THE EFFECTS OF CURRENCY DEPRECIATION ON TRADE: THE CASE FOR SACU COUNTRIES

By

Mofihli David Ntsasa

A Thesis Submitted in Partial Fulfilment of the Requirements for the Award of Degree of

MASTER OF SCIENCE IN ECONOMICS

in the Department of Economics

THE NATIONAL UNIVERSITY OF LESOTHO

June 2024

Supervisor: Dr Johnson Ojo Adelakun

Declaration

I declare that all content of "THE EFFECTS OF CURRENCY DEPRECIATION ON TRADE: THE CASE FOR SACU COUNTRIES" is my original work unless otherwise noted and acknowledged in the tables, text, figures, and footnotes. The data and findings in the work have not been falsified or embellished and all materials used, cited, or quoted are indicated and acknowledged through complete references. I further accede that, to my knowledge, it has not been submitted for a diploma, degree, master's, or any other higher education institution.

Name: Mofihli Ntsasa

Date: 25 June 2024

Acknowledgment

Above all, I thank the Lord Jesus Christ for everything He has done for me. His blessings and guidance have been invaluable throughout this journey. I extend my deepest gratitude to my supervisor, Dr. Johnson Ojo Adelakun, for his unwavering patience, professional guidance, and constant support. His insightful feedback, encouragement, and dedication have been instrumental in shaping this thesis. I am profoundly grateful for his mentorship, which has significantly enriched my academic experience and personal growth. Furthermore, I would like to express my appreciation to the Department of Economics for their assistance and support. The resources and encouragement provided by the department have been essential to my academic progress. I am deeply thankful to my neighbour and landlord, 'Mafane Rantso, for the warm welcome and support during my studies. Her hospitality has made my stay comfortable and pleasant. I am also profoundly grateful to my colleagues, with whom I have shared numerous experiences. Our shared journey through both challenges and successes has been unforgettable. Lastly, I am grateful for the strength and perseverance that kept me from quitting. This achievement is a testament to the collective efforts and unwavering support from everyone involved.

Dedication

I dedicate this thesis to my family, my aunt - Motselisi Ramotsabi, and my siblings -Tlaleng Ntsasa, Lehlohonolo Ntsasa, and Refiloe Ntsasa.

Abstract

This study examines the effects of currency depreciation on trade in the Southern African Customs Union (SACU) countries: Botswana, Eswatini, Lesotho, Namibia, and South Africa. The main research questions address how exchange rate depreciation impacts trade balances. The study fills a literature gap by focusing on the SACU region, which is underrepresented in empirical research on currency depreciation. Utilising a pooled mean group (PMG) regression model using data from 2000 to 2022, the analysis reveals that currency depreciation does not consistently improve trade balances, contradicting traditional economic theories. Key findings indicate that the relationship between currency depreciation and trade balance is complex and context dependent. The study contributes to the literature by highlighting the need for tailored economic policies that consider the unique socio-economic environments of SACU member states. This research underscores the potential of the African Continental Free Trade Area (AfCFTA) to aid in export diversification and industrial capacity enhancement, while also recommending measures for managing exchange rate volatility through regional cooperation and prudent monetary policies.

Key words and phrases: Currency Depreciation, SACU, Trade Balance, PMG Regression, Exchange Rate Volatility

JEL Classification: F31, F14, F15

TABLE OF CONTENTS

List of Figures

List of Tables

List of Abbreviations

ARDL – Autoregressive Distributed Lag

CUSUM – Cumulative Sum

CUSUMSQ – Cumulative Sum of Squares

ECM – Error Correction Model

EMDEs – Emerging Market and Developing Economies

GDP – Gross Domestic Product

IMF – International Monetary Fund

PMG – Pooled Mean Group

RMB – Renminbi

RSA – Republic of South Africa

SACU – Southern African Customs Union

SADC – Southern African Development Community

VIF – Variance Inflation Factor

Chapter 1

1. INTRODUCTION

1.1 Introduction

Trade is essential for both the economic growth and development of a country. A trade surplus generates inflows into the economy, creating a clear path for economic expansion (Raza, 2013). The prevailing belief is that fluctuations in a country's exchange rate affect its trade balance. Specifically, when a currency depreciates, the country's exported goods become more competitive in foreign markets (Bhat & Bhat, 2021b). However, this advantage comes with a drawback as the cost of imported goods rises, leading to a decrease in national welfare as the population consumes less (Qiao, 2013). Alternatively, when a currency appreciates the opposite is expected to happen (Dzanan & Masih, 2017). Many economists attribute the ambiguity in the relationship between currency exchange rates and trade balances to the predominant focus of theoretical and research efforts on developed and capitalist economies, such as the USA, as well as on transitional economies (Raza, 2013). This research paper discusses the relationship between currency depreciation and trade balance in the Southern African Customs Union (SACU). The relationship between currency exchange rates and trade balance is analysed through various economic theories. Four main schools of thought commonly used to determine this relationship include the Marshall-Lerner, the J-curve, the S-curve, and the direct method for devaluation prediction.

The Marshall-Lerner condition asserts that a depreciation of the exchange rate will enhance the trade balance if the combined elasticities of export and import demand are at least equal to one (Hussain & Haque, 2014). Complementing this, the J-curve theory suggests that currency depreciation initially negatively impacts the trade balance but eventually leads to long-term improvement as export elasticity increases (Jamilov, 2012).

1.2 Background of the study

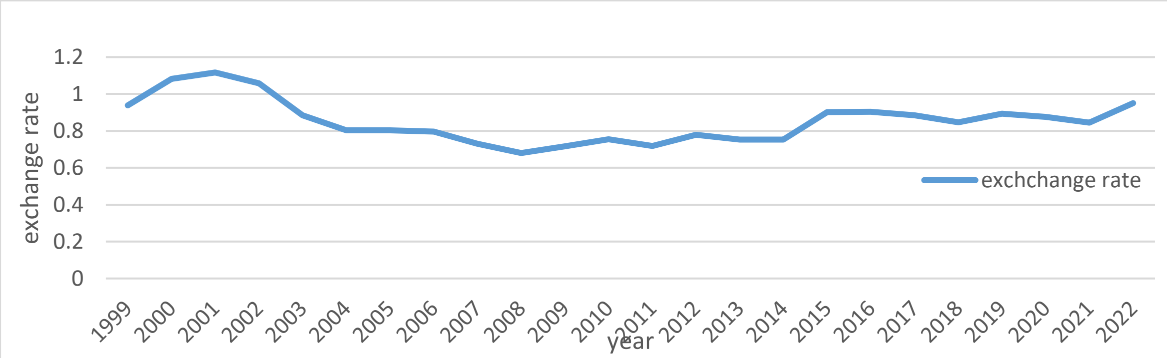
Currency depreciation, defined as the decrease in the value of a currency relative to other currencies in the foreign exchange market, significantly impacts international trade. Theoretically, a weaker currency generally lowers the price of a country's exports and raises the cost of imports, potentially enhancing export competitiveness and reducing trade deficits.

Conversely, a strong currency may hinder export competitiveness and exacerbate trade imbalances (Bloom & Reenen, 2013).

In recent years, global economic dynamics have been characterized by fluctuating exchange rates and currency depreciations across various regions. Financial market turbulence in 2018 illustrated that emerging market and developing economies (EMDEs) continue to face the risk of destabilizing exchange rate movements (Ha et al., 2020). These fluctuations have been influenced by factors including monetary policy decisions, geopolitical tensions, trade imbalances, and economic shocks.

There are currently 16 customs unions notified by the World Trade Organization (Stojanovic, 2020). For developed economies like the European Union, which is the world's largest customs union in terms of economic output among its members, the exchange rate has not depreciated. Customs duties on goods imported into the EU constitute approximately 14% of the total EU budget as part of its traditional resources (European Union, 2020). Although every EU nation is a member of the Economic and Monetary Union (EMU), twenty of them have switched from their native currencies to the euro (Scheinert, 2023). Below is the eurozone exchange rate over the years from 1999 to 2022

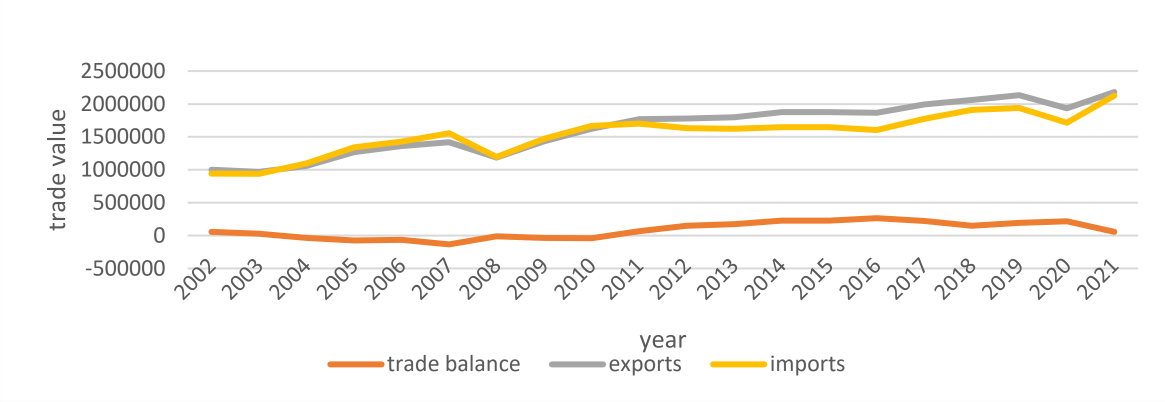
Figure 1.1: The eurozone exchange rate against US dollar over the years from 1999 to 2022.



Source: Author's computations, with data sourced from World Bank Development Indicators

Form Figure 1.1: The eurozone exchange rate against US dollar over the years from 1999 to 2022. It can be seen that the exchange rate for the eurozone against the dollar has been fluctuating. This fluctuation signifies overall stability in the euro currency, with a general trend towards currency appreciation.

Figure 1.2: European Union Trade Balance



Source: Author's computations, with data sourced from Statista.

From Figure 1.2: European Union Trade Balance, it is shown that the European Union has maintained a trade surplus for the specified period from 2002 to 2021. This is an interesting observation given the euro appreciation seen in Figure 1.1: The eurozone exchange rate against US dollar over the years from 1999 to 2022. Thus, the two figures above indicate a more stable exchange rate and an overall surplus in the trade balance.

In Africa, there are approximately six customs unions: The Southern African Customs Union (SACU), The Economic Community of West African States (ECOWAS), The East African Community (EAC), The West African Economic and Monetary Union (WAEMU), The Economic and Monetary Community of Central Africa (CEMAC), and The Common Market for Eastern and Southern Africa (COMESA) (Desiderio Consultants Ltd, 2020). Currency depreciation has been a recurring phenomenon across Africa, influenced by factors such as commodity price fluctuations, political instability, and external debt pressures (Laurent Kemoe et al., 2023). In January 2023, out of the 36 African currencies analysed, 29 experienced depreciation relative to the USD over the year, while only 7 appreciated (African Development Bank, 2023)

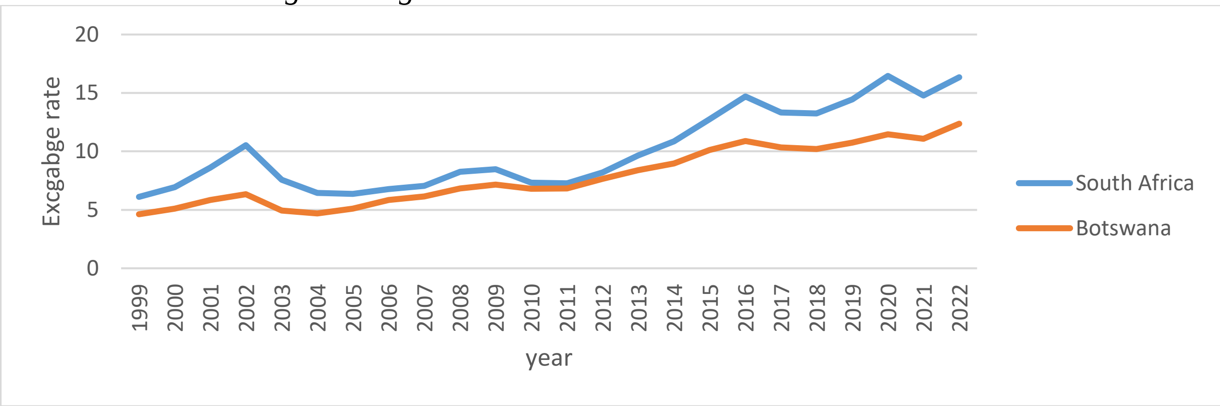
Table A14 in Appendices shows the descriptive statistics of nominal exchange rates against the US dollar across the Southern African Development Community (SADC). The descriptive summary reveals a diverse range of exchange rate behaviours, with notable variations in means and standard deviations among SADC member states. For instance, while some countries like Botswana exhibit relatively stable exchange rates with mean values of around 6.472 units per dollar, others such as Zimbabwe showcase extreme volatility, with a mean nominal exchange rate of approximately 305 million units per dollar. Furthermore, disparities in minimum and maximum exchange rates underscore the heterogeneity of exchange rate regimes within the region.

The SACU, comprising Botswana, Eswatini, Lesotho, Namibia, and South Africa, functions as a customs union facilitating trade among its member states (SACU, 2019) . Over the years, these countries have witnessed substantial currency depreciation, driven by various factors such as global economic trends, domestic policy decisions, and external shocks. While currency depreciation theoretically implies increased export competitiveness due to cheaper domestic goods in international markets (Mankiw, 2022), its actual impact on trade dynamics within SACU economies appears to be more complex.

Despite the depreciation of their currencies, SACU nations have struggled to achieve favourable trade balances, with persistent deficits undermining economic stability and growth prospects (see Figure 1.4: SACU countries Trade Balance). This raises questions about the efficacy of currency depreciation to stimulate exports and improve trade balances within the SACU framework. Moreover, the volatility in SACU revenue streams complicates the economic landscape, posing challenges for fiscal planning and resource allocation within member countries (Ramarenko & Erdier, 2011). Additionally, high levels of foreign debt, which in some cases constitute the largest portion of total debt across SACU Member States, leave them vulnerable to sudden shifts in investor sentiments (SACU, 2019). On average, from the 2005/06 – 2017/18 financial years, Botswana, Eswatini, Lesotho, Namibia, and South Africa's SACU revenue as a percentage of GDP amounted to 25%, 51%, 44%, 32%, and 3%, respectively (SACU, 2019). Therefore except for South Africa these member countries have a significant dependency on SACU revenue as their source of income (Ngalawa, 2014).

Furthermore, the socio-economic context of the SACU region adds another layer of complexity to the analysis. With high levels of income inequality and unemployment rates well above the global average, the impact of currency depreciation on trade dynamics must be viewed in conjunction with its implications for broader socio-economic indicators. Understanding how currency depreciation interacts with trade dynamics and influences employment, income distribution, and public finances is crucial for devising effective policy responses to address the economic challenges facing SACU countries.

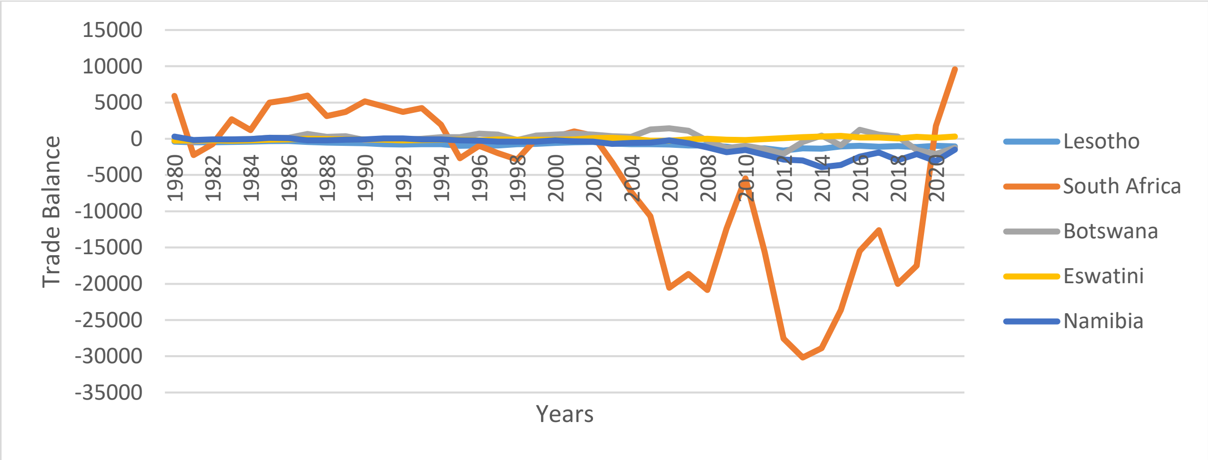
Figure 1.3: SACU exchange rate against US dollar



Source: Author's computations, with data sourced from World Bank Development Indicators

This graph shows the exchange rate trends for SACU member states from 1999 to 2022. It highlights significant fluctuations in exchange rates over the years, with an overall uptrend. Notable volatility is observed in South Africa, which uses the rand as the main currency in Common Monetary Area (CMA) countries, and Botswana.

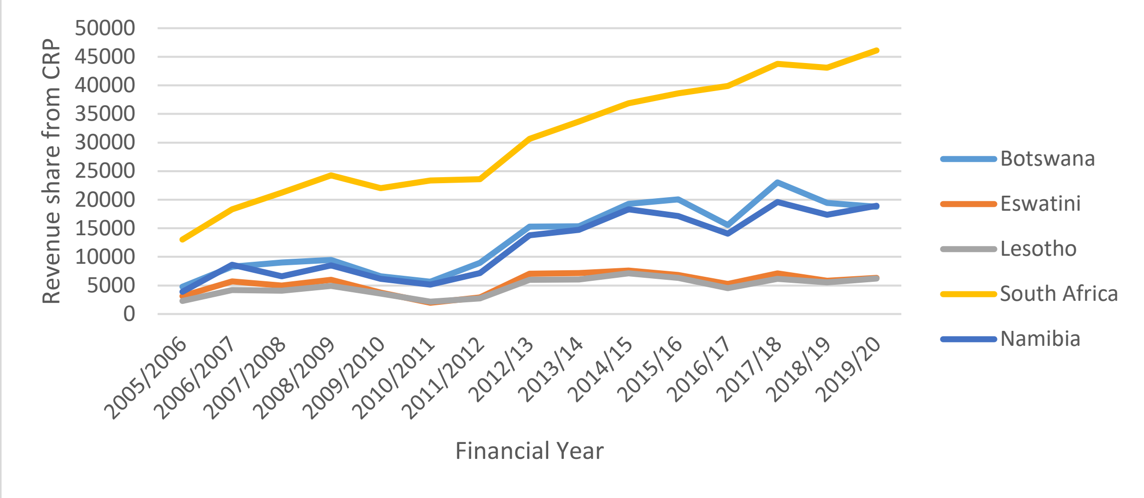
Figure 1.4: SACU countries Trade Balance



Source: Author's computations, with data sourced from World Bank Development Indicators

This graph illustrates the trade balance of SACU member states from 1980 to 2021. The data indicates persistent trade deficits in SACU countries, most notably in Lesotho and South Africa, contrasted with occasional surpluses in Botswana.

Figure 1.5: Revenue share from the common revenue pool

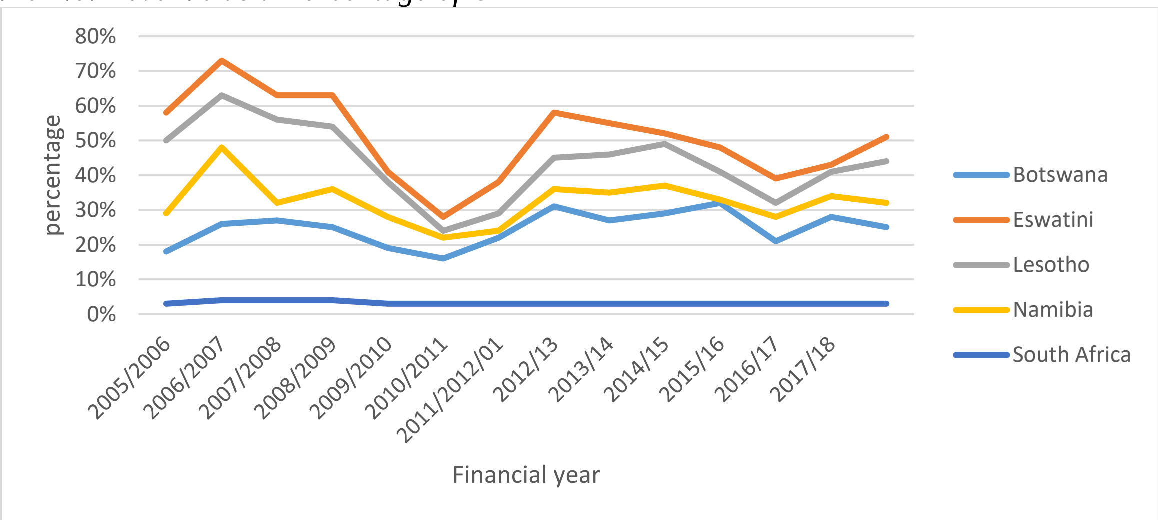


Source: Author's computations, with data sourced from World Bank Development Indicators

The Southern African Customs Union (SACU) Common Revenue Pool is a mechanism through which customs and excise revenues collected by member states are pooled and then distributed among the member countries. The distribution of these revenues is based on a revenue-sharing formula that considers factors such as each country's share of intra-SACU imports and its GDP. This system is crucial for smaller economies like Eswatini and Lesotho, where SACU revenue constitutes a significant proportion of their total government revenue and GDP.

The graph presents the revenue share from the common revenue pool among SACU member states over several financial years. It underscores the dependency of countries like Eswatini and Lesotho on SACU revenue as a significant portion of their GDP.

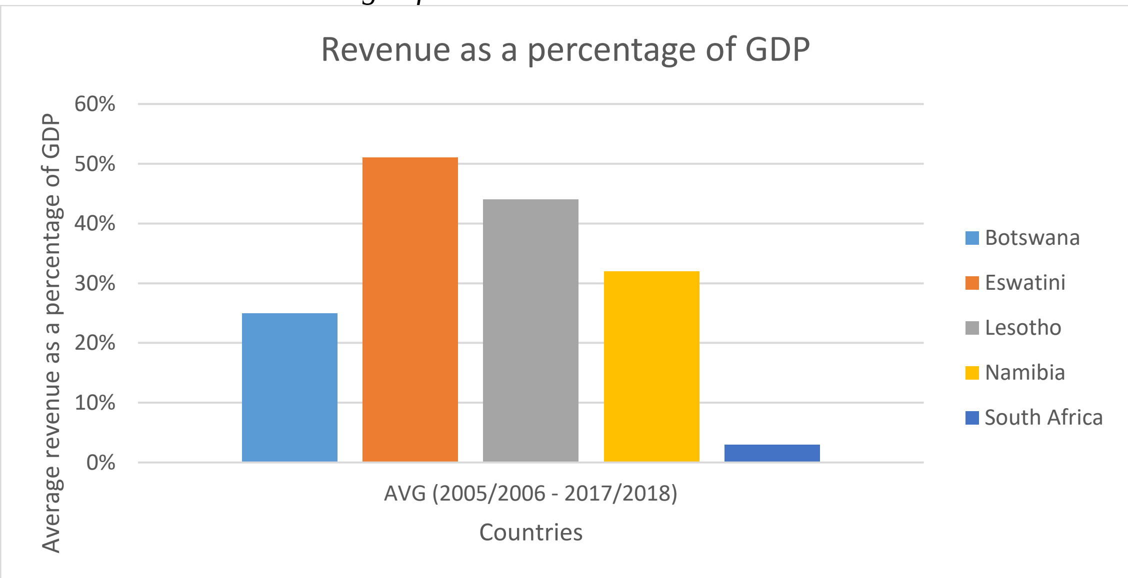
Figure 1.6: Revenue as a Percentage of GDP



Source: Author's computations using data sourced from Source Southern African Customs Union insights: from journey 15 years 2004 -2019

Revenue as a percentage of GDP shows that South Africa depends less on revenue from SACU, whereas the other SACU countries have significant dependency on SACU revenue (see Figure 1.6). Specifically, Eswatini and Lesotho exhibit the highest dependency on SACU revenue. For instance, in the financial year 2006/2007, Eswatini reached the highest percentage, at 70%.

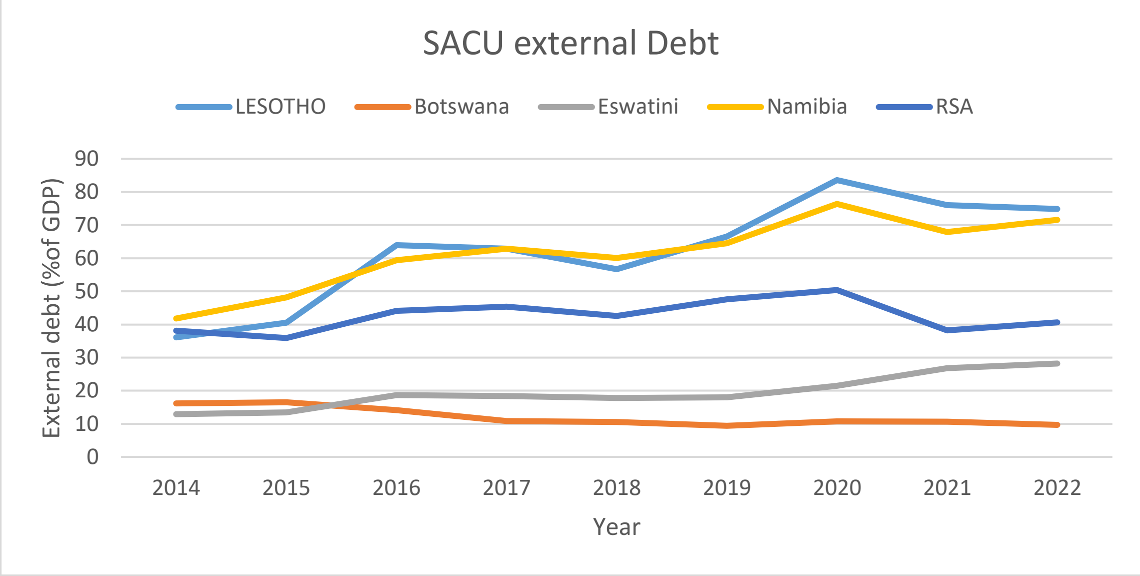
Figure 1.7: Revenue as Percentage of GDP in SACU Member States



Source: Author's computations using data sourced from Source Southern African Customs Union insights: from journey 15 years 2004 -2019

Revenue as a Percentage of GDP in SACU Member States shows revenue as a percentage of GDP in SACU in average terms. It can be seen from that Eswatini and Lesotho heavily depend on the SACU revenue.

Figure 1.8: SACU External Debt (% of GDP)



Source: Author's computations using data sourced from Focus Economics website

From Figure 1.8 (SACU External Debt (% of GDP)) above, it can be seen that Botswana has the lowest and declining external debt amongst all other SACU members, while other member countries' external debt is high and increasing in the long run. This observation is intriguing, especially considering Botswana's trade surplus as depicted in Figure 1.4: SACU countries Trade Balance.

1.3 The statement of the problem

The SACU (Southern African Customs Union) countries have undergone significant currency depreciation over the years, a phenomenon anticipated to enhance export competitiveness according to economic theory (Bloom & Reenen, 2013). However, contrary to expectations, these nations exhibit a pronounced fluctuation in trade balances, with many facing persistent trade deficits on average (see Figure 1.4: SACU countries Trade Balance). Empirical analysis reveals a stark contrast between developed and developing economies.

Developed economies typically enjoy positive trade balances with stable exchange rates (see Figure 1.1: The eurozone exchange rate against US dollar over the years from 1999 to 2022. and Figure 1.2: European Union Trade Balance), while developing economies, including SACU countries, generally face overall trade deficits when their currencies depreciate over time (see Figure 1.3: SACU exchange rate and Figure 1.4: SACU countries Trade Balance). Concurrently, SACU revenue streams have demonstrated considerable volatility making it very difficult to manage public Finances within SACU member countries (Sacu & Cma, 2010). A key factor contributing to the volatility of SACU transfers is the reliance on customs duties, which are inherently unstable, as the main revenue source for the common pool. Thus, trade performance is crucial for SACU revenue, which comprises the Customs Component, Excise Component, and Development Component, all linked to trade. Also, there is a notable upward trend in the external debt amongst the SACU member states (see Figure 1.8: SACU External Debt (% of GDP) Figure 1.8: SACU External Debt (% of GDP).

Furthermore, SACU is the most unequal region globally in terms of income distribution and Unemployment rates are relatively high in these five countries, averaging 24% in 2022 (42% for youth unemployment) (WTO, 2022). This incongruity between theoretical projections and empirical analysis prompts an urgent inquiry into the complex interplay between currency depreciation and trade dynamics within SACU economies.

While SACU aims to promote economic cooperation and integration among its member states, the impact of currency depreciation on trade remains inadequately understood. The available empirical literature investigating the effects of currency depreciation on trade in SACU countries is lacking. The only notable study in this area by (Mhaka et al., 2020) focuses on analysing the J-curve at the industry level. Haansende and Nyambe (2020) examined exchange rate volatility on trade using time series data and the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. However, to the best of my knowledge, this study is the first to employ the panel Autoregressive Distributed Lag (ARDL) pooled mean group approach to analyse the effects of currency depreciation using aggregated data within SACU countries. This methodology provides a more comprehensive understanding of the long-term and short-term impacts of currency depreciation on trade at a broader macroeconomic level. By capturing both the heterogeneous dynamics across countries and the common long-term equilibrium relationship, this approach offers robust insights into how currency depreciation influences trade patterns in the SACU region.

1.4 The purpose of the study

This study aims to assess the impact of currency depreciation on trade within the SACU region.

1.5 Objective and Research Question

The specific objective of this study are:

i. To investigate the impact of exchange rate depreciation on the trade balance within the SACU region.

Research question

i. How does exchange rate depreciation influence the overall trade balance of SACU member countries?

1.6 Significance of the study

While the impact of currency depreciation on trade competitiveness has been extensively studied, research often focuses on larger economies, leaving a gap in understanding its effects within smaller, economically interconnected regions like the Southern African Customs Union (SACU). Comprising Botswana, Lesotho, Namibia, South Africa, and Eswatini, SACU presents a unique context where diverse economic structures and close trade relationships significantly influence the outcomes of currency fluctuations. This study aims to fill this gap by investigating how currency depreciation specifically affects trade competitiveness within SACU, using quantitative methods to provide a comprehensive analysis.

The findings will contribute to a broader knowledge of international trade and regional economic integration by highlighting the unique impacts on smaller customs unions. Insights from this research will assist policymakers in SACU member states in formulating strategies to mitigate adverse effects and enhance trade competitiveness in the face of currency volatility. Additionally, businesses within the region can use these insights to better navigate challenges posed by fluctuating currencies, ultimately supporting economic stability and growth in the SACU region.

1.7 Scope and Limitations of the Study

This study examines the effects of currency depreciation on trade within the Southern African Customs Union (SACU) countries, specifically Botswana, Eswatini, Lesotho, Namibia, and South Africa, over the period from 2000 to 2022. The research focuses on understanding how fluctuations in exchange rates influence trade balances within these countries, using a Pooled Mean Group (PMG) regression model. The analysis incorporates key variables such as the real effective exchange rate, gross capital formation, inflation, trade openness, and the GDP per capita of trading partners to provide a comprehensive assessment of the trade dynamics in the SACU region.

However, the study faces several limitations. First, the availability and reliability of data pose significant challenges. Although efforts were made to obtain consistent and comprehensive data, certain variables may have missed or inconsistent data points, potentially impacting the results' robustness and accuracy. Second, while the PMG model is appropriate for capturing both long-term and short-term effects, it may not fully account for the complex interdependencies between variables in the SACU context. This limitation suggests that alternative modeling approaches might yield different insights.

Additionally, the scope of this study is confined to the SACU countries and, as such, the findings may not be directly applicable to other regions. The study relies on aggregated data, which may overlook industry-specific dynamics and the unique impacts of currency depreciation on various sectors.

Despite these limitations, the research contributes valuable insights into the relationship between currency depreciation and trade in the SACU region. It fills a gap in the existing literature on international trade and regional economic integration, providing a basis for policymakers to develop strategies that mitigate the adverse effects of exchange rate volatility on trade within the SACU framework.

1.8 Organisation of the Study

The remainder of this study is structured as follows: Chapter 2 provides a comprehensive review of the literature, including theoretical and empirical analyses of previous research by various scholars on exchange rates, trade, and related areas of study. Chapter 3 outlines the research methodology employed in the study which also details the model specification. Chapter 4 presents the results, offering detailed summaries and interpretations. Finally, Chapter 5 offers conclusion and policy recommendations based on the study's findings.

Chapter 2

2. LITERATURE REVIEW

2.1. Introduction

The theoretical, empirical, and synthesis of the literature on currency depreciation and its effects on trade are covered in this chapter. These are presented in sections 2.1, 2.2, and 2.3, respectively. The chapter analyses numerous studies on the factors influencing currency depreciation and the relationship between exchange rate adjustments and trade performance. The focus is on the case of SACU countries, examining how changes in currency values impact trade balances, export competitiveness, and overall economic stability within the Southern African Customs Union.

2.2. Theoretical literature

Theoretical literature suggests that fluctuations in exchange rates impact the relative prices of exportable and importable goods, thereby influencing a country's trade volume (Lubis & Abdul Karim, 2021).

2.2.1. The elasticities approach

The elasticities approach highlights how export and import demand are sensitive to shifts in relative pricing brought on by depreciating currencies (Tokarick, 2010). A depreciation of the domestic currency can stimulate exports if foreign demand for a country's goods is relatively elastic, leading to a significant increase in export volume despite the lower export prices (Tokarick, 2010). Similarly, when import prices rise as a result of currency depreciation, import demand may decline, particularly if domestic buyers choose to purchase domestically made alternatives (Tokarick, 2010).

The elasticities approach, though insightful for understanding how exchange rate fluctuations impact trade volumes, has several limitations in today's global economy. Modern production involves complex global supply chains, where cost changes due to exchange rate shifts are distributed across multiple stages and countries, making immediate adjustments difficult (Mayer & Steingress, 2020). Market structures, dominated by large firms and brand loyalties, reduce the responsiveness of trade volumes to price changes (Ahmed et al., 2015). Price adjustments are often delayed by menu costs and long-term contracts, while businesses may use hedging to mitigate currency risks (Mayer & Steingress, 2020); (Cave, 1992). Additionally, government interventions, trade agreements, and the inelastic nature of demand for certain goods further dampen the expected effects of currency depreciation on trade volumes (Cave, 1992). These factors collectively obscure the direct relationship between exchange rate changes and trade flows as posited by the elasticities approach.

The elasticities approach is particularly relevant to studying SACU countries, as it can provide insights into how exchange rate fluctuations might differentially impact each member's trade volumes based on their unique demand elasticities and trade compositions. It underscores the need to analyse the specific responsiveness of SACU countries' imports and exports to currency depreciation.

2.2.2. The Marshall-Lerner

The Marshall-Lerner (ML) condition posits that an exchange rate depreciation will improve a country's balance of payments if the sum of the demand elasticities for imports and exports exceeds one (Saccal, 2022).

However, its practical application in the current global economy is limited by several factors. These include the assumption of high demand elasticities, which are often low in reality; the time lags in trade volume adjustments, exemplified by the J-curve effect; the complexities of global value chains, which can increase costs of imported intermediates; variable currency pass-through rates; the influence of financial markets and central bank interventions; non-price competitiveness factors like product quality and technological advancements; the impact of exchange rate changes on income levels and inflation; and the challenges in accurately measuring trade elasticities (Karsten, 2016). These complexities mean that the ML condition provides only a simplified framework that may not fully capture the nuanced effects of exchange rate changes on trade balances.

For SACU, the Marshall-Lerner condition helps assess whether currency depreciation will effectively improve the trade balance of member countries. It emphasizes the importance of understanding the specific elasticities of SACU imports and exports, and how these might be influenced by regional integration and global value chains.

2.2.3. J-Curve Phenomenon

The J-curve hypothesis posits that the short-term impact of currency depreciation on trade may initially be negative before turning positive over time. In the short run, the volume of imports may increase due to contracts already in place or importers taking advantage of lower prices, while the increase in exports may be delayed as firms adjust to new market conditions (Kenton, 2020). Over the long term, however, the positive effects of currency depreciation on export competitiveness and import substitution are expected to outweigh the initial negative effects, resulting in an improvement in the trade balance (Bhat & Bhat, 2021a).

The J-curve concept, which suggests that a country's trade balance initially worsens following a depreciation before improving over time, faces several limitations in today's global economy. Modern economies' deep integration into global supply chains can increase the cost of imported inputs, offsetting gains from more competitive exports (Aylor et al., 2020). Short-term price stickiness due to pre-existing contracts and market rigidities can delay trade volume responses. Inelastic demand for essential goods limits the impact of price changes on trade volumes (Tutur2u, 2023). Currency pass-through variability, where firms absorb exchange rate fluctuations, can diminish the expected effects (Mehtiyev et al., 2021). Additionally, monetary and fiscal policy interventions to combat inflation, income effects reducing consumer demand, financial market volatility, non-price competitiveness factors like technology and quality, and structural economic changes all complicate the anticipated J-curve effect (Gordon, 2024). These complexities underscore the challenge of applying the J-curve theory to predict trade balance outcomes accurately.

The J-curve phenomenon is pertinent to SACU as it highlights the potential short-term versus long-term effects of currency depreciation on trade balances within the union. It provides a framework for understanding how immediate trade reactions might differ from long-term outcomes, which is crucial for policymakers in SACU countries.

2.2.4. Purchasing Power Parity (PPP)

In the theoretical literature, Purchasing Power Parity (PPP) serves as a fundamental concept in understanding exchange rate determination and its long-term equilibrium. PPP posits that in the absence of transportation costs and trade barriers, the exchange rate between two currencies should adjust to ensure that a basket of goods and services costs the same in both countries when priced in a common currency. This theory, articulated in both absolute and relative terms, helps explain how exchange rates respond to changes in price levels and inflation rates across countries (IG Markets Limited, 2020). It underscores the idea that currency depreciation should, in theory, enhance a country's export competitiveness by making its goods cheaper on the global market while making imports more expensive, thus influencing trade balances.

Purchasing Power Parity (PPP) theory, though essential in exchange rate economics, faces several limitations in the current global economy. Real-world market imperfections, such as transportation costs and trade barriers, prevent the law of one price from universally holding. PPP mainly applies to tradable goods, whereas non-traded goods and services like real estate vary significantly across countries. Short-term exchange rate volatility due to speculative trading and political events, differences in consumption baskets, structural economic changes, inflation measurement discrepancies, and deliberate currency manipulation further complicate PPP's application (The FRED Blog, 2022). Consequently, while PPP offers a valuable long-term benchmark for exchange rate equilibrium, it is less effective for short-term forecasting. It does not fully account for the complexities of modern global trade and finance.

PPP theory is relevant for analyzing long-term equilibrium exchange rates within SACU and understanding how currency depreciation affects price competitiveness over time. It provides a foundation for evaluating whether SACU currencies are aligned with their long-term purchasing power, helping to assess the potential impact on trade flows.

2.3 Empirical literature

Various studies have been carried out to explain the effect of exchange rates on the trade balance of both developed and developing countries. Studies showed mixed results, implying the uniqueness of each study conducted for a particular country or region. Some studies have shown the significant effect of exchange rates on trade balance, while others have found the opposite.

In recent years, there has been a growing body of literature examining the effects of currency depreciation on trade balances in various regions and countries. The Southern African Customs Union (SACU) region, comprised of Botswana, Namibia, Swaziland, Lesotho, and South Africa, presents an interesting case for studying these effects due to its unique economic dynamics and trade relationships. However, while several studies have explored the impact of currency depreciation on trade balances, there are notable weaknesses and critiques in the existing literature.

Izotov (2015) explored the impact of RMB appreciation on Russian-Chinese trade using regression analysis. The study found that RMB appreciation negatively affected Chinese imports and positively impacted Russian exports, particularly for commodity groups with insignificant shares in total bilateral trade. However, for major commodity groups, RMB appreciation had weak negative effects on Chinese exports to Russia and weak positive effects on Russian exports to China. Overall, RMB appreciation was projected to increase Russian exports to China and decrease Chinese imports to Russia without significant changes in the commodity structure of bilateral trade.

Abeysinghe and Yeok (1998) empirically analysed the impact of exchange rate appreciation on export competitiveness in Singapore. The study considered factors such as import content of exports and productivity improvements, using regression analysis. Results indicated that high import content in exports cushioned the adverse effects of currency appreciation on export competitiveness in Singapore. Despite productivity gains, service exports with low import content were negatively affected by currency appreciation. The study emphasised the importance of considering import content and productivity dynamics in assessing the impact of exchange rate movements on export competitiveness.

Işik, Radulescu, and Fedajev (2019) investigated the impact of exchange rate fluctuations on the tourism trade balance between Spain and Turkey using a non-linear ARDL cointegration approach. The study found that Euro depreciation positively influenced tourist arrivals from

Turkey, while Euro appreciation had no significant effect on Spain's tourism balance. Based on these findings, the study proposed policy recommendations to leverage exchange rate dynamics to boost tourism and enhance trade balance in the tourism sector between Spain and Turkey.

Lucarelli, Andrini and Bianchi (2018) analysed the impact of Euro depreciation on trade between Germany, Italy, and the US at the industry level. The study found evidence of a J-curve pattern, indicating initial deterioration followed by long-run improvement in trade balances. The findings highlighted the industry-specific effects of currency depreciation on trade dynamics.

Lubis and Abdul Karim (2021) contribute to understanding the effect of nominal exchange rate depreciation on trade balances in eleven Asian-African countries. Their study spans the period from 1980 to 2019 and examines the relationship between nominal exchange rate depreciation and trade balances, considering external factors such as commodity price crises and global financial crises. Utilising time-series autoregressive distributed lag (ARDL) models, the study finds a positive relationship between nominal exchange rate depreciation and trade in goods in both the long run and short run across most of the countries studied. However, the study also reveals a diminishing significance of the relationship between trade and foreign direct investment in the long run. While providing valuable insights into the impact of nominal exchange rate depreciation on trade balances, the study may face criticism for potential methodological limitations and the generalisability of findings across diverse country contexts.

Kurtović (2017) investigates the effect of the depreciation of the exchange rate on the trade balance of Albania. Utilising quarterly data from 1994 to 2015, the study employs bounds bounds-testing cointegration approach, vector error correction model (VECM), and impulse response analysis. The findings indicate a long-term cointegration between real effective exchange rate depreciation and the trade balance, with real effective exchange rate depreciation positively affecting the trade balance of Albania in both the long run and short run. However, the study's focus solely on Albania and its limited period of analysis may restrict the generalisability of its findings to other countries and periods. Additionally, while the study provides insights into the relationship between exchange rate depreciation and trade balance in the Albanian context, it may overlook broader structural factors influencing trade dynamics.

Mbam and Michael (2020) provide an analysis of the impact of exchange rate depreciation on Nigeria's export performance over the period 1981-2018. Utilising the Auto-Regressive

Distributed Lag (ARDL) model, the study examines the effects of exchange rate movements on both oil and non-oil exports, as well as total exports. The findings suggest a positive and significant impact of exchange rate depreciation on oil export performance and total export performance in both the short run and long run. However, the study also reveals a negative and insignificant effect of exchange rate depreciation on non-oil export performance in the long run. While the study offers valuable insights into the relationship between exchange rate movements and export performance in Nigeria, it may overlook other factors such as structural constraints, trade policies, and global market dynamics that could influence export outcomes.

Jiang and Liu (2023) contribute to understanding the impact of exchange rate changes on the trade balance, focusing on China and its major trading partners. Unlike previous studies, they employ a non-linear Autoregressive Distributed Lag (NARDL) model to examine nonlinear and asymmetric effects on trade balances. The findings reveal significant variations in the impact of exchange rate changes across different trading partners. While a genuine devaluation of the domestic currency improves China's trade balance with some partners, it worsens it with others. This study provides valuable insights into the complex relationship between exchange rate variations and trade balances, emphasising the need for tailored policy responses to different trading relationships. However, further research could explore additional factors influencing trade dynamics, such as trade agreements and market structures.

Doojav (2018) explores the effect of real exchange rate depreciation on trade balance in Mongolia, a resource-rich developing country. Using a vector error correction model, the study finds that exchange rate depreciation improves trade balance in both the short and long run. Specifically, the study observes the fulfilment of the Marshall–Lerner condition in the long run but finds no evidence of classic J-curve effects in the short run. The results suggest that exchange rate flexibility may help address current account deficits and exchange rate risk in resource-rich economies like Mongolia. However, the study's focus on a single country and its specific characteristics may limit the generalisability of its findings to other regions or economies within the SACU context.

Kumar, Begam, and Nargis (2020) focus on the impact of currency depreciation on exports in SAARC countries, including Bangladesh, India, Pakistan, and Sri Lanka. Employing panel ARDL and ECM techniques, the study examines the relationship between currency depreciation and exports from 1981 to 2017. The findings suggest an inverse association between currency depreciation and exports in the long run, with significant short-run implications. The study highlights factors such as the inelastic nature of exportable products, lack of market diversification, and limited regional integration among SAARC economies, which restrict the benefits of currency depreciation on exports. While the study provides valuable insights into the challenges faced by SAARC countries in enhancing export competitiveness, it may overlook certain country-specific factors and structural constraints influencing export dynamics.

Raza (2013) investigates the effects of currency depreciation on trade balances of developing economies, with a focus on South Asian countries. Using the Marshal-Lerner model and multiple regression analysis, the study explores the impact of currency depreciation on trade balances at the individual country level. The findings support the Marshal-Lerner model, indicating that currency depreciation does not always lead to an improvement in the trade balance. This study underscores the complexities involved in the relationship between currency depreciation and trade balances, emphasising the need for nuanced policy responses tailored to specific country contexts. However, it may face criticism for its reliance on cross-sectional data and potential limitations in capturing dynamic trade dynamics over time.

An investigation by (Bhat & Bhat, 2021b) offers insights into the asymmetric impact of exchange rate changes on India's trade balance, utilising an asymmetric non-linear cointegration approach. The study challenges conventional notions of the J-curve phenomenon, particularly in the Indian context. It suggests that in the short run, currency appreciation deteriorates the trade balance while depreciation improves it. However, in the long run, only the impact of currency depreciation is statistically significant. This study provides valuable insights into the nuanced relationship between exchange rate changes and trade balance, especially in emerging economies like India. However, it may overlook certain structural factors that could influence trade dynamics, such as trade policies, institutional frameworks, and global economic conditions.

Maulana *et al.*(2021) contribute to the literature by analysing the effect of depreciation and real exchange rate appreciation on Indonesia's tourism trade balance bilaterally against several countries, including Australia, China, Japan, Malaysia, and Singapore. Their study employs both linear and nonlinear ARDL approaches, considering various control variables such as income, foreign direct investment (FDI), and natural disasters. While the study offers valuable insights into the bilateral relations between Indonesia and its trading partners in the tourism sector, it faces criticism for its focus solely on the tourism trade balance, which may not fully represent the overall trade dynamics of Indonesia. The empirical results show that Chinese and Japanese tourists respond positively to the depreciation in the real currency rate of exchange, thereby increasing Indonesia's tourism trade balance.

Myoung (2017) examines the effects of the real exchange rate and its volatility on the trade balance and real GDP in a set of eighteen countries, mainly OECD-developed countries. Employing econometric procedures and empirical estimates, the study finds that real currency depreciation generally leads to an improvement in trade balance in most examined developed countries. However, it notes that the trade balances after real depreciation do not consistently follow J-curve patterns. Additionally, the study highlights mixed evidence regarding the effects of real exchange rate variability on trade balances and real GDP across countries. While offering valuable insights into the relationship between real exchange rate movements and trade balances, the study's focus on developed countries may limit its applicability to developing economies and regions like the SACU.

Mhaka, Ncwadi and Phiri (2020) examines industry-level evidence of J-Curve effects in the SACU region. By disaggregating trade activity at an industry level for 19 trade products, the researchers determine whether industries benefit or are disadvantaged during periods of currency depreciation over the short and long run. The study found that exchange rate depreciations would be beneficial in 8 out of the 19 trade industries in the SACU region whilst harming the remaining 11 industries. In the strict, theoretical sense the study only found J-curve effects in 6 of the 19 industries in which exchange depreciation initially hurt trade balances and then ‘adjust’ towards positive long-run effects. However, a weakness in this study lies in its reliance on panel regression specifications, which may not adequately capture the complex interactions and heterogeneity across industries. Additionally, while the study offers insights into potential policy implications, it may overlook broader structural factors influencing trade dynamics in the SACU region, such as institutional frameworks and regional integration efforts.

(Haansende & Nyambe, 2020) focuses on analysing the relationship between exchange rate volatility and trade balance in selected SACU member states, including Botswana, Namibia, Swaziland, and South Africa. Employing time series data from 1986 to 2016, the study utilises the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model, impulse response functions, and variance decompositions for analysis. While the study identifies a short-run relationship between exchange rate volatility and trade balance, it faces criticism for its limited scope, focusing solely on exchange rate volatility without considering other macroeconomic factors that could influence trade dynamics. Furthermore, the study's recommendations for central bank intervention to mitigate exchange rate volatility may overlook broader structural issues affecting trade competitiveness within the SACU region.

This literature review provides a comprehensive overview of studies investigating the relationship between currency depreciation/appreciation and trade balances across various regions and industries. Methodologically, the reviewed studies employed a range of quantitative techniques including regression analysis, ARDL models, VECM, and GARCH models to analyse the impacts of exchange rate movements on trade balances. Key findings from these studies include mixed effects of currency depreciation/appreciation on trade balances, with factors such as import content of exports, productivity dynamics, and industry-level effects playing significant roles. Weaknesses identified in some studies include limited sample sizes, potential data limitations, and varying degrees of generalisability due to specific regional or industry contexts.

Some of the existing research studies provide valuable insights into the relationship between exchange rate movements and trade balances in the Southern African Customs Union (SACU) region. Mhaka et al. (2020) focus on industry-level evidence of J-curve effects, investigating how currency depreciation affects trade balances across various sectors within SACU countries. They employ panel regression techniques to analyse the short- and long-term effects of exchange rate movements on trade balances for different industries. On the other hand, the study by Haansende and Nyambe (2020) examines exchange rate volatility and its impact on trade balances in SACU countries, utilising time series data and employing the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model.

However, there remains a notable gap in the literature regarding the comprehensive analysis of the effects of currency depreciation specifically on trade balances in SACU countries. While both Mhaka, Ncwadi and Phiri (2020) and Haansende and Nyambe (2020) touch upon aspects related to exchange rate dynamics and trade balances, a focused investigation into the direct effects of currency depreciation on trade balances is lacking. Specifically, the existing studies do not provide a thorough exploration of how currency depreciation, as opposed to general exchange rate movements or volatility, influences trade balances at both the industry and aggregate levels within the SACU region.

2.4 Synthesis of the Literature

The literature on currency depreciation and its effects on trade provides a rich tapestry of theoretical insights and empirical findings that inform our understanding of this complex relationship. This section synthesises the key themes, findings, and gaps identified in the reviewed studies, with a specific focus on the Southern African Customs Union (SACU) countries.

The literature on the effects of currency depreciation on trade reveals a varied relationship, with outcomes differing significantly across different economic contexts and methodological approaches. The theoretical foundations, including the elasticities approach, the Marshall-Lerner condition, the J-curve phenomenon, and the Purchasing Power Parity (PPP), provide a structured framework for understanding how exchange rate adjustments can influence trade balances. However, these theories face practical limitations when applied to contemporary global economies characterised by integrated supply chains, diverse market structures, and significant government and institutional interventions.

Empirical studies present mixed results, reflecting the diversity of economic structures and external conditions across countries. In developed economies, such as those examined by Myoung (2017), currency depreciation often leads to an improvement in trade balances. This is attributed to the relatively high elasticity of demand for imports and exports, robust institutional frameworks, and the presence of advanced production technologies that enhance export competitiveness. The studies by Lucarelli, Andrini and Bianchi (2018) and Maulana *et al.*(2021) reinforce this trend, demonstrating how currency depreciation positively affects trade balances in specific industries or bilateral trade relations within developed contexts.

In contrast, the evidence from emerging and developing economies, including the Southern African Customs Union (SACU) countries, is less consistent. Studies like those by Lubis and Abdul Karim (2021) and Kurtović (2017) indicate that while currency depreciation can stimulate trade balances in some developing nations, the effect is not uniformly positive. Factors such as the inelastic nature of certain export products, limited market diversification, and structural constraints often dilute the expected benefits of depreciation. For instance, in the SACU context, research by Mhaka, Ncwadi and Phiri (2020) and Haansende and Nyambe (2020) highlights industry-specific variations and the role of exchange rate volatility, suggesting that the trade outcomes of currency depreciation are heavily influenced by sectoral characteristics and external economic conditions.

Despite the wealth of theoretical and empirical studies, there are notable gaps in the literature concerning the direct effects of currency depreciation on trade balances in SACU countries. Existing studies often focus on broader exchange rate movements or volatility rather than isolating the impact of depreciation. Additionally, there is a need for more granular analyses at both industry and aggregate levels to fully capture the diverse economic dynamics within SACU. Conducting focused empirical studies that isolate the effects of currency depreciation on trade balances in SACU countries, considering both short-term and long-term impacts is necessary.

Chapter 3

3. METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used to assess the impact of currency depreciation on trade for SACU countries. The first section of the same chapter presents the details of the data used in this analysis, including the sources and descriptions. The succeeding one, section two presents the theoretical framework that relates to the impacts of currency depreciation on trade. The third section offers the empirical methodology, including the model specification, which aims to tentatively answer the research question. The last section concludes this chapter by presenting estimation techniques as well as robustness checks.

3.2 Data Sources

This study utilises a panel dataset covering the period from 2000 to 2022 for the five SACU countries: Lesotho, Botswana, Eswatini, South Africa, and Namibia. The timeframe was chosen primarily due to the availability and consistency of the required data starting from the year 2000. Data on trade balance were sourced from The Observatory of Economic Complexity, while data for the real effective exchange rate were obtained from the FRED website. Additionally, data for gross capital formation, inflation, and trade openness were acquired from the World Bank Indicators. Finally, data for the GDP per capita of trading partners were sourced from the World Integrated Trade Solution (WITS). The selected period allows for a comprehensive analysis of trade dynamics and economic indicators over a significant duration, providing insights into trends and patterns essential for this study.

3.3 Theoretical Framework

In this subsection, we explore the theoretical foundations guiding our investigation into the impacts of currency depreciation on trade. At the core of our analysis lies the examination of how fluctuations in the real exchange rate shape a nation's trade dynamics. The competitiveness of a country's exported goods hinges upon the real exchange rate, a factor influenced by various theories elucidating the effects of real depreciation on trade. Among these theories, the trade theory, elasticity approach, Marshall-Lerner condition, and J-curve stand out as pivotal frameworks collectively shedding light on the intricate relationship between currency depreciation and trade dynamics.

The paper attempts to examine the effects of currency depreciation on trade balance. The model to be employed will adhere to a direct formulation outlined in the research of Buluswar et al. (1996) Several important factors influencing the import, export, and trade balance of an economy will be taken into account as identified by economic theory. In this context, the trade balance of an economy will be defined as the difference between export revenue (X) and import revenue (M), thus, the trade balance of SACU is articulated as follows:

$$TB = X - M = P_X \, Q_X \left(\frac{P_X}{e}, Y^*\right) - eP_m^* \, Q_M \left(eP_m^*, Y\right) \quad (3.1)$$

where TB represents trade balance, X is export revenue, M is import expenditure, P_X is the SACU price of exports, Q_X is the quantity of exports, P_m^* is the foreign currency price of imports, Q_M is the quantity of imports, e is the value of foreign currency in terms of SACU currency, Y is the domestic national income, Y^* is foreign income

The Two-Country Imperfect Substitute Model

The two-country imperfect substitute model, developed by Rose and Yellen (1989), illuminates the connection between real exchange rates and trade balance in both the short and long term. According to this model, a depreciation of the real exchange rate enhances the trade balance. It assumes the absence of perfect substitutes for locally produced goods and services in both imports and exports, alongside positive price elasticities of demand and domestic and foreign income elasticities. Foreign income and the real exchange rate are found to positively influence the trade balance, while domestic income has a negative impact. The model's reduced form equation, linking the trade balance (TB) to the real exchange rate (RER), domestic income (Y), and foreign income Y^*, is:

$$TB = F(RER, Y - Y^*) \quad (3.2)$$

Despite its advantages, such as simplicity and independence from structural parameters, the model incorporates variables from other models and is therefore not entirely standalone. Nevertheless, it remains a valuable tool in analysing trade dynamics. Studies by various authors, including Bahmani-Oskooee and Ratha (2004), and Arize (1994), have yielded differing conclusions regarding the long-run relationship between exchange rates and trade balance when employing this model. Rose (1991) and Rose and Yellen (1989) observed insignificant effects of exchange rates on trade balance within this framework (Yassin sheikh Ali et al., 2016).

3.4 Estimation strategy

Traditional estimation techniques such as fixed and random effects, as well as GMM have been widely used in the estimation of panel data. The main critique of these conventional techniques is that they do not consider heterogeneity; an inherent issue in panel data analysis application. Furthermore, as argued by Kruiniger (2009), these techniques only permit the changes in the cross-sectional units 'intercepts. It is also imperative to note that cross-sectional dependence is of greater concern to modern researchers worldwide.

In this research, the time dimension is much greater than the cross-sectional dimension (22 years versus 5 countries), and the dynamic mean group estimators (MG and PMG) are well suited for these situations.

Equation 3 illustrates the model with a homogenous slope coefficient while Equation 4 demonstrates the panel model with a heterogeneous slope coefficient. Equation 4 demonstrates a panel model with a heterogeneous slope coefficient.

$$Y_{it} = a1_0 + \beta 1X1_{it} + \beta 2\, X2_{it} + \beta 3X3_{it} + \varepsilon_{it}$$
(3.3)

$$Y_{it} = a2_0 + B1_I X1_{it} + B2_I X2_{it} + B3_I X3_{it} + v_{it}$$
(3.4)

$Where\ \mathrm{i} = \mathrm{cross-section}, \mathrm{t} = \mathrm{time\ series}, \mathrm{y} = \mathrm{Dependent\ variable}, \mathrm{x} = \mathrm{independent\ variable}$. If Equation 3.3 holds, the panel model is estimated using conventional panel model techniques such as Fixed Effects (FE), Random Effects (RE), or Generalized Method of Moments (GMM). Conversely, if Equation 3.4 is valid, the panel model can be estimated using methodologies like Panel Mean Group (PMG) or Dynamic Mean Group (DMG). Nonetheless, model estimation with heterogeneous slope coefficients is often preferred in empirical research due to its greater consistency and alignment with economic realities (Fazli & Abbasi, 2018).

Equation 3.5 presents the DMG estimators with panel ARDL (p, $q_1, q_{2,} q_3, \ldots q_n$)

$$Y_{it} = \sum_{j=1}^{p} \gamma_{ij}\, Y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij}\, X_{i,t-j} + \mu_i + \varepsilon_{it}$$
(3.5)

where, Y_{it} = the dependent variable for Group i

X_{ij} = a vector of the independent variable of group i

δ_{ij} = vector of coefficients

$\mathrm{I} = 1,2,3, \dots, \mathrm{N}$ (groups)

$\mathrm{T} = 1, 2, 3 \dots, \mathrm{T}$ (Time)

However, it is more appropriate to estimate the model with the re-parameterisation of Equation 3.5. The analysis employs structured co-integration within the Dynamic Mean Group (DMG) framework to derive both long-run and short-run estimates. The selection between DMG variants, namely Average Mean Group (AMG) and Pooled Mean Group (PMG), is determined through the Hausman test.The PMG estimation assumes that error terms are independent and not serially correlated with explanatory variables (exogenous). Another crucial assumption of PMG is the existence of a long-term relationship between variables (both endogenous and exogenous). Additionally, PMG assumes that the parameters of the long run are consistent across different cross-sections, although they may vary in the short run. The PMG estimator also offers flexibility by allowing homogeneity in long-run coefficients across subgroups of countries or variables. Thus, employing this estimation approach can help mitigate conventional estimation challenges.

$$\Delta Y_{it} = \left(\varphi_i Y_{i,t-1} B_1' X_{it}\right) + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta Y_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}'^{*} \Delta X_{i,t-j} + \mu_i + \epsilon_i \quad (3.6)$$

The error correction from PMG is estimated as follows:

$$\Delta Y_{it} = \emptyset_i\left(Y_{i,t-1} - \vartheta_1' X_{it}\right) + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta Y_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}'^{*} \Delta X_{i,t-j} + \mu_i + \epsilon_i \quad (3.7)$$

The parameter $\emptyset_i$ represents the speed of adjustment term for error correction. A value of $\emptyset_i$ closer to zero suggests no evidence for a long-run relationship. It is anticipated that this parameter will be significantly negative under the assumption that variables return to a long-run equilibrium. Of particular significance is the vector ϑ', which encompasses the long-run relationships between the variables.

3.5. Model Specification

The generalised ARDL (p, q) model is specified as:

$$Y_{it} = \sum_{j=1}^{p} \delta_i \, Y_{I,y-j} + \sum_{i=0}^{q} B'_{ij} \; X_{i,t-j} \; + \; \varphi_i + \varepsilon_{it} \qquad (3.8)$$

In equation 3.8, y_{it} represents a vector of dependent variables, and (X_{it}) denotes a K $*$ 1 vector of explanatory variables, such as real effective exchange rate, gross capital formation, inflation, and trade openness. These explanatory variables can exhibit different degrees of stationarity, ranging from purely I (0) to I (1), or they may be co-integrated. δ_i represents the coefficient of the lagged dependent variable, often referred to as scalars. B'_{ij} represents 1 $*$ K coefficient vectors capturing the relationship between the explanatory variables and the dependent variable. φ_i denotes unit root-specific fixed effects. The index I range from 1 to N 1, representing the cross-sectional units, while t ranges from 1 to T, representing time. p and q represent the optimal lag orders. ε_{it} is the error term represented as N $*$ T matrix.

The study starts by assuming the following long-run relationship for trade measures

$$Y_{it} = \theta_{0i} + B1_{1i}REER_{it} + \; B2_{2i}GCF_{it} + \; B3_{3i}INF_{it} + \; B4_{4i}X_{it}^{4} + \; B5_{Ri}\, X_{it}^{R} + \; v_{it} \qquad (3.9)$$

The starting point will then be the following ARDL specification in its error correction form:

$$\Delta \, tade_{it} = \emptyset_i\big(\, trade_{i,t-1} - \, \vartheta'_1 \, X_{it}\big) + \sum_{j=1}^{p-1} \lambda^{*}_{ij} \; \Delta \, Y_{i,t-1} + \; \sum_{j=0}^{q-1} \delta'^{*}_{ij} \; \Delta \, X_{i,t-j} + \mu_i + \epsilon_i$$

(3.10)

3.5.1 The dependent variable: Trade

In this study, the outcome variables of interest are a vector of key trade indicators, specifically the trade balance. These variables serve as proxies for the trade dynamics within the SACU region

The trade balance represents the difference between a country's exports and imports. A positive trade balance indicates that a country exports more than it imports, while a negative balance suggests the opposite. Currency depreciation can impact the trade balance by altering the relative prices of exports and imports. A depreciation may improve the trade balance by stimulating exports and reducing imports, thereby narrowing the trade deficit or even generating a surplus.

3.5.2 Explanatory variables: Determinants of trade.

This study selects several factors that determine trade competitiveness. It is also worth noting that different studies identify many variables, but this study's choice is based on the availability of data.

The Real Effective Exchange Rate (REER) reflects the weighted average of a country's currency relative to a basket of other major currencies, adjusted for inflation. Unlike the real exchange rate, which considers the price levels of a single foreign country and the domestic country, REER incorporates multiple foreign countries' price levels, providing a more comprehensive measure of a country's competitiveness in the global market. A depreciation of the REER is expected to make domestic goods relatively cheaper for foreign buyers, potentially boosting exports and reducing imports. Therefore, we anticipate a positive relationship between the REER and exports and a negative relationship between the REER and imports.

Gross capital formation represents the total value of investments in physical assets such as infrastructure, machinery, and equipment. Higher levels of investment can contribute to increased production capacity and economic activity, potentially leading to higher levels of both exports and imports. Therefore, we hypothesise a positive relationship between gross capital formation and exports, and between gross capital formation and imports.

Inflation refers to the rate at which the general price level of goods and services in an economy increases over time. High inflation rates can erode the competitiveness of domestic goods in international markets, potentially dampening export levels. Conversely, inflation may also stimulate imports as consumers seek lower-priced foreign goods. Therefore, the relationship between inflation and trade balance is ambiguous, but it is generally expected to be negative for exports and positive for imports.

Trade openness measures the degree to which a country engages in international trade relative to its total economic activity. Higher levels of trade openness indicate greater integration into the global economy, which can stimulate both exports and imports. Therefore, we anticipate a positive relationship between trade openness and both exports and imports.

GDP per capita of trading partners represents the economic strength and consumer purchasing power of the countries with which a SACU member trades. By calculating the weighted average GDP per capita of the top five trading partners, we capture a comprehensive measure that reflects the relative economic environments of these partners. A higher GDP per capita of trading partners suggests stronger economies with greater purchasing power, which can lead to increased demand for imports from SACU countries, thereby boosting exports.

Conversely, economically stronger trading partners might also supply more competitive goods, potentially increasing imports to SACU countries. Therefore, we anticipate a positive relationship between the GDP per capita of trading partners and both exports and imports.

Table 3.1 - Description of the variables and Data sources

variable	Notation	Measure	Data source
Trade Balance	TB	Annual trade difference between exports and imports (Current US $)	The Observatory of Economic Complexity (OEC)
Real effective exchange rate	REER	Weighted averages of bilateral exchange rates adjusted by relative consumer prices (index).	FRED
Gross capital formation	GCF	The annual growth in the gross net investment in fixed capital assets by enterprises, government, and household (% GDP)	World Development Indicator
Inflation	INF	Inflation, GDP deflator annual percentage growth (%)	World Development Indicator
Trade openness	TO	The sum of exports and imports of goods and services measured as a share of the gross domestic product (% GDP)	World Development Indicator
GDP per capita of trading partner	GDPPCTP	Top 5 of SACU member trading partner's average GDP per capita over the years (weighted average)	World Integrated Trading Solutions (WITS)

Source: Author's compilation

3.6 Econometric Techniques

In this section, we detail the econometric techniques employed in estimating the Panel ARDL PMG model.

3.6.1 Selection of Lag Lengths

First, the selection of lag lengths is crucial to accurately capture the dynamics between variables (Pickard et al., 2003). This involves using information criteria such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), and Hannan-Quinn Criterion (HQC) to determine the optimal lag lengths for each variable. Ensuring that these selected lags are appropriate for both the dependent and independent variables across all panels is essential (Anderson, 2002).

3.6.2 Unit Root Test

Next, testing for unit roots is conducted to confirm that the series is stationary (McNown et al., 2023). This is a prerequisite for reliable ARDL estimation. We employ several tests including the Augmented Dickey-Fuller (ADF) test, which checks for unit roots in individual time series; the Phillips-Perron (PP) test, adjusting for serial correlation and heteroskedasticity; and the Im-Pesaran-Shin (IPS) test, a panel unit root test allowing for heterogeneous coefficients (Bornhorst & Baum, 2007). The aim is to ensure that the variables are integrated of order one, I (1), or stationary at level, I (0).

3..6.3 Cointegration Tests

Following this, cointegration tests are performed to verify the long-term equilibrium relationship among the variables (Yussuf, 2022). We utilise the Pedroni Cointegration Test, which accounts for heterogeneous intercepts and trend coefficients across panels, the Kao Test, which assumes homogeneous cointegrating vectors across panels, and the Fisher-Johansen Test, which combines Johansen's cointegration test in a panel setting (Örsal, 2007). If cointegration is present, we proceed with the PMG estimation.

3.6.4 Description of the Estimation Procedure

The estimation procedure itself involves capturing both short-run and long-run dynamics. The ARDL model is formulated as:

$\Delta Y_{it} = \left(\varphi_i Y_{i,t-1} B_1' X_{it}\right) + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta Y_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}'^{*} \Delta X_{i,t-j} + \mu_i + \epsilon_i$, as seen in Equation 3.6 above. The Error Correction Model (ECM) representation is then given by:

$\Delta Y_{it} = \emptyset_i (Y_{i,t-1} - \vartheta_1' X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta Y_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}'^* \Delta X_{i,t-j} + \mu_i + \epsilon_i$ as seen in Equation 3.7 above.

3.7 Diagnostics tests

The diagnostic tests are carried out following the computation of the Panel ARDL (PMG) model. Diagnostic tests are a set of techniques utilised for regression evaluation that aim to evaluate the validity of a model. The diagnostic tests include testing for heteroscedasticity, serial correlation, normality, and stability of the model.

3.7.1 Heteroscedasticity Tests

Heteroskedasticity tests, specifically the Breusch-Pagan test, are used to assess whether the variance of the residuals is constant. This test is applied to the residuals, and the P-value is evaluated to confirm homoskedasticity.

7.7.2 Serial Correlation

To begin with, serial correlation tests, such as the Breusch-Godfrey test, are applied to detect serial correlation in the residuals of the regression model. The test is run on the residuals of the ARDL model, and the p-values are checked to determine the presence of serial correlation.

3.7.3 Normality

Furthermore, normality tests are employed to establish whether the collection of data fits a normal distribution model well and to estimate the chance that a random variable underlying the collection of data is distributed normally. The null hypothesis suggests normal distribution in the errors and if the p-value is less than the selected significance level when conducting the test can lead to it being rejected.

3.7.4 Stability of the model

Stability tests are essential to check the stability of the regression coefficients over time. The CUSUM test plots the cumulative sum of recursive residuals to assess whether the CUSUM line stays within the 5% significance bounds. Similarly, the CUSUMSQ test, which uses squared residuals, evaluates the stability through a plot of the cumulative sum of squared recursive residuals, ensuring it remains within the critical bounds.

Chapter 4

4. DATA PRESENTATION, ANALYSIS AND INTERPRETATION/DISCUSSION OF RESULTS

This chapter includes the summary statistics of the variables and the findings from various estimation approaches covered in Chapter three, along with their interpretations.

4.1 Summary Statistics

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln TB	115	.394	20.73	-23.50	24.55
Ln REER	115	4.51	.13	4.26	4.96
Ln GCF	115	3.06	.33	2.47	3.72
Ln INF	115	-2.64	1.22	-3.97	4.97
Ln TO	115	4.55	.38	3.82	5.35
Ln GDPPCTP	115	8.1	.62	6.46	9.01

Source: Author’s computation using World Bank data

The descriptive Statistics in

Table 4.1 provide an overview of the six key variables relevant to the analysis of the effects of currency depreciation on trade.The significant variability in the trade balance among SACU countries, with a mean of 0.39 and a standard deviation of 20.73, may be indicative of short-term adjustments post-currency depreciation, as described by the J-Curve effect (Krugman and Obstfeld, 2003). According to (Menyah et al., 2014), similar volatility in trade balances was observed in other developing countries undergoing exchange rate adjustments, highlighting the role of price elasticity in determining the impact on trade. The Marshall-Lerner Condition suggests that for SACU countries, the sum of price elasticities might be low, explaining the observed fluctuations (Krugman et al., 2018)

These statistics highlight the diverse economic conditions within SACU, emphasising the need for targeted economic policies to address each country's unique challenges and opportunities. The wide range in trade balance and inflation underscores differing economic environments, impacting trade dynamics and overall economic stability in the region. The variation in GDP per capita among partner countries also reflects the diverse economic contexts that SACU countries engage with in trade.

4.2. CORRELATION ANALYSIS

Table 4.2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Ln TB	**1.000**					
(2) Ln REER	**-0.209***	**1.000**				
	(0.025)					
(3) Ln GCF	**-0.567***	**0.200***	**1.000**			
	(0.000)	**(0.032)**				
(4) Ln INF	**-0.045**	**0.178**	**0.188***	**1.000**		
	(0.636)	**(0.057)**	**(0.044)**			
(5) Ln TO	**-0.400***	**0.272***	**0.526***	**0.148**	**1.000**	
	(0.000)	**(0.003)**	**(0.000)**	**(0.113)**		
(6) Ln GDPPCTP	**-0.332***	**0.132**	**0.589***	**0.052**	**0.091**	**1.000**
	(0.000)	**(0.159)**	**(0.000)**	**(0.581)**	**(0.336)**	

Notes: ****** p-value <0.01; ** p- value <0.05; * p- value <0.1***

Source: Author's computation using World Bank Development indicators

The correlation matrix presented in

Table 4.2 illustrates the linear relationships and strengths among key variables in the study. The regressors are not linearly dependent on one another, indicating no perfect linear relationships among the variables. The trade balance has a weak negative correlation with the real effective exchange rate (-0.209, $p = 0.025$), suggesting that as the currency depreciates, the trade balance slightly improves. The gross capital formation shows a significant negative correlation with the trade balance (-0.567, $p < 0.001$), indicating that higher capital investment is associated with a worse trade balance.

Interestingly, trade openness has a statistically significant negative correlation with the trade balance (-0.400, $p < 0.001$), implying that countries with higher trade openness tend to have worse trade balances. Additionally, GDP per capita for partner countries has a significant negative correlation with the trade balance (-0.332, p < 0.001), suggesting that higher GDP per capita in partner countries is associated with a worse trade balance for the SACU countries.

Gross capital formation is positively correlated with the log of the real effective exchange rate (0.200, p = 0.032), suggesting that higher capital formation is associated with a relatively stronger currency. There is also a notable positive correlation between gross capital formation and inflation (0.188, p = 0.044), indicating that higher investments might be accompanied by higher inflation rates. Trade openness shows significant positive correlations with both real effective exchange rates (0.272, p = 0.003) and gross capital formation (0.526, p<0.001), reflecting that countries with more open trade policies and higher investments tend to have stronger currencies and higher capital formation.

Furthermore, GDP per capita for partner countries is positively correlated with gross capital formation (0.589, p < 0.001), indicating that trade with wealthier partner countries is associated with higher capital formation within the SACU countries. These correlations underscore the interconnectedness of trade policies, investment levels, and economic conditions within the SACU countries.

4.3. Pesaran's CD-test for Cross-sectional Dependence

Table 4.3: Cross-sectional dependence test on the residual of the independent variables

variable	Breusch-Pagan	Pesaran ScaledLM	Pesaran CD
Ln TB	27.72781***	3.964081***	3.139652***
Ln REER	104.1085***	21.04331***	9.316206***
Ln GCF	14.25220	0.950820	1.549321
Ln INF	15.57379	1.246336	0.234960
Ln TO	17.19006*	1.607747	1.559854
Ln GDPPCTP	22.42768**	2.778913***	-0.620923

Notes: ***** p- value <0.01; ** p- value <0.05; * p- value <0.1. The null hypothesis is that there is no cross-sectional dependence within the panel (Ho = Heterogeneous panel).***

Table 4.3 presents the results of cross-sectional dependence tests on the residuals of the independent variables, which are essential for identifying whether there is correlation between the residuals across different cross-sections [1]. Cross-sectional dependence in panel data implies that the residuals of the dependent variable across different entities (countries) are correlated. The cross-sectional dependence tests reveal varied levels of significance, particularly emphasising the Pesaran CD test. For the trade balance, both the Breusch-Pagan LM (27.72781***) and Pesaran Scaled LM (3.964081***) tests indicate significant dependence at the 1% level, while the Pesaran CD (3.139652***) also shows significance, suggesting strong dependence. The real effective exchange rate demonstrates strong cross-sectional dependence according to the Pesaran CD test (9.316206***), which is highly significant ($p<0.01$).

In contrast, the gross capital formation, while not showing significant dependence in the Breusch-Pagan LM (14.25220) and Pesaran Scaled LM (0.950820) tests, exhibits weak dependence according to the Pesaran CD test (1.549321). Inflation, however, does not exhibit strong cross-sectional dependence across all tests, with the Pesaran CD test showing only weak significance (0.234960*). For the log of trade openness, while the Breusch-Pagan LM (17.19006*) is significant at the 5% level, the Pesaran CD (1.559854*) is significant at the 10% level, suggesting some degree of cross-sectional dependence overall.

Additionally, for GDP per capita for trading partners, the Pesaran CD test reveals weak cross-sectional dependence (-0.620923), suggesting limited correlation among the residuals of this variable across different countries. These results underscore the significance of the Pesaran CD test in identifying cross-sectional dependence and its implications for panel data analysis.

[1] For the analysis, we focused on Pesaran's CD test due to its advantages in panel data models. Pesaran's CD test is robust to a wide range of situations, including those with small cross-sectional and large time dimensions, and it performs well even under strong cross-sectional dependence. This makes it particularly suitable for our study, which involves panel data with potential cross-sectional dependencies.

4.4. Unit root resultsTable 4.4: Panel unit test Results

First-generation panel unit root tests (not applicable under cross-sectional dependence)											
LLC Test (trend and intercept)						**IPS Test (trend and intercept)**					
I (0)			**I (1)**			**I (0)**			**I (1)**		
	t-stat	**Prob**	**t-stat**	**prob**	**decision**		**t-stat**	**Prob.**	**t-stat**	**Prob.**	**Decision**
Ln GCF	-1.744	0.041	-7.082	0.000	I (1)		-0.312	0.622	-6.750	0.000	I (1)
Ln INF	-4.120	0.000	-11.340	0.000	I (0)		-3.566	0.000	-10.240	0.000	I (0)
Ln TO	-0.633	0.263	-6.061	0.000	I (1)		0.389	0.651	-5.600	0.000	I (1)
Ln GDPPCTP	-3.962	0.000	-11.270	0.000	I (0)		-3.132	0.000	-10.691	0.000	I (0)
Fisher dfuller test					**Hadri test**						
Ln GCF	2.844	0.002	5.147	0.000	I (0)		10.832	0.000	-0.616	0.731	I (0)
Ln INF	5.085	0.000	13.679	0.000	I (0)		-0.537	0.704	-2.049	0.980	I (-)
Ln TO	1.069	0.142	9.148	0.000	I (1)		12.773	0.000	-0.701	0.758	I (0)
Ln GDPPCTP	2.461	0.007	16.883	0.000			4.600	0.000	-1.808	0.965	I (0)
Breitung test											
Ln GCF	-0.238	0.406	-2.966	0.406	I (1)						
Ln INF	-2.543	0.006	-3.062	0.001	I (0)						
Ln TO	-1.284	0.099	-2.991	0.001	I (1)						
Ln GDPPCTP	-2.414	0.008	-4.981	0.000	I (0)						
Second-generation panel unit root tests (applicable in the presence of cross-sectional dependence											
Pescadf test						**Xtcips test**					

I (0)			I (1)		Decision	I (0)			I (1)		Decision
Ln TB	-3.858	0.000	-4.409	0.000	I (0)		-4.346	0.000	-5.210	0.000	I (0)
Ln REER	-2.134	0.000	-3.623	0.000	I (0)		-1.940	0.002	-4.337	0.000	I (0)

Notes: Several first generational unit root tests were undertaken (Fisher-type unit-root test based on augmented Dickey–Fuller tests, and, Im–Pesaran–Shin (IPS) unit-root test. I (0) and I (1) represent an integration of orders 0 and 1, respectively. Second-generation unit root tests such as Pescadf and Xtcips were also undertaken.
Source: Authors' computations

Table 4.4 displays the results of various panel unit root tests, which assess the stationarity of the variables in the dataset. The results reveal varying levels of stationarity across the variables, indicating that some may need transformation before further analysis, ensuring that the model is built on stable, reliable data. The first-generation tests indicate that gross capital formation manifests stationarity in both levels and first differences, as evidenced by the statistically significant outcomes under the Levin-Lin-Chu (LLC) criterion. Inflation is also found to be stationary at both levels and first differences. Trade openness is only significant at first difference. GDP Per Capita of Trading Partners is significant in both at levels and at first difference.

The second-generation tests, which accommodate cross-sectional dependence, assert that trade balance and real effective exchange rate maintain stationarity at both levels and first differences, as indicated by the Pescadf and Xtcips tests ($p < 0.05$ and $p < 0.01$, respectively). These findings underscore the pivotal role of acknowledging cross-sectional dependence in ascertaining stationarity within panel data (Green, 2012; Pesaran, 2014).

4.5 Co-integration results

Table 4. 5: First Generational co-integrational test.

	Statistic	**p-value**
Modified Dickey-Fuller t	**-1.7537**	**0.0397**
Dickey-Fuller t	**-1.6937**	**0.0452**
Augmented Dickey-Fuller t	**-2.3982**	**0.0082**
Unadjusted Modified Dickey-Fuller t	**-3.0273**	**0.0012**
Unadjusted Dickey-Fuller t	**-2.1974**	**0.0140**

Source: Author's computation using World Bank Development indicators

Table 4.6: Second-generation panel cointegration tests

Statistic	Value	Z - value	P – value
Gt	-1.181	-0.440	0.330
Ga	-4.175	-0.183	0.427
Pt	-3.857	-2.326	0.010
Pa	-5.763	-3.658	0.000

Source: Author's computation using World Bank Development indicators

The first generational Pedroni test results indicate mixed evidence regarding cointegration. While the Modified Dickey-Fuller t statistic suggests some evidence of cointegration with borderline significance (p = 0.0397), the Dickey-Fuller t statistic also rejects the null hypothesis of no cointegration, indicating significant evidence (p = 0.0452). Additionally, the Augmented Dickey-Fuller t statistic strongly rejects the null hypothesis (p = 0.0082), further supporting cointegration. However, the Unadjusted Modified Dickey-Fuller t statistic is significant (p = 0.0012), suggesting stronger evidence compared to the other tests.

Moving to the second-generation panel cointegration tests, the Gt statistic does not reach significance (p = 0.330), suggesting insufficient evidence of cointegration. Similarly, the Ga statistic also fails to reach significance (p = 0.427), indicating no strong evidence against the null hypothesis. However, the Pt statistic is significant at the 1% level (p = 0.010), providing robust evidence of cointegration. Moreover, the Pa statistic is highly significant ($p < 0.001$), further supporting the presence of cointegration.

4.6 Results of Hausman test

Table 4.7: Hausman (1978) specification test between Dynamic Fixed Effects (DFE) and PMG

	Coef.
Chi-square test value	0.10
P-value	.9999

The acceptance of the alternative hypothesis in Table 4.7: Hausman (1978) specification test between Dynamic Fixed Effects (DFE) and PMG allows the employment of the PMG-ARDL technique. Thus, the result of the Hausman test allows us to estimate the dynamics of the main model (Fazli & Abbasi, 2018)

4.7. Optimal lag selection

Table 4. 8: Optimal lag selection

Variables	Lag
Ln TB	1
Ln REER	0
Ln GCF	0
Ln INF	0
Ln TO	1
Ln GDPPC-Trading partner	0

The optimal lag lengths in Table 4. 8 were selected using the Schwarz Bayesian Criterion (BIC), which is the default criterion in Stata. BIC is known for favoring more parsimonious models by imposing a larger penalty for additional parameters, leading to a model that balances goodness of fit and model simplicity. The optimal lag lengths are (1 0 0 0 1 0) for trade balance, real effective exchange rate, gross capital formation, inflation, trade openness, and gross domestic product per capita of trading partners respectively.

4.8. Pooled mean group (PMG) Regression results

Table 4. 9: long-run estimates

Dependent variable: d (log of trade balance)

Estimated model: f[Ln (REER), Ln(inflation), Ln(GCF)]

Model selection method: Schwarz criterion (BIC)

Selected Lag Length: (1 0 0 0 1 0) Variables

Variables	Coefficients	Std. error	Z- Statistic	Prob.
Ln REER	-63.21995**	24.62566	-2.57	0.010
Ln GCF	-64.50987***	18.54537	-3.48	0.001
Ln INF	6.112298**	2.795987	-2.19	0.029
Ln TO	48.89513***	17.01924	2.87	0.004
Ln GDPPCTP.	6.520902	5.632688	1.16	0.247

The coefficient for Real Effective Exchange Rate (REER) is -63.21995 with a standard error of 24.62566, yielding a Z-statistic of -2.57 and a p-value of 0.010. This negative and statistically significant coefficient suggests that, in the long run, an increase in the real effective exchange rate is associated with a deterioration in the trade balance. Specifically, a one percent increase in the real effective exchange rate leads to a 63.22 percent decline in the trade balance. This implies that currency depreciation negatively impacts the trade balance in the SACU countries within the sample period. These results align with previous studies, such as those of (Kofoworade, 2023), and (Phan & Jeong, 2015).

The coefficient for Gross Capital Formation (GCF) is -64.50987 with a standard error of 18.54537, yielding a Z-statistic of -3.48 and a p-value of 0.001. This negative and statistically significant coefficient indicates that higher gross capital formation is associated with a lower trade balance. This relationship is likely due to the increased imports of capital goods that often accompany higher levels of capital formation, leading to a deterioration in the trade balance.These results are consistent with the findings of this study and those of (Abille & Meçik, 2023). In the present study, the negative effect of GCF on the trade balance is explained by the increase in imports of capital goods, which negatively affects the trade balance. Similarly, (Abille & Meçik, 2023) identified a negative impact of increased domestic economic activity on trade balances, although they examined this through the domestic income variable rather than capital formation directly. Both studies highlight that higher domestic economic activity, whether driven by increased income or capital formation, tends to boost imports, thereby negatively affecting the trade balance.

The coefficient for inflation (INF) is 6.112298 with a standard error of 2.795987, yielding a Z-statistic of 2.19 and a p-value of 0.029. This positive and statistically significant coefficient suggests that higher inflation is associated with an improvement in the trade balance. Specifically, a one percent increase in inflation leads to a 6.11 percent increase in the trade balance. These results align with previous studies, such as those of Yiheyis and Musila(2018), who show that an increase in relative income and a real depreciation are both found to be inflationary and statistically significant in the long run.

The coefficient for trade openness is 48.89513 with a standard error of 17.01924, yielding a Z-statistic of 2.87 and a p-value of 0.004. This positive and statistically significant coefficient suggests that increased trade openness substantially boosts the trade balance. Specifically, greater integration into the global economy enhances export performance and trade dynamics in SACU countries. These findings align with the studies of Baharin and Guangqin(2023) which also observed that higher trade openness positively impacts the trade balance. The rationale behind this relationship is that greater openness allows countries to exploit their comparative advantages more effectively, thereby increasing export volumes and improving the trade balance. Furthermore, increased trade openness often leads to better access to larger markets, advanced technologies, and investment opportunities, all of which contribute to a healthier trade balance.

The coefficient for the GDP Per capita of trading partner is 6.520902 with a standard error of 5.632688, yielding a Z-statistic of 1.16 and a p-value of 0.247. This positive coefficient suggests that higher GDP per capita of trading partners is associated with an improvement in the trade balance. However, the high p-value indicates that this relationship is not statistically significant, implying that changes in the GDP per capita of trading partners do not have a substantial impact on the trade balance in the SACU countries within the sample period.

Table 4.10: Short-run estimates

Dependent variable: d (log of trade balance)

Estimated model: f [Ln (REER), Ln(inflation), Ln (GCF)]

Model selection method: Schwarz criterion (BIC)

Selected Lag Length: (1 0 0 0 1 0) Variables

Variables	Coefficients	Std. error	Z- Statistic	Prob.
ECT	-.5576339***	.1597635	-3.49	0.000
Ln REER				
D1.	-.6974195	19.02022	-0.04	0.971
Ln GCF				
D1.	20.57894	18.53411	1.11	0.267
Ln INF				
D1.	-.9305035	3.482148	-0.27	0.789
Ln TO				
D1	-23.42895	22.26572	-1.05	0.293
Ln GDPPCTP				
D1	16.57016*	7.780685	2.13	0.033
Constant	128.3422***	35.80632	3.58	0.000

Notes: ***Indicates significance level at 1%, **Indicates significance level 5%, *Indicates significance level 10%
Source: Author's computation using World Bank Development indicators

Table 4.10 presents the short-run coefficients of the panel model. The error correction term (ECT) is highly significant (p = 0.000) and negative (-0.5576339), indicating a strong adjustment mechanism where deviations from the long-run equilibrium in the trade balance are corrected at a rate of approximately 56% per period. This confirms a robust long-run relationship among the variables, with any short-term disequilibrium being rapidly corrected.

In the short-run dynamics, the real effective exchange rate (REER) does not show a significant impact on the trade balance, as indicated by the coefficient of -0.6974195 with a high p-value (0.971). This suggests that short-term fluctuations in REER do not significantly influence the trade balance. Gross capital formation (GCF) also does not show a significant impact in the short run, with a coefficient of 20.57894 and a p-value of 0.267, indicating that immediate changes in GCF are not significantly affecting the trade balance. Inflation, measured by the log of inflation, has a coefficient of -0.9305035 with a p-value of 0.789, showing that short-term changes in inflation do not significantly impact the trade balance.

Trade openness, although not significant at conventional levels, shows a relatively large negative coefficient (-23.42895) with a p-value of 0.293, suggesting that increased trade openness could initially lead to higher imports, outweighing export gains, but this effect is not statistically significant. Lastly, the GDP per capita of trade partners has a significant positive impact on the trade balance in the short run, with a coefficient of 16.57016 and a p-value of 0.033. This implies that an increase in the economic performance of trade partners positively influences the trade balance. The constant term is statistically significant (p = 0.000), meaning it is unlikely to have occurred by chance. However, despite its statistical significance, its large magnitude (128.3422) suggests that it may not add practical interpretive value to the model in the short run.

4.9. Diagnostic Test

4.9.1 Heteroscedasticity test results

Table 4.11: Tests for heteroscedasticity (H_0: Constant variance/ homoscedasticity)

	Breusch-Pagan Test
chi2	0.48
Prob>chi2	0.4890

The Breusch-Pagan test for heteroscedasticity was conducted to test whether the residuals are homoscedastic or there is a presence of heteroscedasticity. The findings in Table 4.11: Tests for heteroscedasticity (H_0: Constant variance/ homoscedasticity) **Error! Reference source not found.** revealed that the test cannot reject the null hypothesis of constant variance indicating that the residuals are homoscedastic, as the p-values of the Breusch-Pagan test (0.4890) is respectively greater than the 5% level of significance.

4.9.2. Multi Collinearity Results

Table 12: VIF

Variable	VIF	1/VVIF
Ln GCF	2.39	0.418994
Ln GDPPCTP	1.73	0.578660
Ln TO	1.62	0.618419
Ln REER	1.12	0.895695
Ln INF	1.07	0.938515
Mean VIF	**3.150**	

Source: Author's computation using World Bank Development indicators

The provided VIF results for the regression model indicate low to moderate correlations with the other predictor variables, all well below the common threshold of 10. This suggests that multicollinearity is not a significant issue for any of these variables. With a mean VIF of 3.150, multicollinearity is generally not a concern in this regression model, ensuring that the estimates of the regression coefficients are likely to be reliable and stable.

4.9.3. Error correction term

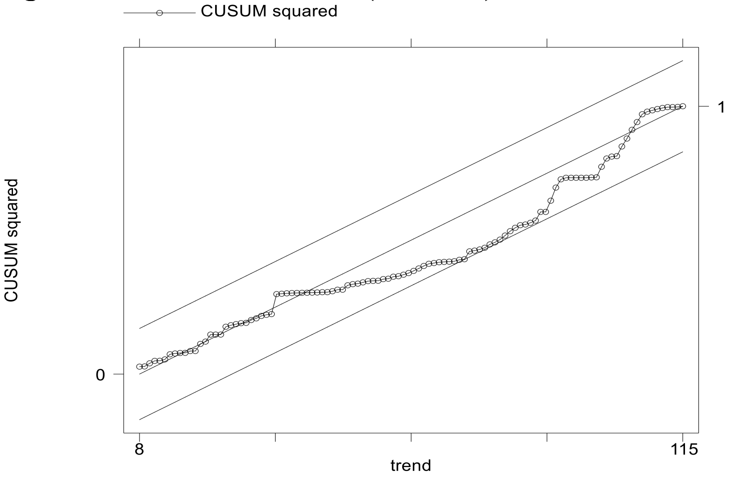
Table 13: Error Correction Term

	Coef.	Std. Err.	Z	P>|z|
ECT	-.5576339	.1597635	-3.49	0.000

The error correction term (ECT) was estimated at ϕ = -.5576339 with a standard error of .1597635, yielding a z-statistic of -3.49, which is statistically significant at the 1% level (p-value = 0.001). This indicates that approximately 55.8% of the deviation from the long-run equilibrium is corrected each period.

4.9.4 Model Stability Results.

Figure 4.1: Cumulative sum (CUSUM)



The cumulative sum (CUSUM) and CUSUM of squares tests are employed to determine the stability conditions for the model. Figure 4.1 shows that all CUSUM values are within the threshold of the 5% level of significance. These findings suggest that the specified Panel ARDL model meets the stability requirements thus being stable.

4.10. Discussion of Main Results

The discussion of the main results of the ARDL pooled mean model is presented in this section. For the ARDL PMG results, REER has a negative and significant impact on the Trade Balance in the long run, but a negative and insignificant impact in the short run. These results align with previous studies, such as those by Phan and Jeong(2015), who found statistically significant negative elasticities suggesting that currency depreciation leads to a deterioration in the trade balance in Vietnam. While the results indicate a negative and significant impact of REER on the trade balance in the long run, they do not explicitly account for potential non-linearities, such as those suggested by the J-curve effect. The J-curve theory posits that a depreciation in the real effective exchange rate may initially worsen the trade balance before leading to improvements (Lal & Lowinger, 2002). Although this study did not include a quadratic term for REER, which could capture this dynamic, the diagnostic test did not reveal clear functional form mis-specifications. Future research could explore this relationship further by incorporating a quadratic specification of REER to assess whether the trade balance follows a J-curve pattern. This could provide additional insights into the long-term dynamics of exchange rates and trade balance, particularly in the context of SACU countries.

The negative long-run influence of exchange rate depreciation on SACU's trade balance can be associated with an increase in the cost of input caused by domestic currency depreciation. Based on the theory, the depreciation of the exchange rate leads to an increase in exports by making domestic products cheaper for foreigners; however, it is linked with the elasticity of the demand for export in a given country. If export demand elasticity is more than unity in a country, the exchange rate's depreciation positively influences exports (Bahmani-Oskooee & Gelan, 2012). Another reason is that the SACU economy highly relies on importing raw materials involved in producing goods for export; the depreciation of the exchange rate makes these goods expensive and raises the cost, negatively influencing exports (Dilanchiev & Taktakishvili, 2021).

In the long run, gross capital formation (GCF) has a significant negative impact on the trade balance. This finding suggests that higher levels of investment within the SACU countries lead to an increase in imports, particularly of capital goods and intermediate goods necessary for investment projects, thereby worsening the trade balance. This result is consistent with the idea that economies in a phase of heavy investment often experience trade deficits due to the importation of machinery, equipment, and other capital goods. However, in the short run, GCF shows a positive but insignificant impact on the trade balance, indicating that the immediate effects of investment on trade dynamics are not substantial. This discrepancy between the long-run and short-run effects may be due to the time lag required for investments to translate into increased production capacity and exports.

These results are consistent with the findings of (Abille & Meçik, 2023) who also identified a negative impact of increased domestic economic activity on trade balances, albeit through the domestic income variable rather than capital formation directly. In both this study and the study by Abille & Meçik, (2023) studies highlight that higher domestic economic activity, whether through increased income or capital formation, tends to boost imports, thereby negatively affecting the trade balance. Inflation has a significant positive impact on the trade balance in the long run, while its short-run impact is negative but insignificant. The long-run positive relationship suggests that higher inflation, which typically erodes purchasing power, may reduce the volume of imports more than it affects exports, leading to an improvement in the trade balance. This can occur if domestic goods become relatively more expensive than foreign goods, prompting consumers and businesses to reduce their import consumption. However, the short-run negative but insignificant impact implies that inflationary pressures do not immediately translate into significant changes in trade balance dynamics. This finding aligns with the notion that inflation affects trade balances through complex and often lagged mechanisms. These results are further supported by studies such as Yiheyis & Musila, (2018), whose estimates suggest that, in the long run, real depreciation contributes to rising inflation

Trade openness exhibits a positive and significant impact on the trade balance in the long run, indicating that greater integration into the global economy enhances the trade balance of SACU countries. This result is intuitive as open economies can better leverage their comparative advantages, leading to increased exports. However, in the short run, trade openness has a negative but insignificant impact, suggesting that the benefits of trade liberalisation take time to materialise as the economy adjusts to new competitive pressures and market opportunities. These findings align with the studies of Bahmani-Oskooee and Gelan(2012), which also observed that higher trade openness positively impacts the trade balance. The rationale behind this relationship is that greater openness allows countries to exploit their comparative advantages more effectively, thereby increasing export volumes and improving the trade balance. Furthermore, increased trade openness often leads to better access to larger markets, advanced technologies, and investment opportunities, all of which contribute to a healthier trade balance.

The GDP per capita of trading partners has a positive but insignificant impact on the trade balance in the long run, while it shows a significant positive impact in the short run. This indicates that wealthier trading partners contribute to improved trade balances for SACU countries, likely due to their higher demand for imports, including those from SACU countries. The significant short-run effect may reflect immediate boosts in export demand following economic growth in partner countries, while the long-run relationship may be muted by other factors influencing trade dynamics over time.

In the context of SACU countries, the relationship between the Real Effective Exchange Rate (REER) and trade balance appears muted, owing to various structural and regional factors. The region's economic framework, heavily reliant on a limited array of primary commodities and beset by infrastructural deficiencies, diminishes the sensitivity of trade balances to exchange rate fluctuations. Moreover, intra-regional trade agreements within SACU foster stability and reduce transaction costs, thereby mitigating the impact of currency movements on trade balances.

Similarly, the negative correlation between Gross Capital Formation (GCF) and the trade balance in SACU nations can be attributed to factors such as the region's dependence on imported capital goods for economic expansion. Integration into global supply chains necessitates substantial imports of technology and machinery, exacerbating trade deficits. Investments aimed at modernising infrastructure and industry inevitably entail significant imports of high-value equipment, straining the trade balance in the short term. Despite these challenges, the positive influence of trade openness on the trade balance is notable, as it facilitates market diversification, encourages foreign investment, and promotes the adoption of efficient production methods, collectively bolstering trade performance in SACU countries.

Chapter 5

5. SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1. Introduction

In this chapter, the main findings of the study are summarized, the conclusions drawn from the research are presented, and relevant policy implications are discussed. The chapter aims to synthesize the key takeaways of the study and provide actionable recommendations based on the analysis of the relationship between currency depreciation and trade within SACU countries.

5.2 Summary and Conclusion

This study aimed to assess the impact of currency depreciation on trade within the Southern African Customs Union (SACU). It analysed the relationship between exchange rate fluctuations and trade balances, focusing on how currency depreciation affects export competitiveness, import costs, and overall economic stability. The study utilised various theoretical frameworks, including the elasticities approach, the Marshall-Lerner condition, and the J-curve phenomenon, to understand the complex interplay between currency depreciation and trade dynamics.

The findings indicate that currency depreciation in SACU countries does not consistently lead to improved trade balances. Despite the theoretical expectation that depreciation makes exports more competitive, the empirical evidence shows that SACU countries often experience persistent trade deficits. Factors such as the inelastic nature of demand for certain goods, the complexities of global value chains, and the volatility of revenue streams from the SACU common revenue pool contribute to these outcomes.

Furthermore, the socio-economic context of SACU countries, characterised by high-income inequality and unemployment rates, adds complexity to the relationship between currency depreciation and trade. While currency depreciation theoretically enhances export competitiveness, its impact on broader socio-economic indicators, including employment and income distribution, must be carefully considered.

5.3 Policy Implications

Based on the findings of this study, several key policy recommendations for SACU member countries emerge. First, diversifying the export base is critical to reducing dependency on a narrow range of commodities, thereby mitigating the adverse effects of currency depreciation and enhancing resilience to external shocks. The African Continental Free Trade Area (AfCFTA) presents an opportune pathway for SACU's drive towards export market diversification and enhancement of its industrial capacity, providing broader markets and fostering greater economic stability through increased trade within the continent (SACU, 2023).

Second, improving the quality and competitiveness of exports through investments in technology, infrastructure, and skills development is essential for producing higher value-added goods that can compete effectively in international markets. Third, managing exchange rate volatility is important; SACU countries should explore monetary policy tools, utilise foreign exchange reserves, and foster regional cooperation to stabilise exchange rates. For example, Botswana's management of its Pula Fund, which invests in foreign assets to cushion against currency fluctuations, can serve as a model. By maintaining a well-managed sovereign wealth fund, Botswana has been able to smooth out the impacts of exchange rate volatility and ensure greater economic stability.

Drawing inspiration from the European Union's approach to exchange rate stability, SACU countries could consider deeper monetary integration and the possibility of a common currency or closely coordinated exchange rate policies to reduce volatility and enhance economic stability within the region. And this could lead to an improved trade balance within the SACU region.

5.4 Areas for Further Research

While this study provides valuable insights into the impact of currency depreciation on trade within SACU, several areas warrant further investigation. Future research could focus on the sectoral impacts of currency depreciation, examining how different industries within SACU countries are affected by exchange rate fluctuations. Long-term studies that track the effects of currency depreciation over extended periods would provide a deeper understanding of the dynamic relationship between exchange rates and trade balances. Comparative analyses between SACU and other customs unions or regional trade blocs could shed light on unique challenges and opportunities faced by SACU countries. Additionally, further research is needed to explore how integration into global value chains influences the effects of currency depreciation on trade in SACU countries. Investigating the broader socio-economic impacts of currency depreciation, including effects on poverty, inequality, and employment, would provide a more comprehensive understanding of its implications. Finally, evaluating the effectiveness of various policy interventions aimed at mitigating the adverse effects of currency depreciation could provide practical guidance for policymakers in SACU countries.

References

Abeysinghe, T., & Yeok, T. L. (1998). Exchange rate appreciation and export competitiveness. The case of Singapore. *Applied Economics*, *30*(1), 51–55. https://doi.org/10.1080/000368498326137

Abille, A. B., & Meçik, O. (2023). The exchange rate, income, trade openness and the trade balance: longitudinal panel analysis for selected SSA countries. *International Trade, Politics and Development*, *7*(2), 138–153. https://doi.org/10.1108/itpd-04-2023-0007

African Development Bank. (2023). *AfDB, Statistics Department 1*. Africa and Global Economic Trends. https://www.afdb.org/en/documents/africa-and-global-economic-trends-january-2023

Ahmed, S., Appendino, M., & Ruta, M. (2015). *Global Value Chains and the Exchange Rate Elasticity of Exports*. MF Working Paper WP/15/252.

Anderson, H. M. (2002). Choosing Lag Lengths in Nonlinear Dynamic Models Choosing Lag Lengths in Nonlinear Dynamic Models. In *working paper*. https://doi.org/OI: https://doi.org/10.4337/9781782543756.00017

Arize, A. C. (1994). Cointegration test of a long-run relation between the real effective exchange rate and the trade balance. *International Economic Journal*, *8*(3), 1–9. https://doi.org/10.1080/10168739400000001

Aylor, B., Datta, B., DeFauw, M., Gilbert, M., Knizek, C., & McAdoo, M. (2020). *Designing Resilience into Global Supply Chains _ BCG*. https://www.bcg.com/publications/2020/resilience-in-global-supply-chains

Baharin, R., & Guangqin, K. (2023). Impact of trade openness, foreign direct investment and exchange rate on manufacturing export in Malaysia. *Labuan Bulletin of International Business &Finance*, *21*(2), 96–117.

Bahmani-Oskooee, M., & Gelan, A. (2012). Is there J-Curve effect in Africa? *International Review of Applied Economics*, *26*(1), 73–81. https://doi.org/10.1080/02692171.2011.619972

Bahmani-Oskooee, M., & Ratha, A. (2004). The J-curve: A literature review. *Applied Economics*, *36*(13), 1377–1398. https://doi.org/10.1080/0003684042000201794

Bhat, S. A., & Bhat, J. A. (2021a). Impact of Exchange Rate Changes on the Trade Balance of India : An Asymmetric Non- linear Cointegration Approach. *Sage Journals*. https://doi.org/10.1177/0015732520961328

Bhat, S. A., & Bhat, J. A. (2021b). Impact of Exchange Rate Changes on the Trade Balance of India:

An Asymmetric Nonlinear Cointegration Approach. *Foreign Trade Review*, *56*(1), 71–88. https://doi.org/10.1177/0015732520961328

Bloom, N., & Reenen, J. Van. (2013). Examining the Effects of Currency Depreciation on Trade Balance in Selected Asian Economies. *NBER Working Papers*, *7*(June), 89. http://www.nber.org/papers/w16019

Bornhorst, F., & Baum, C. (2007). *IPSHIN: Stata module to perform Im-Pesaran-Shin panel unit root test*. https://econpapers.repec.org/RePEc:boc:bocode:s419704

Buluswar, M. D., Thompson, H., & Upadhyaya, K. P. (1996). Devaluation and the trade balance in India: Stationarity and cointegration. *Applied Economics*, *28*(4), 429–432. https://doi.org/10.1080/000368496328551

Cave. (1992). *The Foreign Exchange Market (and instruments)*. 291–306.

Desiderio Consultants Ltd. (2020). *Customs Unions in Africa*. https://www.ddcustomslaw.com/index.php?option=com_content&view=article&id=395%3Acustoms-unions-in-africa&catid=1%3Aultime&Itemid=50&lang=en

Dilanchiev, A., & Taktakishvili, T. (2021). *Currency Depreciation Nexus Country ' s Export : Evidence from Georgia Currency Depreciation Nexus Country ' s Export : Evidence from Georgia*. *September*. https://doi.org/10.13189/ujaf.2021.090521

Doojav, G. (2018). *a Resource-Rich Economy : The Case of Mongolia*. *53*(4), 211–224. https://doi.org/10.1177/0015732518797184

Dzanan, H., & Masih, M. (2017). *Does currency depreciation necessarily result in positive trade balance ? new evidence from Norway*. *82103*.

European Union. (2020). *EU customs union in action*. https://european-union.europa.eu/priorities-and-actions/actions-topic/customs_en

Fazli, P., & Abbasi, E. (2018). Analysis of the Validity of Kuznets Curve of Energy Intensity among D-8 Countries: Panel-ARDL Approach. *International Letters of Social and Humanistic Sciences*, *81*, 1–12. https://doi.org/10.18052/www.scipress.com/ilshs.81.1

Gordon, J. (2024). *J Curve (Economics) - Explained - The Business Professor, LLC*. https://thebusinessprofessor.com/en_US/economic-analysis-monetary-policy/j-curve-definition

Green, W. H. (2012). Econometric Analysis. In *Litigation Services Handbook: The Role of the Financial Expert: Sixth Edition*. Pearson Education. https://doi.org/10.1002/9781119363194.ch9

Ha, J., Stocker, M. M., & Yilmazkuday, H. (2020). *In ‡ ation and Exchange Rate Pass-Through*.

Haansende, C. M., & Nyambe, J. M. (2020). Analysing the Exchange Rate Volatility Relative to Trade Balance: The Case of SACU Countries. *Journal of Economics, Management and Trade*, *26*(6), 60–74. https://doi.org/10.9734/jemt/2020/v26i630266

Hussain, M. E., & Haque, M. (2014). Is the J-Curve a Reality in Developing Countries? *Journal of Economics and Political Economy*, *1*(2), 231–240.

IG Markets Limited. (2020). What is Purchasing Power Parity (PPP)? In *IG Group* (pp. 1–3). https://www.ig.com/en/trading-strategies/what-is-purchasing-power-parity--ppp---191106#limits%0Ahttps://www.investopedia.com/updates/purchasing-power-parity-ppp/

Işik, C., Radulescu, M., & Fedajev, A. (2019). The effects of exchange rate depreciations and appreciations on the tourism trade balance: The case of Spain. *Eastern Journal of European Studies*, *10*(1), 221–237.

Izotov, D. (2015). *RMB Appreciation and Trade Between Russia and China*. *December*.

Jamilov, R. (2012). *Munich Personal RePEc Archive J-Curve dynamics and the Marshall-Lerner condition : evidence from Azerbaijan*. *39272*.

Jiang, W., & Liu, G. (2023). The asymmetric impact of exchange rate changes on bilateral trade balance : evidence from China and its trade partners. *Economic Research-Ekonomska Istraživanja*, *36*(2). https://doi.org/10.1080/1331677X.2022.2129408

Karsten, V. (2016). *Short and long run effects of exchange rate movements on the trade balance: a Eurozone perspective*. 1–27.

Kenton, W. (2020). *J Curve_ Definition and Uses in Economics and Private Equity*. https://www.investopedia.com/terms/j/j-curve-effect.asp

Kofoworade, A. (2023). Effect of Real Exchange Rate on Trade Balance and Economic Growth in Nigeria. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4560722

Krugman and Obstfeld. (2003). *International Economics: Theory and Policy*. https://www.scirp.org/reference/referencespapers?referenceid=56249

Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2018). *International Trade: Theory and Policy*. Pearson. https://books.google.co.ls/books?id=HiLwswEACAAJ

Kruiniger, H. (2009). GMM ESTIMATION AND INFERENCE IN DYNAMIC PANEL DATA MODELS WITH PERSISTENT DATA. *Econometric Theory*, *25*(5), 1348–1391. https://doi.org/10.1017/S0266466608090531

Kumar, M., Begam, A., & Nargis. (2020). The impact of currency depreciation on exports of SAARC countries. *Asian Journal of Economic Modelling*, *8*(1), 16–29. https://doi.org/10.18488/JOURNAL.8.2020.81.16.29

Kurtović, S. (2017). *The Effect of Depreciation of the Exchange Rate on the Trade Balance of Albania*. *17*(2), 141–158. https://doi.org/10.1515/revecp-2017-0007

Lal, A. K., & Lowinger, T. C. (2002). The J-Curve: Evidence from East Asia. *Journal of Economic Integration*, *17*(2), 397–415. https://doi.org/10.11130/jei.2002.17.2.397

Laurent Kemoe, Moustapha Mbohou Mama, Hamza Mighri, & and Saad Quayyum. (2023). *Managing Exchange Rate Pressures in Sub-Saharan Africa—Adapting to New Realities. April 2023 Regional Economic Outlook: Sub-Saharan Africa Analytical Note*.

Lubis, M. R. G., & Abdul Karim, N. A.-H. (2021). THE EFFECT OF NOMINAL EXCHANGE RATE DEPRECIATION ON TRADE IN ELEVEN DEVELOPING COUNTRIES. *Malaysian Management Journal*, *25*. https://doi.org/10.32890/MMJ2021.25.2

Lucarelli, S., Andrini, F. U., & Bianchi, A. (2018). Euro depreciation and trade asymmetries between Germany and Italy versus the US : industry-level estimates. *Applied Economics*, *50*(1), 15–34. https://doi.org/10.1080/00036846.2017.1311000

Mankiw, N. G. (2022). *Principles of Economics, 9th Edition*. Cengage. https://books.google.co.ls/books?id=f1_rzgEACAAJ

Maulana, A., Dawood, T. C., & Zulham, T. (2021). Asymmetrical Exchange Rates Effect on Indonesia's Trade Balance in Tourism. *Jejak*, *14*(1), 102–122. https://doi.org/10.15294/jejak.v14i1.27234

Mayer, T., & Steingress, W. (2020). Estimating the effect of exchange rate changes on total exports. *Journal of International Money and Finance*, *106*(786). https://doi.org/10.1016/j.jimonfin.2020.102184

Mbam, A., & Michael, O. (2020). *Analysis of the Effect of Exchange Rate Depreciation on Export Performance in Nigeria*. *22*(6), 48–60. https://doi.org/10.9790/487X-2206054860

McNown, R., Yan Sam, C., Mcnown, R., Khoon Goh, S., & Goh, K. C. (2023). *A Multivariate Autoregressive Distributed Lag unit Root Test*. *23*.

Mehtiyev, J., Magda, R., & Vasa, L. (2021). Exchange rate impacts on international trade. *Economic Annals-XXI*, *190*(5), 12–22. https://doi.org/10.21003/EA.V190-02

Menyah, K., Nazlioglu, S., & Wolde-Rufael, Y. (2014). Financial development, trade openness and economic growth in African countries: New insights from a panel causality approach. *Economic Modelling*, *37*, 386–394. https://doi.org/https://doi.org/10.1016/j.econmod.2013.11.044

Mhaka, S., Ncwadi, R., & Phiri, A. (2020). *in the sacu Region*. *21*(1), 23–40.

Myoung, S. C. (2017). THE RECENT EFFECTS OF EXCHANGE RATE. *Prague Economic Papers*, *26*(6), 661–689. https://doi.org/10.18267/j.pep.632

Ngalawa, H. P. E. (2014). Anatomy Of The Southern African Customs Union: Structure And Revenue Volatility. *International Business & Economics Research Journal (IBER)*, *13*(1), 145. https://doi.org/10.19030/iber.v13i1.8385

Örsal, D. D. K. (2007). *Comparison of panel cointegration tests, SFB 649 Discussion Paper, No. 2007,029, Humboldt University of Berlin, Collaborative Research Center 649 - Economic Risk*.

Pesaran, M. H. (2014). *Journal of Applied Econometrics*. *21*(August 2012), 1–21. https://doi.org/10.1002/jae

Phan, T. H., & Jeong, J. Y. (2015). Vietnam trade balance and exchange rate: Evidence from panel data analysis. *Journal of Applied Economics & Business Research*, *5*(4), 220–232.

Pickard, S., Baraitser, P., Rymer, J., & Piper, J. (2003). Comparative study. *Bmj*, *327*(7428), 1389. https://doi.org/10.1136/bmj.327.7428.1389

Qiao, H. H. (2013). Exchange Rates and Trade Balances under the Dollar Standard. *The Unloved Dollar Standard: From Bretton Woods to the Rise of China*, *259*. https://doi.org/10.1093/acprof:oso/9780199937004.003.0007

Ramarenko, K., & Erdier, G. E. V. (2011). *Southern African Customs Union Revenue Volatility : Roots and*. 35–46.

Raza, A. (2013). Effects of Currency Depreciation on Trade Balances of Developing Economies: A Comprehensive Study on South Asian Countries. *IOSR Journal Of Humanities And Social Science*, *14*(6), 101–106. https://doi.org/10.9790/0837-146101106

Rose, A. K. (1991). The role of exchange rates in a popular model of international trade: Does the 'Marshall–Lerner' condition hold? *Journal of International Economics*, *30*(3), 301–316. https://doi.org/https://doi.org/10.1016/0022-1996(91)90024-Z

Rose, A. K., & Yellen, J. L. (1989). Is there a J-curve? *Journal of Monetary Economics*, *24*(1), 53–68. https://doi.org/https://doi.org/10.1016/0304-3932(89)90016-0

Saccal, A. (2022). the Marshall Lerner Condition and Money Demand: a Note. *Theoretical and Practical Research in the Economic Fields*, *13*(1), 102–108. https://doi.org/10.14505/tpref.v13.1(25).08

SACU. (2019). *A 15 years journey from 2004 -2019*.

SACU. (2023). *Trade policy review* (Vols. 23–6238, Issue September). https://www.wto.org/english/tratop_e/tpr_e/g447_e.pdf

Sacu, B. O. F., & Cma, T. H. E. (2010). *The Economics of Regional Integration : Current Challenges*.

Scheinert, C. (2023). History of the Economic and Monetary Union. *Fact Sheets on the European Union*, 1–6. https://www.europarl.europa.eu/erpl-app-public/factsheets/pdf/en/FTU_2.6.1.pdf

Stojanovic, A. (2020). Customs union | The Institute for Government. In *Institute for Government* . https://www.instituteforgovernment.org.uk/explainers/customs-union

The FRED Blog. (2022). *Does purchasing power parity (PPP) hold in the long run?* https://fredblog.stlouisfed.org/2022/08/does-purchasing-power-parity-ppp-hold-in-the-long-run/

Tokarick, S. (2010). A Method for Calculating Export Supply and Import Demand Elasticities. *IMF Working Papers*, *10*(180), 1. https://doi.org/10.5089/9781455202140.001

Tutur2u. (2023). *What is Price Stickiness_ _ Reference Library _ Economics _ tutor2u*. https://www.tutor2u.net/economics/reference/what-is-price-stickiness

WTO. (2022). *WT/TPR/S/447 • Southern African Customs Union - 4 -*. 4–7.

Yassin sheikh Ali, A., Nur Sharif Graduate Student, M., Yassin Sheikh Ali, A., & Professor, A. (2016). Determinants of Trade Balance in Somalia: Regression Analysis usinTime Series. *Journal of Economics and Sustainable Development*, *7*(12), 62–71. www.iiste.org

Yiheyis, Z., & Musila, J. (2018). The dynamics of inflation, exchange rates and the trade balance in a small economy: The case of Uganda. *International Journal of Development Issues*, *17*(2), 246–264. https://doi.org/10.1108/IJDI-12-2017-0209

Yussuf, Y. C. (2022). Cointegration test for the long-run economic relationships of East Africa community: evidence from a meta-analysis. *Asian Journal of Economics and Banking*, *6*(3), 314–336. https://doi.org/10.1108/ajeb-03-2021-0032

ECB. (2022) was not cited and has to be removed from the list.

Appendices

Table A14: SADC Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Angola	33	116.655	163.379	0	631.442
Benin	33	523.284	114.914	264.692	732.398
Botswana	33	6.472	3.134	1.86	12.369
BurkinaFaso	33	523.314	114.926	264.692	732.398
Burundi	33	1054.287	602.371	171.255	2034.307
CaboVerde	33	90.303	13.38	68.018	123.213
Cameroon	33	523.314	114.926	264.692	732.398
CentralAfricanRepu~c	33	523.314	114.926	264.692	732.398
Chad	33	523.314	114.926	264.692	732.398
Comoros	33	400.794	68.921	264.69	549.298
DemocraticRepublic~o	32	603.643	608.398	0	1989.391
Djibouti	33	177.721	0	177.721	177.721
EquatorialGuinea	33	523.314	114.926	264.692	732.398
Eritrea	33	11.809	4.716	2.072	15.375
Eswatini	33	8.352	4.168	2.587	16.47
Ethiopia	33	14.612	11.854	2.07	51.756
Gabon	33	523.314	114.926	264.692	732.398
GambiaThe	33	26.938	15.461	7.879	54.923
Ghana	33	1.86	2.124	.033	8.272
Guinea	31	4156.538	3136.064	660.167	9565.082
GuineaBissau	33	523.314	114.926	264.692	732.398
IvoryCoastCotedIvo~e	33	523.314	114.926	264.692	732.398
Kenya	33	76.113	23.062	22.915	117.866
Lesotho	33	8.351	4.167	2.587	16.459
Liberia	33	77.249	42.937	40.903	191.518
Madagascar	33	1900.512	1098.306	298.829	4096.116
Malawi	31	217.936	260.389	2.729	749.527
Mali	33	523.314	114.926	264.692	732.398
Mauritania	31	24.457	9.097	8.061	37.189
Mauritius	33	28.227	7.64	14.863	44.183
Mozambique	33	28.622	21.074	.929	69.465
Namibia	33	8.36	4.171	2.587	16.463
Niger	33	523.314	114.926	264.692	732.398
Nigeria	33	146.551	116.638	8.038	425.979

RepublicoftheCongo	33	523.314	114.926	264.692	732.398
Rwanda	33	531.134	264.458	83.704	1030.308
SaoTomeandPrincipe	32	12.583	7.81	.143	23.29
Senegal	33	523.314	114.926	264.692	732.398
Seychelles	33	9.093	4.324	4.762	17.617
SierraLeone	33	3.821	3.349	.151	14.048
Somalia	9	24804.46	4784.82	19283.8	31558.906
SouthAfrica	33	8.351	4.167	2.587	16.459
SouthSudan	12	123.498	160.726	2.95	534.511
Tanzania	32	1219.798	669.696	195.056	2297.764
Togo	33	523.314	114.926	264.692	732.398
Uganda	33	2103.401	999.557	428.855	3727.069
Zambia	33	5.575	5.229	.03	20.018
Zimbabwe	22	3.056e+08	1.433e+09	.002	6.723e+09

Source: Author’s computations using data sourced from World Bank Development Indicators