and its technological states. Sub Saharan African countries are the least expects to technology when compared to the world, which affects the productions and the scale of the goods to export, therefore term of trade has a negative impact on trade competitiveness of the region.

4.3 MODEL SPECIFICATION

The model can be specified decisively, equating the dependent variable to its independent variables. However, the study employs control variables and Interest rate spread to improve the study's internal validity by minimising the impact of confusion and other independent factors. This helps create a correlation or causal connection between the relevant variables (Bhandari, 2021). The functional form of the model of this study is expressed as:

$$TB = f\ (GFCF, RER, TRWA, TOT, IRS) \qquad (4.1)$$

$$LTB = \beta_0 + \beta_1 LGFCF_{et} + \beta_2 LRER_{et} + \beta_3 TRWA_{et} + \beta_4 LTOT_{et} + \beta_5 IRS_{et} + \varepsilon_{et} \qquad (4.2)$$

TB = Trade Balance measure as current account (% of GDP)

GFCF= Investment measures as Gross Fixed Capital Formation (% for GDP)

RER= Real Effective Rate measure as Real Exchange Rate index (2010=100)

TOT= Term of Trade measured as net barter trade term of trade index in percentage

TRWA= Tariff rate applied weighted mean all product.

The L from equation (4.2) denotes the logarithm of the variable to avoid explosive figures, and data can be analysed robustly. However, the TRWA and IRS are not logged as the variables are already index values. β_0, β_1, β_2, β_3, β_4, β_5 are coefficients tobe estimated, and ε_{er} is the error term. If equation 1 fulfils the assumptions of the classical linear model, the parameters will be estimated using the Ordinary Least Squares (OLS) technique.

4.4 ESTIMATION TECHNIQUES

Techniques that are going to be employed in this study are detailed below.

4.4.1 Stationarity/Unit root test

In empirical economics, panel unit root tests are frequently used. However, there is disagreement over the correct way to interpret the test results. Unit root testing in panel data models has received much attention during the past ten years. (Pesaran, 2011). The plurality of panel unit root tests is made to test whether a unit root exists for a set of panels. Instead, the alternative premise is expressed as contentious and fundamentally depends on the assumptions made about the homogeneity/heterogeneity of the panel (Dritsaki, 2014). Even though each of the main unit-root tests individually is not merged self-sufficient, such an average rejection statistic converges to stationary units when non-stationarity is assumed to be the case (Pesaran, 2011). The panel unit root tests are carried out in an informal way using graph visualisations and in a formal way using the tests listed below...

4.4.1.1 Levin, Lin and Chu Panel unit root

The Levin, Lin and Chu tests the null hypothesis that a unit root can be found in each panel. The Levin–Lin–Chu test excludes the possibility that some nations' variables include unit roots. In contrast, other countries' variables do not because it expects that entire panels will have a standard autoregressive value. EViews explicitly states the number of panels and periods assumed to behave in each test it runs the Levin-Lin-Chu test without a time trend but with panel-specific means necessitates that the number of periods grow more quickly than the number of panels, so the ratio of panels to periods tends to be zero (Breitung, 2000).

4.4.1.2 IPS Panel unit root

It is one of the unit roots tests used to test stationarity. If you utilise data built as a panel, you can find more tests via EViews. The IPS, as opposed to the LLC test, is typically predicated on the diversity of the auto-regressive variables (Viswanathan, 2015). The following is the IPS-proposed heterogeneous panel data model.

$$\Delta y_{it} = \mu_i + \beta_i y_{it-1} + \sum_{k=1}^{pi} \varphi k \Delta y_{it-k} + y_i t + \varepsilon_{it} \qquad (4.3)$$

The null and alternative hypotheses are H_0: μ < 1, H_1: yt…..et=0 st $\beta_y > 0$. . Due to heterogeneity, OLS estimates each equation independently, and the test statistics are produced by averaging the test statistics for each equation (Rajaguru, 2002).

4.4.1.3 Fisher-ADF and PP unit root

Maddala and Choi (2001) suggested that Fisher-ADF and Fisher-PP tests use Fisher's results to assess the combined p-values from each unit root test as an alternate method to test for unit root in panel data. Additionally, the person ADF regression andthe Fisher test may apply different lag lengths. The test benefits from applying to all tests for stationarity; however, it also has certain drawbacks, such as the need to obtainthe p-value using Monte Carlo simulation (Kgomo, 2019).

4.4.2 Descriptive Statistics

Descriptive statistics are organised and summarised properties of the data set. A dataset is a compilation of observations or responses from a sample of a population or the complete population. The study uses descriptive statistics to determine the overall frequency of each activity, its distribution, its averages (mode, mean, and median), and its distribution of responses (range, standard deviation, and variance) (Bhandari, Scribbr, 2020). It shows how different variables in a sample or population relate to oneanother, and in a study, calculating descriptive statistics is an essential step that shouldalways come before performing inferential statistical comparisons because it comprises categories of variables (nominal, ordinal, interval, and ratio) (Kaur et al., 2018). This test assists in detecting mistakes or irregularities in the data that may pointto problems with data entry or collection. It aids in improving data comprehension andmaking accurate short- and long-term predictions. The study can conduct additional tests based on the findings of solid descriptive statistics.

4.4.3 Correlation Matrices

Correlation Matrix is a statistical tool that shows the connection amongst the variables and the interaction between trade balance, investment, real exchange rate, tariff, termof trade, and interest rate. In other words, it supports finding connections and interdependence among variants. It assists in determining both the direction (Positive/Negative) and the intensity (Low/Medium/High) of interrelationships between variables (Thakur, 2022). It is a subset of Covariance with a specific range of values (-1 to 1) where 1 represents an entirely positive linear correlation between two variables, -1 represents a perfectly negative linear correlation between two variables, and 0 represents no correlation at all (Zach, 2020).

4.4.4 Lag Length Criteria

Before testing for cointegration, the lag length must be determined. The quantity of lags that should be included for each variable in the econometric model is called the "optimum lag order." Explicit statistical criteria like the Akaike information criterion (AIC) and Schwarz information criterion (SC) are typically used to choose the estimation of the lag length. In contrast to the final prediction error, the SC criteria and Hannan-Quinn information criterion have fine qualities like the AIC when dealing withsmall samples (Kgomo, 2019).

4.4.5 Cointegration analysis

The panel data cointegration test is used to determine whether there is a long-term relationship between trade balance and the independent variables in the model. Empirical literature states that cointegration approaches for determining whether a long-run relationship exists are becoming more popular.

4.4.5.1 Pedroni panel cointegration test

Pedroni devised the panel cointegration test procedure and assessed the alternative hypothesis with cointegration versus the null hypothesis without cointegration. The cointegration methodology uses four-panel statistics and three group panel statistics: panel v statistic, rho panel statistic, panel PP statistic, panel ADF statistic and group rho statistic, group PP statistic and group ADF. The initial autoregressive term in panel statistics is consistent throughout all various shapes, unlike group panel statistics where the parameter can change between cross sections (Meleddu, 2016) unless the null hypothesis is not accepted within the discussion panel examples, then one of thevariants has cointegration among the relevant variables. Except for the variance ratiostatistic, the numbers have a left-hand rejection area in the limit and are distributed asstandard normal variables (Miguel, 2006).

4.4.5.2. Kao Panel Cointegration test

The Kao test often specifies the cross-section homogenous coefficients and interceptsof the first-stage repressor; it uses similar techniques. It proposes for the null hypothesis of no, Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) type tests cointegration in panel data (different intercepts, common slopes) (Kgomo, 2019). Individuals are assumed to have the same long-run covariance matrix. These tests cannot be utilised on a bivariate system since they need to account for heterogeneity across hypotheses. In the case of panel cointegrated relationships, Kao notes that theresidual-based test is equivalent to checking for a unit root in the LSDV calculated residuals in the large panel scenario.

4.4.5.3 Johansen-Fisher panel cointegration test

Fisher developed a composite test in 1932 based on the findings of various independent tests. The trace statistics and maximum-eigenvalue statistics define the number of cointegrating vectors in the Johansen-Fisher panel cointegration test(Ahmad, 2015). These are combined individual tests derived from individual independent tests. Maddala and Wu (1999) use Fisher's result to propose an alternative approach to testing for cointegration in panel data by combining tests from individual cross-sections. The Johansen-Fisher technique was derived from Johansen's time-series cointegration test, which permits the use of a mixture of I (1) and I (0) variables in the test; this paper utilised the Johansen's Fisher panel cointegration test (Johansen, 1995). This could suggest that employing a set of paneldata variables with varying integration orders will not lead to biased results when doingthe panel cointegration test (StudymodeResearch, 2023).

4.4.6 Panel Auto-Regressive Distributed Lag (PARDL)

PARDLs are regressions using basic least squares involving explanatory and response variable lags as regressors. Including the regressors' unrestricted lag in a regression function is also known as the distributed lag model (Nkoro, 2016). The PARDL modelsare consistently estimated using the ordinary least squares (OLS) method (Pesaran, 2001). The dependent (trade balance) and independent (investment, real exchange rate, tariff and term of trade) variables are connected across historically lagged values and contemporaneously. Although ARDL models have been a part of econometrics for many years, their usage in analyzing cointegrating connections have increased recently. Pesaran and Shin (1998) and Pesaran, Shin, and Smith (2001) are significantworks in this regard.

They specifically contend that the unique benefit of ARDL models is their established resilience to cointegration, even if the integration orders of the relevant variables are misspecified. Pooled Mean Group (PMG) methodology was used by Pesaran et al. (1999) to estimate nonstationary dynamic panels since the non-stationarity of dynamic panels becomes a more relevant concern as the study period rises. The PMGestimator is based on a mix of coefficient amalgamation and averaging. Like the MG estimator, this permits group differences in intercept terms, error variance, and short- run parameters.

However, this limits the comparability of the long-run coefficients. It is possible to compute the short-run coefficients and the speed of the corrective term by beginning with an initial estimate of the long-run coefficient (Letsoalo, 2021). In the short run, certain production elements remain constant while other factors are subject to variation. The long run is usually explained by a time frame that allows adjustments to all production-related aspects. Long-term choices are typically more strategically oriented and concentrated on new technological investments for improvement (Yaday,2021). The study formula for the model is specified in equation (4.2) as:

$$InLTB = c_0 + \sum^{p}_{t-0} \delta_1 InLGFCF_{it} + \sum^{q1}_{t-1} \delta_2 InLRER_{it} + \sum^{q2}_{t-2} \delta_3 InTRWA_{it} + \sum^{q3}_{t-3} \delta_4 InLTOT_{it} + \sum^{q4}_{t-4} \delta_5 InIRS_{it} + \varepsilon_{it} \qquad (4.4)$$

The δ are the long run multiplier, c_0 is the intercept, i= 1, 2, 3……N; t=1, 2, 3…. T; ε isthe error term. i denotes the period (Number) of time, and t denotes an interval of time, e.g. year or quarter. If the variables are cointegrated and I (1), then the disturbance termis an I (0) process. The capacity of cointegrated variables to react to any change fromlong-run equilibrium makes them significant. This trait shows that the equilibrium deviation affects the system variables' dynamic error correction. The error correction equation is rephrased as follows: $\Delta yt = \beta 0 + \beta 1 \Delta xt + \gamma\ (xt-1 - yt-1) + ut$ (4.5)

$(xt-1 - yt-1)$ is the "error correction" characteristic specification, where changes inone variable are correlated with changes in another and the difference between the variables from the prior period is correlated with the changes in one variable. Let γ represent the value that these two terms have in common.

Data needs to be steady on I (0), I (1), or both. Moreover, the ARDL Model cannot function if any of the data variables are stationary at I (2). The quantity of variables thatcan be added to an ARDL model is not restricted. However, it is crucial to take degreesof freedom into account. The degrees of freedom decrease with increased variables, which may impact how the model coefficients are estimated and interpreted (Chetty, 2016). The primary benefit of this technique is its ability to identify cointegrating vectorsin situations where several cointegrating vectors are present. A straightforward linear transformation can transform the ARDL model into the Error Correction Model (ECM),which integrates short-term changes with long-term equilibrium without sacrificing long-term data. The related ECM model requires a certain number of lags to accuratelyrepresent the process of generating data across various modelling frameworks (Nkoro,2016).

The equilibrium relationship between the independent and dependent variables over a longer time span is represented by long-run coefficients. They demonstrate the long-term effects of a permanent change in an independent variable on the dependent variable. The direct effects of changes in the independent variables on the dependent variable are captured by short-run dynamics. They show the short-term adjustments made by the dependent variable prior to reaching the long-term equilibrium. The long-term equilibrium affects the dynamics in the short run. Any short-term deviations are adjusted back to the long-run equilibrium with the aid of the error correction term. It provides freedom in simulating short-term dynamics by allowing for varied lag lengths for distinct variables. Researchers and practitioners can easily apply and understand the ARDL technique because of its simplicity (Kripfganz and Schneider, 2018).

4.4.7 Dumitrescu Hurlin (DH) panel causality test

The Dumitrescu Hurlin (DH) panel causality is a causality test whose procedure considers cross-sectional heterogeneity and produces individual coefficients. The Granger causality test displays the type of causality flow between the variables. It demonstrates how the two research variables support and encourage one another during growth. The relationship is bi-directional when both the independent and the dependent probabilities of causation are significant at the selected significance level. When the significance is noted in only one direction, the causal relationship is unidirectional (independent to dependent or dependent to independent) (Anyalechi et al., 2020). Granger cause Y refers to a time series X where statistically significant information about the possible values of Y can be observed, typically by a sequence of t-tests on the lagged values of X (and the lagged values of Y as well). Weighing thealternative hypothesis is necessary if the null hypothesis asserts that x does not causeGranger Y and vice versa. The 5 percent likelihood rejects this claim. The general equation of the panel granger causality.

$$y_{it} = a_{o,i} + a_{1,i}y_{i,t-1} + \cdots + a_{l,i}\, y_{i,t-1} + \beta_{1,l}\, x_{i,t-1} + \cdots + \beta_{l,i}\, x_{i,t-1} + \varepsilon_{i,t}$$

$$x_{it} = a_{o,i} + a_{1,i}x_{i,t-1} + \cdots + a_{l,i}\, x_{i,t-1} + \beta_{1,l}\, y_{i,t-1} + \cdots + \beta_{l,i}y_{i,t-1} + \varepsilon_{i,t} \quad (4.6)$$

Cointegration testing is essential before conducting a Granger causality analysis. In a test, causation does not always imply that physical changes will be one variable that results in changes in other variables. Because of this, it is crucial to understand that the phrase "Granger causality" is somewhat misleading. As a result, Granger causality describes a correlation that only exists between a variable's current value and its past other variable’s values (Kgomo, 2019). Granger causality tests are often employed but have a potential for abuse in applied research, and their sensitivity can be affected bya model's inclusion of lagged terms. As there is an issue with testing or using small samples, panel data is increasingly frequently utilised to test for causation between variables. As a result of pooling the time series data across sections, panel data enables us to obtain more observations, which can result in higher power of Granger causality tests (Wang, 2016).

4.4.8 Diagnostic testing

The diagnostic test is a procedure for testing the null hypothesis under each test, where the sample values of one or more test statistics and the corresponding probabilitynumbers (p-values) are output from a test command.

4.4.8.1 Normality test

In statistics and probability theory, a test of normality is utilised to determine when a sample was made from a population with a normal distribution using a technique that generates independent and identically distributed values. The third and fourth central moments can be used to conduct normality checks (skewness and kurtosis) (Georgiev, 2022). The Null hypothesis is simply that data may be described using the normal distribution; however, because some normality tests also determine if the data are independently and identically distributed (IID), the Null hypothesis should be rejected if the p-value from these tests is less than 0.05. (Satishprakash, 2015).

Jarque-Bera tests often employ the chi-square distribution to forecast critical values for large samples, but the Lilliefors test is employed for small samples. For sample sizes smaller than 2000 and significance levels ranging from 0.001 to 0.50, the Jarque-Bera test employs a table of crucial values calculated via Monte Carlo simulation. Interpolating into the table yields critical values for a test, with the analytic chi-square approximation used only when extrapolating for a higher sample size.

4.4.8.2 Serial Correlation

The error term is serially correlated when associated across periods (or cross-section observations). In time series, serial correlation occurs when errors from one period transfer over to subsequent periods. First-order serial correlation connects errors from one time to errors from the next, Errors in the Fall of one year may be linked to errorsin the Fall of the following year when your data contains seasonality, second-order serial correlation occurs, where an error affects data two time periods later. Orders higher than second orders do happen, but they are rare (Williams, 2015). The serial correlation will take the Breusch–Godfrey test, If the probability percentage of the observed r-squared Is not significant at the level, we reject the null hypothesis and conclude that there is no autocorrelation an occurrence in the regression mode and accept the null hypothesis if the probability percentage of the r-squared is greater thanthe degree of importance (Zach, 2021).

4.4.8.3 Heteroskedasticity

The variance of the error term is constant across time in traditional linear regression, implying that the error term is homoscedastic. Homoscedasticity describes a sequenceof random variables (or a vector). When the variance of the error term changes with time, the homoscedastic assumption is broken, resulting in heteroskedasticity. In heteroskedasticity, OLS estimates are consistent, but estimated standard errors are no longer meaningful (Ratombo, 2019). When homoscedasticity is present, the null hypothesis is true; when heteroscedasticity is present, the alternative hypothesis is true. The null hypothesis is rejected, and we conclude that heteroskedasticity is present in the regression model if the probability value of the test is less than a certain level of significance (Zach, 2020).

4.4.8.4 Stability testing

If all roots have a modulus of less than one and lie inside the unit circle, the computed VAR is stable (stationary). Specific results (such as impulse response standard errors)are invalid if the VAR is not steady. The inverse root of this Graph indicates stability because all inverse roots lie within the unit circle. The test returns a good result, indicating that the VAR satisfies the stationarity conditions.

4.5 SUMMARY

This chapter outlines data, model specification and estimated techniques to be used to analyse data in this study. The model specification was expressed in an equation method by equating trade balance to investment, real exchange rate, tariff, trade term,and interest rate spread as a control variable. With the estimated technique, the studymentioned informal stationarity using visualisation and formal stationarity using LLC, IPS Fisher PP and ADF, which are panel stationarity testing methods. The study thenmentioned the need to select a lag length criterion before testing for cointegration. Cointegration was then employed to test the availability of a long-run relationship between the variables. The study then can test the panel ARDL to see the results of the long-run relationship and the short-run relationship between the variables. Furthermore, the study tests for Granger causality using the Dumitrescu Hurlin (DH) panel causality test, and the reliability and stability of the model are tested using the heteroskedasticity test, serial correlation test, and AR root. Chapter 5 tests thetechniques mentioned in Chapter 4 to answer the study's aim and objectives.

CHAPTER 5

DISCUSSION / PRESENTATION / INTERPRETATION OF FINDINGS

5.1 INTRODUCTION

This chapter presents, examines, and interprets in detail the research methodology outlined in Chapter 4, thereby addressing the study's set objectives.

5.2 EMPIRICAL TESTS RESULTS

Empirical results consist of tests of all the techniques specified in the methodology section to answer the aim and objectives of the study. This section starts by presenting the stationarity of the informal and formal study. It then discusses cointegration analysis, lag length selection, and panel ARDL approach short and long-run analysis.

5.2.1 Descriptive statistics

Descriptive statistics provide an early indication of variables that can be employed in regression analysis. Presented numerous summarised statistics on a variable such as mean, median, standard deviation, and frequently the lowest and highest observation.

Table 5.1: Descriptive stats results

	LTB	LGFCF	LRER	TRWA	LTOT	IRS
Mean	20.99519	11.79083	2.210254	7.013235	2.040271	9.894558
Median	20.75482	11.91983	2.020856	7.445000	2.056887	5.032291
Maximum	23.78669	13.03518	3.571367	17.84000	2.218408	49.04583
Minimum	16.03631	9.898827	0.803411	0.610000	1.804717	-3.601667
Std Dev	1.544860	0.761110	1.019032	3.745223	0.089177	12.86528
Skewness	-0.317813	- 0.827044	- 0.086834	- 0.036042	-0.705747	1.843514
Kurtosis	2.959305	3.097569	1.413752	2.559710	2.974943	5.417987
Jarqua-Bera	1.724128	11.66848	10.82196	0.845968	8.470003	82.62354
Probability	0.422290	0.002926***	0.004467***	0.655089	0.014480**	82.62354
Sum	2141.509	1202.665	225.4459	715.3500	208.1076	1009.245

Sum sq. Dev.	241.0457	58.50820	104.8811	1416.696	0.803198	16717.07
Observatio ns	102	102	102	102	102	102

Notes: ***, **, * denotes Significance at 1%, 5% and 10%, respectively

Source: Author’s estimations using E-views 12

Table 5.1 shows the descriptive and normality statistics for the variables in the study, with 102 observations. The results show that the trade balance average value is positive, indicating that the selected countries are participating in trade competitiveness. According to Jarque Bera, only trade competitiveness and tariffs arenormally distributed at the 5% level with probability values of 0.42 and 0.65, respectively.

The results further show that the trade balance has the highest mean and median values, with a minimum value of 16.03 and a maximum of 23.78. Interest rates and tariffs have the highest standard deviation compared to the other variables above. Thisshows that the variables spread further away from their mean and that there is a moderate variation in the macroeconomic variables data. Trade policies have been trying to maximise a trade market in Sub–Saharan Africa by reducing trade barriers such as tariffs and quotas, which is most likely inadequate given that countries' abilityto compete in the market differs (Bhawsar, 2015). Therefore, the policies implementedwill affect countries differently depending on their ability, which indicates instability andunreliability. Bolhuis and Kovacs (2022) state that Interest rates have been rising because of tighter monetary policy in advanced countries, rising inflation, capital flight, and currency depreciation throughout the region in the early 2000s. Furthermore, as Sub-Saharan African nations are still recovering from the COVID-19 pandemic, they face several challenges, including global inflation, high borrowing rates, and a crisis related to rising living expenses (IMF, 2023).

5.2.2 Correlation Matrices

The sample correlations of 6 parameters are used to test the correlation between variables, where the diagonal lines above and below are similar because of the structural pattern.

Table 5.2: Correlation matrices results

Variables	LTB	LGFCF	LRER	TRWA	LTOT	IRS
LTB	1.000000					
LGFCF	-0.030198	1.000000				
LRER	-0.062943	0.070635	1.000000			
TRWA	0.033217	0.151110	-0.109101	1.000000		
LTOT	0.109334	-0.077416	-0.007769	0.100393	1.000000	
IRS	-0.144644	0.164630	-0.042379	-0.152843	-0.282451	1.000000

Source: Author's Compilation using E-views 12

Table 5.2 shows the correlation between all the variables. The order of the correlation's strength is changed to LTOT > TRWA> LGFCF>LRER>IRS, going from strongest to weakest. Term of Trade (TOT), Tariff (TRWA), Investment (Gross Fixed Capital Formation (GFCF)), Real Exchange Rate (RER) and IRS all have an association of (r = 0.109, 0.033, -0.030, -0.062 and -0.144 respectively) with trade competitiveness (LTB).

The correlation between the five parameters is at different ranges with different positive or negative impacts. The negative correlation is between tariffs and real exchange rate, as well as the terms of trade: investment and real exchange rate. Interest rate: real exchange rate, tariffs, and term of trade. This indicates a weak correlation between the variables mentioned above, meaning the variables move in opposite directions against each other. The positive correlation is between real exchange rate and investment, tariffs and investment, term of trade and tariffs, and Interest rate and investment. This means the variables improve each other at a weakcorrelation. The study then concludes that there is no multicollinearity between the variables.

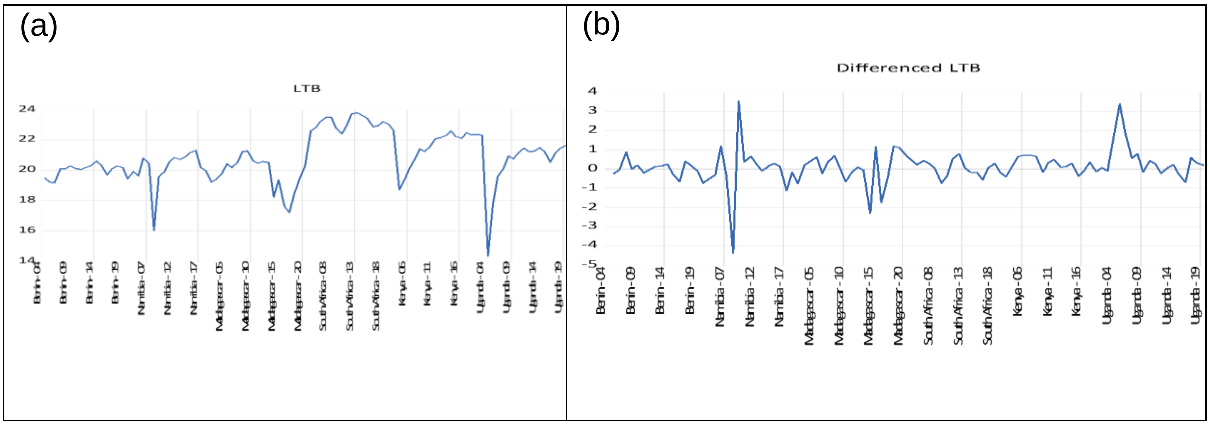
5.2.3 Panel Unit Root Results

The study uses LLC, IPS, ADF-Fisher, and PP-Fisher for formal stationarity, while graph visualisation is used for informal stationarity.

5.2.3.1 Informal unit root results

Below are the figures that present the informal unit root results for all the study variables. The variables are tested at a level to check the stationarity and first difference if the stationarity was not found at the level.

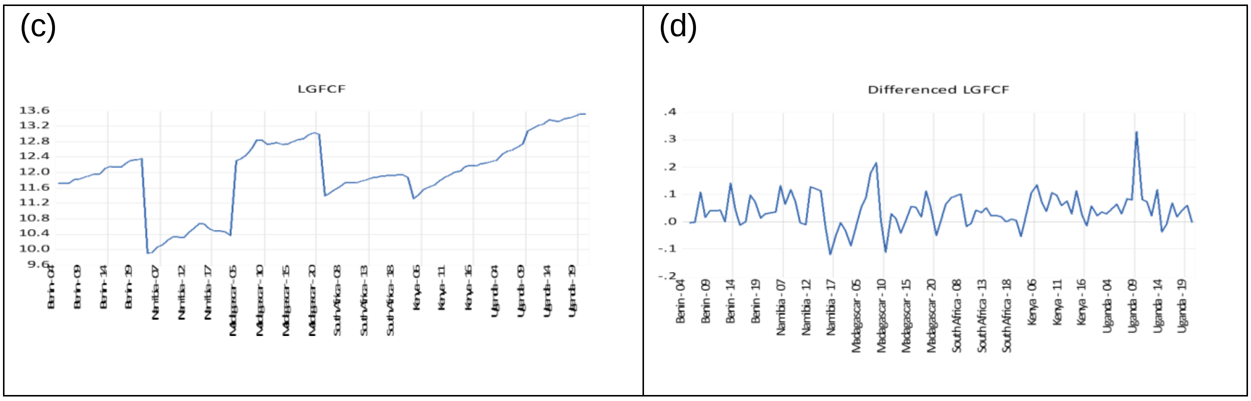
Figure 5.1: Trade Balance



Source: Author’s construction using EViews 12

Figure 5.1 presents trends (a) and (b)for the trade balance, where the first one points out the non-stationarity of the trade balance at a level as the stationarity line is trending away from the mean. The difference in LTB shows stationarity as the trend line shifts along the mean.

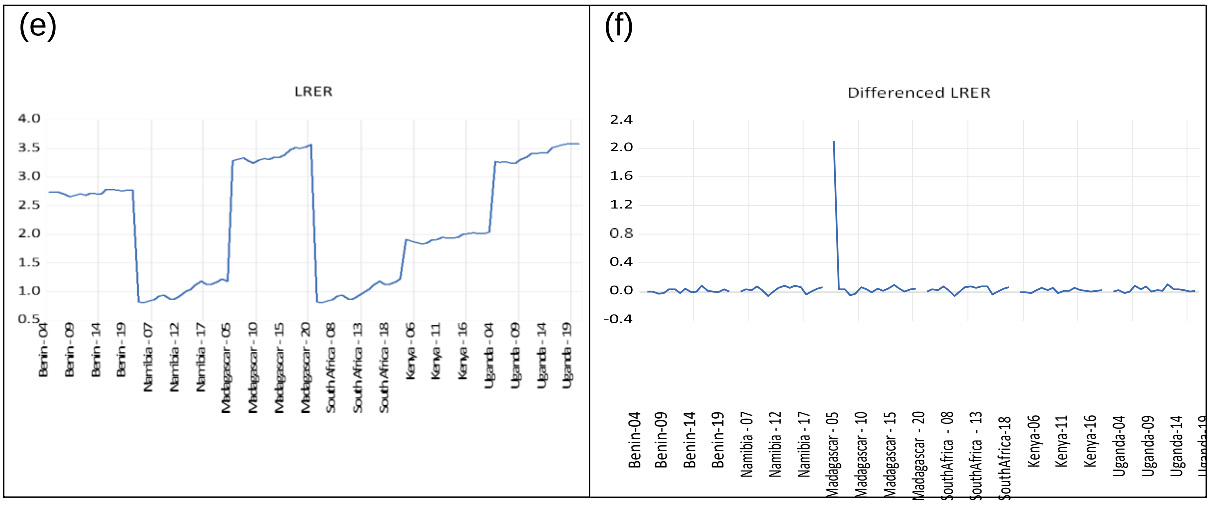
Figure 5.2: Investment



Source: Author’s construction using EViews 12

Figure 5.2: Points out non-stationarity at a level as the trend is shifting away from the mean in Figure 5.2 (c). The investment is then found stationary at the first difference as the trend line is moving along the mean throughout the study period in Figure 5.2 (d).

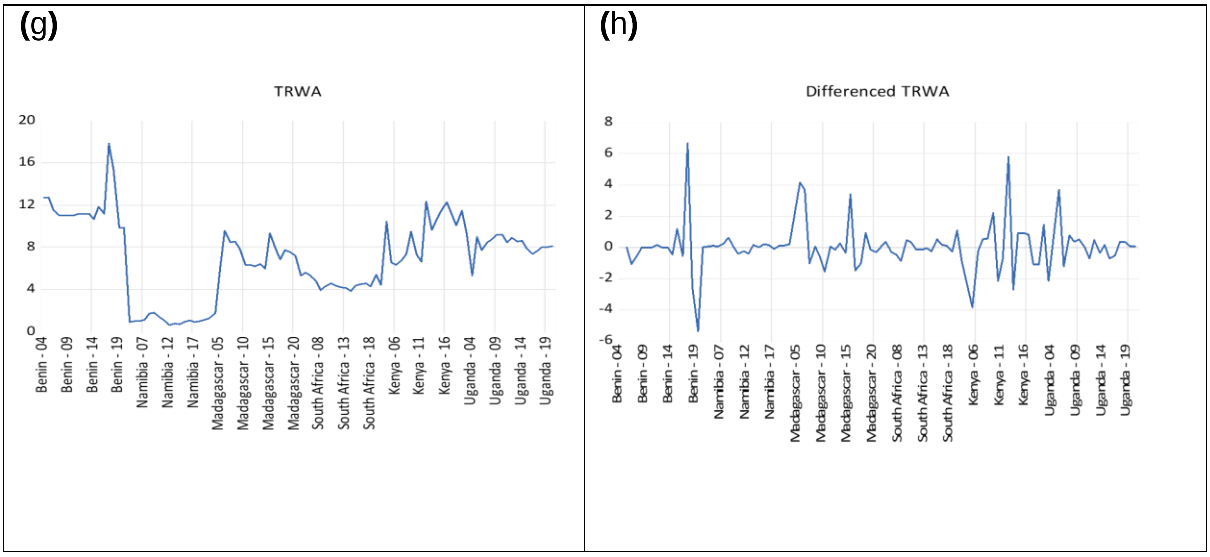
Figure 5.3: Real Exchange Rate



Source: Author's construction using EViews 12

Figure 5.3 (e) shows the non-stationarity of the real exchange rate at a level, giving the author a reason to test the first difference. The first difference shows the stationarity of the real exchange rate as the trend line crosses the mean line shown in Figure 5.2(f).

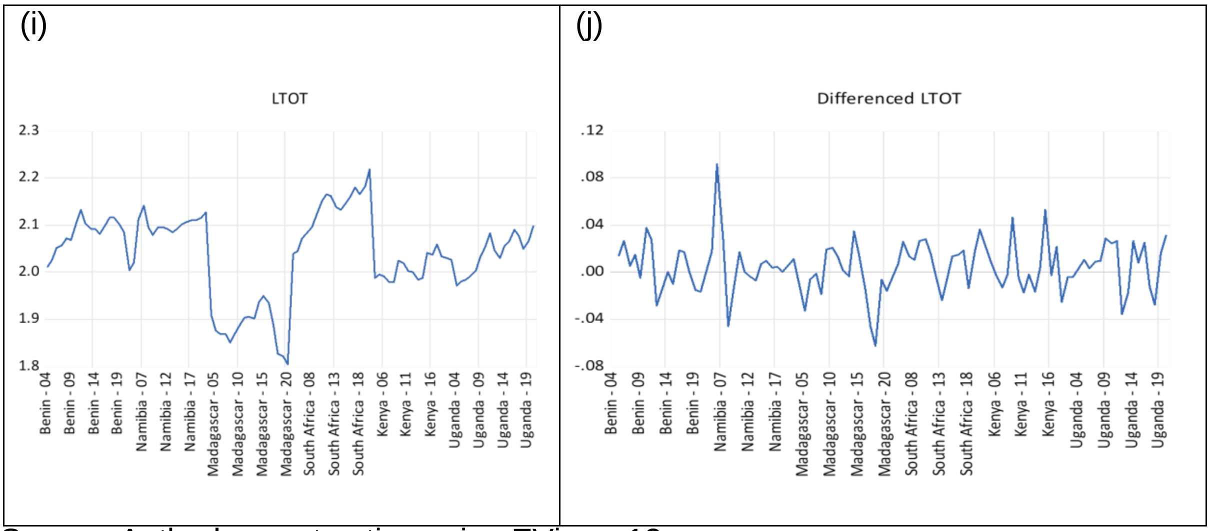
Figure 5.4: Tariff



Source: Author's construction using EViews 12

Figure 5.4 presents tariff stationarity results at level (g) and first difference (g). Figure 5.4 (g) shows non-stationarity as the trend line drifts away from the mean line, and Figure 5.4(h) points out the stationarity of tariff as the trend line moves along the mean line.

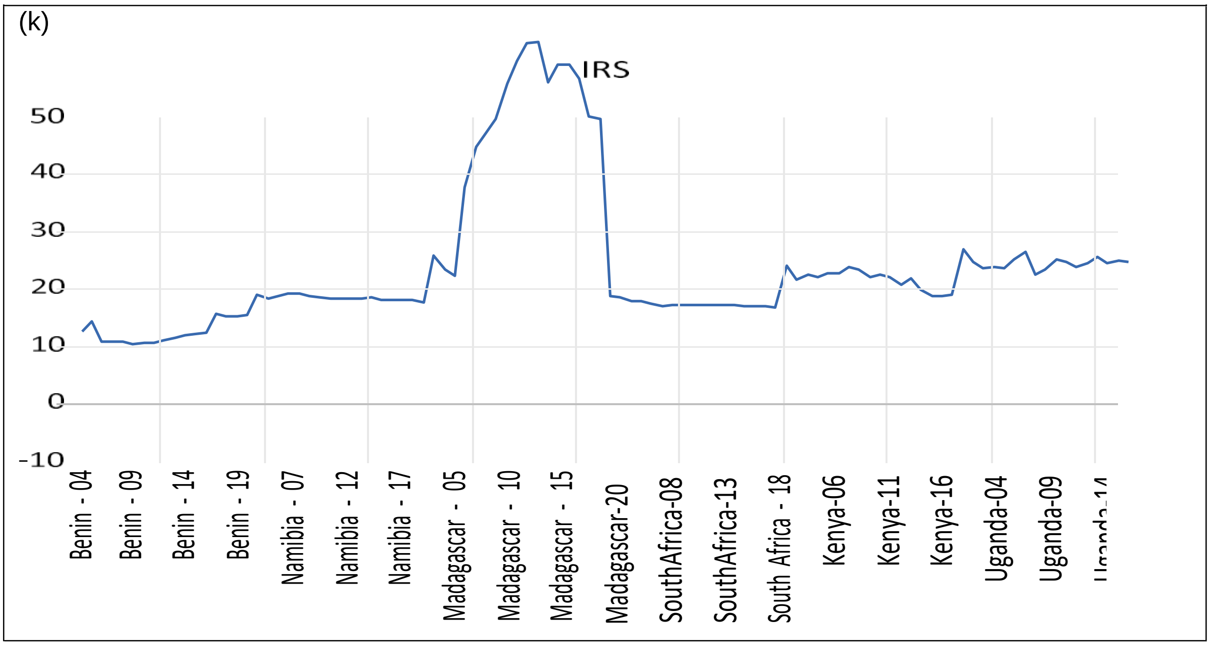
Figure 5.5: Term of trade



Source: Author's construction using EViews 12

Figure 5.5 presents the stationarity of the term of trade. Figure 5.5(i) shows that the LTOT is nonstationary at a level as the trend line drifts away from the mean. Figure 5.5 (j) presents the stationarity of the term of trade at 1st difference.

Figure 5.6 Interest Rate



Source: Author's construction using EViews 12

Figure 5.6 (k) presents the stationarity of interest rate as a control variable of the study. The interest rate is stationary at a level as it trends towards the mean and even crosses the mean line. This means that it is stationary at level I (0). The formal Unit root test is then used to confirm the informal results.

5.2.3.2 Formal Unit Root Tests Result

The unit root test used Levin, Lin Chu, IM, Perasan and Shin (IPS), Fisher Augmented Dickey-Fuller (ADF), and Fisher Phillips Perron (PP) to determine the formal stationarity. The results are presented in the table below to determine the variables' integration level.

Table 5.3: Stationarity/Unit Root Results

Variables	Test Method	Test Equation	Level I (0)	First Difference I (1)	Conclusion
TB	LLC	Intercept	-11.9806***		Stationary at I (0)
		Intercept and Trend	-8.95867***		Stationary at I (0)
		None	1.24804		Stationary at I (0)
	IPS	Intercept	-7.35321***		Stationary at I (0)
		Intercept and Trend	-4.03072		Non-Stationary
	Fisher ADF	Intercept	85.4807***		Stationary at I (0)
		Intercept and Trend	36.7635***		Stationary at I (0)
		None	3.89929		Non-Stationary
	Fisher PP	Intercept	137.661***		Stationary at I (0)
		Intercept and Trend	34.8911***		Stationary at I (0)
		None	3.75735		Stationary at I (0)
LGFCF	LLC	Intercept	-4.98875***	-3.99862***	Stationary at I (1)
		Intercept and Trend	-0.96277	-5.22962***	Stationary at I (1)
		None	6.91325	-4.95541***	Stationary at I (1)
	IPS	Intercept	-2.04649**	-3.02195***	Stationary at I (1)
		Intercept and Trend	0.56211	-3.40608***	Stationary at I (1)
	Fisher ADF	Intercept	28.1551***	29.8152***	Stationary at I (1)
		Intercept and Trend	16.0648	31.7165***	Stationary at I (1)
		None	0.70121	40.2828***	Stationary at I (1)

	Fisher PP	Intercept	77.9539***	40.7544***	Stationary at I (1)
		Intercept and Trend	0.0423**	52.6546***	Stationary at I (1)
		None	0.23433	34.6199***	Stationary at I (1)
LRER	LLC	Intercept	7.62289	10.1534	Non-Stationary
		Intercept and Trend	10.8263	9.02914	Non-Stationary
		None	3.81463	-6.53495***	Stationary at I (1)
	IPS	Intercept	3.38055	-5.46912***	Stationary at I (1)
		Intercept and Trend	-3.59836***	-3.08455***	Stationary at I (1)
	Fisher ADF	Intercept	1.46967	49.9241***	Stationary at I (1)
		Intercept and Trend	32.6979***	29.1017***	Stationary at I (1)
		None	0.71459	54.9308***	Stationary at I (1)
	Fisher PP	Intercept	119.335***	50.8350***	Stationary at I (1)
		Intercept and Trend	29.0460***	39.0537***	Stationary at I (1)
		None	1.07116	65.4784***	Stationary at I (1)
TRWA	LLC	Intercept	-5.62954***		Stationary at I (0)
		Intercept and Trend	-5.86120***		Stationary at I (0)
		None	-0.30310		Non-Stationary
	IPS	Intercept	-4.90094***		Stationary at I (0)
		Intercept and Trend	-4.49249***		Stationary at I (0)
	Fisher ADF	Intercept	45.1308***		Stationary at I (0)
		Intercept and Trend	40.4492***		Stationary at I (0)
		None	6.17483		Non-Stationary
	Fisher PP	Intercept	39.1424***		Stationary at I (0)
		Intercept and Trend	34.4605***		Stationary at I (0)
		None	7.91829		Non-Stationary
LTOT	LLC	Intercept	0.51271	-14.0002***	Stationary at I (1)
		Intercept and Trend	0.72852	-12.0588***	Stationary at I (1)

		None	2.77966	-12.7665***	Stationary at I (1)
	IPS	Intercept	0.21212	-7.91708***	Stationary at I (1)
		Intercept and Trend	-0.18697	-5.94037***	Stationary at I (1)
	Fisher ADF	Intercept	9.93013	56.8119***	Stationary at I (1)
		Intercept and Trend	12.2145	41.0763***	Stationary at I (1)
		None	2.10919	64.9428***	Stationary at I (1)
	Fisher PP	Intercept	24.6132**	31.8055***	Stationary at I (1)
		Intercept and Trend	15.4638	21.8644***	Stationary at I (1)
		None	2.87911	54.2401***	Stationary at I (1)
IRS	LLC	Intercept	-2.4469***		Stationary at I (0)
		Intercept and Trend	-3.63991***		Stationary at I (0)
		None	-2.89017***		Stationary at I (0)
	IPS	Intercept	-1.43847*		Stationary at I (0)
		Intercept and Trend	-1.70459**		Stationary at I (0)
	Fisher ADF	Intercept	21.2256**		Stationary at I (0)
		Intercept and Trend	25.2981**		Stationary at I (0)
		None	20.7822*		Stationary at I (0)
	Fisher PP	Intercept	27.7590***		Stationary at I (0)
		Intercept and Trend	24.2791**		Stationary at I (0)
		None	26.5012***		Stationary at I (0)

Notes: ***, **, * denotes Significance at 1%, 5% and 10%, respectively

Source: Author's estimations using E-views 12

Table 5.3 presents the unit roots test results, where the findings support the use of the Panel ARDL techniques in analysing the impact of the predictors on trade competitiveness. Indeed, GFCF is seen to be at I (1), RER is at I (1), TOT was seen to be stationary at I (1) and lastly, the control variable of IRS is stationary at I (0). According to the majority rule, TB and TRWA were found to be stationary at I (0).

5.2.4 VAR Lag Length Criteria

VAR Lag Length Criteria define a way in which to select optimal lags that have a minimum value, as reported by each of the criteria (Adeleye, 2018). Table 5.2 provides the lag length criteria.

Table 5.4: VAR Lag length results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-595.1976	N/A	0.199502	15.59661	15.59661	15.48789
1	98.20917	1262.356	9.56e-09*	-0.172264*	-0.172264*	-0.933258*
2	127.2761	48.44455	1.16e-08	1.093219	1.093219	-0.320056
3	168.6336	62.56654*	1.05e-08	2.043558	2.043558	-0.021998
4	202.9544	46.64100	1.19e-08	3.174328	3.174328	0.456491

Notes: indicates lag order selected by the criterion, LR- sequential modified LR test statistic (each test at 5% level), FPE-Final prediction error, AIC- Akaike information criterion, SC-Schwarz information criterion and HQ-Hannan-Quinn information criterion.

Source: Author’s estimations using E-views 12

Choosing the appropriate lag length is the first step in the cointegration tests. Lag length implements the criteria of FPE, AIC, SC, and HQ, resulting in the lowest value represented by the mark (*). The AIC test statistics were confirmed to be superior for small samples. As a result, lag one will be applied to estimate the set model.

5.2.5 Panel Cointegration test

Panel cointegration tests are carried out to determine cointegration between the variables. The study examines the long-term relationships of the significant variables that affect trade competitiveness using the panel cointegration of Pedroni, Kao and Johansen Cointegration test.

5.2.5. 1 Pedroni Cointegration test

The Pedroni (1999) cointegration test consists of seven tests divided into two sections: within-dimension and between-dimension. Tables 5.3, 5.4, and 5.5 provide the full results of Pedroni from all the different hypothesis tests. The tables present the three trend assumptions Pedroni uses to test cointegration: deterministic trend, Determinism and intercept, and no intercept or trend.

Table 5.5: Pedroni Cointegration results (Deterministic trend)

Hypothesis Tests	Statistics	Probability	Weighted Statistics	Probability	Conclusion
Within Dimension					
Panel v-Statistic	-1.225297	0.8898	-0.602381	0.7265	No Cointegration
Panel rho-Statistics	2.324062	0.9899	2.125854	0.9832	No Cointegration
Panel PP-Statistics	-0.389087	0.3486	-0.171907	0.1206	No Cointegration
Panel ADF Statistics	-0.490343	0.3119	-1.614844	0.0532	No Cointegration
Between Dimension					

Group rho-Statistics	2.844711	0.9978	No Cointegration
Group PP-Statistics	-5.416149	0.0000***	Cointegration
Group ADF-Statistics	-2.555266	0.0017***	Cointegration

Notes: *** and **denotes significance at 1% and 5%, respectively.

Source: Author’s estimations using E-views 12

Table 5.5 presents a deterministic trend, Pedroni cointegration test, consisting of 11 statistics tests from within and between dimensions. The within dimension gave no cointegrating equation out of all eight equations as the probability values are greater than 1% and 5%. The Between dimension gave 2 cointegrations out of 3, which means that this trend assumption has 2 cointegrating equations out of 11 equations. The study fails to reject the null hypothesis of no cointegration in this deterministic trend as a number of cointegrating equations support the null hypothesis.

Table 5.6: Pedroni Cointegration results (Deterministic trend and intercept)

Hypothesis Tests	Statistics	Probability	Weighted Statistics	Probability	Conclusion
Within Dimension					
Panel v-Statistic	-0.997464	0.8407	-0.775544	0.7810	No Cointegration

Panel rho-Statistics	2.253558	0.9879	2.579046	0.9950	No Cointegration
Panel PP-Statistics	-2.454898	0.0070***	-3.237976	0.0006***	Cointegration
Panel ADF-Statistics	-2.319645	0.0104**	-3.284040	0.0005***	Cointegration
Between Dimension					
Group rho-Statistics	3.337849	0.9996	No Cointegration		
Group PP-Statistics	-7.246258	0.0000	Cointegration***		
Group ADF-Statistics	-3.952401	0.0000	Cointegration***		

Notes: ***, **, denotes Significance at 1% and 5%, respectively

Source: Author's estimations using E-views 12

Looking at the deterministic trend and intercept assumption, the within-dimension cointegration of Table 5.6 shows that both panel v and panel rho statistics are insignificant. However, the panel PP and ADF statistics are significant at 5%. Moreover, the weighted statistic shows that both panel PP and ADF are significant at a 1% significance level. The between-dimension section shows that Group PP and ADF statistics are significant at a 1% level, and Group rho- statistics are insignificant.Therefore, the null hypothesis of no cointegration for the trade competitiveness model isrejected because most of the tests indicated a long-run co-movement in the set model.

Table 5.7: Pedroni Cointegration results (No intercept or trend)

Hypothesis Tests	**Statistics**	**Probab ility**	**Weighted Statistics**	**Probabili t y**	**Conclusion**
Within Dimension					
Panel v-Statistic	-0.917125	0.8205	-0.707637	0.9273	No Cointegration
Panel rho-Statistics	2.010409	0.9778	1.752991	0.9771	No Cointegration
Panel PP-Statistics	-0.600392	0.2741	-0.626716	0.6959	No Cointegration
Panel ADF-Statistics	-0.760774	0.2234	-1.317764	0.0938	No Cointegration

Between Dimension			
Group rho-Statistics	2.671278	0.9962	No Cointegration
Group PP-Statistics	-3.952405	0.0000***	Cointegration
Group ADF-Statistics	-2.410456	0.0080***	Cointegration

Notes: ***, ** denotes Significance at 1% and 5%, respectively.

Source: Author's estimations using E-views 12

Table 5.7 has two cointegrating equations of Group PP-Statistics and Group ADF-Statistics under the between-dimension section. The Group PP and ADF Statistics are we are cointegrating at 1% and 5%, respectively. The equations under the Within dimension are not cointegrating, so we accept the null hypothesis because only 2 equations cointegrate. With all the trend assumptions of Pedroni, only one of the threeis cointegrating, so this brings the need to test Kao and Johansen's cointegration teststo confirm the co-movement in the long run.

5.2.5.2 Kao Cointegration test

To confirm the long-run co-movement in the model, the Kao cointegration was tested, and the results are presented in Table 5.8. The Kao test's null hypothesis states that there is no cointegration in the models, which allows for an unbalanced panel over the long run if the p-value is greater than 0.5.

Table 5.8: Kao Cointegration test results

	t-Statistics	Probability
ADF	-2.518969	0.0059*
Residual variance	0.581009	
HAC variance	0.231788	

Notes: ***, ** denotes Significance at 1% and 5%, respectively.

Source: Author's estimations using E-views 12

With Pedroni not providing enough support for cointegration, it became essential to proceed with the Kao method. As seen in Table 5.8, the Kao results confirm the presence of a long run cointegration, while the probability results reject the null hypothesis of no cointegration at the 1% level of significance.

5.2.5.3 Johansen Fisher Cointegration test

The test applies both trace and max-eigen statistics to provide the best results for co-integration. According to the rule of thumb, cointegration exists in the model if the p-value is less than 0.05, and it does not exist if the p-value is more than 0.05.

Table 5.9: Johansen Fisher Panel Cointegration test results

Hypothesised No. of CE(s)	Eigenvalue	Trace statistics	0.05 critical value	Probability
None*	0.487197	102.8985	1.000	0.0147
At most 1	0.215323	42.79077	41.73	0.8931
At most 2	0.176343	20.96730	174.1	0.9848
` At most 3	0.023958	3.507217	195.4	1.0000
At most 4	0.011468	1.324762	90.98	0.9996
At most 5	0.003180	0.286677	48.56	0.5924

Notes: Trace statistics indicates 1 cointegration equation at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; ** Mackinnon-Haug-Michelis (1998) p-values.
Source: Author’s estimations using E-views 12

The result of the Johansen-Fisher test shows the existence of one cointegrating equation from both the Trace and Max-Eigen value at a 5% significance level. To conclude on cointegration tests, the existence of statistical solid evidence in favour of panel cointegration in the trade competitiveness model is confirmed with a probabilityof 0.0147. Accordingly, the Pedroni at the intercept level and the Kao and Johansen results strongly provide evidence of cointegration. Henceforth, there is a long-run relationship between the variables, suggesting that proceeding to the Panel ARDL is now appropriate.

5.2.6 Panel Autoregressive Distributed Lag Results

The PARDL presents how each variable affects trade competitiveness in the long run and short run estimates. The short-run results also present the error correction model results to measure the speed of adjustment.

Table 5.10: Long Run Results

Variable	Coefficient	Standard error	t-stat	Probability
LGFCF	4.740151	0.909188	5.213608	0.0000***
LRER	-8.289862	2.440975	-3.396127	0.0014***
TRWA	0.166333	0.101945	1.631596	0.1092
LTOT	-14.08031	2.818724	-4.995279	0.0000***
IRS	-0.011591	0.016578	-0.699152	0.4878

Notes: ***, **, * denotes Significance at 1%, 5% and 10%, respectively.

Source: Author's estimations using E-views 12

Table 5.10 above shows the impact of investment, real exchange rate, tariff, and trade terms on trade competitiveness over the long term. The results indicate that the tariff is positive and insignificant, with a probability value of 0,1092. These results are in linewith the work of Afonso and Vergara (2022), which state that an increase in tariff is insignificant to the trade balance in Africa. This means that tariff has no impact on trade competitiveness in the Selected countries.

The results also show that the influence of investment, real exchange rate, and trade terms significantly impact the success of trade competitiveness in the selected sub-Saharan African countries. Investment is significant at the 1% level, which means that a 1% increase in investment will result in a 4.74 increase in trade competitiveness to indicate a positive relationship. The results are in line with the work of Ikpesu et al. (2019), who state that domestic investment has a beneficial impact on regional growth, which improves trade competitiveness mainly through exports, and they are also in line with the acceleration theory of investment which state that an increase in nationalincome plays a vital role in the country's economic state to be able to compete with other countries. This means that an increase in investment also increases the trade competitiveness of the nations. Policymakers must implement policies that draw investment to spur regional and international commercial growth as the county's state also plays a role in the trade.

The real exchange rate is significant, with a probability of 0.0014, and the real exchange rate and trade balance have a negative relationship. This means that a 1%increase in the real exchange rate will result in an 8.28 decrease in trade competitiveness. Real exchange rate results are incompatible with theoretical predictions of J curve theory, which states that trade competitiveness is significantly reduced by the rise in the currency rate and is in line with the work of (Ndou, 2021). The decrease in trade balance means that the Sub-Saharan African Countries are lesscompetitive in the trade market, and an increase in the real exchange rate drops the prices of imports. Ultimately, this can result in decreased exports from the targeted country and more imports.

Table 5.10 further confirms the significance with a probability value of 0.0000, which is significant at a 1% level of significance. Significant relationship between terms of trade and trade balance; therefore, a 1% increase in terms of trade will result in a 14.08 decrease in trade competitiveness. Funke et al. (2008) and, Ndoumand Gumata (2017) reveal that sub-Saharan Africa has attained negative challenges because it is less diversified, concentrated on a limited number of natural resources, and has a thinner manufacturing base. A country becomes more competitive when export pricesrise faster than its import prices, meaning that sub-Saharan Africa can buy more imports for the same number of exports.

Table 5.11: Short Run results

Variance	**Coefficient**	**Standard error**	**t-stat**	**Probability**
Cointeq	-0.541412	0.187201	-2.892138	0.0057***
LGFCF	-1.241290	2.254428	-0.550601	0.5844
LRER	2.461683	2.378809	1.034838	0.3058
TRWA	-0.189616	0.259977	-0.729355	0.4693
LTOT	6.807043	6.092284	1.117322	0.2693
IRS	0.032974	0.088475	0.372691	0.7110
C	4.657075	1.955542	2.381475	0.0212**

Notes: ***, **, * denotes Significance at 1%, 5% and 10%, respectively.

Source: Author’s estimations using E-views 12

The study shows that investment, real exchange rate, tariffs, and terms of trade are insignificant to trade competitiveness in the short run. Table 5.11 presents short-run results together with the coefficient of error correction term (ECT), which indicates the speed of adjustment of 0.541412. The speed of adjustment is negative and significantat the 1% level. This shows that system divergence from the long-term equilibrium is fixed at the rates of 54.14 percent. Empirical findings in this study point to a convergence path to equilibrium.

On the other hand, the constant variable (c) is positive and significant at a 5% level with a probability value of 0.0212. This without considering investment, real exchangerate, tariff, term of trade and interest rate the trade competitiveness in the selected Sub-Saharan African countries in the short term will improve by 4.65. Several significant economic features can be used to explain patterns in international trade (Bhawsar & Chattopadhyay, 2015). This means that the Sub-Saharan African economy, in the short run, will improve instantly while holding investment, realexchange rate, tariff, term of trade and interest rate constant. This shows that trade competitiveness only partially depends on the above-stated variables. Through the constant positive variable, trade competitiveness will grow. In the short term, trade competitiveness will not make any economic changes in the economy/societies with the influence of investment, Real exchange rate, tariff, trade term, and interest rate.

Even though the short run results are insignificant some of the variables still align with the prior expectations. Investment in the short run does not align with the prior expectation of the study but aligns in the long run. Real exchange rate, tariff and term of trade align with the prior expectation of the study as the J curve states that the real exchange rate must deteriorate in the short term to improve in the future which really does improve in the future. Optimal tariff theory states that tariffs improve the trade state of the country well if the tariff is high. The finding aligns well with the expectations as the tariff rates are low-medium rated compared other countries in SSA and reflected in the long run as well. The short run results align well with the prior expectations while in the long run they do not. The term of trade in the long run improve trade competitiveness of the region.

5.2.7 Dumitrescu-Hurlin panel causality results

This section presents the DH panel causality results to identify the causality of the variables in the study. This is a summarised version; the full version can be found in the appendix section as appendix I.

Table 5.12: Dumitrescu-Hurlin panel causality test

Null hypothesis:	W-Stat	F statistics	Probability
LGFCF does not homogeneously cause LTB	0.41733	-0.97031	0.3319
LTB does not homogeneously cause LGFCF	1.20426	0.02848	0.9773
LRER does not homogeneously cause LTB	0.93994	-0.30699	0.7588
LTB does not homogeneously cause LRER	8.93516	9.84079	0.0000***
TRWA does not homogeneously cause LTB	0.44561	-0.93441	0.3501
LTB does not homogeneously cause TRWA	3.54635	3.00114	0.0027***
LTOT does not homogeneously cause LTB	1.82533	0.81677	0.4141
LTB does not homogeneously cause LTOT	2.79682	2.04981	0.0404**
IRS does not homogeneously cause LTB	1.60307	0.53467	0.5929
LTB does not homogeneously cause IRS	0.84763	-0.42416	0.6714

Notes: ***, ** denotes Significance at 1%, 5% and 10%, respectively.

Source: Author’s estimations using E-views 12

Table 5.12 presents the results of the Dumitrescu-Hurlin panel causality test. As proved, at 5% levels of significance, values support the hypothesis of a causal unidirectional relationship between trade competitiveness to the real exchange rate, tariffs, and term of trade, with a probability value of 0.0000, 0.0027 and 0.0404, respectively significant at 1% and 5% level of significance. The lagged value of the trade balance is crucial in forecasting the real exchange rate, tariffs, and terms of trade but not the other way around, which implies that Sub-Saharan Africa's current trade account balance can be used to forecast future performance in relation to tariffs, real exchange rates, and terms of trade.

Mogoswane and Molele (2020) and Anyalechi, Okereke, and Ikechukwu (2020)revealed a bidirectional causal association between trade balance and investment anda single-direction relationship between real exchange rate, import, and trade openness. The study found a unidirectional relationship of trade competitiveness withreal exchange rate, tariffs, and term of trade. This shows a strong causality between the trade competitiveness and real exchange rate.

5.2.8 Diagnostic test

The diagnostic tests determine whether the model is reliable and efficient. Table 5.13, 5.14 and Figure 5.6 provides a diagnostic test's outcomes.

5.2.8.1 Serial Correlation

Serial Correction is the association between observations of the same variable over a range of periods.

Table 5.13: Serial correlation results

Null Hypothesis: No serial correlation at lag h						
Lag	LRE*stat	Df	prob	Rao F-stat	Df	prob
1	37.70383	36	0.3912	1.052615	(36.292.6)	0.3931
Null Hypothesis: No serial correlation at lag h						
Lag	LRE*stat	Df	prob	Rao F-stat	Df	prob
1	37.70383	36	0.3912	1.052615	(36.292.6)	0.3931

Notes: *,** ** denotes Significance 1% and 5%, respectively.

Source: Author’s estimations using E-views 12

According to Table 5.13, the model has no serial correlation because it indicates a p-value of 0.3931, which is greater than the 5% significance level. Therefore, the null hypothesis of no serial correlation is accepted. This indicates that the variables mentioned earlier are independent of their historical values and that the autocorrelation issue has no impact on the investigation.

5.2.8.2 Heteroskedasticity

This test determines if the model variables impact the variance of the regression errors.

Table 5.14: Heteroskedasticity results

Chi-sq	Df	Probability
539.9293	546	0.5652

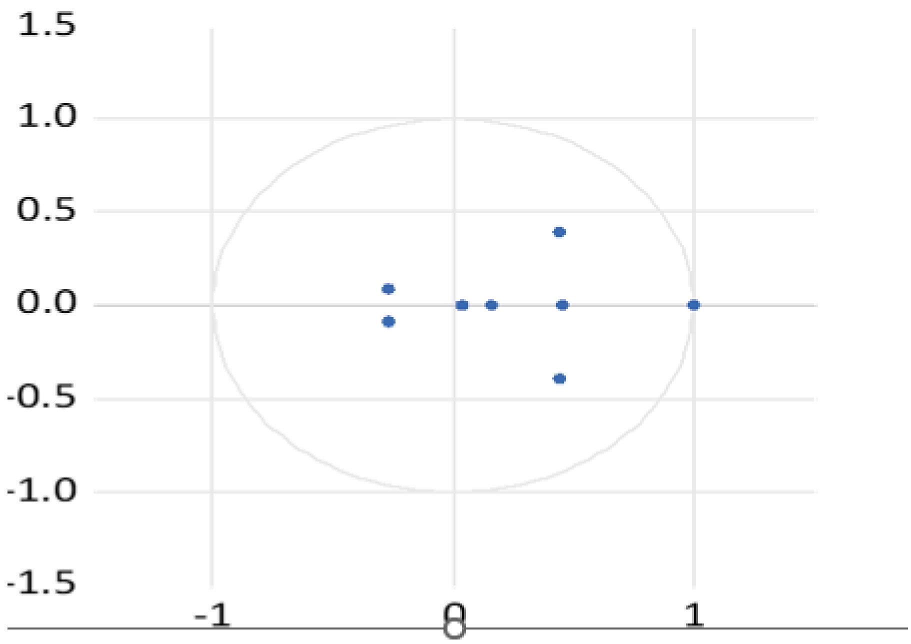
Source: Author’s estimations using E-views 12

Table 5.14 indicates a probability value of 0.5652, which is greater than all levels of significance. Significance residuals are homoscedastic.

5.2.8.3 AR Root

The AR root test uses the modulus, which must lie within the 0 horizontal to confirm the model's stationarity and stability.

Figure 5.7: Inverse Roots of AR characteristic polynomial results



Source: Author's construction using EViews 12

Figure 5.7 shows strong evidence that the computed VAR model is stationary and stable. This is because all the modulus are on the zero-horizontal line, demonstrating that the model is substantial and stable. The modulus of the AR root lies between 1 and -1, indicating and confirming the model's stability.

5.3 SUMMARY

This chapter reports the results of the interrogated major determinants of trade competitiveness in selected sub-Saharan Africa from 2004 to 2020 using econometric methodologies, as outlined in Chapter 4. The stationary results were tested using LLC, IPS, Fisher ADF and PP at a 10% level of significance. Lag length criteria and Correlation matrices test were tested before the cointegration tests, and according to Schwarz information criterion, lag 1 meets the study criteria for the models. Panel cointegration used the Pedroni, Kao, and Johansen Fisher cointegration tests to check and confirm the availability of the long-run relationship between the variables in Sub-Saharan Africa. To test for a causality relationship between the variables, the study used the Dumitrescu-Hurlin panel causality test, which revealed a unidirectionalrelationship between trade.

Competitiveness on the real exchange rate, tariff, and term of trade. The study then tested a diagnostic test. The study rejected the null hypothesis of serial correlation and the null hypothesis of heteroskedasticity. To confirm the stability of the model, the study tested the AR root, and all the modulus of the AR root were between 1 and -1 toindicate stability. Chapter 6 concludes the study findings and gives recommendations.

CHAPTER 6:

SUMMARY, RECOMMENDATIONS, CONCLUSION

6.1 INTRODUCTION

Chapter 5 presents the study results using different techniques. This is the last chapter of the study, and it presents a summary, the interpretation of the findings, and a Conclusion together with recommendations. It also mentions the contributions and limitations of the study.

6.2 SUMMARY AND INTERPRETATION OF FINDINGS

The study's aim was to interrogate the major determinants of trade competitiveness for selected sub-Saharan African countries from 2004 to 2020. To answer this objective, the study employed the Panel ARDL on the long and short-run relationship and Granger causality to test whether there is an existing innovation among the variables.

The unit root test gave out the stationarity of the study, revealing that trade balance, tariffs and interest rate are stationary at level I (0) while investment, real exchange rate and trade term are stationary at first difference I (1). Graphs were also used to confirm the results, but the statistics gave a robust and evident result. The Descriptive statistics showed that the trade balance, tariff and interest rate are generally distributed with probability values more significant than the 5% significance level. The lag length implemented the criteria of FPE, AIC, SC and HQ, and the test was statistically confirmed to be superior at lag 1 to carry out cointegration tests and other tests. Before the cointegration tests, the study employed the correction matrices, and positive and negative correlations of variables were identified. In relation to the trade balance, the variable's correlation strength was Term of Trade (TOT), Tariff (TRWA), Investment (Gross Fixed Capital Formation (GFCF), Real Exchange Rate (RER) and IRS from the strongest to the weakest, respectively.

The study carried out three cointegration tests, which all confirmed the existence of long-run relationships. There is a positive relationship between the trade balance and the investment and a negative relationship between the trade balance and the real exchange rate and term of trade. The short-run results revealed that it is only constant.

The variable influences trade competitiveness. The short-run results further indicated a 54% speed of adjustment, which was significant at the 1% level of significance.

5.2.7 Dumitrescu-Hurlin panel causality test indicated a unidirectional relationship between trade balance and real exchange rate, trade balance and tariff, and trade balance and term of trade, with a probability value of 0.0000, 0.0027 and 0.0404 all significant at 5% level of significance. The significant results of the study were tested for serial correlation and heteroskedasticity, and the AR root revealed thatthe model has no serial correlation and heteroskedasticity, with probability 0.3931 and0.5652. Therefore, we reject the null hypothesis. Lastly, the AR root was tested, and all the modulus lie within -1 and 1 of the horizontal line.

The results mean that investments are a core drive in the economy for competitiveness in the trade market of Sub-Saharan African countries. Investments grow the economy of its states while it advances its capability to compete with other countries or regions. Tariffs and terms of trade worsen the country's state when they increase; the country struggles to trade and meet its competitor’s level. The short-run results mean that the investment, real exchange rate, tariff, and term of trade don't affect trade competitiveness in the short run. The constant variable means that the trade competitiveness will fluctuate quickly due to other variables not interrogated in the study. The causality results show that the trade competitiveness in Sub-Saharan Africa improves the real exchange rate, tariff and trade terms. When a country becomes more competitive and engaging in the trade market, its exchange rate value and tariff improve. Sub-Saharan Africa's ability to compete in the trade market means an increase in exports, which also increases the country's trade terms.

6.3 CONCLUSIONS AND RECOMMENDATION

In view of the results, the study aimed to answer the following questions: 1) What is the impact of investment on trade competitiveness? 2) What is the connection between a real effective exchange rate and trade competitiveness? 3) What is the effect of tariffs on trade competitiveness? 4). How is the term of trade associated with trade competitive? 5). Is there causality among the determinants and trade competitiveness? The questions were answered in that investment positively impacts trade competitiveness. In contrast, real exchange rates and terms are negatively associated with trade competitiveness in Sub-Saharan Africa.

The error correction model also confirms the co-movement in the long run, with a 54% negative and significant speed of adjustment. The short-run results also showed that trade competitiveness can improve through the constant variable while holding other variables in the short run. The study also revealed that trade competitiveness has a unidirectional relationship with the real exchange rate, tariff, and terms of trade.

According to the study findings, the recommendations are as follows:

- Implementing policies that draw investment to spur regional and international trade growth as the county's state also plays a role in the trade. Governments should seek to improve infrastructure investment further to ease doing business, as this is seen to improve the trade balance and drive trade competitiveness. It should increase infrastructure investment for business facilitation, as this is perceived to enhance trade balance and stimulate trade competitiveness. Infrastructure eases transportation by lowering trade barriers and making it possible for specific locations to get the resources and people they require. It also eases connectivity and networking between countries.
- Implementations of policies that will lead to an appreciation of the real exchange rate will result in term of trade improvement because exports will rise, imports become cheaper, and countries will become more competitive in the trade industry. The decrease in trade balance means that the Sub-Saharan African Countries are less competitive in the trade market, and an increase in the real exchange rate drops the prices of imports. Ultimately, this can result in decreased exports from the targeted country and more imports. Exchange rate volatility will lead to uncertainty regarding imports and export prices, affecting the country's terms of trade. The exchange rate in the regions needs to be more stable, hindering the country's opportunities. It is observable from the study that investment is influential to trade competitiveness with a positive influence.
- Processing the zones to produce commodities is meant for export by frequently providing incentives, including tax reductions, streamlined customs processes and infrastructure assistance. These zones serve as hubs for export-oriented production, which helps countries draw in international investment and generate employment. Policies will promote industries through targeted trade policies, offering tax advantages, subsidies, and other benefits. This makes these industries more competitive in global marketplaces by negotiating advantageous trade

agreements, sending trade missions, or providing export subsidies to increase domestic product market access. To obtain better conditions in trade agreementsand make pledges of preferential treatment.

With international agencies like GATT and WTO that are intended to promote free trade between countries and end protectionism. It placed a strong emphasis on handling commercial partners fairly. GATT mediated reduced trade barriers and ensured a smooth, predictable, and unrestricted trade flow. It was negotiating and upholding regulations among participating countries addressing intellectual property, trade in goods, and services.

6.4 LIMITATION OF THE STUDY

The study interrogates the significant determinants of trade competitiveness in the selected Sub-Saharan African countries. It does not determine all the significant determinants of trade competitiveness; it only determines investment, real exchange rate, tariff, and trade term, and it uses interest rate spread as a control variable. The study does not include market depth, access to foreign exchange, and the possibility of legal standards. Due to data availability, the study focused on the Sub-Saharan African countries: Benin, Namibia, Madagascar, Kenya, South Africa, and Uganda. Due to data availability, the sample countries might need to represent the SSA accurately; however, other authors could do better where data is available. Yearly data of these countries was utilised to interrogate the significant determinants of trade competitiveness.

6.5 AREAS OF FUTURE RESEARCH

The study uses yearly data to interrogate only investment, real exchange rate, tariffs, and term of trade—on-trade balance as a proxy for trade competitiveness from 2004 to 2020. It does not interrogate all major determinants of trade competitiveness. Future studies can focus on other areas within Sub-Saharan Africa with different periods, like monthly, and other major determinants of trade competitiveness.

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APPENDICES

Appendix A: Data

years	Countries	TB	GFCF	LGFCF	RER	LRER	TRWA	TOT	LTOT	IRS
2004	Benin	-2,9E+08	5,25E+11	11,72026	527,338	2,722089	12,7	102,5955	2,011128	-1,32417
2005	Benin	-2,3E+08	5,21E+11	11,71671	527,2584	2,722023	12,68	106,0624	2,025561	0,436667
2006	Benin	-2,2E+08	5,2E+11	11,71634	522,4256	2,718024	11,57	112,7323	2,052048	-3,085
2007	Benin	-5,3E+08	6,67E+11	11,82409	478,6337	2,680003	11,03	114,2	2,057666	-3,06167
2008	Benin	-5,4E+08	6,92E+11	11,83991	446	2,649335	11,03	118,1787	2,072539	-3,14
2009	Benin	-6,5E+08	7,59E+11	11,88007	470,2934	2,672369	11,03	116,8451	2,06761	-3,60167
2010	Benin	-5,3E+08	8,33E+11	11,92051	494,7943	2,694425	11,03	127,3728	2,105077	-3,27333
2011	Benin	-5,2E+08	9,18E+11	11,96306	471,2486	2,67325	11,15	135,5389	2,132064	-3,24492
2012	Benin	-5,8E+08	9,22E+11	11,9646	510,5563	2,708044	11,15	127,0639	2,104022	-2,95333
2013	Benin	-6,7E+08	1,28E+12	12,10731	493,8996	2,693639	11,15	123,4199	2,091385	-2,36667
2014	Benin	-8,9E+08	1,42E+12	12,15207	493,7573	2,693514	10,64	123,46	2,091526	-1,92
2015	Benin	-6,8E+08	1,38E+12	12,13986	591,2117	2,771743	11,81	120,5442	2,081146	-1,84417
2016	Benin	-3,5E+08	1,38E+12	12,14038	592,6056	2,772766	11,2	125,737	2,099463	-1,63
2017	Benin	-5,3E+08	1,73E+12	12,23771	580,6567	2,763919	17,84	130,72	2,116342	1,6675
2018	Benin	-6,5E+08	2,05E+12	12,31214	555,4465	2,744642	15,25	130,8684	2,116835	1,37

2019	Benin	-5,8E+08	2,12E+12	12,32688	585,9508	2,767861	9,86	126,4023	2,101755	1,376667
2020	Benin	-2,7E+08	2,27E+12	12,35618	574,2945	2,759135	9,86	121,6149	2,084987	1,4425
2004	Namibia	4,46E+08	7,92E+09	9,898827	6,459693	0,810212	0,88	100,8882	2,00384	5,0375
2005	Namibia	3,29E+08	8,59E+09	9,934214	6,377117	0,804624	0,96	105,0778	2,021511	4,37
2006	Namibia	1,08E+09	1,17E+10	10,06766	6,76715	0,830406	0,97	129,7242	2,113021	4,8825
2007	Namibia	7,48E+08	1,36E+10	10,13207	7,054392	0,84846	1,15	138,3353	2,140933	5,3375
2008	Namibia	-9214704	1,78E+10	10,24921	8,251742	0,916546	1,75	124,4195	2,094888	5,3525
2009	Namibia	-3,2E+08	2,1E+10	10,32273	8,52282	0,930583	1,77	119,8749	2,078728	4,876667
2010	Namibia	-4,5E+08	2,09E+10	10,31982	7,33025	0,865119	1,33	124,7675	2,096101	4,723333
2011	Namibia	-8,6E+08	2,05E+10	10,31076	7,300025	0,863324	1,07	124,8623	2,096431	4,4475
2012	Namibia	-1,1E+09	2,75E+10	10,43956	8,193771	0,913484	0,61	123,7982	2,092714	4,443125
2013	Namibia	-9,9E+08	3,65E+10	10,56254	9,750075	0,989008	0,75	121,7208	2,085365	4,311667
2014	Namibia	-1,2E+09	4,74E+10	10,67559	10,84289	1,035145	0,7	123,5567	2,091866	4,450833
2015	Namibia	-1,6E+09	4,52E+10	10,6556	12,88192	1,109981	0,9	126,4577	2,101945	4,610833
2016	Namibia	-1,8E+09	3,44E+10	10,53682	14,70877	1,167576	1,03	127,6693	2,106087	4,19784
2017	Namibia	-5,7E+08	3,08E+10	10,48805	13,3129	1,124273	0,91	128,9343	2,110369	4,141557
2018	Namibia	-4,9E+08	3,05E+10	10,48492	13,23394	1,121689	1	128,9698	2,110488	4,275033
2019	Namibia	-2,2E+08	2,85E+10	10,45549	14,44869	1,159828	1,1	130,7396	2,116407	4,170555
2020	Namibia	2,7E+08	2,34E+10	10,36908	16,46327	1,216516	1,26	134,1119	2,127467	3,707899
2004	Madagascar	-4E+08	2E+12	12,30146	14,77868	1,169635	1,74	80,95931	1,908267	11,965
2005	Madagascar	-7,3E+08	2,27E+12	12,3557	1868,858	3,271576	5,89	75,05316	1,875369	9,5
2006	Madagascar	-5,9E+08	2,78E+12	12,44451	2003,026	3,301687	9,54	73,96758	1,869041	8,35
2007	Madagascar	-8,4E+08	4,21E+12	12,62389	2142,302	3,330881	8,48	73,79904	1,868051	23,775
2008	Madagascar	-1,7E+09	6,92E+12	12,84037	1873,877	3,272741	8,51	70,72179	1,849553	30,75
2009	Madagascar	-1,7E+09	6,99E+12	12,8445	1708,371	3,232582	7,89	73,87268	1,868484	33,23167
2010	Madagascar	-8,9E+08	5,4E+12	12,73245	1956,206	3,291415	6,32	77,52444	1,889439	35,70833
2011	Madagascar	-7,8E+08	5,77E+12	12,76155	2089,95	3,320136	6,37	79,99793	1,903079	41,85
2012	Madagascar	-8,6E+08	5,94E+12	12,77368	2025,118	3,30645	6,18	80,26646	1,904534	45,725
2013	Madagascar	-8,1E+08	5,42E+12	12,7337	2194,967	3,341428	6,39	79,64288	1,901147	48,83417
2014	Madagascar	-8,1E+07	5,53E+12	12,74252	2206,914	3,343785	5,99	86,26141	1,935817	49,04583
2015	Madagascar	-2,6E+08	6,3E+12	12,79918	2414,812	3,382883	9,35	89,14861	1,950115	42,05
2016	Madagascar	44804654	7,14E+12	12,85386	2933,508	3,467387	7,86	86,16275	1,93532	45
2017	Madagascar	-3E+07	7,45E+12	12,87203	3176,539	3,501954	6,83	77,47468	1,88916	45
2018	Madagascar	98048614	9,65E+12	12,98456	3116,11	3,493613	7,74	67,08504	1,826626	42,63958
2019	Madagascar	-3E+08	1,08E+13	13,03518	3334,752	3,523064	7,54	66,13566	1,820436	36
2020	Madagascar	-6,2E+08	9,65E+12	12,9847	3618,322	3,558507	7,2	63,78484	1,804717	35,67917
2004	South Africa	-6,4E+09	2,51E+11	11,39903	6,459693	0,810212	5,29	109,3249	2,038719	4,7375
2005	South Africa	-8E+09	2,92E+11	11,46491	6,359328	0,803411	5,64	110,9892	2,045281	4,581667
2006	South Africa	-1,2E+10	3,57E+11	11,55305	6,771549	0,830688	5,29	117,8722	2,071412	4,025
2007	South Africa	-1,6E+10	4,46E+11	11,6497	7,045365	0,847903	4,81	121,5349	2,084701	4,011667
2008	South Africa	-1,6E+10	5,64E+11	11,75166	8,261223	0,917044	3,9	124,4909	2,095138	3,5125
2009	South Africa	-7,9E+09	5,45E+11	11,73609	8,473674	0,928072	4,32	132,3735	2,121801	3,171667
2010	South Africa	-5,4E+09	5,37E+11	11,72966	7,321222	0,864584	4,59	141,2368	2,149948	3,368333
2011	South Africa	-9,3E+09	5,93E+11	11,77271	7,261132	0,861004	4,39	146,2948	2,165229	3,3275

2012	South Africa	-2E+10	6,4E+11	11,80593	8,209969	0,914341	4,22	145,2397	2,162085	3,313333
2013	South Africa	-2,1E+10	7,19E+11	11,85657	9,655056	0,984755	4,15	137,5087	2,13833	3,3475
2014	South Africa	-1,8E+10	7,57E+11	11,87884	10,85266	1,035536	3,87	135,8331	2,133005	3,324167
2015	South Africa	-1,5E+10	7,96E+11	11,90099	12,75893	1,105814	4,38	140,0048	2,146143	3,263333
2016	South Africa	-8,5E+09	8,3E+11	11,91915	14,70961	1,167601	4,51	144,8522	2,160925	3,286667
2017	South Africa	-9,1E+09	8,33E+11	11,92052	13,3238	1,124628	4,61	151,1375	2,179372	3,129167
2018	South Africa	-1,2E+10	8,53E+11	11,93085	13,23393	1,121689	4,32	146,3721	2,165458	3,085
2019	South Africa	-1E+10	8,65E+11	11,93727	14,44843	1,159821	5,37	152,146	2,182261	3,116667
2020	South Africa	6,79E+09	7,65E+11	11,88351	16,45911	1,216406	4,4	165,3513	2,218408	2,8275
2004	Kenya	-1,3E+08	2,07E+11	11,31638	79,17388	1,898582	10,44	97,07418	1,987104	10,09833
2005	Kenya	-2,5E+08	2,65E+11	11,4228	75,55411	1,878258	6,58	98,8731	1,995078	7,8
2006	Kenya	-5,1E+08	3,62E+11	11,55834	72,10084	1,85794	6,32	98,24312	1,992302	8,496831
2007	Kenya	-1E+09	4,3E+11	11,63297	67,31764	1,828129	6,79	95,37028	1,979413	8,178093
2008	Kenya	-2E+09	4,68E+11	11,67064	69,17532	1,839951	7,35	94,99224	1,977688	8,714809
2009	Kenya	-1,7E+09	5,99E+11	11,77743	77,35201	1,888472	9,52	105,7433	2,024253	8,837524
2010	Kenya	-2,4E+09	7,5E+11	11,87506	79,23315	1,898907	7,32	104,5378	2,019273	9,814133
2011	Kenya	-3,8E+09	8,62E+11	11,93551	88,81077	1,948466	6,6	100,3851	2,001669	9,418197
2012	Kenya	-4,2E+09	1,03E+12	12,01242	84,5296	1,927009	12,38	99,98492	1,999935	8,151262
2013	Kenya	-4,8E+09	1,1E+12	12,04297	86,12288	1,935119	9,64	96,26545	1,98347	8,671688
2014	Kenya	-6,4E+09	1,43E+12	12,15655	87,92216	1,944098	10,55	97,09315	1,987189	8,140551
2015	Kenya	-4,4E+09	1,52E+12	12,18208	98,17845	1,992016	11,47	109,6855	2,040149	6,897669
2016	Kenya	-4E+09	1,47E+12	12,16809	101,5044	2,006485	12,25	108,9979	2,037418	7,871005
2017	Kenya	-5,7E+09	1,69E+12	12,22733	103,41	2,014563	11,16	114,61	2,059223	5,993449
2018	Kenya	-5E+09	1,78E+12	12,25135	101,3016	2,005616	10,07	108,1231	2,033918	4,768059
2019	Kenya	-5,3E+09	1,94E+12	12,28808	101,9913	2,008563	11,48	107,0608	2,02963	4,935063
2020	Kenya	-4,8E+09	2,07E+12	12,31679	106,4508	2,027149	9,32	106,1058	2,025739	5,027081
2004	Uganda	-1675020	3,06E+12	12,48628	1810,305	3,257752	5,32	93,3977	1,970336	12,86267
2005	Uganda	49224086	3,56E+12	12,55188	1780,54	3,250552	8,98	95,62195	1,980558	10,85287
2006	Uganda	-3,2E+08	3,81E+12	12,58096	1831,452	3,262796	7,71	96,39152	1,984039	9,611969
2007	Uganda	-5,6E+08	4,63E+12	12,66589	1723,492	3,236409	8,44	98,47512	1,993327	9,843695
2008	Uganda	-1,2E+09	5,57E+12	12,74607	1720,444	3,235641	8,75	100,6535	2,002829	9,77953
2009	Uganda	-1E+09	1,19E+13	13,07587	2030,488	3,3076	9,22	107,5561	2,031635	11,20266
2010	Uganda	-1,6E+09	1,44E+13	13,15902	2177,558	3,33797	9,18	113,7911	2,056108	12,48735
2011	Uganda	-2,1E+09	1,71E+13	13,2326	2522,802	3,401883	8,44	120,8872	2,08238	8,489806
2012	Uganda	-1,7E+09	1,8E+13	13,25531	2504,563	3,398732	8,9	111,3386	2,046646	9,351826
2013	Uganda	-1,8E+09	2,36E+13	13,37247	2586,89	3,412778	8,5	107,0051	2,029405	11,1679
2014	Uganda	-2,2E+09	2,17E+13	13,3367	2599,788	3,414938	8,64	113,7078	2,05579	10,77472
2015	Uganda	-1,7E+09	2,13E+13	13,32847	3240,645	3,510632	7,88	115,9483	2,064264	9,833733
2016	Uganda	-8,3E+08	2,5E+13	13,39807	3420,098	3,534039	7,33	122,9386	2,089688	10,64818
2017	Uganda	-1,5E+09	2,61E+13	13,41666	3611,224	3,557654	7,67	119,5244	2,077457	11,58144
2018	Uganda	-2,1E+09	2,86E+13	13,4566	3727,069	3,571367	8,01	112,0719	2,049497	10,46161
2019	Uganda	-2,5E+09	3,29E+13	13,51711	3704,049	3,568677	8,05	116,4402	2,066103	11,02152
2020	Uganda	-3,6E+09	3,29E+13	13,51656	3718,249	3,570338	8,09	125,1416	2,097402	10,74156

Appendix B: Descriptive stats

	LTB	LGFCF	LRER	TRWA	LTOT	IRS
Mean	20.81993	11.98948	2.210254	7.013235	2.040271	9.894558
Median	20.66288	11.98851	2.020856	7.445000	2.056887	5.032291
Maximum	23.78669	13.51711	3.571367	17.84000	2.218408	49.04583
Minimum	14.33134	9.898827	0.803411	0.610000	1.804717	-3.601667
Std. Dev.	1.640748	0.916623	1.019032	3.745223	0.089177	12.86528
Skewness	-0.704936	-0.519510	-0.086834	-0.036042	-0.705747	1.843514
Kurtosis	4.751029	2.684073	1.413752	2.559710	2.974943	5.417987
Jarque-Bera	21.47882	5.012335	10.82196	0.845968	8.470003	82.62354
Probability	0.000022	0.081580	0.004467	0.655089	0.014480	0.000000
Sum	2123.633	1222.927	225.4459	715.3500	208.1076	1009.245
Sum Sq. Dev.	271.8973	84.85994	104.8811	1416.696	0.803198	16717.07
Observations	102	102	102	102	102	102

Appendix C: Correlation Matrics

	LTB	LGFCF	LRER	TRWA	LTOT	IRS
LTB	1.000000	-0.030198	-0.062943	0.033217	0.109334	-0.144644
LGFCF	-0.030198	1.000000	0.070635	0.151110	-0.077416	0.164630
LRER	-0.062943	0.070635	1.000000	-0.109101	-0.007769	-0.042379
TRWA	0.033217	0.151110	-0.109101	1.000000	0.100393	-0.152843
LTOT	0.109334	-0.077416	-0.007769	0.100393	1.000000	-0.282451
IRS	-0.144644	0.164630	-0.042379	-0.152843	-0.282451	1.000000

Appendix D: Unit root

1. Trade Balance (LTB)

Panel unit root test: Summary
Series: LTB
Date: 07/29/23 Time: 22:08
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-11.9806	0.0000	6	93
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-7.35321	0.0000	6	93
ADF - Fisher Chi-square	85.4807	0.0000	6	93
PP - Fisher Chi-square	137.661	0.0000	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LTB
Date: 07/29/23 Time: 22:09
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.95867	0.0000	6	93
Breitung t-stat	0.51137	0.6955	6	87
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.03072	0.0000	6	93
ADF - Fisher Chi-square	36.7635	0.0002	6	93
PP - Fisher Chi-square	34.8911	0.0005	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

2. Tariff (TRWA) at level

Panel unit root test: Summary
Series: TRWA
Date: 07/29/23 Time: 22:29
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.62954	0.0000	6	95
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.90094	0.0000	6	95
ADF - Fisher Chi-square	45.1308	0.0000	6	95
PP - Fisher Chi-square	39.1424	0.0001	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: TRWA
Date: 07/29/23 Time: 22:29
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.86120	0.0000	6	94
Breitung t-stat	-1.61485	0.0532	6	88
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.49249	0.0000	6	94
ADF - Fisher Chi-square	40.4492	0.0001	6	94
PP - Fisher Chi-square	34.4605	0.0006	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: TRWA
Date: 07/29/23 Time: 22:30
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.30310	0.3809	6	94
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	6.17483	0.9070	6	94
PP - Fisher Chi-square	7.91829	0.7915	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3. Investment (LGFCF) at Level

Panel unit root test: Summary
Series: LGFCF
Date: 07/29/23 Time: 22:13
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.98875	0.0000	6	91
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.04649	0.0204	6	91
ADF - Fisher Chi-square	28.1551	0.0053	6	91
PP - Fisher Chi-square	77.9539	0.0000	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LGFCF
Date: 07/29/23 Time: 22:14
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.96277	0.1678	6	94
Breitung t-stat	3.12148	0.9991	6	88
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.56211	0.7130	6	94
ADF - Fisher Chi-square	16.0648	0.1883	6	94
PP - Fisher Chi-square	21.5986	0.0423	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LGFCF
Date: 07/29/23 Time: 22:16
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	6.91325	1.0000	6	90
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	0.70121	1.0000	6	90
PP - Fisher Chi-square	0.23433	1.0000	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Investment (LGFCF) at 1st Difference

Panel unit root test: Summary
Series: D(LGFCF)
Date: 07/29/23 Time: 22:17
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.99862	0.0000	6	87
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.02195	0.0013	6	87
ADF - Fisher Chi-square	29.8152	0.0030	6	87
PP - Fisher Chi-square	40.7544	0.0001	6	90

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(LGFCF)
Date: 07/29/23 Time: 22:19
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.22962	0.0000	6	85
Breitung t-stat	-3.50028	0.0002	6	79
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.40608	0.0003	6	85
ADF - Fisher Chi-square	31.7165	0.0015	6	85
PP - Fisher Chi-square	52.6546	0.0000	6	90

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(LGFCF)
Date: 07/29/23 Time: 22:19
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.95541	0.0000	6	86
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	40.2828	0.0001	6	86
PP - Fisher Chi-square	34.6199	0.0005	6	90

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

4. Real Exchange Rate (RER0 at Level

Panel unit root test: Summary
Series: LRER
Date: 07/29/23 Time: 22:21
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	7.62289	1.0000	6	93
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	3.38055	0.9996	6	93
ADF - Fisher Chi-square	1.46967	0.9999	6	93
PP - Fisher Chi-square	119.335	0.0000	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LRER
Date: 07/29/23 Time: 22:23
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	10.8263	1.0000	6	88
Breitung t-stat	-4.32148	0.0000	6	82
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.59836	0.0002	6	88
ADF - Fisher Chi-square	32.6979	0.0011	6	88
PP - Fisher Chi-square	29.0460	0.0039	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LRER
Date: 07/29/23 Time: 22:24
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 3
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	3.81463	0.9999	6	93
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	0.71459	1.0000	6	93
PP - Fisher Chi-square	1.07116	1.0000	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Real Exchange Rate (RER) at Level

Panel unit root test: Summary
Series: D(LRER)
Date: 07/29/23 Time: 22:25
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	10.1534	1.0000	6	84
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.46912	0.0000	6	84
ADF - Fisher Chi-square	49.9241	0.0000	6	84
PP - Fisher Chi-square	50.8350	0.0000	6	90

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(LRER)
Date: 07/29/23 Time: 22:26
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	9.02914	1.0000	6	87
Breitung t-stat	-5.87300	0.0000	6	81
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.08455	0.0010	6	87
ADF - Fisher Chi-square	29.1017	0.0038	6	87
PP - Fisher Chi-square	39.0537	0.0001	6	90

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: D(LRER)
Date: 07/29/23 Time: 22:26
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-6.53495	0.0000	6	88
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	54.9308	0.0000	6	88
PP - Fisher Chi-square	65.4784	0.0000	6	90

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

5. Term of trade (TRWA) at Level

Panel unit root test: Summary
Series: LTOT
Date: 07/29/23 Time: 22:32
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.51271	0.6959	6	91
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.21212	0.5840	6	91
ADF - Fisher Chi-square	9.93013	0.6221	6	91
PP - Fisher Chi-square	24.6132	0.0168	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LTOT
Date: 07/29/23 Time: 22:33
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	0.72852	0.7669	6	89
Breitung t-stat	-1.30835	0.0954	6	83
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.18697	0.4258	6	89
ADF - Fisher Chi-square	12.2145	0.4286	6	89
PP - Fisher Chi-square	15.4638	0.2170	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: LTOT
Date: 07/29/23 Time: 22:34
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	2.77966	0.9973	6	93
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	2.10919	0.9992	6	93
PP - Fisher Chi-square	2.87911	0.9963	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

6. Interest rate (IRS) at Level

Panel unit root test: Summary
Series: IRS
Date: 07/29/23 Time: 22:51
Sample: 2004 2020
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.44469	0.0072	6	95
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.43847	0.0752	6	95
ADF - Fisher Chi-square	21.2256	0.0472	6	95
PP - Fisher Chi-square	27.7590	0.0060	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: IRS
Date: 07/29/23 Time: 22:56
Sample: 2004 2020
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.63991	0.0001	6	94
Breitung t-stat	-0.13507	0.4463	6	88
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.70459	0.0441	6	94
ADF - Fisher Chi-square	25.2981	0.0135	6	94
PP - Fisher Chi-square	24.2791	0.0186	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Panel unit root test: Summary
Series: IRS
Date: 07/29/23 Time: 22:57
Sample: 2004 2020
Exogenous variables: None
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 2
Newey-West automatic bandwidth selection and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.89017	0.0019	6	93
Null: Unit root (assumes individual unit root process)				
ADF - Fisher Chi-square	20.7822	0.0537	6	93
PP - Fisher Chi-square	26.5012	0.0091	6	96

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Appendix E: Lag Length Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LTB LGFCF LRER TRWA LTOT IRS
Exogenous variables: C
Date: 07/29/23 Time: 23:26
Sample: 2004 2020
Included observations: 78

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-595.1976	NA	0.199502	15.41532	15.59661	15.48789
1	98.20917	1262.356	9.56e-09*	-1.441261*	-0.172264*	-0.933258*
2	127.2761	48.44488	1.16e-08	-1.263490	1.093219	-0.320056
3	168.6336	62.56654*	1.05e-08	-1.400863	2.043558	-0.021998
4	202.9544	46.64100	1.19e-08	-1.357805	3.174328	0.456491

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix F: Panel Cointegration Results

Pedroni

Pedroni Residual Cointegration Test
Series: LTB LGFCF LRER TRWA LTOT IRS
Date: 07/29/23 Time: 23:09
Sample: 2004 2020
Included observations: 102
Cross-sections included: 6
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 2
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-1.225297	0.8898	-0.602381	0.7265
Panel rho-Statistic	2.324062	0.9899	2.125854	0.9832
Panel PP-Statistic	-0.389087	0.3486	-1.171907	0.1206
Panel ADF-Statistic	-0.490343	0.3119	-1.614844	0.0532

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.844711	0.9978
Group PP-Statistic	-5.416149	0.0000
Group ADF-Statistic	-2.937672	0.0017

Pedroni Residual Cointegration Test
Series: LTB LGFCF LRER TRWA LTOT IRS
Date: 07/29/23 Time: 23:14
Sample: 2004 2020
Included observations: 102
Cross-sections included: 6
Null Hypothesis: No cointegration
Trend assumption: Deterministic intercept and trend
Automatic lag length selection based on SIC with a max lag of 1
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.997464	0.8407	-0.775544	0.7810
Panel rho-Statistic	2.253558	0.9879	2.579046	0.9950
Panel PP-Statistic	-2.454898	0.0070	-3.237976	0.0006
Panel ADF-Statistic	-2.310645	0.0104	-3.284040	0.0005

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	3.337849	0.9996
Group PP-Statistic	-7.246258	0.0000
Group ADF-Statistic	-3.952401	0.0000

Pedroni Residual Cointegration Test
Series: LTB LGFCF LRER TRWA LTOT IRS
Date: 07/29/23 Time: 23:17
Sample: 2004 2020
Included observations: 102
Cross-sections included: 6
Null Hypothesis: No cointegration
Trend assumption: No deterministic intercept or trend
Automatic lag length selection based on SIC with a max lag of 2
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.917125	0.8205	-0.707637	0.7604
Panel rho-Statistic	2.010409	0.9778	1.752991	0.9602
Panel PP-Statistic	-0.600392	0.2741	-0.626716	0.2654
Panel ADF-Statistic	-0.760774	0.2234	-1.317764	0.0938

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.671278	0.9962
Group PP-Statistic	-3.952405	0.0000
Group ADF-Statistic	-2.410456	0.0080

Johansen

Date: 07/29/23 Time: 23:28
Sample (adjusted): 2006 2020
Included observations: 90 after adjustments
Trend assumption: Linear deterministic trend
Series: LTB LGFCF LRER TRWA LTOT IRS
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.509317	127.1945	95.75366	0.0001
At most 1	0.394333	63.11834	69.81889	0.1523
At most 2	0.143675	17.99004	47.85613	0.9976
At most 3	0.036563	4.030596	29.79707	1.0000
At most 4	0.006517	0.678227	15.49471	1.0000
At most 5	0.000997	0.089748	3.841465	0.7645

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Kao

Kao Residual Cointegration Test
Series: LTB LGFCF LRER TRWA LTOT IRS
Date: 07/29/23 Time: 23:34
Sample: 2004 2020
Included observations: 102
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 3
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-4.635915	0.0000
Residual variance	0.721862	
HAC variance	0.442673	

Appendix G: Panel ARDL long and short run results

Dependent Variable: D(LTB)
Method: ARDL
Date: 07/29/23 Time: 23:21
Sample: 2005 2020
Included observations: 96
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): LGFCF LRER TRWA LTOT IRS
Fixed regressors: C
Number of models evaluated: 1
Selected Model: ARDL(1, 1, 1, 1, 1, 1)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
LGFCF	2.833808	0.486847	5.820741	0.0000
LRER	-2.047229	0.726981	-2.816071	0.0067
TRWA	0.006560	0.081820	0.080173	0.9364
LTOT	-6.115871	2.330317	-2.624480	0.0112
IRS	-0.024711	0.019394	-1.274160	0.2080
	Short Run Equation			
COINTEQ01	-0.665731	0.169559	-3.926241	0.0002
D(LGFCF)	-0.554143	1.657233	-0.334379	0.7394
D(LRER)	2.539526	2.080717	1.220505	0.2275
D(TRWA)	-0.334388	0.405466	-0.824702	0.4131
D(LTOT)	5.032227	5.721101	0.879591	0.3829
D(IRS)	0.034121	0.044898	0.759966	0.4505
C	2.781500	0.867906	3.204841	0.0023

Root MSE	0.376371	Mean dependent var	0.116672
S.D. dependent var	0.884149	S.E. of regression	0.512548
Akaike info criterion	1.344476	Sum squared resid	14.44881
Schwarz criterion	2.554023	Log likelihood	-21.56829
Hannan-Quinn criter.	1.834263		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix H: Pairwise Dumitrescu Hurlin Pane Causality

~~1~~	37.70383	36	0.3912	1.052615	(36, 292.6)	0.3931

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	37.70383	36	0.3912	1.052615	(36, 292.6)	0.3931

*Edgeworth expansion corrected likelihood ratio statistic.

Appendix J: Heterokedasticity

VAR Residual Heteroskedasticity Tests (Levels and Squares)
Date: 07/29/23 Time: 23:33
Sample: 2004 2020
Included observations: 90

Joint test:

Chi-sq	df	Prob.
517.5608	504	0.3284