SOVEREIGN CREDIT RATINGS, FOREIGN PARTICIPATION AND BOND YIELDS IN SELECTED AFRICAN COUNTRIES.

By

Tatonga Gardner Rusike

Supervisor:

Professor Imhotep Paul Alagidede

A thesis submitted to the Graduate School of Business Administration of the University of the Witwatersrand in fulfilment of the requirements for the degree of Doctor of Philosophy in Development Finance

November 2020

DECLARATION

I Tatonga Gardner Rusike, declare that this thesis is the result of my own work. I am submitting it to fulfil the requirements for the degree of Doctor of Philosophy at University of Witwatersrand, Johannesburg. To my knowledge, this thesis contains no material previously published or written by any other person, for any degree or examination in this or any other university, except where due reference is made in the text of the thesis. All errors are my own.

Signed: ……...

Date: ……...

Tatonga Gardner Rusike
Johannesburg, South Africa

DEDICATION

To the Lord Almighty, Ebenezer, this far you have taken me.

For the Rusike clan – my late parents, siblings, wife and children.

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to the following people:

- Professor Imhotep Paul Alagidede my supervisor, for his guidance and mentorship throughout this journey. There were areas I did not feel comfortable to venture into but you helped encourage me to explore uncharted territories and bring new contributions to academia. This is the basis of the PhD journey and good supervision.
- Wits Business School PhD panel of September 2016- for moulding the initial thoughts and ideas on the topic and approving the research.
- I would like to thank various conference participants as follows (i) 2019 African Finance Association conference, 21 – 22 May 2019, Victoria Falls, Zimbabwe where I presented a paper titled "*Does foreign participation in African local currency government debt markets impact on government bond yields and volatility*?, (ii) 2019 African Review of Economics and Finance conference 29 – 30 August 2019, Johannesburg South Africa, where I presented a paper titled "*A review of the political economy of sovereign credit ratings and their impact on Eurobond market in African countries*", and (iii) The 2019 Biennial conference of Economic Society of South Africa participants, 3 – 5 September 2019, Johannesburg, South Africa where I presented a paper titled "*Government bonds and their investors in South Africa- do we know their impact?*". The quality feedback I received helped to strengthen and expand arguments and methodologies I have applied.
- Mmabatho Leeuw for continually supporting part time students to remain connected and fulfil the school requirements. Without her coordination, we may not have reached this stage smoothly.
- Last but not least, to my wife Nyaradzo and my children, Joshua, Tanatswa and Tendekai. For all the times I left home just to write this thesis, and many weekends I spent in my home office without playing and socialising as normal families do, your patience and support are greatly appreciated. To my siblings, Sandys, Abel, Melody and my late parents, thank you for recognising talent and nurturing me from a young age to pursue my heart's desires.

LIST OF PUBLICATIONS AND RESEARCH OUTPUTS

Conference Presentations

1. Does foreign participation in African local currency government debt markets impact on government bond yields and volatility? - 2019 African Finance Association conference, 21-22 May 2019, Victoria Falls, Zimbabwe.

2. A review of the political economy of sovereign credit ratings and their impact on Eurobond market in African countries- 2019 African Review of Economics and Finance conference 29-30 August 2019, Johannesburg South Africa, and

3. Government bonds and their investors in South Africa- do we know their impact? The 2019 Biennial conference of Economic Society of South Africa, 3-5 September 2019, Johannesburg, South Africa.

Papers in the Process of Submission for Review

1. The political economy of Sovereign Credit Ratings: An African perspective. Journal of African Trade
2. The empirical impact of sovereign credit ratings on Eurobond yields: An event study analysis of African sovereigns. Research in International Business and Finance.
3. Foreign participation and bond yields in South African government bonds: An ARDL approach.

ABSTRACT

The thesis investigates two main themes- the influence of changes in foreign participation and sovereign ratings on local currency and Eurobond yields. As background analysis, we first explored the development of local currency government bond markets in Africa through a literature survey. The theoretical discussion builds on the concept of original sin developed by Eichengreen and Hausmann (1999) and proposes a modified way of measuring original sin.

We then examine whether changes in foreign participation impact bond yields and volatility in six African countries employing a battery of econometric techniques in both panel and time series settings. We establish that increase in foreign participation reduces bond yields confirming the benefits of investor base diversification. Other than the level of foreign participation, we also observe that the lag of bond yields, policy interest rate, inflation, exchange rate and global policy rate are significant variables explaining the behaviour of bond yields in the group. However, the impact on bond yields volatility is mixed. While increasing foreign participation has no impact on volatility in the group setting, isolating South Africa shows that changes in foreign participation do impact on the volatility of bond yields. Thus, increasing foreign participation in South Africa does come with a cost of higher bond yields volatility.

The second theme addresses the political economy of sovereign credit ratings in Africa and empirically examines the impact of changes in sovereign credit ratings on bond yields using event study and panel vector auto-regressions techniques. The political economy analysis reflects that while credit rating agencies have faced global criticisms, there are Africa specific challenges. Using tests on ratings accuracy and ratings failures, we showed that African countries have higher default rates than global averages. Our data on African sovereign ratings show that credit rating agencies failed during the 2011 Arab spring and the 2014 oil price fall. Our event study analysis reflects that only close to a third of rating actions directly impact bond yields. The empirical analysis largely suggests that changes in sovereign ratings are no longer unanticipated, and not carrying much new information.

Keywords: Africa, bond yields, bond market development, credit rating agencies, Eurobonds, foreign participation, political economy, original sin and sovereign credit ratings.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
ADF	Augmented Dickey Fuller Test
AFMI	African Financial Markets Institute
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag Model
AREAERS	Annual Report on Exchange Arrangements and Exchange Restrictions
ASEA	African Securities Exchange Association
ATS	Automated Trading System
BATS	Bond Automated Trading System
BESA	Bond Exchange South Africa
BIS	Bank of International Settlements
CAPM	Capital Asset Pricing Model
CDS	Credit Default Swaps
CRAs	Credit Rating Agencies
CSD	Central Securities Depository
DF-GLS	Dickey Fuller Generalised Least Squares Method
EU	European Union
EM	Emerging Markets
EMEA	Europe Middle East and Africa
ESMA	European Securities and Markets Authority
ESMID	Efficient Securities Markets Institutional Development
FISB	Fixed Income Securities Board
FFR	Federal Funds Rate
FPART	Foreign Participation
FX	Exchange Rate
GBI-EM	Government Bond Index – Emerging Markets
GBY	Government Bond Yields
GDP	Gross Domestic Product
GMM	Generalised Methods of Moments
HIPC	Highly Indebted Poor Countries
IFC	International Finance Corporation
IIF	International Institute of Finance
IMF	International Monetary Fund

IOSCO	International Organisations of Securities Commissions
IPS	Im-Pesaran-Shin Unit Root Test
JSE	Johannesburg Securities Exchange
LC	Local Currency
LCBM	Local Currency Bond Market
LLC	Levin-Lin-Chu Unit Root Test
NBFIs	Non-Bank Financial Institutions
NRSRO	Nationally Recognised Statistical Rating Organisations
NSE	Nigeria Stock Exchange
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
OTC	Over the Counter
RATI-	Ratings
RGDP	Real Gross Domestic Product
SARB	South African Reserve Bank
SEC	Securities and Exchange Commission
SSA	Sub-Saharan Africa
USD	United States Dollars
VAR	Vector Auto-regression
VECM	Vector Error Correction Modelling
VIX	Volatility Index

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

1.1. Background and Context of Study

Financial systems in Africa have historically been dependent on the banking sector for financing while governments have been dependent on aid Moyo (2010). As capital market sources evolved, the equities market developed relatively faster than the bond market. Statistics compiled by Adelegan and Radzewicz-Bak (2009) for African countries show that, on average, equity market was the most developed with market capitalisation between 50 – 100% of gross domestic product (GDP), while banking sector assets averaged 30 – 50% of GDP and domestic debt averaged 10 – 40% of GDP in the period prior to the global financial crisis.

Not only do African bond markets lag other capital markets within the region, but they also lag other developing continents such as Asia and Latin America. In Latin America, the Mexican crises of 1982 and 1987 provided the initial catalyst in developing bond markets in the region. Borensztein, Cowan, Eichengreen and Panizza (2008) show that domestic bond market capitalisation was around 31% of GDP in Latin America compared to East Asia which had total market capitalisation of 51% of GDP. The Asian crisis of the late 1990s provided a way for that continent to reassess financing for development. Consequently, bond markets in Asia grew more rapidly after the 1997 financial crisis. Asian bond markets also continued to grow strongly after the 2008 financial crisis from a combination of strong economic fundamentals, favourable global financing conditions and regional initiatives to expand the bond markets. Regional initiatives such as Asian bond market index (ASEAN+3) and Asian bond fund project were spearheaded by the Asian Development Bank and other multilaterals to develop and promote increased local currency issuances.

In Africa, bond market capitalisation as a ratio of GDP, tracked by the International Monetary Fund (IMF) (2014) estimates the outstanding stock of government securities close to fifteen (15%) of GDP in 2010 for Sub-Saharan Africa (SSA) which is much lower than peers in Asia and Latin America. Essers, Blommestein, Cassimon and Flores (2016) provide a detailed data set on capitalisation of marketable debt as a percent of GDP for individual SSA countries including Mauritius (41%), South Africa (35%), Kenya (25%), Ghana (24%), Nigeria (15%), Zambia (14%), and Uganda (13%)[1]. From other regions historical experiences, it is clear that local currency bond markets have been developed during a period of financial crisis when international markets are difficult to access. Other reasons include the persistent need to fund fiscal deficits, pension reforms and improvements in macro fundamentals (Borensetein *et al*, 2008).

Therefore, since the Asian financial crisis in 1997 and the 2007/08 global financial crisis, the development of local currency bond markets has been a key theme for many stakeholders in Africa. Multilateral institutions such as the African Development Bank (AfDB) and International Finance Corporation (IFC) have also promoted the growth of local currency bond markets in Africa (see IFC (2012) and African Development Bank (2018). In 2012, the IFC launched a Pan-Africa bond programme to support local currency issuances in Botswana, Ghana, Kenya, South Africa, Uganda and Zambia. In the same year, the African Development Bank also launched its "African Financial Markets Initiative- AFMI" to directly support African countries in building local currency bond markets.

[1] Ethiopia (21%), Malawi (19%) and Eritrea (46%) have no secondary market and Eritrea only issues short-term treasury bills.

Local currency bond markets provide an alternative source of funding to donor aid. Moyo (2010) argues donor aid has declined over the years and has not worked for development. Local currency bond markets are also an alternative to traditional external concessional borrowing and commercial bank financing. For governments, access to local currency bond markets helps to reduce exposure to foreign currency denominated debt (Adelegan and Radzewicz-Bak 2009, Mu, Phelps and Stotsky (2013). For central banks, the development of local currency bond markets can enhance greater transmission of monetary policy to the economy through the interest rate channel and establishing yield curves as countries issue longer dated local currency bonds.

The development of local currency bond markets has come along with changes in the investor base of government debt holders. In Africa, South Africa and Ghana lead the relative share of foreign investors in government securities. In Chapter 3 data, we show that foreigners account for close to forty percent (40%) of all outstanding local currency government securities in both South Africa and Ghana, while in Nigeria and Egypt foreigners account for close to thirty percent (30%), Zambia twenty percent (20%) and Uganda less than ten percent (10%) over 2011 – 2018. Foreign participation is increasing as a result of financial integration, portfolio diversification, improvements in macroeconomic indicators and attractive interest rates outside home countries, among other factors. Sienaert (2012) concurs that foreign participation has been driven by improvements in economic performances and policymaking in developing countries.

Researchers argue that foreign investor participation provides benefits as well as costs. For instance, Andritzky (2012) argues that foreign investors help to facilitate the development of liquid benchmarks which in turn help to improve liquidity in the secondary markets. However,

changes in foreign investor flows can have destabilising effects, particularly as these portfolio flows can shift over very short periods. Such changes pose risks of greater volatility in bond markets. When short-term portfolio flows move too frequently, they tend to be "hot money" which can cause problems for monetary policy conduct. Peiris (2010) argued that the collapse of Lehman Brothers in September 2008 resulted in higher outflows in emerging markets and greater yields volatility. Since the announcement of US monetary policy normalisation in May 2013 and more recently in 2018, emerging markets have generally suffered significant bond outflows. It is therefore vital to understand the impact of such flows on changes in yields and volatility, if any. These movements can increase volatility in yields and in turn, complicate monetary policy.

Another phenomenon that has been embraced by African countries in bond market development is the issuance of dollar denominated bonds in international markets over the last twenty years. The dollar denominated bonds are commonly known as Eurobonds and have proved a funding source for SSA sovereigns. Debt relief through the Heavily Indebted Poor Countries (HIPC) initiative helped to ease debt burdens (World Bank 2018). Then improvements in economic management also helped countries to be able to seek external commercial debt in addition to the standard concessional loans from multilateral and bilateral partners. In the book "Dead aid: Why aid is not working and how there is another way for Africa" Moyo (2010) argued for a new shift in funding of African governments. For instance, shifting to Chinese lending and the issuance of Eurobonds as a way for African countries to wean themselves off aid. In this research, we explore the latter concept- rise of Eurobonds as a source of funding for African countries.

The African Eurobond market has grown phenomenally over the last 20 years. Smith (2019) suggest that at least United States Dollars (USD)100 billion Eurobonds issued by 21 countries is currently outstanding. As of June 2019, at least 20 countries had accessed the international bond markets with outstanding issuances exceeding USD100 billion. Many sovereigns have issued Eurobonds for the first time. For instance, Seychelles in 2006; Republic of Congo, Gabon, and Ghana in 2007; Senegal in 2009; Namibia and Nigeria in 2011; Zambia in 2012; Rwanda, Mozambique and Tanzania in 2013; Ethiopia and Kenya in 2014, Angola and Cameroon in 2015 and more recently Benin in 2019. For some, they have become regular issuers with multiple Eurobonds outstanding- South Africa, Nigeria, Ghana, Kenya, and Senegal among others.

In order to issue Eurobonds, it is mandatory to have internationally recognised credit ratings assigned. Consequently, African countries have increasingly sought credit ratings over the last decade. These credit ratings issued by the big three CRAs, namely, S&P Global Ratings, Fitch Ratings Inc. and Moody's Corporation, have enabled African countries to access international capital markets. However, the world of credit ratings also comes along with its own challenges- the role and impact of credit ratings has been a subject of contestation since the global financial crisis. From the oligopolistic nature of the industry dominated by three big firms, to the mistakes made by CRAs in financial crisis (Deb, Manning, Murphy, Penalver and Toth 2011) and the perceived low ratings assigned to African countries (Olabisi and Stein 2015). For example, there are debates around the role of ratings and measuring the financial impact of changes in ratings on government bond yields. The debates around the role of ratings is juxtaposed in the political economy of credit ratings which includes criticism of credit rating agencies, Paudyn (2014).

This research focuses on analysing the trends and characteristics of local currency bond markets and international issuances by SSA countries, the effects of changes in non-resident participation on yields and volatility in bond markets as well as the impact of sovereign credit ratings in determining Eurobond yields.

These series of topics will help investors, asset managers and policy makers better understand the drivers of SSA bond markets.

1.2. Problem Statement

The study investigates the impact of changes in share of foreign participation on local currency government bond yields and examines the political economy of sovereign credit ratings and the impact sovereign ratings changes have on Eurobond yields and overall economic variables.

Changes in local currency bond yields are influenced by a combination of supply and demand factors. The demand factors relate to the investor base and supply side factors relate to changes in macro fundamentals, such as interest rates and fiscal deficits. While the changes on supply side can be clearer with deteriorations or improvements in macro fundamentals leading to higher or lower yields, it is less clear on the demand side. That is, to what extent different types of investors influence changes in bond yields. Is there a marked difference between the impact of domestic and foreign holders on government bond yields? Andritzky (2012) states that a large domestic investor base is associated with low and stable yields mainly due to their long-term view of investments. The prominent domestic market participants are usually institutional investors such as pension funds, banks and insurance companies who tend to buy and hold government securities for longer periods.

If domestic bond holders provide such a stable and low yield environment as Andritzky (2012) argues, why be concerned with foreign investors then? The first theme of the study examines the influences of foreign participation on local currency bond yields in selected African countries. Kavli and Viegi (2015) observe that foreign participation in local government bonds increased significantly from 2009 to 2013 as foreign investors bought South African government bonds. Nigeria's entry into the JP Morgan Government Bond Index-Emerging Markets in September 2013 resulted in sizeable inflows into the Naira bond market in 2013.

However, these flows can be quick to reverse. Peiris (2010) argued that the collapse of Lehman Brothers in September 2008 resulted in higher outflows in emerging markets and greater yields volatility. Then, since the announcement of US monetary policy normalisation in May 2013, emerging markets suffered significant bond outflows until February 2014 when the flow of funds reversed. However, JP Morgan announced that it would exclude Nigeria's bonds from its index in October 2015 after what the investment bank reviewed as restrictive measures in the foreign exchange market that would reduce transparency and ease to transact by foreign investors. Consequently, Nigeria was excluded from the same index in October 2015, which was followed by sizeable foreign portfolio outflows.

It is important to understand the impact of such changes in foreign participation on bonds yields, and volatility. These movements can cause volatilities in yields and in turn complicate monetary policy. The problem is that in African countries, little is known about the flows or factors that have supported or inhibited increased foreign participation. Empirical analysis is still limited in the assessment of costs and benefits that arise from foreign participation in bond market development in SSA. Declining yields could be a result of improving macro

fundamentals which then cause non-resident holdings to increase (Sienart 2012). Thus, it is important not to assume direction of causality but test the different relationships.

The second theme of this thesis is to examine the influence of sovereign credit ratings on Eurobonds, which have become a popular source of funding for many African governments. With at least 20 African sovereigns having issued Eurobonds, they are clearly a popular external financing option for these countries. If sovereign ratings are powerful, and the CRAs seem to exert a significant influence on governments and corporates around the world, then the impact in Africa should also be significant. And if this is the case, the observed bond yields and volatility of yields should be an input in any decision making regarding raising external funds. However, there is no systematic attempt to investigate such an important subject as the impact of CRA's on yields, and volatility as they are perceived to be.

African Eurobond issuances have provided a mechanism to measure and assess African sovereign credit risk. Investors tend to measure a sovereign's willingness and ability to repay debt through the price mechanism reflected in bond yields or credit default swaps (CDS) spreads. While sovereign credit ratings tend to be less volatile, bond yields tend to change more frequently exhibiting volatilities in response to investor sentiment. The problem is that bond yields tend to respond to sovereign credit rating changes (and vice versa) but the magnitude and direction of changes are less clear. It is therefore important to understand not only the political economy surrounding sovereign ratings but also to test empirically the perceived power of credit ratings by assessing their impact on Eurobond yields and economic variables.

1.3. Research Questions

From the discussion above the thesis provides background analysis on trends and determinants of local currency government bond markets development as a first step and further investigates the following two key questions:

i. (a). Does foreign participation impact on bond yields? If so, how and to what extent? If not, what other factors could affect bond yields?

ii. (a) What are the political economy questions surrounding sovereign credit ratings and their implications on African countries?

(b) Do changes in sovereign credit ratings impact on Eurobond yields and other economic fundamentals?

1.4. Objectives of the Study

The main objective of the thesis is to explore the nature and characteristics of government bond markets in Africa over time. We do this by first scoping the literature on trends and determinants of local currency bond market development as background analysis. Then, we specifically examine two objectives that flow directly from the research questions:

i. Examine the impact of changes in share of foreign participation on nominal government bond yields, and volatility in African countries after controlling for the impact of changes in macro fundamentals.
ii. Examine the political economy questions of sovereign ratings in Africa and empirically estimate the impact of changes in sovereign ratings on Eurobond yields.

1.5. Justification and Significance of the Study

An important contribution of the thesis is to enhance the knowledge on development of African bond markets and dynamic factors that contribute significantly to changes in both local currency and Eurobond yields. We explore how individual dynamic factors such as changes in foreign participation and sovereign credit ratings that have all come to the fore of development finance over the last two decades impact on bond yields and economic variables.

The concept of foreign participation in domestic government bond markets is still evolving as African countries are opening their economies and the investors who invest in government bonds are changing. Due to this infancy, foreign participation in under-researched empirically. Only Peiris (2010) and Kavli and Viegi (2013) have focused empirically on foreign participation in South Africa. Foreign participation in government bonds and sovereign credit ratings are at the heart of financial integration, financial globalisation as well as, financial and economic development connecting African countries with the rest of the global world. A better understanding of these two important phenomena is required by African countries and contributes to development finance literature on these topics which is currently lacking and limited in Africa.

We show that in Africa, increasing foreign participation is resulting in lower bond yields and thus policy makers should pay attention to changes in the investor base. On sovereign ratings we introduce the political economy questions on CRAs that have not been tested in an African context. In the analysis we develop concepts of ratings accuracy, and ratings failures that have not been explored in Africa. Our empirical analysis tests the perceived power of CRAs on impacting bond yields when sovereign ratings change, enriching the understanding and role of CRAs in Africa.

The study starts with a background analysis of trends and determinants of bond market development. For our sample of countries, these areas have not been adequately covered in literature providing a gap to explore. While the determinants of bond market development have been broadly examined in the literature, the results have remained mixed. Eichengreen and Luengnaruemitchai (2004), Eichengreen, Panizza, and Borensztein (2008), Adelegan and Radzewicz-Bak (2009), Bae (2012) and Mu *et al* (2013) have found a similar broad set of structural, institutional and macroeconomic variables. However, they have focused on different regions and the broad set of variables had varying methodologies and results with varying economic and statistical significance. We follow a literature survey of trends and determinants of bond market development in selected African countries to provide a background analysis to the main questions we attempt to answer in the next chapters.

Our contribution is to develop a modified measure of original sin initially developed by Eichengreen and Hausman (1999). In its early form, original sin refers to the inability of a government to borrow abroad long term and in its' own local currency. The modified measure of original sin takes into account the share of long-term debt securities as a ratio of external and domestic debt securities in African countries. the larger the ratio, the lower the problem of original sin. Lower level of original sin is good for local currency debt market development as funding is increasingly reliant on domestic market and reduces risks associated with foreign currency debt.

The research helps in understanding to what extent investor base diversification through foreign participation influences changes in local currency nominal government bond yields and the related policy implications for the functioning of these markets in Africa. While domestic

investors may tend to be more stable and have a long-term view, foreign investors on the other hand may take a shorter-term view in search of higher yields and cause volatilities when they exit as external market conditions change. We explain the extent to which changes in foreign participation impact local currency government bond yields in selected African countries.

Thus, our research aims to provide a better understanding of the existing dynamic relationships that can help governments improve their own financing options while deepening the domestic capital markets and improving financial intermediation. Understanding these factors and trend drivers is important to policymakers to drive the right policies. For investors and asset managers it supports making the right choices to anticipate changes in bond yields and volatility and take appropriate hedging strategies.

Examining the relationships between credit ratings, global factors and Eurobond yields is important in understanding sovereign credit risk, particularly in Africa where issuance of Eurobonds is currently popular but the same issuing governments barely comprehend external factors that drive these movements. For example, Eurobonds behaviour have not been adequately explored in African literature. A few studies, such as Olabisi and Stein (2015) attempted to understand if African sovereigns paid a higher premium for Eurobonds more than levels suggested by the fundamentals for sovereign risk. On the other hand, Mutize and Gossel (2019) reviewed the impact of changes in sovereign ratings on bond yields but focused on local currency bond yields. However, they did not analyse the effects of changes in credit ratings impact on Eurobond yields. In isolating the impact of a rating change in an event window, we hope to contribute in the understanding of not only the impact for our sample of countries but also the broader methodology in event studies.

This analysis not only helps investors in assessing credit quality of instruments they buy, but also asset managers in portfolio diversification, policymakers in making the right choices in driving bond market development and multilateral development finance institutions in promoting long-term financing of infrastructure investments. Our research combines two key areas on characteristics of bond market development in Africa and the relationships between eurobond yields and credit ratings.

Specifically, we isolate the influence of non-residents on local currency bond yields and the effects of sovereign ratings on Eurobond yields. To analyse the key concepts of changes in sovereign ratings and foreign participation impact on government bond yields we utilised both qualitative and quantitative techniques which include political economy analysis of sovereign credit ratings, generalised methods of moments (GMM), autoregressive distributed lag models (ARDL), and event study methodologies. Enhanced knowledge of the impact of changes in foreign participation on bond yields in Africa should likely encourage countries to regularly publish this data set and monitor the trends closely.

1.6. Organisation of the Thesis

The research is organised as follows:

Chapter two reviews the background analysis on trends and empirical determinants on bond market development in African countries. The empirical literature survey considers the concept that reduction in original sin may lead to the development of local currency bond markets. In the trends of bond markets, we provide data analysis linking up the factors in literature survey to explain the trends we observe in the data and test the concept of modified original sin.

Chapter three discusses the underlying economic theories on foreign participation based on investor base and home bias theories before proceeding to empirically estimate the impact of changes in share of foreign participation on nominal government bond yields, and volatility in selected African countries. We follow two approaches in estimating the impact of foreign participation on bond yields- the first is to estimate based on data availability a group of selected African countries using static and dynamic panel methods, while the second focuses on South Africa using time series analysis and proceeds to analyse and interpret both set of results.

Chapter four reviews the political economy of sovereign credit ratings in Africa and assesses the perceived power of credit ratings agencies (CRAs) by empirically estimating the impact of changes in sovereign credit ratings on selected Eurobond yields in African countries. We start by reviewing the theoretical role of credit ratings in financial markets- asymmetric information and regulatory requirements and proceed to trace the performance of credit ratings in various financial crisis which have provided a base for the political economy discussions. The empirical estimations use the event study approach to test the impact of changes in credit ratings on Eurobond yields. We also use the panel VAR approach to examine the impact of sovereign rating changes on economic variables.

Chapter 5 discusses concluding remarks, key findings of the study and offers recommendations and insights for consideration by policymakers, investors and academics.

CHAPTER 2: DETERMINANTS OF BOND MARKET DEVELOPMENT IN AFRICA: OVERVIEW OF THEORY AND EVIDENCE

2.1. Introduction

The study of bond markets is important for several reasons. Local currency bond markets provide an alternative source of funding from donor flows, traditional external concessional borrowing and bank financing. Access to local currency bond markets helps to reduce the extent of foreign currency denominated debt exposure thus reducing exchange rate risk with higher local currency denominated debt (Adelegan and Radzewicz-Bak 2009; Mu *et al* 2013).

The bond markets help to link borrowers with savers which improves savings and financial intermediation. The bond market provides savers with more choices other than the traditional deposits in the banking system. Developing local currency bond markets also reduces reliance on the banking system for the government and improves corporate funding sources. Government borrowing in the banking system may tend to have a crowding out effect on private sector as they compete for the same funds being lent by banks. More so, banking system borrowing tends to be short-term and at high cost while bond markets provide an alternative that may be cheaper and carries long maturities. Banks do not have a variety of fixed income short-term instruments which are well provided by the bond market.

Deep domestic bond markets help central banks to conduct monetary policy effectively. More specifically, a developing bond market helps policy makers such as central banks to conduct monetary policy within a well-established interest rate framework or yield curve. Thus, developing bond markets provide better monetary policy efficiency through liquidity and deeper domestic markets, possibly improving the monetary policy transmission mechanisms (Mu *et al*, 2013).

Lastly, government borrowing in the bond markets encourages better accountability. For instance, better public finance management, increased transparency by government and conduct better fiscal and cash management policies as investors scrutinise the uses of the money, and the extent of disclosures in government finances. The incentive to be more transparent is less so in cases where the governments are funded by central banks.

This chapter provides a background analysis on theoretical and empirical literature review on of bond market development in Africa. The theoretical discussion builds on the concept of original sin developed by Eichengreen and Hausmann (1999) and proposes a modified way of measuring original sin in today's modern world. The empirical literature survey considers the concept that reduction in original sin may lead to the development of local currency bond markets. These factors are known as determinants of bond market development which we then discuss individually as expected theoretical relationships as well as how other previous studies have approached the empirical estimations and the various factors found important. In the trends of bond markets in the SSA section, we provide a data analysis linking up the factors in literature survey to explain the trends we observe in the data.

Like many other studies, we are challenged by data limitations which have restricted the number of sample countries to not more than twenty and the sample period for the data included in the analysis to less than twenty years. However, we extend our analysis from the standard bond market capitalisation data and introduce a few key ratios that allow us to interrogate the primary market data. Not only do we test the concept of modified original sin, but we test it with our own data sample and introduce some further analysis on the secondary market data as well as developments in market infrastructure for bond markets in SSA.

2.2. Literature Review

2.2.1. Background Literature Review: Original Sin Hypothesis

The 1997 Asian financial crisis provided a way for Asian countries and more broadly, developing countries, to reassess financing for development. The financial crisis emanated from a balance of payments problem. That is, significant exposures to high external debt and a currency crisis that ensued following the mismatch between higher external liabilities and lower external assets to meet such liabilities. The reassessment of external accounts mismatches resulted in considering inward looking financing options. This culminated in exploring ways to develop domestic financial markets. Particularly, the development of local currency bond market.

It seemed developing countries were able to borrow in foreign currency more regularly, but not necessarily in their own local currencies. The high external debt exposures led researchers to question whether developing countries could be able to borrow in their own currencies abroad. The lack of ability to borrow abroad in own currencies gave birth to the concept of the original sin theory.

The theory of bond market development originates from the seminal work of Eichengreen and Hausmann (1999) who coined the term ‘original sin’. In their definition, the original sin hypothesis as a situation in which a country is not able to issue its local currency debt abroad or issue long-term local currency debt in its domestic market. The guiding assumptions are that, such a country does not operate in isolation, has investments and liabilities in foreign currency and suffers from original sin. Eichengreen and Hausmann (1999) argued that the problem of original sin could cause financial crisis, as was the case with 1997 Asian financial crisis. Domestic investments could face a currency mismatch (assets denominated in local

currency while liabilities are denominated in foreign currency) or maturity mismatch (long-term projects financed by short-term loans). The potential currency mismatch has come to be referred in the literature as international original sin while the maturity mismatch is known as domestic original sin. Nevertheless, the lower the level of original sin, the better a country can finance its development path in domestic markets which reduces external vulnerability. Consequently, it is important to understand how to estimate this measure.

In further developing the concept of original sin, Eichengreen, Hausmann and Panizza (2002, 2003) developed the measure of original sin initially set as:

$$\boldsymbol{OSINz = 1 - \frac{securities\ issued\ by\ country\ z\ in\ currency\ z}{total\ securities\ issued\ by\ country\ z}} \qquad (2.1)$$

Where OSINz is equal to the original sin indicator in country z.

In developing this measure, the term securities could be used in a broader sense to include loans issued by country *z* in both denominator and numerator. In this original form, the measure of original sin can be problematic, particularly in our context of SSA. With the development of local currency bond markets, countries now issue local currency debt in their own domestic markets and no longer need to go abroad in search of investors. In fact, more than the domestic investor base, the new reality in developing bond markets, is that foreigners come to participate in the domestic markets thus making foreign participation a form of determinant of bond market development. In our view, the concept in its simplest form is more to do with measuring local currency marketable debt as a ratio of total marketable debt (both domestic and external) subtracted from one and not necessarily going abroad to issue the local currency debt. We will return to the phenomenon of foreign participation in Chapter 3 in more detail as we explore the impact of foreign participation in the development of local currency bond markets.

Studies such as Eichengreen *et al* (2002, 2003), particularly for developed and emerging market countries, have focused on the international original sin. We would like to turn our attention to the concept of domestic original sin. As defined above, it refers to the inability of countries to issue long-term local currency denominated debt on fixed rate basis. It could be measured as follows:

$$\boldsymbol{dOSINz = \frac{FC+DSTF+DLTII}{FC+DLTF+DSTF+DLTII+DLTIP}} \qquad (2.2)$$

Where dOSINz is domestic original sin in country *z*; FC – foreign currency debt, DSTF – domestic short-term fixed rate debt, DLTII – domestic long-term floating rate debt (indexed to an interest rate), DLTF – domestic long-term fixed rate debt, and DLTIP – domestic long-term debt indexed to price level.

The rationale here in equation (2.2) is to measure short-term fixed rate debt plus domestic long-term floating rate and foreign currency debt divided by all total external plus domestic debt in all its maturities. The lower the ratio the less prevalent is the problem of domestic original sin. Thus, it is the absence of domestic long-term fixed rate issues in the numerator that is key. If the composition of government securities is dominated by foreign currency and domestic short-term securities, it therefore means the share of long-term securities is smaller. When the share of long-term securities is smaller, the incidence of original sin is much higher. In our view, it is a misnomer to measure a concept of domestic original sin without including the long-term securities in the numerator. Thus, we propose a more simplistic alternative measure as follows:

$$\boldsymbol{dOSINz = \frac{Domestic\ Long\ Term\ Fixed\ rate\ securities}{Total\ Securities}} \qquad (2.3)$$

In equation 2.3 the higher the ratio the lower the incidence of original sin. However, it has not always been easy to issue long-term securities in many SSA countries. Local currency fixed rate securities are attractive and can be bought by investors in a country with stable macroeconomic framework and trends. Where such framework and trends are volatile, countries tend to issue more indexed securities to attract investors. Eichengreen *et al* (2002) argue that if firms in an open economy country are not able to borrow long-term for investment projects but fund them through short-term credit lines or securities, such investments could suffer from maturity mismatches.

The reasons behind high incidence of domestic original sin could be related to unstable macroeconomic policies such as history of high inflation or volatile exchange rates which lead investors to be less susceptible to lend long-term in an environment where policies and trends could change. Perhaps, putting in a different context Eichengreen *et al* (2003) have argued that developed markets countries are able to borrow in their own currencies abroad and long-term since they may have already developed their own domestic markets first. Such development could be measured by a diversified investor base, a credible policy framework and independent institutions, which, reduces pressure to weaken currency or manipulate interest rates in favour of a few. Thus, interest and exchange rate volatility can complicate the development of a long-term local currency bond market if prices are unstable.

Consequently, the panacea to reduce the extent of original sin is to build deep and liquid local currency domestic debt markets. In a paper by Essers and Cassimon (2012) they show that while domestic original sin still exists in SSA countries, the extent has declined over the years. That is, SSA countries are now better able to issue long-term debt at fixed interest rates. Such

solutions to reduce original sin leads to the development of bond markets locally. Thus, we explore the determinants that impact on local currency bond market development.

2.2.2. Background Literature Review: Empirical Evidence

The determinants of bond market development have indeed been examined in the literature. However, the results have remained mixed. These studies have found a similar broad set of structural, macroeconomic performance, financial system and institutional variables to be the key drivers of bond market development, albeit, with varying economic and statistical significance. The categories tend to overlap depending on each individual researcher classifications, but the variables are broadly the same.

To start with, the dependent variable is usually the level of bond market development. Most researchers generally use outstanding securities or specifically domestic bonds outstanding expressed as a ratio of the size of the economy. While other measures add the government and corporate securities or distinguish between the two, we specifically focus on the government securities market. Therefore, our reference to bond market development implicitly mean government bond market development.

In our understanding of factors affecting bond market development, structural factors usually relate to the size of the of the economy and level of development, while institutional factors relate to governance, regulatory and institutional strength factors. On the other hand, financial system factors relate to the depth and concentration of the banking or broader financial sector while macroeconomic factors have a lot more to do with performance of the economy through inflation, interest rates, exchange rates, economic growth rates among others. In this section we first discuss the expected theoretical relationships between bond market development and

individual variables and discuss the observed empirical relationships and behaviours from past studies in the next sections.

Table 2.1: Explanatory Variables Classifications

Structural	Institutional	Financial system	Macroeconomic
– Economic size; – Economic development; – Trade openness; and – Capital account openness.	– Common law/ Law and order; – Legal origin; – Corruption; – Bureaucratic quality; – Geographic endowments; and – Investment profile.	– Size of banking system; and Concentration of banking system.	– Interest rates level, spread, volatility; – Exchange rate regime and volatility; – Fiscal balance; and – Inflation.

Source: Author's compilations from various literature sources

We take each of the variables above to assess theoretical relationships and compare with empirical results from other research in developing countries data. There is a common theme between original sin in developed and developing countries. In fact, the developed countries, for example, the US, Japan, Europe and Britain among others, have not suffered original sin since they have major currencies traded worldwide and can issue debt in their currencies which is easily bought by a wide variety of investors. But developing countries, are not able to do as much. Thus, there is a consistent theme of larger and stable economies having larger domestic bond markets while developing countries have weaker bond markets as market size is still small, wealth levels are still low, and macroeconomic trends are still volatile.

Structural Factors

There are four main measures of structural factors that we consider in this discussion. **Economic size** as measured by nominal GDP has shown to have a directly proportional relationship to bond markets development, provided other factors are held constant. Countries of smaller economic size, are less likely to have well developed bond markets as they lack economies of scale for deep and liquid markets. As Adelegan (2009) and Mu *et al* (2013) articulate that the debt amounts that could be potentially raised in small economies could be too small to attract cross border companies and foreign investors into local bond markets. Intuitively, smaller economies tend to exhibit infrequent buying and selling of debt securities which tend to lead to greater price volatility and discourage risk averse investors. Market participants such as investment banks are less likely to add such bonds to their bond indices or portfolio managers invest in such local currency bonds. Intuitively, this reflects a positive relationship between market size and bond market development. It is therefore likely that the larger economies have more developed bond markets. Local and foreign investors are likely to participate in larger domestic markets.

Indeed, most empirical literature (Eichengreen and Luengnaruemitchai (2004), Burger and Warnock (2006), Adelegan and Radzewicz-Bak (2009), Mu *et al* (2013), Smaoui, Grandes and Akindele (2017) agree that economy size is significant and has a positive relationship with bond market development. Thus, market size, measured by nominal GDP is a very important factor in the development of local currency bond markets. Only Essers *et al* (2016) is an exception in finding economic size to be insignificant in explaining bond market development.

Economic development in countries at an early stage of economic development may not have an immediate need for deep and liquid bond markets (Bae 2012). Thus, the more developed a

country is the more likely will be bond market development. Wealthier economies, proxied by GDP per capita, tend to have a higher savings rate and a diversified investor base which allows different investors to easily take up debt issued by governments thus exhibiting a positive relationship with bond market development. Conversely, underdeveloped countries tend to have volatile investment environments, or government dominance in commercial activities, weak creditor rights, lack of transparency and poor corporate governance in some cases.

Empirical findings in literature prove interesting when assessing the impact of economic development. Like economic size, most empirical studies found economic development as having a significant and positive relationship with bond market development. These include Eichengreen and Luengnaruemitchai (2004), Eichengreen *et al* (2008), Adelegan and Radzewicz-Bak (2009) and Bae (2012). In fact, Bae (2012) considers that economic development is the most important variable in understanding the determinants of bond market development. However, this is in the context of eliminating economic size variable which Bae (2012) considers is similar and could pose multicollinearity problems.

Trade openness is usually measured by exports to GDP which reflects the export base of an economy. This is considered a structural factor as the size or composition of exports do not change on a regular basis and its level relative to GDP would also measure the extent of trade of one country with rest of the world. The *a priori* expectations are that more open economies encourage securities market development. However, the relationship measured by the sign of the coefficient can be ambiguous. For example, negative sign suggests that countries that are less integrated have more incentive to develop domestic bond markets to meet financing needs domestically which is consistent with significant and negative relationship found in Adelegan (2009) and Mu *et al* (2013). On the other hand, entrenched interests could seek to prevent their

advantaged position from being undermined by market competition from outsiders but as Bae (2012) argues, they are less able to get their way in more open economies. Thus, according to Eichengreen and Luengnaruemitchai (2004), Eichengreen *et al* (2008), and Smaoui *et al* (2017) trade openness is positively related to bond market development. However, Bae (2012) found trade openness insignificant to explain bond market development.

Capital account openness is usually measured by the extent (or absence) of restrictions on capital flows. To measure extent of foreign exchange restrictions, the IMF uses the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAERS) Article VIII to list restrictions in countries. But these restrictions can apply to both current and capital accounts. A more open economy with less capital controls is expected to be positively related to bond market development. One of the arguments in Bae (2012) is that foreign capital flows reduce the cost of capital due to more risk sharing between domestic foreign investors. Capital controls such as those that limit foreigners to invest in debt securities in domestic markets or repatriate their interest earnings and principal payments can hinder foreign participation in domestic securities and liquidity. More so, openness to foreign portfolio investment can also enhance governance quality of local companies and access to foreign participation in local currency (Adelegan 2009). Conversely, capital controls may encourage governments to borrow more locally rather than external.

The impact of capital account openness on bond market development is mixed. For example, capital controls are insignificant for explaining bond market development in Bae (2012) and Smaoui *et al* (2017). However, others including Adelegan and Radzewicz-Bak (2009) and Mu *et al* (2013) found capital controls significant and negatively related to bond market development while Eichengreen and Luengnaruemitchai (2004) found significant and positive

relationship with bond market development. That said, perhaps capital account openness is not the best measure to use. Bond inflows are usually classified as portfolio flows in the current account and not in the capital account. Either way, countries with capital account restrictions also have some similar current account restrictions which limits the ability and extent of foreigners' participation in the domestic local currency bond markets.

We observe that within structural factors economic size and development are significant and most important while the importance of trade or capital account openness is less convincing or can be argued depending with the extent of foreign participation in domestic bond market. The expansion or level of development of an economy can be a function of macroeconomic trends and policies, which we now turn to.

Macroeconomic Trends and Policies

The original sin theory by Eichengreen and Hausmann (1999) developed the idea that countries that have higher incidence of original sin are usually those that have unstable and volatile macroeconomic trends. Particularly, a history of high inflation and high exchange rate and interest rate volatility. Thus, we explore how these factors have fared in empirical estimations.

Macroeconomic policies include exchange and interest rate regimes. There are different arguments for and against fixed or floating exchange rate regimes. For instance, fixed or pegged **exchange rate regimes** could encourage foreign investors demand for bonds due to little exchange rate risk. On the other hand, fixed or pegged exchange regimes could also lead some to underestimate risk of lending to banks and companies if the peg is not fully supported by adequate foreign currency reserves. Thus, resulting competition could slow development of bond market while on the other hand, greater exchange rate flexibility could encourage bond

market development. The currency risk from floating exchange rates can limit investments in local currency debt securities. Similarly, exchange rate volatility can hinder bond market development. In empirical estimation, exchange rate volatility is usually estimated as the absolute value of relative exchange rate changes over the year.

Exchange rate volatility has a negative and significant relationship with bond market development as evidenced in many empirical studies including Adelegan and Radzewicz-Bak (2009), Bae (2012) and Mu *et al* (2013), which is consistent with *a priori* expectations. Only a few studies (Smaoui *et al* 2017) found a different sign positive and significant relationship while Eichengreen and Luengnaruemitchai (2004) and Essers *et al* (2016) found negative but insignificant (or weakly significant) relationship with bond market development. Thus, the more volatile an exchange rate is, the less likely it will attract investment into local currency bond market.

There is an interconnected relationship between **interest rates** policy, interest movements and **inflation** profiles of countries. In theory, a negative relationship is expected between nominal interest rate volatility and bond market development. Low interest rates and stable inflation could mean lower debt service costs which encourages borrowing and development of local currency bond market. Conversely, countries with high **inflation** are likely to experience high debt servicing costs which would discourage borrowing and thus bond market development. That is, high inflation rates can raise transaction costs or greater political risks of intervention to control prices. To measure these effects, researchers have used a couple of variables. For example, i**nterest rate spread,** which represents extent of competition and efficiency in the banking system, so a higher spread (if associated with less competition and inefficiency) could

encourage bond market development. Interest rate variability may reduce attractiveness of holding securities for risk averse investors and reflects a thin market.

Again, the level of lending rates and their changes matter to bond market development. The empirical analysis by Eichengreen and Luengnaruemitchai (2004), Adelegan and Radzewicz-Bak (2009), Bae (2012), Mu *et al* (2013) and Smaoui *et al* (2017) found that higher **interest rate spreads** have a significant and negative relationship with bond market development. Thus, higher interest rates and interest rate volatility are associated with a smaller bond market, as high levels of interest rates or spreads reflect less competition in the financial system. Burger and Warnock (2006) and Essers *et al* (2016) used inflation measures which they also found to have negative and significant relationship with bond market development. It is therefore consistent with the original sin theory and other researchers that countries with better inflation and interest rates performance (low and stable) are better able to develop bond markets and fund themselves locally.

The development of government bond markets must start with the need of government to borrow. Thus, **fiscal balance** should be an important variable to start with. Countries that run budget deficits have greater need for funding and in such cases domestic borrowing will encourage growth of the government bond market in such countries, with a caveat that such financing is predominantly done in the domestic market. The fiscal balance is estimated as the moving average of past budget balances which better reflect the fiscal stance over several years. A single year fiscal deficit could be impacted by one off factors, reducing its ability to reflect fiscal stance of a government. Most empirical results on fiscal balance in Eichengreen and Luengnaruemitchai (2004), Burger and Warnock (2006), Adelegan and Radzewicz-Bak (2009), Bae (2012), Essers *et al* (2016) and Smaoui *et al* (2017) largely concur and demonstrate

a negative and statistically significant relationship with bond market development. Stronger fiscal balances are associated with smaller bond markets which, intuitively, makes sense. For example, if a government is running fiscal surpluses, there is no need to borrow. Once it runs deficits, then there is a need to borrow. The larger the fiscal deficit, the greater the financing need.

Structure of Financial System

The banking sector variables are important for bond market development for many reasons. The size, and concentration of banking sector are the main factors utilised to assess the financial system strength. The **banking sector size** is usually measured by domestic credit to private sector as a ratio to GDP. The sign for the relationship with bond market development can be either negative or positive depending with how the banking sector is viewed. For example, if banking sector complements bond market development, we can expect a positive sign, that is, the higher the credit extension or developed banking sector the more likely the bond market will also be developed.

Empirically Mu *et al* (2013), Essers *et al* (2016) and Smaoui *et al* (2017) all found size of banking system is significant and positively related to bond market development. The positive relationship can also be enhanced by the role banks play in the financial markets. For example, banks can also place excess funds in fixed income securities so they function as investors in bonds. In fact, in developing markets, banks are the main participants as investors, then serve roles as market makers and/or dealers. So, the expected sign is a positive relationship with bond market development. Although some studies such as Bae (2012) have found domestic credit by banks insignificant to explain bond market development, they are in the minority, which

explains the importance of the banking sector to financial sector and financial markets development.

If the role of the banking sector is viewed as substitute to bond market access, then higher lending by banks could discourage bond markets as banks' lending is considered as competition to bond issuances and thus, a negative relationship with bond market development. In this sense, countries with a more developed banking sector rely less on bonds and have a less developed bond market. Banks and bond market intermediation appear to be substitutes for each other rather than being complimentary.

To assess the extent of competition in the banking sector, researchers use banking sector concentration measures. For example, Smaoui *et al* (2017) uses the ratio of assets for three large banks to total commercial banking sector assets with a higher asset ratio suggesting increased concentration which would not support development of bond market. Indeed, the empirical results of Smaoui *et al* (2017), Adelegan and Radzewicz-Bak (2009) and Eichengreen and Luengnaruemitchai (2004) confirm that the concentration of the banking sector has a negative and significant relationship with bond market development. Thus, concentrated banking systems have lower bond market development.

Institutional variables

These factors focus on the level of governance, regulatory and institutional strength which can support bond market development. Under development of market-supporting institutions usually leads to unreliability of contract enforcement and uncertainty of investor rights. These are qualitative factors that can be measured through dummy variables or constructing a qualitative index.

Common Law, Law and order and the Legal System are key variables in this regard. The common law element originates from the work of La Porta, Lopez-de Silanes, Shleifer and Vishny (1998) who demonstrate that the origin of a country's legal system explains the degree of investor protection in that country. Evidence in La Porta *et al* (1998) has shown that British and English common law systems offer stronger investor protection systems than French civil law traditions. Empirical estimations by Eichengreen and Luengnaruemitchai (2004), Adelegan and Radzewicz-Bak 2009 and Mu *et al* (2013) concur that the origin of the (British) legal system has a significant and positive relationship with bond market development. However, others such as Smaoui *et al* (2017) and Essers *et al* (2016) disagree as they find that the English legal system's origin is insignificant in their empirical estimations.

An alternative consideration can be law and order assessment. The variable for law and order can be assessed as two separate components with the law sub-component focused on assessing the strength and impartiality of the legal system, while the order one is focused on evaluating public observance of the law (Bae, 2012). Thus, countries law and order will be ranked from high to low. The importance of the law and order variable is less convincing than origin of legal system. We find that law and order variables are insignificant in Adelegan and Radzewicz-Bak (2009), Bae (2012) and Smaoui *et al* (2017). However, Mu *et al* (2013) find them significant and positively related to bond market development. Burger and Warnock (2006) using a measure of rule law found significant and positive relationship to bond market development.

With **corruption**, intuitively a negative relationship is assumed, that is, lower levels of corruption should support bond market development. A high level of corruption tends to distort

the economic and financial environment and introduces instability into the political process. Corruption makes it more difficult to conduct business effectively so could result to outflow or withholding of investment. A high level of corruption undermines law enforcement thus could negatively impact bond market development. Not many studies measure the corruption variable. Those that do, find it insignificant. For example, Smaoui *et al* (2017) found a negative but insignificant relationship between corruption and bond market development.

Investment profile focuses on factors impacting the risk to investment using risk ratings. The risk rating has 3 components namely contract viability, profit repatriation and payment delays. A higher investment profile will support bond market development. Bond market capitalisation is expected to rise as investment risk declines. Investment profile is significant and positively related to bond market development in Eichengreen and Luengnaruemitchai (2004) and Smaoui *et al* (2017), but insignificant in Adelegan and Radzewicz-Bak (2009).

Bureaucratic quality attempts to measure the strength of institutions and the quality of bureaucracy. Countries with strong institutions are less susceptible to policy shifts or changes and are given higher points as low risk countries. Thus, countries with weak bureaucracy, governance and regulation will discourage investment in bonds. An adequate regulatory framework including accounting disclosure standards, penalties for auditors and accountants providing false information, and sanctions for insider trading or market manipulation, will discourage investment in bonds. Bureaucratic quality is significantly and positively related to bond market development as illustrated in Smaoui *et al* (2017) as well as Adelegan and Radzewicz-Bak (2009). This relationship has however been found to be significant (weak) and negative in Eichengreen and Luengnaruemitchai (2004).

Geographical endowments were popularised by the work of Beck, Dermirguc-Kunt, and Levine (2002) in endowment theories which suggests that environmental factors shape long-standing institutions, influencing financial development. Thus, countries with less favourable geographical and diseased environments should have less developed financial markets. The distance from the equator factor is not statistically significant in Smaoui *et al* (2017) but significant and positive in Eichengreen and Luengnaruemitchai (2004).

There is no consensus in literature on the importance of institutional variables. For example, Bae (2012) argues none of the institutional variables matter to government bond market development. This contrasts with Burger and Warnock (2006) who place the role of institutions to be significant and important. Thus, we should be cautious in interpreting the strength of institutional variables. Our view is that these are qualitative measures that may only be significant if the quantitative variables are already in place.

We should take note of explanatory variables that could be related, for example, economic size and economic development or banking sector size and banking sector concentration which introduces the problem of multicollinearity if they were all to be included in one model. Thus, in empirical estimations, it is important to choose the most important or significant variable that demonstrates the strength of the relationship rather than trying to include all possible variables. This is the case in Smaoui *et al* (2017) who had too many variables (seventeen) in one equation which poses such multicollinearity problems. For example, their observations on bureaucratic quality, size of banking system and interest rate volatility may have lost significance due to high collinearity among the governance and macroeconomic variables. In comparison to Bae (2012) who tested nine variables and found only four to be significant.

Similarly, the level of bond market development can exhibit contemporaneous economic relationships with multiple explanatory variables such as interest rates or fiscal balance causing the problem of **endogeneity**. For example, bond market development could be driven by the size of fiscal deficit or *vice versa* government borrowings through securities issuance could result in higher fiscal balances. Similarly, on interest rates, Mu *et al* (2013) note that the supply of bonds could drive interest rates while the level of interest rates could also determine amount of securities issuance by governments thus causality could run in both directions.

As Bae (2012) observes that developed markets generally have higher GDP per capita, lower fiscal deficits, larger exports, lower exchange rate volatility, larger banking sectors, lower interest rates and larger stock markets. Thus, it is important to understand how African countries would generally fair, given that, they are generally weak on structural factors but have in recent years provided stable macroeconomic performances.

In the concluding remarks, we have observed that determinants of economic size, economic development, fiscal balance, interest rates level/spread/volatility, size of banking system and British legal origin have strong linkages with bond market development. Other factors such as openness, bureaucratic quality and investment profile, although important and significant in some cases, are less convincing. For example, capital account openness and investment profile are more of particular concern for foreign investors than they are for domestic investors. Thus, a wider domestic investor base, will reduce the impact of foreign participation in determining the extent of bond market development.

2.3. Trends in Bond Market Development

2.3.1. Primary Market Data Analysis

SSA debt data reporting is in most cases limited, patchy or not fully available. Partly because the debt capital markets are a recent phenomenon in the 21st century where some systems and reporting frameworks are still being developed. The standard sources of reporting also differ from one country to another. The main sources of stock of debt data and issuances are the governments themselves through national treasuries reporting. Central banks also report fiscal data using treasury sources or from their own compilations. As fiscal agents in issuing government securities, central banks tend to report consistently on issued securities along with their primary market statistics. Where the debt securities are traded through an exchange, we tend to observe that the relevant securities or bond exchanges record the trading values. Due to differences from various national sources, we observe increasing attention by international organisations, such as multilaterals or associations, to compile central databases collating and harmonising the different sources. However, they too seem to be facing challenges in updating their debt databases in recent years as we explain below.

To put into context our data efforts, it is important to highlight that previous studies presented bond market data tackled the problem from different sources. For example, the African Development Bank's African Financial Markets Institute (AFMI) database provides debt data for 2005 – 2012 only. The Bank of International Settlements (BIS) data tables C1 – C3 report data on debt securities outstanding for countries globally but does not have much on developing African countries domestic securities outstanding except for South Africa. The Organisation for Economic Cooperation and Development (OECD) African Central Government Debt Statistical Yearbook which is more detailed than any other database on African countries debt

data. The last published 2014 OECD government statistical database provides data for sixteen African countries for 2003 – 2013.

We have built our domestic marketable securities debt database from the OECD and supplemented with own sources, where these are published and available, for instance annual debt reports; annual economic reports; central banks annual reports; budget documents; securities exchanges market reports; IMF data tables; Bloomberg and S&P Global Market Intelligence and statistical tables from various countries. Our database extends the analysis from 2007 – 2017 for the same sixteen countries. We then attempt to provide a more detailed analysis of the primary and secondary market data changes which is absent in the OECD data.

The data starts from the 2000s because with the exception of South Africa and a few others, most African countries started issuing debt in the 2000s. Berensmann, Dafe, Lindenberg and Volz (2015) note that since 2005, several low-income countries only started issuing local currency denominated debt with 5 – 10 year maturities such as Mozambique and Uganda while others such as Kenya, Tanzania and Zambia among others, have issued bonds with more than ten year maturities. For example, bond issuances started in 2003 for Nigeria, 2000 for Zambia while Kenya only took off in 2001 but had started issuing in the 1980s.

Table 2.2: Stock of Domestic Marketable Securities Nominal (USD millions)

Nominal USD size (millions)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola	4,035.39	13,890.67	9,322.32	7,192.64	7,536.75	8,763.51	15,400.00	20,600.00	22,900.00	30,700.00	32,000.00
Cameroon	385.23	346.81	357.17	695.04	895.62	920.73	1,589.49	1,775.01	2,111.17	2,024.78	2,885.09
Ghana	3,822.89	3,916.48	4,197.52	5,604.00	7,639.42	9,803.72	12,120.82	10,819.03	10,381.84	12,598.81	15,054.98
Kenya	6,456.45	5,541.27	6,838.66	8,176.69	8,983.45	9,986.40	12,171.88	14,191.46	13,883.73	15,026.02	18,705.54
Madagascar	645.17	532.70	551.13	550.64	586.16	656.08	655.45	645.44	333.00	526.00	669.00
Malawi	682.58	1,039.18	1,235.79	1,025.04	1,326.54	614.24	914.76	918.06	1,019.48	1,126.50	1,314.69
Mauritius	3,747.19	3,390.00	3,806.30	4,055.67	4,326.77	4,507.65	4,702.19	5,063.74	5,682.41	5,936.12	6,678.25
Mozambique	204.64	168.71	146.74	571.55	744.30	835.85	994.27	1,089.00	896.00	1,251.93	1,771.95
Namibia	1,310.75	988.51	1,356.93	1,468.03	1,954.80	2,020.81	1,838.00	1,839.44	1,803.56	2,859.58	3,755.02
Nigeria	18,391.44	17,503.82	21,580.62	30,212.54	36,021.94	42,048.06	46,753.97	43,085.42	44,340.17	35,077.57	34,922.29
Rwanda	320.47	275.54	311.27	368.21	301.94	387.87	503.36	561.43	676.17	696.89	931.88
Sierra Leone	212.58	228.84	196.06	209.32	217.10	258.31	306.31	860.92	635.68	608.09	577.36
South Africa	70,229.81	56,686.47	94,923.04	131,159.58	128,429.36	142,451.06	134,386.84	138,298.70	114,912.15	144,855.77	181,758.02
Tanzania	2,749.66	2,036.90	1,709.63	2,278.66	2,166.17	2,933.82	4,137.52	4,388.09	4,654.67	5,526.06	5,567.06
Uganda	1,626.83	1,399.41	1,362.01	1,513.69	1,750.71	2,232.05	2,909.33	3,379.99	3,124.41	3,438.61	3,411.42
Zambia	1,701.00	1,421.38	2,047.86	2,071.03	2,562.97	2,787.90	3,426.86	3,532.36	2,249.81	3,216.13	4,762.00

Source: OECD until 2013, various national sources and author's calculations.

In nominal terms in the table above, we observe that South Africa started as the largest market and has remained the largest by market size over the sample period. South Africa's debt issuances are large because the development of the domestic market started in the 1990s much earlier than most SSA countries. More so, South Africa's history of apartheid meant international borrowing was blocked until 1994. As a result, funding solutions were inward looking which led to the development of the domestic bond market in South Africa.

From empirical literature, it is noteworthy to emphasize that economic size and level of development are important determinants of bond market development. In South Africa's case, it has been the largest economy in the Africa region and is classified as a medium income country relative to low income countries in its neighbourhood. From a macroeconomic perspective, South Africa has pursued stable macroeconomic policies and good governance which have delivered stable interest rates and low inflation which has attracted investors locally and foreigners into the domestic bond markets.

South Africa is followed by Nigeria, Kenya, Angola and Ghana which make the top five domestic debt securities markets by market size in nominal terms. Interestingly, Nigeria and Angola are also large economies which experienced high economic growth rates over 2000 – 2009 and improving macroeconomic performances. The economic development has helped to develop the private sector and wider investor base, particularly in the non-oil dependent economies of Kenya and Ghana. The latter, have also financed their fiscal deficits domestically. Nigeria, Kenya and Ghana have taken steps to develop domestic debt market through establishing debt management offices and market infrastructure to allow electronic trading of bonds through securities exchange and over the counter (OTC).

Conversely, the five smallest markets in our data sample are Sierra Leone, Rwanda, Madagascar, Malawi and Mozambique which are all less than USD1 billion in market size. Sierra Leone, Rwanda and Madagascar are all small economies with the size of their economies less than USD10 billion each. All five countries are traditionally classified as low-income countries and thus access cheaper external concessional lending from bilateral and multilateral lenders, thus, domestic issuances have been low.

Table 2.3: Stock of Domestic Marketable Securities (Percentage to GDP)

Country	Stock of Domestic Marketable Securities to GDP										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Angola	6%	16%	14%	9%	7%	7%	11%	14%	22%	31%	26%
Cameroon	2%	2%	1%	3%	3%	3%	5%	6%	7%	7%	8%
Ghana	12%	12%	12%	14%	15%	18%	22%	22%	22%	25%	26%
Kenya	19%	17%	18%	21%	21%	20%	22%	24%	23%	22%	24%
Madagascar	8%	6%	6%	7%	7%	7%	6%	6%	4%	5%	6%
Malawi	19%	24%	24%	19%	22%	19%	25%	24%	28%	19%	21%
Mauritius	46%	40%	42%	42%	40%	41%	39%	40%	44%	47%	47%
Mozambique	2%	2%	2%	6%	6%	6%	6%	7%	7%	13%	13%
Namibia	14%	13%	14%	12%	18%	16%	15%	15%	19%	24%	25%
Nigeria	7%	6%	7%	8%	9%	9%	9%	9%	9%	11%	11%
Rwanda	9%	6%	6%	6%	5%	5%	7%	7%	8%	9%	10%
Sierra Leone	10%	9%	9%	9%	8%	7%	8%	16%	12%	14%	16%
South Africa	23%	22%	28%	32%	35%	37%	40%	42%	44%	45%	48%
Tanzania	13%	9%	7%	9%	7%	9%	9%	10%	11%	11%	11%
Uganda	11%	9%	7%	8%	8%	10%	11%	13%	13%	14%	13%
Zambia	14%	14%	15%	10%	12%	11%	12%	14%	13%	15%	19%
Average (Unweighted)	13%	13%	13%	13%	14%	14%	15%	17%	18%	19%	20%

Source: OECD until 2013, various national sources and author's calculations.

When we express the local currency debt securities market relative to the size of their economies, we observe that market capitalisation has increased from an unweighted average

of 13% of GDP in 2007 to about 20% of GDP in 2017, which reflects the growing nature of local currency debt securities over time. Assessing countries individually we observe that, along with South Africa, Mauritius becomes one of the top two largest debt securities market in the region. Mauritius is a small open economy with its size slightly above USD10 billion which is mainly financial offshore centred. Thus, the government in Mauritius may have been able to develop its domestic debt market utilising the developed financial sector and savings already in the domestic economy.

Ghana, Kenya and Namibia become a distance third, fourth and fifth in terms of debt securities market. Ghana and Kenya, which have shown rising nominal increases in debt securities, also demonstrate that such increase has come along with a higher pace of economic growth. On the other hand, Namibia's domestic securities have not kept up with growth in the economy resulting in a declining share of debt securities relative to the size of the economy. Cameroon, Madagascar, Mozambique and Rwanda are the least capitalised local currency debt market. Madagascar also falls in this category as a small island economy without large investor base or large banking sector to support uptake of domestic securities.

Nigeria and Angola which are large in nominal terms drop to the low categories when expressed to the size of the economies. Over the years, Nigeria exhibits a somewhat static level of domestic debt securities to GDP ratio close to 10% of GDP while Angola on the other hand has increased strongly from 3% of GDP in 2003 to over 20% of GDP in the last three years of our sample period. Angola's increase may be related more to large currency devaluations in 2016 while the economy contracted. Ghana and South Africa have presumably the largest growth rate from 13% – 26% of GDP, and 31% – 48% of GDP respectively, over the 2007 – 2017 sample period. Although GDP as a measure of economic size is important to assess bond

market development, it should be treated more cautiously in SSA. We have observed that countries like Nigeria, Kenya and Ghana have rebased their GDPs in the last 5 years which resulted in the economic base substantially increasing by 20 – 40 % in nominal terms. Such increase then could understate the size of the domestic bond market and this is potentially the case for the Nigeria data.

Therefore, an alternative way to assess the development of bond markets is to also consider the original sin concept developed by Eichengreen and Hausmann (1999) which we adapted earlier in literature review section. Using our equation (2.1), we have developed the first measure of original sin which is essentially measuring the total domestic debt securities to total debt securities. Total debt is defined as domestic plus external debt. The rationale is to measure the ability of countries to fund themselves more in the domestic bond market relative to international borrowings. This applies particularly to those countries that we have observed to be in the top by nominal issuances size rather than relative to GDP.

Table 2.4: Domestic Debt as a Ratio to Total Debt Expressed as a Percentage

Country	Domestic Debt/ Total Debt											
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Ghana	22%	53%	58%	50%	46%	48%	50%	52%	51%	44%	40%	44%
Kenya	42%	45%	50%	51%	51%	56%	47%	51%	55%	54%	50%	50%
Nigeria	37%	80%	84%	83%	85%	86%	86%	87%	84%	83%	81%	76%
South Africa	87%	85%	83%	84%	88%	90%	90%	91%	91%	91%	90%	90%
Zambia	34%	64%	50%	58%	57%	54%	57%	47%	49%	42%	33%	33%

Source: Various national Government sources and author's calculations.

Table 2.4 above is a smaller sample that consists of countries that we have observed could be classified as in the top five. We observe that, indeed, South Africa is predominantly funded by

the domestic debt market thus international original sin is at its lowest. The higher the domestic debt relative to total debt, the more likely it is that a country is able to fund itself locally. This is after removing the need to go abroad and issue local currency denominated debt as investors now follow the issuers in their own jurisdictions. South Africa's local currency debt to total debt ratio of 90% is comparable to many emerging market peers. Ghana, Nigeria and Zambia data from 2006 onwards shows benefits from external debt relief granted to these countries in 2006 by multilateral institutions under the highly indebted poor countries (HIPC) initiative. Thus, external debt stock becomes lower while the proportion of domestic debt becomes higher. Nevertheless, such debt relief was more than fifteen years ago, and these countries have indeed taken steps to develop their domestic debt markets. Therefore, reducing the extent of international original sin as we have redefined it.

Since we have established that most countries are now able to issue local currency denominated debt, the next stage is to consider to what extent these debt securities are longer term dated securities. We consider both treasury bonds to total domestic marketable debt securities and long-term domestic debt to total debt (external plus domestic). The latter is what we consider as the second measure of original sin-domestic original sin.

Table 2.5: Share of Treasury Bonds to Total Domestic Marketable Debt Securities

Country	Share of Treasury Bonds/ Total Domestic Marketable Debt										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola	30%	35%	49%	85%	64%	76%	79%	83%	86%	81%	78%
Cameroon	100%	100%	100%	100%	89%	87%	86%	84%	69%	75%	74%
Ghana	76%	58%	58%	62%	63%	69%	67%	60%	53%	62%	82%
Kenya	77%	82%	77%	76%	78%	80%	71%	71%	73%	70%	65%
Madagascar	70%	80%	75%	73%	77%	82%	87%	87%	80%	80%	80%
Malawi	8%	23%	21%	22%	18%	22%	28%	30%	61%	72%	74%
Mauritius	60%	67%	68%	68%	74%	77%	79%	85%	85%	88%	88%
Mozambique	100%	100%	100%	71%	75%	79%	72%	63%	64%	60%	60%
Namibia	66%	63%	66%	60%	51%	53%	57%	59%	55%	63%	61%
Nigeria	67%	71%	63%	67%	60%	53%	55%	61%	66%	68%	69%
Rwanda	64%	81%	77%	61%	58%	61%	41%	46%	36%	46%	61%
Sierra Leone	22%	16%	14%	12%	11%	10%	8%	16%	21%	16%	13%
South Africa	89%	88%	84%	84%	85%	86%	86%	87%	88%	87%	87%
Tanzania	9%	37%	33%	50%	64%	57%	74%	72%	61%	67%	77%
Uganda	45%	50%	54%	57%	61%	57%	62%	66%	69%	65%	74%
Zambia	46%	82%	53%	55%	62%	52%	47%	52%	51%	59%	57%

Source: Author's calculations.

Table 2.5 above shows the composition of treasury bonds which reflects medium to long-term debt to total marketable debt securities. We are unable to disentangle medium from long-term for all countries as the data distribution is uneven in the different countries. The clear distinction is short-term treasury bills of one year or less versus the long-term bonds with maturities of at least one year and upwards. Nevertheless, Angola, Cameroon, Kenya, Madagascar and South Africa have always had medium to long-term debt securities more dominant composition in total debt securities at the beginning of our sample period.

It also shows that countries like Malawi, Sierra Leonne and Tanzania all had short-term debt securities more than 50% of debt securities in 2007 which reflects under development in bond

markets. However, over time Tanzania has managed to transition the composition into more medium to long-term debt securities dominating the total debt securities. Sierra Leonne is still underdeveloped as short-term debt securities still dominate overall total domestic debt securities.

Table 2.6: Share of Long-Term Local Currency Debt as Ratio of Total Debt

Country	Long-term Local Currency debt/Total Debt											
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Ghana	16%	38%	47%	29%	26%	29%	32%	35%	34%	26%	22%	27%
Kenya	32%	33%	39%	42%	39%	42%	48%	44%	39%	37%	36%	32%
Nigeria	16%	48%	61%	66%	62%	63%	60%	58%	53%	47%	55%	57%
South Africa	80%	77%	74%	74%	73%	76%	77%	78%	78%	79%	79%	79%
Zambia	6%	15%	50%	34%	30%	30%	29%	25%	23%	22%	12%	18%

Source: Various national sources and author's calculations.

In another smaller sample which eliminates the smaller markets, we continue to confirm that South Africa is the most developed market with its long-term local currency funding remaining closer to 80% of total funding which includes external debt. If countries are able not only to fund themselves domestically but also borrow in longer term maturities, then indeed such domestic debt markets are well developed. This is similarly the case for Nigeria which appears to depend more on long-term local currency debt market. However, Ghana and Zambia do indicate that these two are far from developed. While they can fund themselves more in the domestic market, such funding is either short-term treasury bills or largely more reliant on external borrowing compared to long-term domestic securities.

The presence or dependency on external debt issuances reduces longer term domestic funding capabilities. We could have enhanced our analysis further by comparing the long-term domestic issuances between floating rates versus fixed rates, however, not all these countries

are able to report this data publicly on a regular basis. A very high ratio of fixed rate long-term domestic debt securities to total external plus domestic debt securities would enhance the extent of development of the local currency debt market as well as the extent of decline in domestic original sin. Our last section of data analysis interrogates the investor base available to take up the issued domestic securities.

In analysing investor base diversification, we are limited by data distribution and classifications by different countries. For example, some countries group pension funds, insurance and non-financial public enterprises into broadly institutional investors while foreigners can be distributed between banks and fund managers. What is common however, is the stability of the category of banking sector holdings. The starting point is that banks traditionally dominate the financial system in many SSA countries (Adelegan, 2009), which then dominate in buying government bonds. They are still one of the largest group of investors in government bonds due to some of their roles as market makers in the primary market. In recent years other investors have started to participate more in government securities market, for example, non-bank financial institutions (NBFIs) such as pension funds, insurance companies and foreign investors.

Table 2.7: Share of Banks Government Debt Holdings to Total Marketable Debt Holdings

Country	Investor Diversification (Commercial Banks Holdings)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola	78%	97%	57%	88%	96%	96%	0%	0%	51%	0%	0%
Cameroon	50%	52%	57%	74%	66%	57%	74%	-	-	0%	0%
Ghana	31%	29%	39%	46%	36%	28%	29%	27%	27%	28%	15%
Kenya	46%	44%	48%	53%	50%	48%	50%	48%	51%	61%	56%
Madagascar	27%	37%	47%	43%	51%	63%	60%	-	-	0%	0%
Malawi	26%	20%	17%	16%	22%	18%	16%	28%	20%	16%	19%
Nigeria	64%	64%	59%	57%	67%	55%	46%	50%	37%	34%	43%
Sierra Leone	36%	56%	47%	54%	57%	69%	74%	44%	73%	66%	63%
Tanzania	73%	55%	51%	54%	56%	56%	51%	49%	45%	38%	36%
Uganda	54%	60%	73%	69%	46%	57%	52%	49%	41%	43%	45%
Zambia	36%	45%	49%	52%	57%	13%	51%	30%	31%	29%	41%

Source: Author's calculations.

Commercial banks hold government securities as part of central bank liquid assets reserve ratios. Where credit extension to private sector is low or weak, banks tend to increase government securities holdings as they provide a risk-free return (passive income) without taking the risk of lending. As we observe in Table 2.7 above, banks are the primary holders of government debt. We observe positive decline in the share of banks holdings for many countries such as Ghana, Tanzania, Nigeria, Uganda and Zambia (except in 2017) which is consistent with improving investor base diversification. On the face of it, the Kenyan banking sector share of government debt appears to be stagnant and rising in later years without telling a story. On the other hand, Angola, Cameroon, Madagascar and Sierra Leone trends are confusing moving in the opposite direction with the share of banks holdings increasing instead of declining as would be expected in developing bond markets. These trends can also be explained by other macroeconomic factors that influence the investor base trends. Where there

are large institutional investors, such as pension funds and insurance companies to some extent, the holdings are less concentrated in the banking sector but spread with institutional investors.

A high concentration of government securities held by the banking sector can pose risks to the financial system. Berensmann *et al* (2015) asserts that since sovereign debt typically makes up most of domestic debt, sovereign debt problems in situation where banks have high concentration of local currency government, bond holdings could trigger a banking crisis with the European debt crisis in 2012 providing the most recent example. Thus, a diversified investor base is important to mitigate such challenges.

When local currency bond markets are more developed, we observe foreigners coming to buy local currency debt. This is the case for a few markets in SSA. For example, the Essers *et al* (2016) dataset shows that foreign participation in SSA is mainly in four countries namely South Africa with 35 – 40% of holdings, Nigeria with 20% of holdings, Ghana with more than 30% of holdings and Uganda with 10 – 20% of holdings. Other SSA country holdings are either negligible or non-existent due to limits on foreign investment restrictions (for example Botswana and Malawi) or foreign investors are prohibited from owning government securities (for example in Ethiopia) or more generally exchange control regulations limit or inhibit foreign participation (as is the case in Angola and Mozambique). African countries therefore face a diverse level of foreign participation in local bonds due to a combination of liquidity, foreign exchange regulations and transparency in the bonds trading systems among other factors.

2.3.2. Secondary Market Data Analysis

Secondary market data tends to be high frequency and runs a shorter span of years. For African countries, mostly because the regulatory framework and market infrastructure that has only

been developed predominantly in the last ten years. Prior to that, either trading was manual or there was no trading at all. So, we start by providing only markets that have active trading in the secondary market followed by institutional developments and reforms that support such developments.

To compile our second dataset, we use the African Stock Exchanges Association (ASEA) yearbooks which were published on an annual basis for 2005 – 2012. However, the yearbooks have been discontinued or are no longer being published. As in past approaches, the gaps were supplemented from national sources such as the securities exchange, central bank, ministry of finance or debt management reports.

In Table 2.8 below, we have eliminated smaller markets where trading values are small, for example less than USD1 billion per annum, reflecting average monthly activity also less than USD100 million. Thus, only a few countries which are ranked at the top of Sub-Saharan markets are shown below. All four countries in Table 2.5were in the top five in Table 2.1 and considered more generally in the top five of debt securities markets in Africa. On the hand South Africa, is in a class of its own, when compared with regional neighbours as our data tables show. South Africa is usually compared globally with other emerging and developed markets on financial markets development, characteristics or trends.

Table 2.8: Secondary Bond Market Trading statistics – Value of Trades (USD millions)

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ghana	353	1,373	1,014	727	1,753	2,572	3,159	4,209	2,945	3,146	2,920
Kenya	674	1,357	1,227	1,452	5,697	5,299	6,558	5,256	5,582	2,961	4,235
Nigeria	4,570	33,475	75,865	112,000	90,728	56,646	46,783	50,064	40,437	47,739	43,125
South Africa	1,642,653	2,035,410	2,069,219	1,815,470	2,549,218	2,565,029	2,680,650	1,965,329	1,655,200	1,480,595	1,999,682

Source: Various national sources and Author's calculations.

There are many statistics that could be utilised to assess the level and depth of secondary market trading activities. For mature markets, researchers usually use various measures of liquidity such as bid-ask spreads and/or turnover ratios while other general measures can focus on average yields, maturities, number of transactions and subscriptions levels. These also tend to be granular on various bonds traded to assess specific characteristics. Since we are dealing with still developing bond markets where trades are less frequent, we have proposed to utilise annual data and demonstrate points of gradually improving trends in a comparative analysis which also includes the development in market infrastructure. In a single country analysis, such as South Africa or comparatives with emerging markets, it is indeed right to use high frequency data analysis. Even more with empirical analysis.

Table 2.8 shows that South Africa is way ahead of its regional peers by multiple times and this has been the case for over ten years given the trillions of US dollars that have been traded annually for over ten years. Nigeria comes a distant second with average trading annually close to fifty billion US dollars in the last few years. From our theoretical and empirical analysis, one of the factors that matter for determinants of bond market development is market size. As we observe South Africa and Nigeria, which are the two largest economies in the SSA region, also have the largest size in terms of outstanding government marketable debt securities (Table 2.2) and also in value of trades in the secondary market (Table 2.8), but perhaps other determinants also play a part, which we will explore in the following paragraphs.

While Ghana and Kenya show much lower trading activities relative to Nigeria and South Africa, they have progressed significantly in the last six years. This is evidenced by their trading values that used to be less than USD1 billion ten years ago but have progressed in recent years. They also stand out when compared to other smaller markets that are still growing such

as most sovereigns in Table 2.2with a sample of sixteen countries. Much of the development in recent years is related to the determinants of bond market development discussed earlier. These include establishing market infrastructure and investor base which help with issuances and trading of bonds issued.

As our sample of countries in Table 2.2 are issuing debt securities, it is safe to assume that primary debt markets have indeed been established in most SSA countries. However, secondary debt markets are still relatively weak except for a few countries that we have highlighted in Table 2.6. How do we get to understand the differences in the number of countries in Table 2.2 versus Table 2.6? The difference lies in the extent of development in the secondary markets. In the ensuing paragraphs we try to explain the differences in the level of secondary market trading activities. We start with South Africa where secondary government bond markets are established. We attempt to address the question of why South Africa is much more developed than its regional peers.

South Africa is the most sophisticated bond market in Africa. Bond market development started in the 1980s and 1990s. According to Mboweni (2006), the developments started with the government issuing benchmark bonds, establishing a yield curve and an auction-based system. This was followed up in 1990 with the South African Reserve Bank (SARB) playing an active role in establishing a secondary market. For example, in 1990, the central bank started providing two-way quotes for benchmark bonds, which provided the central bank as a market maker, albeit informally. The central bank's role in developing government debt market was then limited post 1994 so that the central bank only focused on its mandate of price and financial stability. In 1996, that role was taken up by the Bond Exchange South Africa (BESA), after being granted a licence. Primary dealers were then appointed by the South African

National Treasury in 1998 and subsequently BESA launched its Bond Automated Trading System (BATS) in 2000. Since then bonds are traded electronically and the secondary market has grown rapidly. Since being acquired in 2009 by the Johannesburg Securities Exchange (JSE) to be a fixed income division, BESA no longer exists on its own. In 2011, JSE launched a new automated trading system for bonds, Nutron online trading system.

The JSE records that at the end of 2013, eight primary dealers were permitted to participate in market making in the secondary market for qualifying government paper. South Africa's debt capital markets are comparable with other emerging and developed markets relative to peer African neighbours. For example, the JSE records that its' debt market is liquid, well developed in both investor base diversification and daily activity with at least USD2 billion traded daily. Put into context with Table 2.8 above which shows values of trades in trillions of US dollars on an annual basis for South Africa versus millions of US dollars for most African regional peers.

2.3.3. Institutional Reforms

2.3.3.1. Market Infrastructure

To trade bonds, you require bids, offers, and a settlement system or platform that is transparent and of good standards. Trading platforms are one way to achieve that. Trading platforms enhance price discovery and transparency. Secondary market trading of government bonds is a new phenomenon in many countries as electronic trading platforms have only been recently created.

South Africa as an early adopter has government bonds traded in the primary market through the auctions of SARB and restricted to primary dealers only while secondary market trading is done through the JSE (Hassan, 2013).

Nigeria trades its government bonds through the Nigeria Stock Exchange (NSE) and FMDQ Group electronic trading platform with most of the trades taking place on the latter. FMDQ OTC E-Bond platform introduced in 2013 but only became fully operational in March 2014. Around the same time, the NSE also introduced a new trading platform, X-Gen, and appointed fixed income market makers in 2013.

In Kenya, reforms started in 2003 with liberalisation of the pension and insurance industries. In 2007 the IFC introduced the Efficient Securities Markets Institutional Development (ESMID) Program in East Africa to support bonds issuance with key market players, such as central banks, as issuers of government bonds and securities regulators whose trading platforms are utilised. The programme helped to harmonise the financial market infrastructure used in bonds trading as well as reduce the approval time for applications to issue bonds. Kenya bonds are traded on the Fixed Income Securities Board (FISB) and listed on the Nairobi Stock Exchange. Secondary market trading is through licensed stockbrokers. In 2009, Kenya introduced the enhanced Automated Trading System (ATS) to improve efficiency and liquidity in the trading of government bonds. Since then, the automated trading and settlement system for government bonds have been utilised. As we observe in Table 2.5, secondary market trades increased dramatically from 2010 following the introduction of the automated trading system. In 2014, the online trading system of government bonds was integrated with the central bank settlement system.

In Ghana, secondary market trades improved in 2007 with increased OTC trading by primary dealers. However, real take off was in 2011 and has remained at a relatively high level. Similar to Nigeria, secondary market trades are a combination of OTC and exchange trades. In strengthening the secondary market in Ghana, the treasury, central bank and securities exchange established the Ghana Fixed Income Market and the Bloomberg e-bond trading system in August 2015. This was also followed up in July 2016 with updated guidelines and responsibilities for primary dealers to support both primary and secondary debt markets development.

Zambia, which features in some of the developing local currency bond markets in the region also took steps initially led by the central bank. The Bank of Zambia issued guidelines for secondary market trading in 1998 in government bonds through the Lusaka Stock Exchange. In 1999, in addition to commercial banks, non-bank financial institutions were allowed to participate in the government auctions. Governments bonds are traded and listed on the Lusaka Stock Exchange. Other than the market infrastructure through electronic platforms, it is also the importance of the participants that make the market. The participants range from commercial and investment banks, stockbrokers, pension funds, insurance sector and others.

From the trading platforms, there is also a greater need for efficient clearing and settlement systems – real-time gross settlement (RTGS) systems in East Africa. In South Africa settlement of debt securities through STRATE is maximum T+3 (Clearstream, 2019). Nigeria government bonds settlement is T+2. Kenya settlement is T+3. The last step on market infrastructure is the securities depository where bonds can be held centrally, safely and securely in the process of settlement and transfer of ownership electronically. There are currently divergent set ups in the different countries. On one hand, South Africa has an independent centralised securities

depository system, through STRATE, for clearing all capital market instruments trading (Clearstream, 2019). STRATE also uses the electronic trading system for bonds which is linked and operated by the JSE. Similar to South Africa, Ghana also has a centralised securities depository company for all financial market securities traded in Ghana and has had since December 2013. Similarly, for Nigeria, they use the Central Securities Clearing System (CSCS) for all bonds traded on the Nigeria Securities Exchange and the FMDQ platform which reflects a harmonised process.

On the other hand, some central banks, such as Kenya and Uganda each have their own central securities depository (CSD) for government bonds while stock exchanges also have their own CSDs for equities and bonds traded on the stock exchange (Biau, 2018). However, Biau (2018) argues that the East African region is also considering pursuance of a centralised regional CSD.

2.3.3.2. Role of Primary Dealers

Mohanty (2002) asserts that many countries around the world set up primary dealers' system to promote development of bond markets. Primary dealers promote the development of both primary and secondary debt markets. The expected results, Mohanty (2002) argues, are primary dealers can guarantee success of auctions, promote liquidity in the secondary market through the provision of two-way quotes and can also eliminate potential challenges with banks taking the sole responsibility of market making. Thus, the point is that market makers can enhance liquidity in the bond market by making sure that there are agents ready to participate on either side of buying or selling the securities.

South Africa appointed primary dealers or market makers as early as 1998 which helped development of the government bond market much earlier than peers. On the other hand, the government in Nigeria started issuing bonds in 2003, thereafter, supporting institutions

implemented their reforms to ensure that the local currency market grew by providing the regulatory framework, platforms and participants. In Nigeria, the NSE appointed fixed income market makers who were stockbroking firms. Nigeria introduced primary dealer market makers for the first time in 2006 to create liquidity for government bonds by providing a two-way quote system. Kenya is still rolling out a market makers platform. Bonds are mainly traded on the FISB while the OTC trading takes place through the Nairobi Stock Exchange.

2.3.3.3. Pension Reforms

Pension funds' investments are more stable, can act as countercyclical when other investors are withdrawing from the market thereby stabilising the market (Adelegan, 2009). They help to increase participation of non-bank financial institutions and encourage growth of secondary market trading. Countries have been reforming their pension fund industries to allow for and broaden investment into long-term government securities. Zambia and Kenya reformed their pension sectors in 2003 while Nigeria introduced the Pension Reform Act in 2004. Ghana introduced the National Pensions Act of 2008 which provides limits and guidance for pension fund investments in government securities.

2.3.3.4. Bond Indices

The development of secondary markets is also being helped by the new concepts of bond indices. Bond indices allow index providers to choose the most liquid bonds and package them into an index and provide an instrument for investors. The bond indices have also encouraged foreign investors to enter African local currency debt markets. For example, indices such as JP Morgan Global Bond Index Emerging Markets (GBI-EM), Barclays and Citi World Government Bond Index (WGBI) and the Ecobank middle Africa bond index (MABI) among others, have attracted a lot of attention from foreign investors.

Table 2.9: Summary of Africa Bond Indices

Index name	Composition
S&P Africa Sovereign Bond Index	13 African sovereigns LC debt.
Citi World Government Bond Index	23 global sovereigns LC debt
FTSE Emerging Markets US Dollar Government Bond Index	25 global sovereigns on FC debt
JP Morgan Global Bond Index Emerging Markets	18 Emerging market sovereigns on LC debt
Bloomberg Barclays Global EM Local Currency Government bond index.	Emerging markets
AfDB/AFMISM Bloomberg African Bond Index	8 African sovereigns LC debt

Sources: Author's compilations.

Credit ratings culture and foreign participation usually matter for international issuances rather than local currency issues in domestic economy. However, foreign investors tend to look at ratings, particularly local currency ratings assigned by international rating agencies. Such local currency ratings can also be used as a basis for inclusion in various government bond indices. South Africa is the only African country still included in the Citibank WGBI while they have exited the GBI-EM due to the fall in its credit ratings over the last five years. The GBI-EM tracks changes in emerging market (EM) local currency bond prices.

Nigeria's inclusion in the JP Morgan Government Bond Index[2] in October 2012 subsequently led to substantial increases in foreign participation. For example, during 2013 foreign participation reached a peak of USD11 billion. Nigeria's Naira bonds had 0.72% weight in the index. However, fall in oil prices in mid-2014 and global risk aversion resulted in macro

[2] South Africa is the only other African country with local currency bonds included in the JP Morgan GBI-EM then.

pressures in the economy including weaker exchange rate and a more restrictive foreign exchange regime. JP Morgan GBI-EM added Nigeria to the index in October 2012, put them on negative watch in January 2015 and finally delisted in October 2015. The reasons were lack of exchange rate (FX) liquidity as central bank tried to stabilise the Naira exchange rate following a fall in international oil prices which negatively impacted the oil dependent economy. At the time of exclusion from index, foreign holdings had fallen to USD3 billion.

Other than the infrastructure for smooth electronic trading and settlement of bonds, it is also very vital to have good bond instruments. That is, benchmark bonds with sizeable values, different maturities that allow the establishment of a yield curve. That way, bonds are able to be priced correctly taking into account the size, tenor, inflation outlook and risk premium. In such cases, researchers can argue a well-developed bond market can indeed help with monetary policy transmission through the interest rate channel. The policy interest rate is therefore used to anchor inflation expectations. Inflation targeting regimes use policy interest rates as a tool to anchor inflation expectation. Thus, such countries are able to issue long-term securities on a fixed rate basis. Other than aiding monetary policy transmission, it also reduces the extent of the domestic original sin concept we discussed in earlier sections.

2.4. Concluding remarks

This chapter has discussed the theoretical underpinnings of bond market development through the lens of the original sin theory. We have found that the original concept developed by Eichengreen and Hausmann (1999) needs further modification consistent with challenges faced today. We then modified both concepts of international and domestic original sin. The international original sin concept sought to understand to what extent countries were able to borrow in their own currencies internationally. However, we have demonstrated that in today's

world, countries no longer need to go abroad to issue local currency denominated debt but now issue in their domestic countries. Further we modified the domestic original sin concept to measure primarily long-term domestic debt securities as a ratio to total external and domestic debt securities.

Our literature review showed that some determinants are more important than others in influencing bond market development. Particularly, structural determinants of economic size and economic development. Their importance is rarely disputed in empirical estimations. Further, macroeconomic determinants of fiscal balance, interest rates level and volatility along with inflation stability are equally important. Exchange rate regimes and volatilities of the currency matter but are much more important for markets where foreign investors are present due to exchange rate risk or potential mismatches between external liabilities and assets. There is more contestation within empirical literature as to the extent of the importance of institutional determinants of bond market development.

In all our data trend analyses, South Africa stands out as the most developed debt market in the SSA region. Our data results show that the economic size, stage of economic development, stable macroeconomic policies and performance as well as a developed financial sector, are important factors of bond market development. Market supporting infrastructure for issuing and secondary market trading was also developed way ahead of regional peers. Other markets such as Mauritius are also larger relative to the size of economy due to its benefits as an offshore financial centre. Nigeria's bond market development follows South Africa regarding higher dependence on long-term local currency denominated debt.

According to the World Bank (2018), the Highly Indebted Poor Countries (HIPC) initiative helped countries such as Ghana, Nigeria and Zambia, among others to benefit from external debt relief. These countries went on to strengthen their domestic markets. However, Zambia and Ghana are still reliant on short-term treasury bills on funding in the domestic market. Countries that have established debt management offices, such as Nigeria and Kenya, have shown better development and a more focused approach for issuing long-term debt securities.

Smaller countries by bond market size, such as Sierra Leone, Rwanda, Madagascar and Malawi (to some extent) remain small due to a number of factors which include their small economic size, their low-income country status or low stage of development, which limits the ability to fast track the development of domestic borrowing as they are still dependant on external concessional funding. In a nut shell, the extent of our modified original sin has largely declined in the region's big economies such as South Africa and Nigeria. On the other hand, the second tier of Kenya, Ghana and Zambia are still on their way to reduce the extent of modified original sin while the smaller countries still have a long way to go.

We have observed that development of primary debt markets requires governments to issue marketable securities that can be bought by investors. The growth of the primary market can be assessed in nominal terms or relative to the size of the economy as we have outlined in Table 2.2 and Table 2.3. We showed that on an unweighted average, domestic marketable securities have increased from about 14% of GDP in 2007 to about 20% of GDP in 2017 which reflects the growth of the primary debt market. Further broadening the primary market requires a diverse investor base which not only includes the commercial banks but also other participants such as pension funds, insurance sector, asset managers and foreign participation. We were not able to share data on various investors buying government bonds due to the differences in

classification of investors in the sample countries. What we endeavoured to do with Table 2.8 is to show the declining trends of government debt held by commercial banks which usually demonstrate that other investors are increasingly participating in the government debt market.

Development of the secondary debt market can be assisted by having in place the relevant trading platforms which allows countries to gradually shift from OTC trading to exchange trading. In these platforms, primary dealers are ready as market makers to provide two-way quotes thus enhancing price discovery. These can only be helped where the governments are able to carry out reforms that enhance the ability of a diverse set of investors to participate in buying and selling of government debt. For example, reforms aimed at easing restrictions to pension funds industry, insurance industry, reducing transaction costs and regulations to foreigners when investing in local currency debt. More importantly is the right and stable macroeconomic environment.

Data limitations have led us to create our own debt database. Most of the studies for developed and developing markets take data from the Bank of International Settlements (BIS) tables which is not available for many African countries. For example, the specific BIS data tables are known as Table C1-C3 which contain domestic and international securities statistics for many countries. Except for South Africa, the statistics for African countries are not reported. Some steps have begun to collate the fixed income data by African Development Bank, OECD and the ASEA but data gaps remain. Thus, the importance of developing and maintaining databases and reporting fixed income data by exchanges and regional organisations needs to continue to be strengthened.

CHAPTER 3: ASSESSING THE IMPACT OF FOREIGN PARTICIPATION ON GOVERNMENT BOND YIELDS IN AFRICAN LOCAL CURRENCY GOVERNMENT DEBT MARKETS

3.1 Introduction

Since the 2007/08 global financial crisis, development of local currency bond markets has been a key theme for many stakeholders including policy makers and multilateral institutions. This is because debt denominated in local currency provides lower risks to governments than foreign currency denominated debt. For central banks, development of local currency bond markets, can enhance greater transmission of monetary policy through interest rates to the financial markets and to the real economy. In the process of promoting local currency bond markets, institutional investors have also become innovative in exploring investment options outside their own geographic borders. To some extent, this weakens the home bias arguments on investments and favours the international capital asset pricing theory. As such, development of local currency bond markets has come along with a diversifying investor base from traditional banks and pension funds to recent phenomena on increasing share of foreign participation in local currency bond markets.

In Africa, South Africa and Ghana lead the relative share of foreign investors in government securities. For example, foreigners account for close to forty percent of all outstanding local currency government securities in both South Africa and Ghana, while in Nigeria and Egypt foreigners account for close to thirty percent, twenty percent in Zambia and less than ten percent in Uganda over 2011 – 2018. Foreign investors are increasingly seeking government debt denominated in local currency. Particularly in African countries where bond yields are much higher relative to developed markets. Therefore, the study is of key interest in this decade

for policymakers, academics and portfolio managers to enhance understanding of the impact these trends may have on various economic indicators.

There are a number of reasons that are associated with the rising trend in foreign participation in local currency bond markets. In emerging and frontier markets, foreign participation is increasing as a result of numerous factors related to financial integration and portfolio diversification, improvements in macroeconomic indicators, and attractive interest rates outside home countries, among others. Firstly, in a financially integrated world, developing financial markets provide a wider pool of investible assets across the globe which increases options for portfolio diversification. Secondly, the development of the financial markets, has also come along with improvements in macroeconomic management and performances reducing perceived risks in emerging markets. Sienaert (2012) concurs that foreign participation has been driven by improvements in economic performances policymaking progress in developing countries. In subsequent sections, we explore some of the factors that drive foreigners to invest in local currency securities.

From traditional equity markets, bond markets have become investment options in recent years. Investment banks have developed bond indices which help to track selected bond securities in different countries providing investors with a variety of options across countries. For instance, there are global bond indices, emerging markets bond indices and frontier markets bond indices. South Africa and Nigeria were included in Citigroup's World Government Bond Index and JP Morgan Government Bond Index, respectively, in 2012, which contributed partly to rising foreign participation in their local currency denominated bonds.

The reduction of interest rates in advanced markets post the financial crisis and the generally high interest rates in frontier markets have rendered bond yields in emerging markets and frontier markets attractive pulling international investors to these markets. Foreign investor participation in local currency debt markets also help central banks in monetary policy transmission, as a deepening investor base helps with competitive pricing of debt securities. Thus, can improve the interest rate transmission channel. More so, they provide a source of foreign currency in the economy. Multilateral institutions such as African development Bank and International Finance Corporation (IFC) have also promoted the growth of local currency bond markets as non-resident issuers in Asia and African markets.

Researchers argue that foreign investor participation in local currency bond markets provides benefits as well as costs. Andritzky (2012), concur that foreign investors help to facilitate the development of liquid benchmarks in bond markets which in turn helps to improve liquidity in the secondary bond markets. The premise of these assertions stem from the assumption that foreign investment could have a different investment philosophy and time horizon relative to domestic investors. That is, domestic institutional investors generally buy bonds and hold them until maturity. On the other hand, foreign investors are more likely to trade frequently and therefore contribute to a more liquid market.

Moreover, foreign investors add to diversifying the investor base. Traditional investors in government securities remain banks, insurance companies, pension funds and local asset managers. Pension industry reforms and growth of the insurance sector across countries are helping to boost demand for long-term government securities. The addition of foreign investors provides a wider and more diversified investor base helping government options in seeking long-term finance. The presence of foreign investors also helps with checks and balances in

developing government's debt management systems. Lee (2015) argues that greater foreign participation encourages governments to modernise trading platforms, infrastructure and general debt management reforms. More so, scrutiny by foreign investors and credit analysts can help reduce principal agent problems that are associated with private loans and enhance higher quality reporting and governance by borrowing governments.

However, changes in foreign investor flows can have destabilising effects, particularly, as these portfolio flows can shift over very short periods. Such changes pose risks of greater volatility in bond markets. Emerging markets can experience sudden stops when global risks change resulting in outflows that can be destabilising (see Calvo and Talvi 2005 on sudden stops). When short-term portfolio flows move too frequently, they tend to be "hot money" which can cause problems for monetary policy conduct. Peiris (2010) argued that the collapse of Lehman Brothers in September 2008 resulted in higher outflows in emerging markets and greater yields volatility. Since the announcement of US monetary policy normalisation in May 2013 and more recently in 2018, emerging markets have generally suffered significant bond outflows.

It is therefore vital to understand the impact of such flows on changes in yields and volatility, if any. These movements can increase volatility in yields and in turn complicate monetary policy. More importantly, empirical analysis is still limited in the assessment of costs and benefits that arise from foreign participation in bond market development in African markets. The research attempts to explain to what extent supply (domestic macro conditions) and demand factors (investor diversification) influence changes in local currency nominal government bond yields. While domestic investors may tend to be more stable and have a long-term view, foreign investors on the other hand may take a shorter-term view in search of higher yields and cause volatilities when they exit as external market conditions change. Thus, our

research aims to provide a better understanding of the dynamic relationships that can help governments in improving their own financing options and at the same time deepening the domestic capital markets and improvement in financial intermediation. Understanding these factors and trend drivers is important to policymakers to drive the right policies, investors and asset managers in making the right choices in their investment decisions across a broader set of financial markets.

The analytical techniques that we develop in this chapter endeavour to address two questions empirically: (i) Does foreign participation impact on bond yields in African countries? If so, how and to what extent? If not, what other factors could affect bond yields? (ii) Does foreign participation impact on bond yields volatility in African countries, and if so, how and to what extent. We also examine the other factors that matter for bond yields volatility.

3.2 Literature review

The argument of foreign participation impacting on bond yields is premised on investor base theory. In discussing the investor base theory, we start our analysis on the primary factors impacting bond yields. We also consider the broader theory on home bias- which typically impact on investors choices before deciding to invest offshore.

3.2.1. Bond Yields theory

Supply side theories are premised on the impact that macroeconomic fundamentals have on bond yields. From this perspective, the starting point in understanding bond yields on the supply side is to initially place it in the context of the negative relationship between bond prices and interest rates as specified in (3.1)

$$\boldsymbol{P_t = f(I_t)} \qquad \textit{(3.1)}$$

Where P_t is bond price, I_t is interest rate and subscript, t, represents time t.

The relationship assumes that if interest rates increase, bond prices fall, and vice versa (Howells and Bain, 2007). From theory, we also know that bond prices are inversely related to bond yields. Where bond prices start at par value at a given coupon rate, when interest rates increase higher than the coupon rate, the price of the bond stands at a discount to its maturity value, when the interest rate is below the coupon rate, the price stands at a premium (Howells and Bain, 2007). The adjustment in bond prices is assumed to fall while yields increase to incorporate higher interest rates, and vice versa. So, bond prices fall while yields increase.

The second point is that bond yields are also a function of interest rates and many other factors such as economic growth, fiscal deficits, and government debt position which are referred as control variables in literature studying the determinants of bond yields.

$$\boldsymbol{Y_{it} = \alpha + R_{it} + X_{it} + \varepsilon_{it}} \qquad \textit{(3.2)}$$

Where Y_{it} are nominal government bond yields, α is an intercept, R_{it} are interest rates such as short-term interbank rate. Short-term interest rates are used to control for the effects of monetary policy on the bond yield term structure (Peiris 2010). X_{it} is a set of control variables which include real GDP growth rate, government debt to GDP, fiscal deficit to GDP and ε_{it} is a residual. Economic theory assumes that there is a negative relationship between bond yields and economic growth while there is a positive relationship with fiscal variables. Regarding economic growth, the faster an economy grows, the more likely bond yields tend to fall as bonds are an alternative to other forms of investment such as private capital or equity. *Ceteris paribus*, a growing economy is associated with lower risk profile thus bond yields tend to

decline. For fiscal variables, bond yields tend to increase with higher fiscal deficits and rising government debt.

On the demand side, however, theoretical underpinnings are weak but there is evidence of investor base diversification impacting on bond yields. The empirical literature explored in the next sections also suggest that foreign participation can play a role in determining the level of bond yields and the volatility of such bond yields. We introduce a simplistic model to start with as follows:

$$\boldsymbol{Y_{it} = \alpha + R_{it} + FP_{it} + X_{it} + \varepsilon_{it}} \qquad (3.3)$$

All other terms are defined the same as Equation (3.2) with the addition of FP_{it} for ratio of foreign participation. Investor base diversification can reflect the depth of financial markets and financial systems such as the case in US, Canada, Europe and Australia (Andritzky 2012). For example, Andritzky (2012) data set shows that non-residents participation is majority in Australia and Euro Area (more specifically France, Germany, and Italy among others). While other countries are not majority dominated by non-residents, they have a significant share of at least 15% in Canada, Japan, Korea, UK and US among others.

A diversified investor base can help improve liquidity, efficiency and effectiveness of local currency bond markets. That is, different investors may have different objectives such as domestic pension funds versus non-resident holdings can employ different investment strategies which can benefit the local markets. So, diversification of investor base can lead to more competitive pricing on bonds only to the extent that different investor groups have different risk perceptions and preferences. According to Andritzky (2012), two important factors are key; investors substitution function of current against future consumption and the

universe of available instruments. Although different investors may exhibit different substitution preferences, only a change in the aggregate preference or in the universe of available assets influence yields.

Other contrasting views are premised on the term structure of interest rates which explains the relationship between interest rates of bonds with the different maturity periods. Graphically this relationship is also known as a yield curve. It is the shape of the yield curve that provides an idea of the direction of future interest rate changes on bonds. As a start, the market expectations theory supposes that bond yields are primarily a function of future interest rates and not necessarily of investor preferences. Market expectations theory in relation to bond yields suggest that investors utilise long-term interest rates expectations to project short-term interest rates influencing bond yields. That is, according to Browne and Manasse (1989), the long-term interest rates on bonds are a function of the weighted average of the present and expected future short-term interests. That is, in order to understand the likely long-term interest rates on bonds, the theory takes into account the current short-term rates on bonds, and the likely future path of interest rates in the long-term and the risk premium.

Assuming markets are frictionless, that is, investors are risk neutral, can forecast future short-term rates, all bonds are the same and there are no transaction costs, then the long-term interest rates should be easily predictable. For instance, one-year treasury bills over a ten-year period should be able to approximate the interest rates on ten-year bonds. Thus, as investors seek to maximize expected returns over the holding period, they will drive the long-term rates, to the level of the future short-term rates. Thus, all factors held constant, on average, the current long-term interest rate should equal the market expectation of the average level of current and future

short-term rates. In such a case yield curves are usually flatter as arbitragers level out the differences in investor preferences for duration assuming markets are frictionless.

However, markets are not frictionless or as efficient resulting in different slopes of yield curves. For instance, the segmented market theory supports an upward sloping yield curve as different investors in different segments target different maturities. As the market expectations theory does not always hold, it implies there are other factors influencing interest rates and bond yields. For instance, risk premiums for different maturities, shifts in demand preferences or supply of bonds can alter the steepness of the yield curve.

Home bias theory is another strand of literature that tend to explain why investors prefer to stay and invest at home. The home bias concept is generally about local investors preferring to invest within the domestic market as they know it well. For developed markets, interest rates tend to be low and stable making them predictable. On the other hand, emerging and frontier markets are characterised by frequent changes in prices such as volatile securities returns' and volatile exchange rates, among others. In order to invest abroad as a diversification strategy, the return should be commensurate with the risk premium. From the basic capital asset pricing model (CAPM) by Markowitz (1959) and Sharpe (1964), the investor is able to maximise the returns in a portfolio of assets given a certain level of volatility in the domestic market. The extension to international capital asset pricing model is done to include foreign investments risk through adding the exchange rate risk premium to calculate the required return on foreign assets. Fidora *et al* (2006) argue that higher real exchange rate volatility does induce bias towards domestic securities than the risk of investing in foreign securities. More so, home bias is particularly higher for bonds than equities as returns in bond securities are typically less volatile than equity returns.

The home bias arguments probably explain why banks are generally the largest holders of government local currency securities. With international portfolio diversification and different types of institutional investors, including asset management companies, there are more substantial international investments and related research in reducing information asymmetries between local and international bond markets. Darvas and Schoenmaker (2017) argue that, *ceteris paribus*, the larger the assets managed by institutional investors, the smaller the home bias which provides risk sharing opportunities. Therefore, international portfolio diversification and institutional investors searching for yields have resulted in trends of rising share of foreign participation even in emerging and frontier markets that we explore in this chapter.

3.2.2. Empirical Evidence

Despite emerging over a decade ago, the empirical literature on the impact of foreign participation on the levels of bond yields remains scant and evolving[3]. The early studies that attempted to analyse the impact of changes in foreign investors on bond yields perhaps started with Burger and Warnock (2006). Then, reporting on foreign participation was very weak and infrequent. The approach taken by Burger and Warnock (2006) was to analyse this impact for 41 countries from a US investor portfolio diversification perspective. They sourced the data on US bond investments abroad directly from the Federal Reserve and asset managers. At that time, bond market returns in less developed countries where characterised by volatile returns which made it unattractive for US based investors to significantly diversify their portfolios more towards less developed economies financial markets supporting the home bias theory. Despite the potential diversification benefits, US investors shunned developing markets and

[3] See summary of key empirical studies in Appendix

recommended countries to improve macroeconomic stability to attract foreign investor participation in local currency bond markets.

Daniel (2008) also attempted to perform an exercise on understanding foreign investor participation from a French perspective. The perception of emerging markets had already started to change compared to the time Burger and Warnock (2006) published. Daniel (2008) compiled statistics on 24 emerging markets from French investors perspective. The dataset showed that French investors holdings as share of securities denominated in local currency, had increased from less than 10% in 2002 to close to 30% in 2005. There has been a concerted effort to increase issuance of local currency debt relative to foreign currency debt. More so, with the financial crisis of 2007/08, increasing local currency debt financing became a key issue for many countries and international organisations.

Despite this, foreign investor participation dataset was still incomplete. Only the International Monetary Fund (IMF), Bank of International Settlement (BIS) and a few national sources had started compiling data on foreign investors participation in local currency bond markets. As a result, most of the empirical literature reviewed here are only from 2010 as not much studies exist prior to this period. Thus, increasing foreign participation is a key theme of this decade and many years to come, which contributes to the relevance of this research to academic study as well as policy makers and portfolio managers diversification strategies.

For the few studies that have been done, they concur that increased foreign participation is resulting in lower bond yields in advanced, and emerging markets thus a negative association. But not many have actually analysed such impact on specific Sub-Saharan African countries that have been growing their local currency bond markets and experiencing rising share of

foreign participation in these markets. We endeavour to add our contribution in assessing the impact foreign participation has on bond yields specifically in African countries.

In the literature surveyed in this chapter there seems to be concurrence that increased foreign participation does indeed result in bond yields declining. In our view, seminal work on analysing impact of foreign participation on bond yields probably starts with the work of Peiris (2010). Peiris (2010) investigated for ten emerging markets, using panel data analysis, established that increase in foreign participation can indeed result in government bond yields declining. That is, yields can reduce by six basis points if foreign participation increases by 1%. This work, was followed up by Andritzky (2012) who investigated the same for advanced G20 countries using VAR analysis and similarly confirms 3 - 7 basis points average reduction in bond yields.

More recently, Ebeke and Lu (2014) on twelve emerging markets foreign holdings and a more specific focus on Poland, found that increased foreign participation does indeed reduce bond yields by 7 - 9 basis points, on average. However, the extent of yields reduction can depend on control variables utilised, that is, the more control variables utilised, the yield coefficient weakens. The control variables, mainly, interest rates, GDP growth rates, volatility index and inflation rates are similar to Andritzky (2012). Ebeke and Lu (2014) also examine role played by fiscal and external buffers in shaping the yield dynamics with foreign participation. They say fundamentals matter less on level of yields but more on volatility. Lee (2015) also found similar results on lower yields (-3 basis points) if foreign participation were to increase by 1%.

However, unlike the literature on the impact of foreign participation on yields, literature on the impact on bond yields volatility is mixed. Peiris (2010) provides such mixed evidence in his

seminal work. Peiris (2010) found six out of ten countries with foreign participation not significantly impacting volatility of bond yields. For example, foreign participation has significant effects on bond yields volatility in Korea being positive while negative effect in three emerging markets (Malaysia, Mexico and Turkey) meaning increasing foreign participation actually decreases volatility. At the same time, Brazil, Czech Republic, Hungary, Indonesia, Poland and Thailand have no significant relationship. Thus, Peiris (2010) asserts that on volatility there could be other macro factors, fiscal balances for example, that could be more significant than just increased foreign participation. On the other hand, Badalci and Kumah (2010) found that government bond yields volatility will increase with higher foreign participation. Volatility tends to increase with changes in global factors.

Andritzky (2012) also found an insignificant relationship and small association between foreign participation and bond yields volatility. The effect may depend on other country specific macroconditions or even time period considered. Lee (2015) finds bond yields volatility impact is not significant while Ebeke and Lu (2014) found that volatility increases with foreign holdings. Where volatility impact is less significant, this is usually attributed to other stronger factors impacting on volatility. Ebeke and Lu (2014) also found that other than foreign participation, the current account balance and global volatility also explain the positive and significant relationship with local currency bond yields.

Understanding the relationships between foreign investors participation and impact on bond yields is not done in isolation. The analyses utilise control variables that have theoretical underpinnings in explaining bond yields behaviour. So, it is important to explain these interactions in relation to bond yields. Control variables have been similar for most of the studies. But the statistical significance of control variables differs and their relationship to bond

yields is not uniform across countries. As a starting point, we explained in the theoretical section that primarily bond yields are a function of interest rates. So, we start the review of control variables with monetary factors.

Central bank policy rate appears to be the best measure of short-term interest rate in the domestic market. The relationship between foreign participation and policy rate is generally positive and statistically significant in Peiris (2010), Andritzky (2012) and Ebeke and Lu (2014). The latter, shows very strong impact of 44 - 70 basis points change in yields. While inflation has a positive and significant relationship with bond yields in Peiris (2010) and Lee (2015) but on the other hand Andritzky (2012) and Ebeke and Lu (2014) found inflation still has positive relationship with bond yields but it is insignificant. This probably implies that changes in inflation do not always have a meaningful impact on movements in bond yields. All other monetary aggregates do not significantly explain changes in bond yields across the empirical studies reviewed.

Other than interest rates, changes in bond yields can also be explained by governments' fiscal and debt positions. In an ideal world, bond yields should be reflecting the cost of borrowing of the government, or the riskiness of lending to the government. For example, weakening of fiscal deficit or increasing debt burden should be reflected in rising bond yields. With fiscal variables, the evidence is mixed regarding statistical significance and in some cases the sign of the economic relationship. While Peiris (2010) found a positive and significant association with a strong 20 basis point change of yields when fiscal deficit increases by 1%. On the other hand, Andritzky (2012) found both fiscal variables, budget balance and debt, statistically insignificant thus not explaining changes on bond yields. Ebeke and Lu (2014) found fiscal balance negative relationship with bond yields but it is statistically insignificant while

government debt is also insignificant but with no consistent sign in the relationship. Generally, the impact of fiscal balance on government bond yields may actually differ across countries depending with initial conditions. Baldacci and Kumar (2010) argue that fiscal deficits do impact on bond yields but may depend on the initial fiscal conditions, strength of institutions or ability to access global capital markets. Thus, it leaves it open on the extent of significance of fiscal variables.

Other than the potential effect of interest rates or government's fiscal position, bond yields could also be explained by economic performance. As Burger and Warnock (2006) highlighted the challenges of still developing countries is the macro economic instability which results in volatile returns and fails to attract foreign investors. However, empirical evidence on the effect of economic variables is not strong across countries. Economic activity aggregates do not significantly explain changes in bond yields (Peiris 2010). Similarly, Andritzky (2012) and Ebeke and Lu (2014) also found real gross domestic product (GDP) growth has a positive association with bond yields but mostly statistically insignificant. However, Lee (2015) found real GDP growth significant, albeit, with a negative relationship suggesting that high growth EMs tend to attract or associated with lower bond yields. Lee (2015) makes same argument with volatility of bond yields as they are negative and significant.

Opening up financial markets to foreign investors also has an implication on the balance of payments accounts which means that it is important to consider such variables in explaining changes in bond yields. The main measures for external factors are usually the current account balance, trade balance, foreign exchange reserves, exchange rates or openness of an economy. We observe that current account balance has a positive association with bond yields and Peiris (2010) says this is more important for emerging markets than advanced countries. However,

Andritzky (2012) found the relationship negative but statistically insignificant for advanced countries. Exchange rates are statistically insignificant in Andritzky (2012) but significant in Ebeke and Lu (2014) and Lee (2015). However, its impact is very small, less than 1 basis point change in yields for both Ebeke and Lu (2014) and Lee (2015) with a positive association.

As economies open up to global financial and trade flows, it is also important to consider the influences of global factors on domestic bond yields. Global factors are important and play different roles in advanced versus emerging markets. There are three main measures of global factor reviewed in literature, namely, US federal funds rate as policy interest rate for advanced economies, US ten-year bond yield as a measure of global liquidity and Chicago Board Options Index of volatility as a measure of global volatility index. US interest rates, proxied by federal funds rate, is an important and significant global factor in Peiris (2010), Lee (2014) and Ebeke and Lu (2014) but insignificant after controls. Global volatility index (VIX) has a positive association but insignificant in Andritzky (2012) and Ebeke and Lu (2014). However, Lee (2015) found a significant relationship and makes the argument that the VIX may not be a great proxy to capture risk aversion in EM government bond markets as it is constructed to capture implied volatility of large-cap equity market in the United States.

Our literature survey establishes that indeed increase in foreign participation does result in bond yields declining but is not strong on the impact on volatility. Perhaps, weak relationships between foreign participation and bond yields volatility suggests that government policy responses should rather be focused on domestic macro fundamentals rather than the potential negative impacts when foreign investors pull out. Control variables impact on bond yields have different outcomes perhaps depending on individual country characteristics. Interest rates

remain one of the most important control variables explaining bond yields consistent with theoretical literature.

3.3. Recent Trends in Foreign Participation in Africa

Traditionally, we have observed that banks, pension funds and insurance companies are the main holders of government securities. Over time countries have opened up holding of government securities to foreigners. For these countries with laws that allow foreigners to participate in their local currency bond markets, we have also observed rising share of foreign participation.

We analyse the influence of foreign participation on bond yields through the share of holdings to total securities. Analysis using share of holdings is able to demonstrate to what extent non-residents holdings could influence overall changes in bond yields. The extent of foreign participation in local currency markets is not uniform across African countries. The factors that influence changes in foreign participation directly affect changes in bond yields.

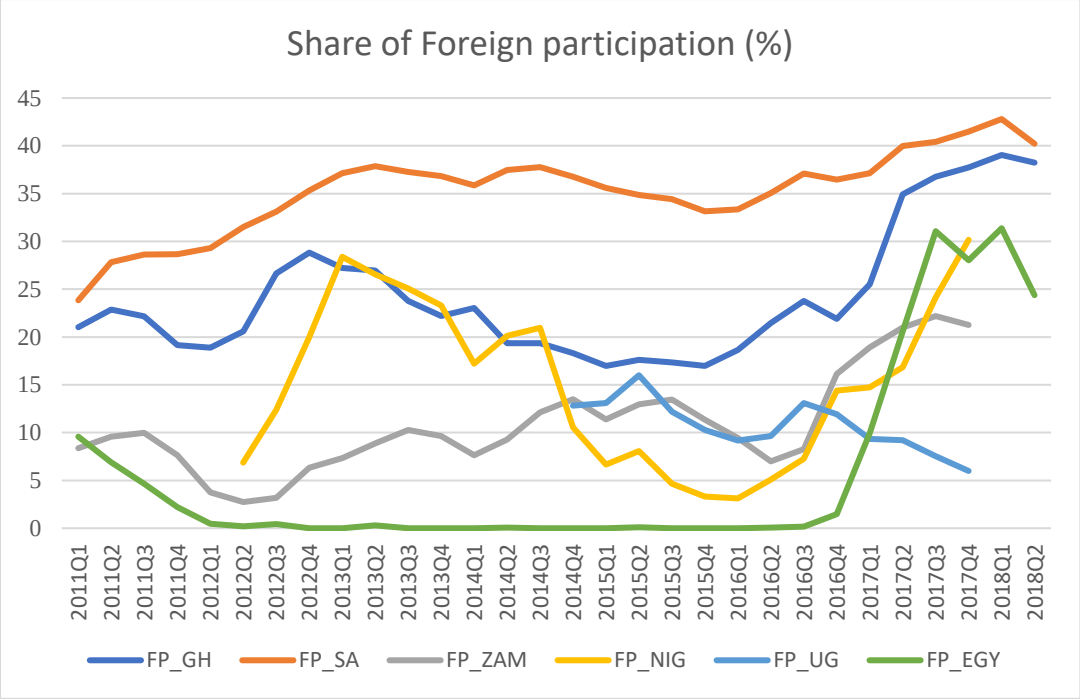


Figure 3.1: Foreign Participation Trends in Africa

Source: Author's calculations

FP is an abbreviation of foreign participation. Gh stands for Ghana, SA for South Africa, ZAM for Zambia, NIG for Nigeria, UG for Uganda and EGY for Egypt. **Figure 3.1** above shows that the share of total foreign participation in our six-country sample has increased remarkably over the last three years and is generally volatile. South Africa has generally enjoyed the largest share of foreign participation throughout the sample period, followed by Ghana. Over the last eight years, the extent of foreign participation in local currency government bonds in South Africa and Ghana have increased from around 20% in 2011 to close to 40% of total debt holdings by June 2018. Zambia's share has also steadily increased over the years. On the other hand, during the sample period, we also observe sharply declining trends in Nigeria, Egypt, and Uganda. We believe the changes in foreign participation are driven by generally common factors related to domestic and global factors.

In our view, bond market indices play a part in the trends of foreign participation in South Africa and Nigeria. The rising share of foreign participation trend in 2012 could be explained by the inclusion of South Africa in the Citibank World Government Bond Index. In Nigeria, the share of foreign participation increased markedly in 2012 from less than 5% reaching a peak of 28% in 2013Q1 after Nigeria was included in the JP Morgan Government Bond Index[4] in October 2012. The inclusion in a government bond index is usually perceived as "certification" or a stamp of approval to open domestic bond markets which encourages foreigners to participate in these markets.

On the other hand, exchange rate policies can also lead to inflow or outflow of foreigners. Nigeria subsequently got excluded in the bond index in October 2015 due to primarily a more restrictive exchange rate regime following the fall in oil prices. By then the share of foreign participation had dropped below 5%. When Nigeria central bank re-introduced a market determined exchange rate in March 2017, foreign holders of government bonds returned to Nigeria and the share of holdings increased from 3% end of 2015 to 30% by end of December 2017. Similarly, for Egypt, foreign holders of government bonds returned to Egypt following the floating of the currency in November 2016 and increased their share of government debt holdings to close to 30% in 2018. The political crisis in Egypt in 2011 was an important determinant that led to outflows of foreign participation in early 2012 to near zero for many years until the exchange rate liberalisation at the end of 2016.

Zambia has had a steadier increase in its share of foreign participation from about 10% in 2011 to over 20% in 2017. Between 2015 and 2016 the share of foreign participation was on a declining trend probably due to multiple reasons that included decline in commodity prices,

[4] South Africa is the only other African country local currency bonds to be included in the JP Morgan GBI-EM

copper in the case of Zambia, which resulted in significant exchange rate depreciation and increasing political risks towards 2016 national elections. Post the 2016 elections, the share of foreign participation increased remarkably to peak at 24% during 2017. This also coincided with improvement in copper prices over the same period. Political crisis in Egypt in 2011 was an important determinant that led to outflows of foreign participation in early 2012 to near zero for many years until the exchange rate liberalisation at the end of 2016.

The effect of global factors also contributes to foreigners' decision in reducing or increasing their share in government debt holdings. Fed tapering announcements from May 2013 probably explain the reduction in share of foreign holdings in second quarter of 2013 mainly in Ghana, Nigeria and South Africa before moderating in early 2014. The second half of 2014 was followed by international decline in commodity prices and consequent risk aversion in emerging and frontier markets resulting in declining share of foreign participation. Since 2016, foreign participation has substantially increased. For the three countries (South Africa, Ghana and Egypt), we also observe the 2018 data showing a decline in share of foreign participation primarily due to the effects of rising interests in the United States of America.

Other than the overall share of foreign participation in government securities, we also consider the type of securities that foreigners prefer where data is available in a disaggregated form. There is mixed evidence of foreign investors targeting short-term treasury bills and long-term government bonds. In Egypt and Zambia, the majority of holdings are in treasury bills which give rise to the idea that foreigners chase yields in emerging and frontier markets especially when they invest in short-term securities relative to long-term.

On the other hand, South Africa, foreign participation is only in long-term bonds. More generally, South Africa has one of the developed local currency bond markets in emerging markets. Long-term bonds contribute 90% of total local currency debt. Within the long-term bonds, the share of fixed rate bonds is about 80%, of which foreign holdings are close to 50% of fixed rate bonds. Peiris (2010) dataset showed emerging markets average is 65 - 71% share of fixed rate bonds, while advanced markets are 90% fixed rate. But large variations in emerging and frontier markets, for example, Latin America average is 23% fixed rate out of total debt outstanding. Thus, South Africa stands out as one of the most developed debt markets in emerging markets.

3.4 Methodologies

3.4.1. Data and variables description

Of the six countries in our study only three (Ghana, Egypt and South Africa) publish frequently debt holdings data which includes foreign participation. The other three do not publish, data was sourced directly from the central banks and Ministries of Finance. In panel estimation, we utilise five countries quarterly data, namely Ghana, Nigeria, South Africa, Uganda and Zambia over 2011-2017. Ghana and South Africa had all variables and data points available for the full sample period. On the other hand, Nigeria had some missing data on foreign participation, debt and money supply variables. Uganda had some missing data points on foreign participation while Zambia was missing some data points on the debt variable. We have excluded Egypt from the empirical estimations as the share of foreign participation was near zero for more than half of our sample period.

Other international studies have generally used IMF as main data source and supplemented with other sources. In our case, IMF does not have quarterly data sets for most African

countries. For example, the IMF does not report bond yields data for Nigeria, Uganda and Zambia or policy rate for Zambia and Uganda. Most of our variables are therefore generally sourced from individual central banks, national treasuries and statistical agencies[5]. The global factors were sourced from the Federal Reserve of St Louis. Data availability in many African countries is a challenge. For example, we have data gaps in Ghana (bond volatility series is only constructed from 2012Q3 as monthly bond yields data is only available from August 2012), Nigeria (most data is available from 2012Q1), Uganda (foreign participation data only starts from 2014Q4), and Zambia (no quarterly fiscal balance variable while debt data is only available from 2013Q3).

Due to the absence of historical fiscal balance data for Zambia, we did not utilise fiscal balance variable for all countries in the panel and remain with debt to GDP as the main proxy of fiscal stance. From the starting point of twelve variables, there are too many variables to be incorporated into a single model. Based on our literature survey on economic significance of control variables, we did not utilise real economic growth and US bond yields in our estimation tests.

Government Bond yields (GBY): the standard measure in literature is to use ten-year bond yields as proxy for all bond yields in each country, which we employ in the case of South Africa and Nigeria. For Ghana, Uganda and Zambia, we used the average five-year GBY due to the reasons of foreign investor concentration and data availability. For bond yields volatility we use, the standard deviation calculated from monthly GBY data to produce quarterly estimates of volatility in line with previous literature.

[5] Detailed data sources for each country are in the appendix section

Foreign participation (FPART)- in line with previous literature, we utilise the share of foreign participation to total outstanding local currency debt obligations of the government. The conceptual definition of FPART refers to the share of holdings by foreigners or non-residents to total domestic securities outstanding in a broad sense. In some cases, the majority of holdings could be in short-term securities and some in long-term securities. For example, in Egypt, foreign holdings are mostly in total treasury bills which is ultimately the total foreign holdings to total domestic debt securities ratio. On the other hand, South Africa, where foreign holdings are primarily investing in long-term securities.

Based on theoretical and empirical literature, we control for various other determinants of bond yields, including central bank policy rate (POLICYRATE), inflation, current account balance (CAB), exchange rate (FX), debt, real gross domestic product growth (RGDP), global policy interest rates (FFR-GLOB), global bond yields and global volatility. Our starting point attempts to include all the variables. However, due to data behaviour explored in the following sections, some variables are removed. While FPART series is now available on a monthly basis in recent years, it is not long enough. In utilising quarterly data over a limited number of years, it is not possible to include all potential variables in a single equation due to loss of degrees of freedom that could occur as a result of too many parameters.

Bond yields tend to respond to changes in central bank policy rates and inflation expectations. However, Peiris (2010) results suggested domestic monetary aggregates and real economic activity do not impact on government bond yields. For monetary aggregates, we consider broad money as measure of money supply and average consumer prices as measure of inflation. Government borrowing plans tend to be a function of its fiscal balance and debt position which supports inclusion of fiscal variables in determining bond yields. In addition, the important

variables also tend to be the external position of a country measured by its current account balance and the exchange rate adjustments. Therefore, changes in these external measures can tend to impact government bond yields.

In literature, global factors are considered very important in influencing bond yields in emerging markets. It is the changes in global interest rates, bond yields or volatility that influence non-residents to participate in local currency debt markets abroad. These global factors are mainly US federal funds rate to measure global liquidity, US 10-year bond yields and volatility index measured by Chicago Board Options Exchange Volatility Index which is utilised as a proxy for global risk appetite.

The study employs panel data and time series approaches to analyse a set of African countries for the period 2011 - 2018. The starting point of 2011 and choice of countries are both informed by data availability, primarily foreign participation series which is not available on a quarterly basis, prior to 2011. In the panel, we utilise quarterly data as foreign participation and domestic macroeconomic factors are available infrequently. Most of the studies reviewed in the literature section have also utilised quarterly data for the same reasons. For South Africa case study, we are able to utilise higher frequency data (monthly) which is all published and predominantly accessed from South African Reserve Bank.

Our departure from the previous literature on foreign participation is our data sources. Most studies on advanced countries and some emerging markets have utilised the IMF database for control variables. Unfortunately, the same statistics are not available for African countries. For South Africa, all domestic variables data is sourced from South African Reserve Bank while

foreign participation is sourced from National Treasury. The global factors are sourced from the Federal Reserve of St Louis.

The analytical techniques that we develop in this section endeavour to test the following hypothesis empirically:

Hypothesis 1 –

H0: Foreign participation does not have an impact on bond yields in selected African countries.

H1: Foreign participation has an impact on bond yields in selected African countries.

Hypothesis 2 –

H0: Foreign participation does not have an impact on bond yields volatility in South Africa.

H1: Foreign participation has an impact on bond yields volatility in South Africa.

From the two hypotheses, we endeavour to explore the first hypothesis in panel analysis using system general methods of moments (GMM) approach and the second hypothesis in time series analysis using autoregressive distributed lag models (ARDL). In most literature, there are two baseline approaches to testing the hypothesis namely, using static and dynamic panel data models. For static models, they utilise pooled ordinary least squares (OLS) regressions, fixed effects regressions and random effects regressions. Dynamic panel models utilise the system general methods of moments.

3.4.2. Panel Estimation Techniques

3.4.2.1. Static panel data models

There are standard three models in static panel data analysis, namely, pooled, fixed effects and random effects models. Pooled regression models are simplistic in pooling together all variables across time and across countries. That is, pooled regressions assume a common intercept, c_i and the common coefficients α and β to be efficient OLS estimators for the group. That is, there are no individual effects-such as time effects, where u_i =0.

$$\boldsymbol{gby_{it} = c_i + \alpha fpart_{it} + \beta X_{it} + \varepsilon_{it}} \ \ (\boldsymbol{u_i = 0}) \qquad \textit{(3.4)}$$

If all classical model assumptions are met, that is, zero mean for error terms, homoscedastic error variances, independence across observations and exogeneity of independent variables, then indeed OLS provides efficient estimators. While the process of pooling can help to overcome challenges with short time series of quarterly data, it also neglects the cross section and time series nature of the data and does not distinguish differences between countries. In a way, pooling disregards the heterogeneity that may exist among countries in the sample. For instance, the mean of the error terms may not be zero or the residuals may not be correlated with explanatory variables. In another way, it is possible that the residuals may not be homoscedastic. If either of the assumptions are not met, then pooled regression methods tend to be biased and inconsistent. As a result, researchers tend to explore using the fixed effects approach.

Fixed effects regression methods- Greene (2010) suggests that differences across groups or time can be captured in differences in the constant term, and the error variances and slopes are constant across individual effects. That is, each country can have its own intercept. Fixed

effects model allows to control for unobservable country specific factors that may be correlated with level of bond yields in each country. The coefficients on foreign participation variables would thus measure the true impact of foreign investors, conditional on the presence of fixed effects. Thus, fixed effects specification is specified as follows:

$$\boldsymbol{gby_{it} = c_i + \alpha fpart_{it} + \beta X_{it} + u_i + \varepsilon_{it}} \qquad (3.5)$$

In equation 3.5, the main addition is u_i. Both c_i and u_i represent country and quarter fixed effects. The fixed effects specification allows heterogeneity, that is, distinguishing each of the countries to have their own intercept values. However, the intercept does not vary over time. In other words, it is time invariant but considered as part of the intercept. Thus, u_i is allowed to be correlated with explanatory variables. More so, fixed effects specifications do not eliminate endogeneity challenges or the potential conditional effects dependency on countries macroeconomic fundamentals. The estimation for fixed effects is performed using Least Squares Dummy Variable (LSDV) approach and tested using an F test. The F test assumes that all u_i=0 for each country. If p value is less than 5% it means we reject the null and conclude that it's important to distinguish each of the intercepts. Distinguishing intercepts means that fixed effects model is the appropriate model relative to the ordinary least squares' method. Thus, the F- test in a way compares and chooses the best model between the fixed effects and the pooled regression models.

On the other hand**,** random effects regression methods- assume that (i) the unobserved individual effects (heterogeneity) are uncorrelated with explanatory variables, (ii) the residuals, ε_{it} are random variables with constant intercepts and constant slopes, (iii)error variances are randomly distributed across groups and or time. In this case, if the intercepts and slopes are the

same, differences across individuals or time can only be observed in the error term. Thus, u_i is included as part of the composite error term, w_{it}, compared to the fixed effects where it is standalone. Nevertheless, u_i, is assumed to be independent of the explanatory variables, X_{it} and the traditional error term, ε_{it} . That is $w_{it} = u_i + \varepsilon_{it}$. For example:

$$\boldsymbol{gby = c + \alpha fpart_{it} + \beta X_{it} + w_{it}} \qquad (3.6)$$

According to Greene (2010), the limiting challenge with random effects is the inconsistency due to correlation between explanatory variables and the random effect. We estimate random effects model using the generalised least squares approach and test the hypothesis using the Breusch-Pagan Lagrange multiplier (LM) as is standard in the literature. The LM test focuses on testing if the individual or time specific variance components are equal to zero. Rejecting the null hypothesis, means that the data exhibits a significant random effect, and thus it would be the correct model to deal with heterogeneity. If the null hypothesis is not rejected then it means the random effect model is not the best, and can therefore choose the pooled regression model. Thus, the LM test helps researchers to decide between a random effects regression and pooled regression which uses simple OLS regression.

When each of the models above are utilised in the baseline scenario, there are further procedures that can be carried out to choose the best model. For example, we use the Hausman test to choose the best model between the fixed effects and the random effects model. It tests whether individual effects, u_{it}, are actually uncorrelated with one or more of the explanatory variables in the model. The starting point is a null hypothesis that the random effect model is appropriate. The null is also interpreted as differences in coefficients are not systematic which means that the coefficients estimated from the fixed effects and the random model should not

be systematically different. If the probability value is significant at 5% level or lower, the test rejects the null hypothesis and accept that fixed effects is the best appropriate model. Rejecting the null hypothesis means that the individual effects, $u_{it,}$ are significantly correlated with one or more of the explanatory variables. In this case the random effects model would not be appropriate to use. The Hausman test results led us to choose the fixed effects as the best model to analyse the impact of foreign participation on bond yields in our sample of African countries. Thus, we estimated the following fixed effects model:

$$gby_{it} = \beta_0 + \beta_1 fpart + \beta_2 Debt + \beta_3 Cab + \beta_4 Inflation + \beta_5 Policyrate + \beta_6 FFR_{glob} + \beta_7 logFX + \varepsilon_t \quad (3.7)$$

After choosing the fixed effects as the best model, we perform a couple of diagnostic tests. First, we use the Kernel Density estimate to test if the data is normally distributed. Secondly, we test for cross-sectional dependence/contemporaneous correlation using Breusch-Pagan LM test of independence which assume a null hypothesis that residuals across countries are not correlated. Thirdly, we test for the presence of heteroscedasticity using the modified Wald test for groupwise heteroskedasticity in fixed effect regression model which utilises a chi square distribution. Fourth, for serial correlation we test if residuals are correlated across countries using Wooldridge autocorrelation F test. The null hypothesis assumes that there is no serial correlation. If the probability value is 5% and lower, we reject the null and conclude that there is serial correlation. If p-value is greater than 5% then we fail to reject the null hypothesis.

3.4.2.2. Dynamic panel modelling using GMM

Most literature on impact of foreign participation on bond yields have utilised static panel data methods. Our contribution, to this analysis, is to introduce dynamic panel methods in the

analysis. Static panel data regressions often do not eliminate challenges of endogeneity. With endogeneity, for example, it is possible that some of the explanatory variables are not truly exogenous but endogenous. For instance, some endogeneity could be unobservable factors (in the residuals) correlated with regressors such as bond yields or foreign participation which could therefore make estimates biased. Another form of endogeneity is the level of foreign participation being influenced by changes in policy interest rate, inflation or government's fiscal stance. Investors could increase their share where they see higher bond yields due to rising interest rates or weakening fiscal position. GMM is a class of estimators that has the potential to reduce these endogeneity issues. By containing one or more lags of the dependent variables, the models become dynamic and provide an adjustment mechanism using GMM techniques.

Dynamic panel methods are able to provide efficient estimators even in the presence of heteroscedasticity and correcting for both serial correlation and endogeneity. We apply GMM techniques, which, were initially developed by Holt-Eakin, Newey and Rosen (1988) then Arellano and Bond (1991) popularised Difference GMM. Developments in GMM techniques were further extended by Arellano and Bover (1995) and Blundell and Bond (1998), of which, the latter is now commonly known as System GMM. Both difference and system GMM techniques are general estimators designed for data with fewer time periods but many individuals, that is, small T and large N panels.

The advantages of GMM techniques is that they make fewer assumptions about the underlying data generating process but utilise sophisticated techniques to isolate useful information. The key underlying assumptions are 1) dynamic process which allows past values to influence current values of regressors 2) allows for presence of fixed effects which provides for a

different intercept for each of the countries in our analysis 3) regressors do not need to be strictly exogenous, they can be endogenous. That is, they can be correlated with past and current values of the residuals, 4) linear specification and 5) presence of heteroscedasticity and serial correlation within individuals but not across the group of residuals. That is apart from fixed effects, the residuals may also have individual specific patterns of serial correlation and heteroscedasticity.

Within the GMM techniques, we have two choices of either applying the difference GMM or its improvement, the system GMM. With difference GMM, Arellano and Bond (1991) transform regressors by differencing them. First differencing can remove the unobserved heterogeneity. If we consider our previous equation (3.4) re-specified as follows:

$$\boldsymbol{gby_{it} = \alpha + \beta_1 X_{it} + \beta_2 fpart + \beta_3 W_{it} + V_{it}} \qquad \textit{(3.8)}$$

Where $$\boldsymbol{V_{it} = \mu_i + \varepsilon_{it}} \qquad \textit{(3.9)}$$

Where, X_{it} is a set of exogenous control variables, and W_{it} are predetermined regressors (which include lags of GBY and any other endogenous regressors. These regressors could be correlated with μi, the unobserved individual effect. In the equation 3.8 above, first differencing, will remove the unobserved μi and any other associated omitted variables. Including lags in levels act as instruments for the differenced variables.

Arellano and Bover (1995) and Blundell and Bond (1998) argued that difference GMM estimators can have poor finite sample properties in terms of bias and precision when the series are persistent. That is, using lagged levels as instruments for first differenced variables can

result in weak instruments. Thus, they modified by adding not only lagged levels but lagged differences. As a modification to difference GMM, we opt for the latest technique, system GMM, which augments Arellano and Bond (1991) estimator by assuming further that first difference of instrumenting variables are uncorrelated with fixed effects. This assumption allows the introduction of additional instruments through building a system of two equations. That is, the original equation and the transformed equation, thus improving efficiency in the system GMM. Thus, Blundell and Bond (1998) proposed the use of additional moment conditions. Consistent with Arellano and Bover (1995), the moment conditions rely on mean stationarity assumption in the data. This is in fact an additional restriction to the initial conditions of the process generating dependent variable, gby. In our model, we estimate the following one step system GMM equation:

$$\begin{aligned} \boldsymbol{gby_{it}} = \ & \boldsymbol{\beta_0 + \beta_1 fpart + \beta_2 Debt + \beta_3 Cab + \beta_4 Inflation +} \\ & \boldsymbol{\beta_5 Policyrate + \beta_6 FFR_{glob} + \beta_7 logFX + \beta_8 gby_{it(-1)} + \varepsilon_t} \end{aligned} \qquad \textit{(3.10)}$$

In order to estimate the above GMM equation, we first need to ensure that heteroscedasticity, which is unobserved, is present. If heteroscedasticity is present then transformations in the GMM framework are able to deal with endogeneity problem. The endogeneity problem arises when explanatory variables are correlated with the error term which makes estimators less useful. As a starting point, we assume all regressors are exogenous and not correlated with the error terms, that is, no endogeneity in the OLS regressions in static models. When we add the lag of GBY as an explanatory variable, we potentially give rise to serial correlation. Essentially, we have two potential problems of serial correlation and endogeneity that need to be solved in our model.

To address endogeneity, system GMM uses lagged values of predetermined variables as instruments, in levels and differences until orthogonality is achieved. So, we pre-select our instruments. Previous literature has guided us in choosing lag of GBY and FPART as instruments to explore in the estimations. For example, Ebeke and Lu (2014), and Lee (2014) used second and third lags of FPART as instruments in their estimations. In our case, additional, correlation exercises showed POLICYRATE may be highly correlated with GBY and domestic factors in Ghana and South Africa, which led us to explore POLICYRATE as an instrument. In choosing the instruments, our starting point is from lags of dependent variable, GBY, and we explore with adding FPART and/or POLICYRATE. Our sample for empirical estimation is five countries, which, limits the number of lags to range from one up to five lags. We instrument using lagged values of GBY and FPART. The number of lags is determined by serial correlation where the residuals are not correlated. As our data sample is short, the number of lags should be as low as possible. Many lags may cause degrees of freedom challenges. The instrumental variables can have one or two lags at most, but mostly guided by serial correlation and limiting the number of instruments since we have a small sample.

To deal with serial correlation, we use the Arrelano and Bond autocorrelation tests. In addition, we carry diagnostic tests to our model. For example, Wald chi square test for testing for the presence of heteroscedasticity in our error variances and the Sargan test for testing joint significance of parameters and over identifying restrictions. With the latter test, the null hypothesis is that instruments set is valid and model correctly specified. If the p-values are too high, we fail to reject the null meaning that its correctly identified.

3.4.3. Time Series Estimation: Autoregressive Distributed Lag (ARDL) Analysis

In testing hypothesis one in the case of South Africa, we utilise time series analysis. In time series analysis, data properties are very important. Different time series could exhibit different properties. With our financial data, some time series may diverge away from the mean over time while others may converge to the mean. Non-stationary series is the one that diverges away from the mean. Cointegration methods have evolved from Engle and Granger (1987), to Johansen and Juselius (1990) and ARDL by Pesaran and Shin (1999) and Pesaran *et al* (2001). Engle-Granger technique does not allow combining different orders of integration, I (0) and I (1). Johansen technique on the other hand requires a combination of I (1) to produce I (0). ARDL is superior as it allows taking different or mixed orders of integration. ARDL is also a parsimonious OLS based model which, takes sufficient number of lags to capture the data generating process in a general to specific modelling framework. ARDL is also good at identifying multiple cointegrating vectors, efficient for small samples and obtains unbiased estimates of the long run model (Harris and Sollis 2003). ARDL takes 4 steps in our estimation 1) ensuring the order of integration 2) choosing optimal lag length 3) bounds test and 4) short and long run equations of ARDL.

Most financial time series exhibit unit roots, that is, non-stationary. They become stationary after first differencing. But first differencing takes away the long run properties or equilibrium relationships between the variables. To test for order of integration, we utilise the Augmented Dickey Fuller (ADF), Dickey Fuller Generalised Leased Squares (DF-GLS) and the Philips Perron (PP) tests to examine the properties of the data. Brooks (2014) suggests that a challenge with unit roots of ADF and PP is they do not explicitly determine the optimal lag length. To overcome this, the guidance suggested is either to choose lag length based on the frequency of the data, which is simplistic or to explore information criteria available in estimation

procedures. SBIC, AIC, HQIC. When using information criteria, ideally all 3 should agree. If they differ, the choice is to use literature to choose for optimal lag length. For example, some papers argue AIC is best with monthly data, HQIC with quarterly data on samples over 120 and SBIC works with any sample size for quarterly data or VEC models. Given our time series data is monthly, we opt for Akaike information criteria (AIC), to choose the appropriate lag length. These ensure that the residuals are gaussian and allow us to have economically interpretable results. Automatic lag length section chosen by AIC is an ARDL (2,2,0,0,1,0,0,2) regression, that is, gby_sa (-2), fp (-2), polr (0), ffr (0), gby_glob (-1), fb (0), tradeB (0) and reer (-2). It is also optimal in our case that AIC chose maximum of two lags as introducing many lags of explanatory variables could potentially pose multicollinearity problems.

Bounds testing is utilised to test if there are long run relationships. The null hypothesis is that coefficients of the long run variables are equal to zero, that is, there is no cointegration or long run relationship. We accept null hypothesis for F or T test if test statistic is closer to zero than the lower bound of the critical values. Or reject null hypothesis for F or T test if test statistic is more extreme than the upper bound of the critical values. The existence of a long run relationship (cointegration) is confirmed if both null hypothesis for F & T tests are rejected. F statistic (Wald test) rejection confirms long run relationship. The outcome of the bounds test helps us to choose the correct specification among the choices of a VECM, ECM or ARDL. For the choice of critical values used in F and T tests, Pesaran *et al* (2001) provide lower and upper bounds for the critical values for large samples. We utilise the latest critical values developed by Kripfganz and Schneider (2018).

The principle with ARDL is that GBY is determined by its lagged values, current and lagged valued of other exogenous variables with lag order (p, q), where p represents lags for dependent

variable while q represents optimal lags for exogenous variables. So, we estimate ARDL equations of the following form:

Long run equation:

$$gby_{sa} = \beta_0 + \Phi gby_{sa\,t-2} + \beta_1 FP_{t-2} + \beta_2 Policyrate + \beta_3 FFR + \beta_4 gby_{globt-1} + \beta_5 FB + \beta_6 TradeB + \beta_7 REER_{t-2} + \varepsilon_t \quad (3.11)$$

Short run equation:

$$\Delta gby_{sa} = \beta_0 + \beta_1 \Delta FP + \beta_2 \Delta Policyrate + \beta_3 \Delta FFR + \beta_4 \Delta gby_{glob} + \beta_5 \Delta FB + \beta_6 \Delta TradeB + \beta_7 \Delta REER + \alpha ECT + \varepsilon \quad (3.12)$$

Where α is coefficient of error correction coefficient or speed of adjustment term (ECT) which must always be negative and significant, ε ~ iid (0, σ2)- zero mean and constant variance.

In estimating volatility, we utilise similar equations as above. However, we replace the dependent variable (gby_sa) with the volatility measure (Sdev). For global factors we explored with federal funds rate and global policy rate together with VIX but chose the latter due to economic significance to the model. Thus, vix, becomes the main proxy for global factors. The lag length selection chosen automatically by AIC is an ARDL model (1,1, 0, 0, 0, 0, 0). The automatic lag length selection from AIC shows one lag for volatility and foreign participation while all other variables have no lags. The following ARDL equations are subsequently estimated:

Long run equation:

$$Sdev = \beta_0 + \beta_1 FP_{t-1} + \beta_2 Policyrate + \beta_3 VIX + \beta_4 FB + \beta_5 TradeB + \beta_6 REER + \varepsilon \quad (3.13)$$

Short run equation:

$$Sdev = \beta_0 + \beta_1 \Delta FP + \beta_2 \Delta Policyrate + \beta_3 \Delta VIX + \beta_4 \Delta FB + \beta_5 \Delta TradeB + \beta_6 \Delta REER + \alpha ECT + \varepsilon \quad (3.14)$$

Similar to level equations, a bounds testing procedure is estimated to check if there are long run relationships in the variables. As the bounds test using F and t tests confirm long run relationships in our variables, we proceeded to estimate long and short run equations. The adjustment coefficient must be well behaved, that is, negative sign and statistically significant.

On diagnostics tests we use Durbin Watson and Breusch-Godfrey tests for serial correlation, which focuses on testing the residuals with a null hypothesis that there is no serial correlation. A Durbin Watson statistic that is close to 2 and failing to reject the null hypothesis for Breusch-Godfrey, confirm the absence of serial correlation. For heteroscedasticity we utilise the Breusch Pagan heteroscedasticity test. The Cusum test is also employed to check for model stability. The Ramsey reset test is employed to test for omitted variables. The null hypothesis assumes that there are no omitted variables, thus a rejection of the null hypothesis would suggest that there could be some omitted variables in the model.

3.5. Presentation of Empirical Results and Analysis

3.5.1. Panel Baseline Estimation Results

We started our analysis by taking the static panel methods to analyse the impact of FPART on level of GBY and its volatility. We explored three options of pooled, fixed effects and random effects models all reported in **Table 3.1** below.

Table 3.1: Panel Methods Results

Dependent Variable: GBY (2011 Q1 – 2017 Q4)				
Variables	**Pooled**	**Fixed Effects**	**Random Effects**	**System-GMM**
gby_1				0,845 [102,81] ***
FPart	-0,296 [-2,94] **	0,009 [0,22]	-0,296 [-7,26] ***	-0,064 [-3,3] ***
Debt	0,109 [1.82]	0,070 [1,43]	0,109 [3,46] ***	-0,003 [-0,14]
CAB	0,279 [0,74]	-0,182 [-1,04]	0,279 [1,24]	-0,13 [-0,80]
Inflation	0,095 [0,92]	0,366 [4,57] ***	0,0958 [1,10]	0,06 [4,65] ***
Policy rate	0,408 [2,04]	0,330 [2.5] **	0,408 [4,37] ***	0,069 [2,10] **
Ffr_glob	-0,813 [-0,56]	-2,574 [-2,86] ***	-0,813 [-0,79]	-0,53 [-0,75]
logfx	-0,397 [-1,73]	0,037 [0,03]	-0,397 [-2,29] **	-0,13 [-1,53]
Intercept	13,775 [3,95] ***	5,553 [1,76] *	13,775 [8,13] ***	2,83 [2,80] ***
Diagnostics				
R-squared	0.7879			
Heteroscedasticity-Wald Chi2		290 (0,00)	371,5 (0,00)	13,49 (0,096)
F test		26,69 (0,00)		
Breusch Pagan LM test			0.00 (1.00)	
Autocorrelation- Arrelano-Bond test AR(2)				-0,45 (0,652)
Wooldridge autocorrelation F test		39,577 (0,003)		
Sargan test (over identification) $\chi 2$				124 (0,005)
Hausman test		1 333 (0,00)		
σ_u		4.105	0	
σ_e		1.961	1.961	
ρ		0.814	0	

Note: Statistics in parentheses

****, **, * represents significance at the 1%, 5%, and 10% levels respectively*
[] represents t statistic; ( ) probability values

Pooled and random effects results are very similar. In the random effects model results, the Breusch-Pagan LM test shows that our probability value it too high at 1, which implies that we fail to reject the null hypothesis of no random effects. The same, Breusch-Pagan test also shows us that in the case where we fail to reject the null hypothesis, it also means that the random effects model is not the best choice when compared with the ordinary least squares approach utilised in the pooled regression model. Thus, pooled regression model is better than the random effects. However, we also note that the coefficient of foreign participation is exactly the same magnitude in both regressions. Both random and fixed effects approaches show that heteroscedasticity is present when we fail to reject the null hypothesis of constant variances in the residuals. If the residuals do not have constant variances, then one of the assumptions of ordinary least squares estimations are violated which could make the estimators inefficient.

As a next step, we proceeded to utilise the Hausman test to choose the best model between the fixed effects and random effects. The test uses a null hypothesis that random effects model is appropriate. The probability value is significant at less than 1% level which shows that we reject the null hypothesis and conclude that fixed effects is the appropriate model. Since the random effects model has been found to be inferior by two tests- Breusch-Pagan and the Hausman test- we do not discuss the test further. We therefore only discuss the fixed effects results in further detail, while merely reporting results of the other two models.

For the fixed effects model the F test, which, assumes that all $u_i=0$ for each country, results show us that we reject the null hypothesis of no distinction of ui suggesting that different intercepts (individual specific effects) are required and therefore fixed effects is the appropriate model. We then proceed to interpret the individual coefficients. The starting point is that, if fixed effects regression model is the appropriate model, then FPART does not matter in

explaining changes in GBY as the effect of increasing FPART on level of GBY is positive but statistically insignificant.

When we consider other control variables, this approach shows that three control variables, that is, POLICYRATE, INFLATION, and FFR-GLOB are significant in explaining changes in GBY. The FFR-GLOB, which is a proxy for global interest rate, has negative relationship while POLICYRATE and INFLATION have positive relationship with GBY. The positive relationship with POLICYRATE and INFLATION is intuitively correct and consistent with previous literature. That is, as increase in POLICYRATE or higher INFLATION tends to lead investors to expect more compensation through higher GBY, other factors held constant. Due to the low level of development of local currency debt markets in most African markets, perhaps monetary factors, primarily interest rates as well as inflation expectations, are sufficient in explaining the behaviour of bond yields in African countries. However, the sign for FFR-GLOB, is difficult to interpret. It is possible to explain a negative sign and is supported by previous work of Ebeke and Lu (2014) as well as Lee (2015).

The negative sign for FFR-GLOB could suggest that an increase in FFR-GLOB would result in a decline in GBY in local markets. On the face of it, the negative sign for federal funds rate could suggest that an increase in global policy rate would result in a decline in government bond yields in local markets. To understand this, we have to start from the premise that foreign investors tend to chase yields in emerging and developing markets. If interest rates rise in advanced markets, it will result in foreign investors leaving emerging markets and returning to advanced markets in search of improved yields and are more secure at home under the home bias assumption. Consequently, the surge in foreigners selling off their holdings in developing

markets usually pushes up bond yields especially in the case of South Africa, at least and not the reverse as the sign for federal funds rate suggests.

Our R squared is about 70% which suggests that variables in the model do explain the majority of changes in bond yields. We also checked for multicollinearity and found no evidence of multicollinearity as the vif values are less than 10 or 1/vif greater than 0.1. We then perform further diagnostic tests on the chosen model. To check if there is any cross-sectional dependency in our five countries caused by common factors that could be unobserved and being reflected in residuals, we use two tests Breusch-Pagan LM test of independence and the Pesaran (2004) cross sectional dependency test. Both our test results show that we fail to reject the null hypothesis of no cross-sectional dependency in Breusch-Pagan LM and Pesaran tests and conclude that there is cross sectional independency across countries in our data. For heteroscedasticity, we performed the modified Wald test for group wise heteroscedasticity in fixed effects regressions. The null hypothesis is that error variances are homoscedastic. The results show that we reject the null hypothesis and conclude that there is heteroscedasticity.

While normality tests, show that residuals are normally distributed, the serial correlation results show that there is serial correlation in the residuals. Due to the presence of serial correlation and heteroscedasticity, the fixed effects regression model would need further modifications for the estimators to be efficient. For example, introducing instrumental variables or proceeding to perform a dynamic panel model estimation. Due to the presence of heteroscedasticity, we also proceeded to estimate dynamic panel modelling methods. More so, fixed effects specifications do not eliminate endogeneity challenges or the potential conditional effects dependency on countries macroeconomic fundamentals.

We utilised the Arellano and Bover (1995) and Bover and Blundell (1998) one step system GMM. We introduced two lags of the dependent variable, (GBY) and one lag of the policy rate (POLICYRATE) as instruments in our GMM estimation. The instruments reflect endogenous variables which in our case, GBY is assumed to be endogenous. Economic theory supports the view that current bond yields are affected by the previous level of bond yields. Previous economic literature has also utilised the lags of the dependent variable and foreign participation as instruments. We then added POLICYRATE as another endogenous variable in the instruments after a trial with FPART which did not yield statistically significant results. According to Arellano-Bond (1991), the number of instruments should not exceed the number of groups in the panel which limits our groups to 5 lags for the five countries in the sample. However, increasing the number of lags also has the effect of reducing the sample size. Given our small sample for number of countries, we explored with lags one and two to choose the best lags without serial correlation in our error terms. We also reduced the number of variables by testing each of the variables and how they impact the model results. For example, we have three global factors variables, GBY-US, FFR-GLOB and Chicago Board Exchange volatility index (VIX). We tried each of the three and chose the variable, FFR-GLOB, which has the best economic significance in our model.

The lag of bond yields (+) is statistically significant in explaining changes in bond yields. The dynamic system GMM estimation shows that the majority of changes in the current level of bond yields are explained 85% of the time by the level of bond yields in the previous period which tend to reduce the extent of the effect of other variables. Since past values do not predict 100% of the current bond yields, this suggests that there is still room for other fundamental factors that explain behaviour of bond yields other than the past values.

We established that FPART has a statistically significant negative relationship with GBY, that is, a 1% increase in FPART will reduce GBY by about six basis points. Thus, increasing FPART is beneficial for African countries as it helps to diversify the investor base, and consequently reduce bond yields. Although we analyse a different set of countries compared to other studies, the impact of FPART on GBY appears to be of similar magnitude. For example, GBY declining 4- 6 basis points in Peiris (2010), 3- 7 basis points in Andritzky (2012), 7- 9 basis points in Ebeke and Lu (2014) but slightly lower in Lee (2015) at 3 basis points. The similar magnitude perhaps explains the threshold to which a diversified investor base can impact on GBY. Thus, other factors have a role in explaining bond yields. The use of dynamic modelling which considers lags of regressors and the introduction of instruments in the equation estimation results in observing the statistical significance of the impact of foreign participation on bond yields.

Consistent with fixed effects model results, the same control variables, that is, POLICYRATE, and INFLATION remain significant in explaining GBY while FFR-GLOB becomes insignificant. In addition, the lag of GBY (positive sign) is also an additional variable that is significant in explaining changes in GBY. The dynamic system GMM estimation shows that the majority of changes in the current level of GBY is explained 85% by the level of GBY in the previous period which reduces the extent of the effect of other variables. For example, the effect of POLICYRATE is reduced to 7 basis points relative to an average 40 basis points in our static models and previous literature (Ebeke and Lu 2014).

The effect of INFLATION on GBY is positive and statistically significant in our study similar to economic theory and some previous literature Peiris (2010) and Lee (2014). However, this is not always the case in literature as Andritzky (2012) and Ebeke and Lu (2014) found the

relationship statistically insignificant. Perhaps in Africa, INFLATION changes more frequently as none of the central banks directly operate full inflation targeting (except for South Africa) regimes. Due to the low levels of development of local currency debt markets in most African markets, perhaps monetary factors; primarily interest rates and inflation expectations; are sufficient in explaining the behaviour of bond yields in African countries. More so, many central banks are using policy interest rates to implement monetary policy and act as guidance on market interest rates and ultimately cost of borrowing through bond yields.

The effect of inflation on bond yields is not always statistically significant. Where INFLATION is probably low and stable as in many advanced markets or monetary zones in West and Central Africa or rand monetary union in southern Africa, it does not explain changes in GBY significantly. In the case where the level of FPART does not impact on changes in GBY, such as fixed effects model, the changes in FFR-GLOB seem to matter. Thus, our panel results for both static and dynamic analysis shows that the lag of GBY, level of FPART, POLICYRATE, INFLATION and FFR-GLOB are all significant variables explaining the behaviour of bond yields.

We then performed diagnostic tests to ensure residuals were well behaved and that the model is correctly specified. For heteroscedasticity, we performed the modified Wald test for group wise heteroscedasticity which showed that heteroscedasticity still existed but did not compromise the validity of results when using GMM techniques. The Sargan test of overidentifying restrictions results showed high probability value leading us to fail to reject the null hypothesis that the model is correctly specified. Then serial correlation test showed there is no autocorrelation after two lags.

3.5.2. Estimating Panel Bond Yields Volatility

We followed the same approach as above in examining if control variables also have an impact on bond yields volatility. Starting with pooled ordinary least squares, all variables were insignificant except exchange rate. That is to say, all our explanatory variables do not explain changes in bond yields volatility. But the problem with this model is that the R-squared is very low which could suggest misspecification of the model.

Using the fixed effects approach, our results also show that no variables are significant to explain changes in bond yields volatility. The R squared is still very low similar to pooled regression. Wooldridge test for autocorrelation shows no serial autocorrelation among our residuals. We also tried using the random effects model and result remains none of the variables are significant at all in explaining changes in bond yields volatility. However, when using the dynamic modelling approach with bond yields volatility, our results show that only policy interest rate is statistically significant. All the other variables are statistically insignificant. In a nutshell, our take away is that bond yield volatility is affected by exchange rate movements and policy interest rate only.

Foreign participation is not statistically significant in all our volatility equations. This is not surprising for two reasons. Firstly, under developed local currency debt markets, which is our sample of African countries, do not have much active trading in the secondary markets According to the African Stock Exchanges Association (ASEA) yearbooks, only South Africa has secondary market trades valued at least USD2 trillion per annum. Nigeria only comes a distant second with trades in the secondary market valued at around USD50 billion per annum. The absence of market participants who are always ready to participate in either side of the trades in developing markets, thus implies limited volatility. In markets where there is active

trading, one would expect more volatility of yields in response to changes in macroeconomic variables or inflow and outflow of foreign holdings.

Secondly, previous literature has also found mixed evidence on the impact of foreign participation on bond yields volatility by examining broader emerging markets. Other than Ebeke and Lu (2014) who found the relationship statistically significant, most other researchers did not. For example, Peiris (2010) found six of the ten sampled countries did not have statistically significant relationship between foreign participation and bond yields volatility suggesting there could be other factors at play. Similarly, Andritzky (2012) found the relationship statistically insignificant. Perhaps, bond markets in SSA are not developed enough to experience volatility. Thus, we can conclusively say in our sample group, increasing foreign participation does not come at a higher cost of increasing volatility in bond yields. On the other hand, the overall level of foreign participation may not be strong or high enough to result in higher volatility or there are other factors, that are more important, such as exchange rate and policy interest rate, to explain bond yields volatility.

Alternatively, it could be our quarterly volatility measure that is problematic or determinants of volatility are not fundamental factors but other high frequency indicators missing in our model specification which results in a very low R-squared. Other future studies could consider different factors and measures of volatility to understand the volatility of bond yields better than we have done here.

3.5.3. ARDL Time Series Analysis on South Africa

Our specific case study analysis on South Africa uses monthly data which is more high frequency. As a preliminary step, we carry out 3 different unit root tests, mainly, Augmented

Dickey Fuller test, the Philips Perron tests and the Dickey Fuller generalised least squares tests to identify the order of integration in our variables before proceeding to specify and estimating our model. Appendix 3.6 shows results of unit root tests in both levels and in first difference form.

Our unit roots tests show mixed evidence of stationary and non-stationary characteristics which is permissible in ARDL estimations. Across the three tests, three variables are consistently stationary in levels- money supply, volatility index and fiscal balance. For non-stationary in levels, all variables become stationary after first differencing. Therefore, no variable is integrated of order 2 which allows us to perform ARDL. In choosing the lag length, we utilised the Akaike information criteria to choose the best possible lags automatically. The automatic lag length selection chose two lags of foreign participation and exchange rate, one lag of domestic bond yields, global bond yields, and money supply while the other variables had zero lags. Lag one and two choices are also consistent with the absence of autocorrelation in the residuals as well as previous literature in similar estimations.

Table 3.2: ARDL Bounds Test Results – Pesaran *et al* (2001)

F = 5,215 t = -3,473 H_o= No level relationship

Pesaran, Shin, And Smith (2001) Bounds Test								
	10%		**5%**		**1%**		**p-value**	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
F	2,093	3,307	2,439	3,762	3,210	4,761	0,000	0,005
t	-2,515	-4,173	-2,840	-4,556	-3,483	-5,297	0,010	0,272

We utilised the bounds testing procedure to draw conclusive inferences of relationships in our variables. We utilised the Kripfganz and Schneider (2018) critical values which are latest development since Pesaran *et al* (2001) and Narayan (2005) critical values. The null hypothesis

is that coefficients of the lagged variables are zero, that is, there is no long run relationship. We reject the null hypothesis of no long run relationships. Thus, the outcome of the bounds test indicates that we can proceed to specify an error correction model to assess short and long run relationships.

The analysis here is based on the alpha, α, adjustment coefficient characteristics, that must be well behaved, that is, negative and statistically significant. Since we are modelling government bond yields, the error correction term, α, to be observed is the coefficient of government bond yields. Indeed, we observe in Table 3.3, below, that the coefficient is -0,23 and t value is -3.47 and probability is less than 1% which shows that error correction coefficient is well behaved, negative and statistically significant. The adjustment shows the errors in the previous period will be corrected in the current period. Therefore, we can make interpretations of long run relationships. The error correction represents speed of adjustment to long run equilibrium. So, result implies there is statistical support for the existence of a long run relationship between the identified cointegrated variables.

Table 3.3: ARDL Long and Short Run Equation Results

Dependent variable is gby_sa	
Adjustment (α,)	-0,23 [-3,47] ***
Long run terms	
FP	-0.1236 [-3, 57] ***
POLR	0,5704 [2,83] ***
FFR	0,692 [1,60]
GBY-glob	0,6913 [3,38] ***
FB	0,1517 [1,23]
TradeB	0,6570 [1,76] *
REER	-0,064 [-3,33] ***
Short run terms (differenced)	
GBY-(-1)	0,1715 [1,87] *
FP	-0,0715 [-3,18] ***
POLR	0,1335 [2,84] ***
FFR	0,1620 [1,32]
GBY-GLOB	0,745 [6,47] ***
FB	0,0355 [1,36]
TradeB	0,1538 [1,97] *
REER	-0,0604 [-8,08] ***
Diagnostics	
Serial correlation Durbin Watson	1,931 (value should be close 2 for no autocorrelation)
Serial correlation-Breusch Godfrey (lag1)	0,047 (0,827)
Heteroscedasticity- Breusch Pagan	9,24 (0,0024) ***
Ramsey RESET test- omitted variables	3,06 (0,0340)

Note: Statistics in parentheses
****, **, * represents significant at the 1%, 5%, and 10% levels respectively*
[] represents t statistic; () probability values

The final model estimated has eight variables- government bond yields, foreign participation, policy rate, federal funds rate, global bond yield, fiscal balance, trade balance and exchange rate. So, **Table 3.3** above shows that of the seven explanatory variables, four of these (foreign participation, policy interest rate, global bond yield, and exchange rate) can consistently explain long and short run dynamics in changes to bond yields, at least at the 5% level of significance. But the magnitude of impact measured by coefficients differ between the two-time horizons. Federal funds rate and government's fiscal balance are insignificant suggesting no relationship with bond yields. The result is interesting in a way, as it suggests government's fiscal position does not necessarily affect its own borrowing costs but rather driven by other

macroeconomic factors. Neither does the level of global policy rates affect South Africa's specific bond yields. In the panel analysis earlier, we observed federal funds rate as statistically significant although with a negative association.

In the specific case of South Africa, the impact of changes in foreign participation is associated with a negative relationship with bond yields which is statistically significant. This is similar to our panel results estimation and previous literature which confirm the benefits of increasing foreign participation to local currency bond markets. Additionally, in the case of South Africa, the impact of foreign participation is much more pronounced in the long run. Increase in foreign participation reduces bond yields by 7 basis points in the short run and 12 basis points in the long run. South Africa also has a higher share of foreign participation consistently over the sample period than any other country in the sample. Perhaps, this is more to do with South Africa's higher level of financial integration with global markets compared to African peers. For instance, while Nigeria has been excluded in global bond indices[6], South Africa has remained in global bond indices, thereby attracting consistent levels of foreign investment in government bonds. Another view may be associated with sovereign credit risk. South Africa's sovereign ratings are generally at a higher level than peer African countries, despite falling out of investment grade by two credit rating agencies.

For control variables, our results showed that the impact of policy interest rates on bond yields is positive and consistent with economic theory and previous literature. The impact of a one percent increase in policy rate on bond yields is 13 basis points in the short run and about 57 basis points in the long run. This is plausible considering that South Africa pursues an inflation

[6] JP Morgan index- was included in 2012 but subsequently excluded in 2015.

targeting framework which uses the central bank policy rate, repo rate, as the main tool to target inflation and transmit the policy rate to the financial markets and the real economy.

Exchange rate movements measured by real effective exchange rate have a statistically significant negative relationship with bond yields. An increase in real effective exchange rate (appreciation) comes from the strengthening of terms of trade in a domestic economy. The stronger terms of trade help to narrow the size of current account deficit. If this is the case, the funding need becomes smaller, thereby reducing the country's borrowing levels and consequently bond yields which reflect cost of borrowing of the government. South Africa also experiences exchange rate volatility that is linked to the terms of trade changes or is externally driven by developments in the global markets. The larger the current account deficit, the more the likelihood of a higher exchange rate depreciation which results in higher bond yields. Conversely, a declining current account deficit is also synonymous with exchange rate appreciation, other factors held constant, or at least minimal depreciation and therefore, declining bond yields.

US bond yield changes also explain bond yields in South Africa. Here, the relationship is positive and statistically significant. A rise in bond yields in the US can attract foreign investors to go back home. This implies that yields are stable and predictable in-home markets and may not be worth the risk of bigger exposures in less developed markets. The effect would then be an increase in global bond yields, leading to an increase in local currency bond yields. This is best explained through the link with foreign participation. When foreign holders depart local markets for home countries, the exit process can result in local currency bond yields being pushed up as new investors demand higher compensation for holding the securities. In the case of South Africa, practical experience has demonstrated that when foreigners exit, local asset

managers buy the securities and bid for higher yields, which acts as a normal adjustment mechanism. This was the case in May 2013 when the US Federal reserve started to increase their policy rate and again in 2018 with rising interest rates from the Federal Reserve.

Global policy rate and government's fiscal position impact on bond yields in South Africa. While these two variables were statistically insignificant, we considered the reasons why this may have been the case. The result is interesting in a way as it suggests a government's fiscal position does not necessarily affect its own borrowing costs but is rather driven by other macroeconomic factors. In South Africa's case, the size of the fiscal deficit has generally been stable in a range of 3- 4% of GDP. Thus, within these levels, bond yields already capture the sovereign risk. Thus, changes in fiscal measures are not statically significant in explaining bond yields. Importantly, to understand the insignificance of the global policy rate on South Africa data requires a lot more analysis. Our model contains both global policy rate and global bond yield which factor in global influences on bond yields. It is the latter that has provided better economic significance. Thus, it does not take away the effect of global factors on South Africa's bond yields but rather economic significance is better explained by the reaction of global bond yields rather than directly through the global policy rate. We also performed a series of diagnostic tests which confirm no serial correlation, presence of heteroscedasticity and stability of the model which is also correctly specified.

Diagnostic tests- For serial correlation, we use Durbin Watson and Breusch-Godfrey tests which focuses on testing the residuals with a null hypothesis that there is no serial correlation. As we observe in Durbin Watson that our statistic is close to 2 while for Breusch-Godfrey, we fail to reject the null hypothesis that there is no serial correlation. Lag one in Breusch-Godfrey also reinforces our choice of using one lag in the estimations with the residuals that have no

autocorrelation problem. Heteroscedasticity still exists as we reject the null hypothesis of homoscedastic variances. Cusum test for model stability shows our model is stable and within the bounds. Ramsey reset test for omitted variables rejects the null that there are omitted variables which implies our model is correctly specified.

3.5.4. Estimating Time Series Bond Yields Volatility in South Africa

After establishing that changes in foreign participation do have an impact on bond yields, we test whether changes on foreign participation have an impact on bond yields volatility in South Africa. We constructed our volatility measure from the weekly bond yields series to provide a monthly standard deviation series. Other literature explored in previous sections have used similar standard deviation measures or constructed GARCH models with higher frequency data. The unit root tests and lag selection remain the same from the estimations in level of bond yields. So, the starting point here is to try and establish if long run relationships exist. Bond yield level is replaced by bond yield volatility as dependent variable in the model specifications.

Table 3.4: Bounds Test Results for Bond Yields Volatility

F = 10,591 t = -8,598 H_o= No level relationship

Pesaran, Shin, And Smith (2001) Bounds Test								
	10%		**5%**		**1%**		**p-value**	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
F	1,825	2,993	2,160	3,433	2,910	4,393	0,000	0,000
t	-1,614	-3,713	-1,952	-4,084	-2,611	-4,795	0,000	0,000

Table 3.5: ARDL Long Run and Short Run Equations Results for Bond Yields Volatility

Adjustment	-0.9581 [-8,60] ***
Long run terms	
Foreign participation	0.6097 [2,20] **
Policy rate	-1.2318 [-0,93]
vix	0.4503 [2,27] **
Fiscal balance	0.1092 [0,08]
Trade balance	-1.5368 [-0,37]
Exchange rate (reer)	0.1015 [0,74]
Short run terms (differenced)	
SA bond yield volatility (lagged)	
Foreign participation	-1.3543 [-1,25]
Policy rate	-1.1803 [-0,92]
vix	0.4315 [2,23] **
Fiscal balance	0.1046 [0,08]
Trade balance	-1.4725 [-0,37]
Exchange rate (reer)	0.0973 [0,74]
Diagnostics	
Serial correlation Durbin Watson	1.97 (close to 2 is no serial correlation)
Serial correlation-Breusch Godfrey (lag1)	0,019 (0,8916)
Heteroscedasticity- Breusch Pagan	0,00 (0,9544)
Ramsey RESET test- omitted variables	0,99 (0,4033)

In the short run- all variables are insignificant to explain the behaviour of bond yields volatility, except, VIX, which is a proxy for global volatility index. So, in the short run, volatility of South Africa's bond yields is primarily a function of volatility in the global capital markets measured by the Chicago Board Volatility Index. As with other global factors, the impact of global volatility on domestic bond yields volatility is mixed. For example, Andritzky (2012) and Ebeke and Lu (2014) do not find a statistically significant relationship while Lee (2015) found the relationship to be significant. Some see the VIX proxy as directly measuring the volatility of the equity indices and not necessarily reflecting bond markets volatility. In South Africa's case it is plausible to expect transmission between global equity markets and domestic bond

markets due to South Africa being more integrated with global markets than peer African countries.

In the long run, however, changes in foreign participation also affect the volatility of bond yields in South Africa, that is, an increase of one percent in foreign participation will result in bond yields volatility increasing by close to 60 basis points in the long run. This magnitude is a very strong response which explains that the majority of the volatility is explained by the behaviour of foreign holdings of local currency debt. The result provides credibility to the argument that increasing foreign participation in South Africa can be a cost as it results in higher bond yields volatility. The diagnostic tests were well behaved-no serial correlation, no omitted variables, the model is stable and error variances are homoscedastic.

3.6 Concluding remarks

We set out to estimate the impact of changes in foreign participation on local currency government bond yields and bond yields volatility in a group of African countries using panel and time series techniques.

Our results show that foreign participation is statistically significant in explaining changes in bond yields. That is, increasing foreign participation can result in declining bond yields confirming the benefits of foreign participation in investor base diversification. Our results are consistent with previous literature that asserts that increasing share of foreign participation results in declining local currency bond yields. Additionally, in the case of South Africa, the impact of foreign participation is much more pronounced in the long run. Increase in foreign participation reduces bond yields by 7 basis points in the short run and 12 basis points in the long run. Similar to panel analysis results, monetary factors are important in understanding the

behaviour of bond yields. In South Africa's case, we show that central bank policy rate, global factors, and the external position including value of the rand matter to bond yields more than government's own debt position.

With respect to the impact on bond yields volatility, we found out that, the impact of increasing foreign participation is mixed. Specifically, in the panel analysis, we did not find any evidence that increasing foreign participation causes bond yields volatility. In that regard, increasing foreign participation is not a cost to recipient countries. The result is consistent with other studies on emerging markets which have found limited impact of foreign participation on bond yields volatility. What matters for bond yields volatility is changes in exchange rate and domestic policy interest rates.

When we isolate South Africa, in a specific case study, we found that indeed, increasing foreign participation comes with increased costs of volatility of bond yields in South Africa. Bond yields volatility in South Africa is also caused by global financial markets volatility, measured by the Chicago Board Options Volatility Index. Perhaps it is more to do with South Africa which is more closely integrated with the global financial system through the deep capital markets relative to the rest of the African countries in our sample, which are less integrated.

From the panel and time series analysis, we established that the impact of foreign participation on bond yields is generally similar across countries. Thus, increasing foreign participation is beneficial for African countries as it helps to diversify the investor base, and consequently reduce bond yields. Therefore, policy makers, particularly central banks, should pay attention to changes in level of foreign participation in individual countries. More so, changes in

macroeconomic variables, that is, inflation, interest rates locally and globally, exchange rates matter to impacting bond yields. While for the broad sample group, volatility of bond yields does not seem to be a cost, it does matter in South Africa where changes in foreign participation do indeed result in higher bond yields volatility.

Limitations- in the panel analysis, we only explored with one fiscal variable, debt burden, which probably limits the options of testing fiscal variables impact on bond yields. The absence of consistent quarterly fiscal deficits data in some Africa countries (specifically Zambia) made it difficult to use this variable in the panel. The measure of volatility can also be strengthened in other studies by using more complicated techniques such as GARCH provided higher frequency data on foreign participation is also available. With each passing year, more data points emerge, which can allow other researchers to continue to explore the phenomena of foreign participation in African countries.

CHAPTER 4: THE POLITICAL ECONOMY OF SOVEREIGN CREDIT RATINGS AND THEIR IMPACT ON BOND MARKETS IN AFRICA

4.1. Introduction

Globally international borrowing by governments has been in existence for many decades. For instance, O'Malley (2015) details the evolution of external borrowing for financing rail infrastructure by developed countries such as the US and European countries- the UK, France, among others, from the late 1940s. Developing countries joined the wave from the 1970s at a time when oil prices increased substantially negatively weakening the external balance sheets for oil importing countries. Particularly, Latin American countries- Mexico, Brazil, Venezuela and Argentina borrowings from international banks such as US commercial banks. For Latin American countries, problems emerged in the 1980s starting with the Mexican crisis that also spread to the neighbours.

In 1989, the US, IMF and World Bank developed a plan for developing countries to restructure their commercial external debt with commercial banks and replace the loans with issuing bonds- which came to be known as the Brady bonds, O'Malley (2015). The process allowed countries such as Mexico, Argentina, and Brazil among others to issue bonds in the international capital markets.

Since 2007, African countries have been attracted to a new source of financing in the international bond markets, Eurobonds. The issuance of these Eurobonds has increased at a rapid pace. Smith (2019) suggest that at least USD100 billion Eurobonds issued by 21 countries is currently outstanding. African Eurobond issuances have provided a mechanism to measure and assess African sovereign credit risk. Investors tend to measure a sovereign's willingness

and ability to repay debt through the price mechanism reflected in bond yields or credit default swaps (CDS) spreads.

The sudden interest in Eurobonds by African countries requires scrutiny. IMF (2014) assert that there are number of drivers for Eurobond issuances by African countries. These include favourable global financing conditions and decline in commodity prices. As the US predominantly carried out unconventional monetary policy with very low interest rates, global investors sought higher yields in emerging and frontier markets. With excess liquidity and the search for higher yields, global investors found diversification and portfolio reallocation in African Eurobonds. On another hand, since June 2014, the decline in commodity prices, mainly oil and gas, mining and metals prices have put fiscal and external positions strains to countries more dependent on resource revenues for fiscal and export receipts. As the fiscal revenues have fallen, several sovereigns have turned to borrowing in the international markets through the Eurobonds. Other than these reasons, Eurobonds also increase the fiscal envelope with which to fund long-term infrastructure projects for African countries (IMF 2014).

In order to issue bonds in the international markets, it is mandatory to have credit ratings assigned. As a result, African countries have increasingly sought credit ratings over the last decade. The credit ratings have enabled African countries to access international capital markets. The Eurobonds have been issued with credit ratings assigned by all or some of the big three credit rating agencies, mainly S&P Global, Fitch and Moody's. Sovereign credit ratings attempt to measure willingness and ability to repay commercial debt obligations by bond issuers using a combination of macroeconomic and governance related factors.

The role and impact of credit ratings has been a subject of contestation since the global financial crisis. For example, there are debates around the role of ratings and measuring the financial impact of changes in ratings on economic variables. The debates around the role of ratings is juxtaposed in the political economy of credit ratings which includes criticism of credit rating agencies. Arguments against credit rating agencies are not universal. They range from being too generous and slow on downgrades during the global financial crisis, too quick to downgrade during the European sovereign debt crisis and generally too low sovereign ratings for African countries. In this chapter, we measure the perceived power through the impact of rating changes directly on bond yields and on economic aggregates. For Africa, there are arguments that some credit ratings assigned by international agencies may be too low, which impose higher cost of borrowing to the governments.

While sovereign credit ratings tend to be less volatile, bond yields tend to change more frequently exhibiting volatilities in response to investor sentiment. The problem is that bond yields tend to respond to sovereign credit rating changes but the magnitude and direction of changes are less clear. It is therefore important to understand the relationships in the two measures of sovereign credit risk with respect to African Eurobonds.

Examining the relationships between credit ratings and Eurobond yields is important in understanding sovereign credit risk, particularly in Africa where issuance of Eurobonds is currently popular but the same issuing governments barely comprehend factors that drive these movements. For example, changes in credit ratings impact on Eurobond yields have not been adequately explored in African literature. In isolating the impact of a rating change in an event window, we hope to contribute in the understanding of ratings impact on bond yields in our sample of countries.

In the next sections, we examine the theoretical and empirical literature underpinning the role and impact of credit ratings in financial markets. We also discuss the political economy of the credit ratings industry which explain the criticisms and arguments for and against the CRAs and what steps can be taken to improve the industry. We also discuss the evolution of the Eurobonds issuances and the history of sovereign credit ratings before proceeding to carry out the empirical estimations on the impact of rating changes on economic variables in selected African countries.

4.2. Literature review

4.2.1. Theories on roles of rating agencies

Economic theories first classified the role of rating agencies around two main functions- market and regulatory functions. Both take into account the asymmetric information and the hardwiring of ratings in regulation as the key drivers on the role of rating agencies. However, three other theories have emerged over the years which also consider the efficient market hypothesis, the sorting function and the philosophical heterodox theory. In many ways, asymmetric theory and the efficient market hypothesis are closely linked in explaining the market function and the importance of information availability to market players. We explain each of the five theoretical constructs in the following section.

4.2.1.1. Information asymmetry

The market function is premised on the theory of asymmetric information. Information asymmetry theory originates from the seminal contributions of Akerlof's (1970) market for lemons proposition in relation to the second-hand car market. That is, in the second-hand car market, sellers are privy to information about the quality of the cars that the buyers do not

know. In that case buyers are not able to distinguish good cars (peaches) from bad cars (lemons). As sellers are not willing to offer guarantees on the vehicles, the peaches are driven out of the market. As buyers are not able to distinguish peaches from lemons due to information asymmetry, buyers end up buying lemons.

When related to the financial markets, and particularly the loan market, there are information asymmetries between lenders and borrowers. Borrowers are not willing to disclose as much information on their credit worthiness and lenders do not know enough about the borrowers. In the same vein, good borrowers may be driven out of the market by rates lenders ask to compensate for the unknown information. The market is left with higher risk borrowers. This is precisely where credit rating agencies (CRAs) come in. CRAs are able to bridge this information asymmetry gap between lenders and borrowers as independent assessors of creditworthiness. Thus researchers- Deb, Manning, Murphy, Penalver and Toth (2011), Rhee (2015) and Binici, Hutchinson and Miao (2018) also argue that CRAs can reduce information asymmetries between lenders and borrowers. CRAs are able to do this by collating data on different borrowers in a central place better than individual investors can do. Centralising the data collation process reduces costs through economies of scale. CRAs then provide relative rankings of creditworthiness in a ratings scale as an independent party. S&P (2012) further add that when lenders combine credit ratings opinions with own analysis, the result is a superior allocation of limited capital. Is this really the case in reality that CRAs are correctly bridging the information gap?

To begin with, the continued existence of the CRAs industry suggests that they are playing a role that is useful to both lenders and borrowers over time. Questions arise from the fact that it is the borrower that pays CRAs to perform the relative rankings on creditworthiness creating a

potential problem of moral hazard. Researchers argue that the current set up-issuer pays model-creates a moral hazard for CRAs to rate same borrowers(issuers) and their securities who pay them. For instance, Bozovic *et al* (2011) argue that the CRAs current set up-issuer pays model and oligopolistic nature of the industry-probably act as an incentive for CRAs not to accurately report credit risks through their ratings. Thus, in their perspective CRAs may have a conflict of interest in executing this role. We discuss in more detail the issuer pays model and its merits in the political economy section.

4.2.1.2. Regulatory role

Regulators globally have embedded ratings in issuing bonds and capital management of companies, thus making CRAs an integral part of the financial markets in performing the regulatory role. The CRAs independent opinions on relative rankings on creditworthiness is a very crucial element in financial regulation. For example, in the United States of America (USA) CRAs are given the status of nationally recognised statistical rating organisation (NRSRO) status since 1975. Prudential regulations for banks, insurance and pension funds holdings of securities for liquidity purposes to be minimum investment grade. For example, Bank of International Settlements (BIS) (2006) on Basel II regulations incorporate ratings as a requirement in capital adequacy assessments of financial institutions. Since CRAs are independent parties, their regulatory role can also be viewed as "certification role" (Deb *et al* (2011) and Binici *et al* (2018)). Rhee (2015) also argues CRAs reduce the cost of regulation.

The evolution of regulation of CRAs started in the US in the 1970s by designating CRAs as NSROs. Thereafter, we have observed the enactment of the Dodd-Frank Act. The Credit Rating Agency Reform Act of 2006 is part of the Dodd-Frank set of regulations inadvertently promoted the use of CRAs. That is, as part of the Dodd-Frank Act, an office of credit ratings

(OCR) was set up to monitor and regulate CRAs. According to Binici *et al* (2018)- IOSCO revised the code of conduct fundamentals for CRAs in 2008. The Eurozone also put together their own regulatory framework with ESMA as the official regulator. That is, the EU CRA framework of 2009, 2011 and 2013.

According to Paudyn (2014) the EU CRA framework is the most comprehensive set of regulations guiding CRAs. The EU CRA framework introduced the mandatory calendar system in the review of sovereign ratings. The calendar system requires CRAs (primary or lead analysts) that operate in the EU or associated with EU offices to publish its calendar annually for rated sovereigns associated with the EU by geography or office headquarters. As a result of this, CRAs publish their review dates at the beginning of each year for sovereigns that are rated in Europe, Middle East and Africa. The publication of the calendar makes the reviews anticipated by fixed income analysts, investors and overall market anticipants interested in ratings. Perhaps the pre-publication of calendar dates when each of the sovereigns will be reviewed takes away the unanticipated nature of ratings and makes them more predictable. We discuss these points later in the discussion of results for event study analysis.

While some regulations, such as BIS capital adequacy regulations embedding ratings, some regulations have also sought to reduce the extent and sole reliance on ratings as an independent arbiter. For instance, Section 939A of the Dodd Frank Act of (2010) sought to reduce and eliminate specific mandatory references to credit ratings on capital requirements assessments of companies and financial institutions which would in some way reduce the hardwiring of ratings in regulation. In as much as the regulatory function could be diminished in law, in financial markets practice, the ratings have become a key part of the system. Perhaps regulation of CRAs can still play a role in shaping the industry. That is re-defining the payment system

and the oligopolistic nature of the industry. In the interim regulators have focused on limiting conflict of interest by prohibiting CRAs from advising issuers in structuring transactions or policy advise following lessons from the global financial crisis. In as much as use of CRAs is encouraged it should be limited to credit opinions only, and be transparent on the processes of methodologies utilised.

4.2.1.3. Efficient market hypothesis

Other theoretical views focus on the efficient market hypothesis initially developed by Fama (1970). If markets were efficient, then lenders and borrowers would be able to find each other at the right price. There would be no need for rating agencies, all things being equal. That is, market prices fully reflect all available information and thus there are no opportunities for investors to earn abnormal returns. As markets are not efficient and do not clear on their own, the role of rating agencies in providing relative rankings of credit worthiness is required. There are three variants of the efficient market hypothesis. Firstly, the weak form takes into account only information from past prices. Secondly, the semi strong form takes into account not only information from past prices but also publicly available information. Thirdly, the strong form which takes into account information from past prices, publicly available information and also includes non-public information. The element of non-public information could be linked to insider information.

Since CRAs view their opinions on credit ratings as forward looking, they already incorporate past prices. In addition, CRAs also utilise fundamental analysis and forecasts of economic variables in their methodologies. If weak form efficiency was sufficient, then technical analysis which focuses on past prices would also be sufficient to forecast the likely credit trends. Thus, the link with the efficient market hypothesis is likely at the semi strong and strong form of

market efficiency. At a minimum the semi strong, as CRAs interact with rated countries and probably receive information that may not be in the public domain to help determine their rating outcomes. In the empirical section, we test whether credit ratings still provide new information to investors which is essentially testing the semi strong and strong from of the efficient market hypothesis.

4.2.1.4. Sorting function

Research work is emerging showing rating agencies providing new explanations post their traditional mainstream roles-market and regulatory functions. Rhee (2015) argue that CRAs are still able to exist even in the absence of asymmetric information and the regulatory role. CRAs can exist by performing the sorting function. The function entails sorting large sets of information on credit data and aggregating them to relative rankings of credit worthiness. The sorting function is still somewhat linked to efficient market hypothesis. If CRAs are not providing new information, they can still provide a sorting function in credit markets (Paudyn (2014) and Rhee (2015)). Rhee (2015) argues that information sorting by CRAs can reduce transaction costs as CRAs are able to perform this specialised role with centralised resources. Thus, sorting can provide the basis of price signalling and value discovery by market participants. Sorting promotes market efficiency.

However, the evolution of artificial intelligence is challenging the information sorting function as machines with data can similarly perform this function. Rhee (2015) also argues that CRAs can be viewed as libraries- they sort-organise credit information and categorise like a library without providing any new information. If CRAs are information repositories as the sorting function argues, they can be linked to the weak form of efficiency in the efficient market hypothesis construct.

4.2.1.5. Heterodox arguments

Another theory on the role of rating agencies is the philosophical heterodox theory propagated by Ioannou (2013) and Paudyn (2014). These argue that CRAs are part of the neoliberalism convention which propose the economics of limits. Paudyn (2014) argues CRAs are part of neoliberalism that impose "fiscal rectitude" on sovereigns for fear of being downgraded. As a result, threats of downgrades impose fiscal austerity- low budget deficits on democratically elected governments. Paudyn (2014) argues the politics of limits imposed by CRAs interfers with policy priorities of sovereign governments. Nevertheless, Ioannou (2013) still argues that without the certification role of CRAs, market participants would be ignorant of the future. While modern day investors are now smarter and able to carry out their own analysis, they still somewhat need to follow the guidance provided by CRAs.

In our view the reliance on CRAs as sole arbiters of credit worthiness is declining as evidenced by the growth of the fixed income market analysis and improving trading activity in the secondary markets. That is CRAs are no longer the only ones who know and lead the assessments of relative creditworthiness. Most asset managers have specialised teams with in built internal ratings assessments that may differ with those assigned by CRAs. The asset managers take positions by trading their views in the bond market more frequently compared to the publications of ratings reports. As a result, the costs of debt in the market are also influenced by trading activity in the fixed income markets.

On the other hand, it is easier for CRAs to rate market issued debt as terms and conditions are publicly available. As countries borrow in foreign currency and access the markets, they need credit ratings. So indeed, credit ratings are important for market debt. In the recent decade,

particularly in Africa, we have observed increasing levels of lending by China to African countries. Chinese terms are not easily disclosed in the public domain and are related to infrastructure projects which makes it somewhat difficult for CRAs to have full visibility as countries tend to be less willing to disclose these "confidential" terms. In our view the increasing quantum of Chinese debt reduces the influence of rating agencies' to fully assess the sovereign risk under the opaque terms scenario.

4.2.2. Empirical Literature

The traditional literature empirically examines two strands on the role and impact of CRAs changes. First, is the impact credit ratings changes have on financial markets. Financial markets aggregate includes bond yields (spreads including CDS), and stock market indices. Secondly, is the impact rating changes have on economic aggregates. Economic variables include economic growth and exchange rate, among others. Within financial markets, another strand of literature specifically examines the impact of sovereign ratings on stock market variables. For instance, Kaminsky and Schmukler (2002), Ferri, Liu, and Stiglitz (1999), Mora (2006). We turn our attention primarily to the bond market analysis, where literature is still developing and requires further analysis, particularly for African countries.

The first empirical review question that we seek to examine is whether sovereign rating changes impact on bond market variables? Early studies were carried out by Cantor and Parker (1996) as well as Reisen and Maltzan (1999). Cantor and Parker (1996) analysed the impact of changes in credit ratings announcement on euro dollar bond spreads for 18 countries for 1987-1994 period. On the other hand, Reisen and Maltzan (1999) followed the same approach but utilised an overlapping period 1989-1997 for emerging markets. Both studies utilised the event study methodology with very short event windows such as 2,3,5, 10-day windows and a

combination of abnormal and cumulative abnormal returns. The rationale with shorter event windows is to reduce the contamination or dilution of the impact of an event which may bias the results.

Cantor and Packer (1996) found that sovereign ratings do indeed impact on bond spread changes after 60% of the 79 credit announcements were statistically significant. Thus, credit ratings do provide new information as they influence credit spreads. Reisen and Maltzan (1999) who carried out their study when questions about role and impact had already arose following the Mexico currency crisis and Asian financial crisis both in the 1990s. From their 152 rating announcements in Reisen and Maltzan (199), about 97 or 64% of total rating events affected the Eurodollar bond spreads of the emerging markets under analysis.

Further distinctions in Cantor and Parker (1996) also relate to the distinction between investment grade ratings and non-investment grade. Cantor and Parker (1996) found that the effect of credit rating changes was much stronger for countries rated in investment grade compared to non-investment grade.

In the 2000s, post the Asian financial crisis and the global financial crisis there has been greater scrutiny on the impact of CRAs on bond market variables. Most of the studies, which we examine below, still show rating changes impact on bond markets but delve deeper into the different impacts of positive versus negative rating actions as well as the investment grade versus non-investment grade. Ismailescu and Kazemi (2010) examine the effect of CRAs announcements on the CDS spreads for 22 emerging markets using event study method for daily data 2001-2009. They also utilise primarily a 3-day event window to reduce contamination despite reporting results for other windows as well. Their results show that a

significant fraction of credit rating upgrades was preceded by negative CDS premium changes at least one month prior to the rating event- which led them to conclude that favourable credit rating announcements were anticipated, similar to Gande and Parsley (2005) analysis. However, increases in CDS spreads prior to negative credit rating events were even stronger. They find asymmetric reactions of CDS markets to credit rating events. Positive rating announcements have an immediate impact, while negative rating announcements have no impact on sovereign CDS markets.

Afonso, Furceri, and Gomes (2011) examine the effects of CRAs announcements on sovereign bond yield spreads, CDS spreads in 24 European Union countries using event study on daily data Jan 1995- Oct 2010, from all the 3 agencies. Similar to Cantor and Packer 1996, Reisen and Maltzan (1999), Afonso *et al* (2011) used 3-day window to reduce contamination problems. Their results did confirm previous studies that government bond yield spreads respond significantly to CRAs announcements. Of note, is Afonso *et al's* (2011) assertion that the reaction of bond markets (CDS spreads) to negative rating events actually increased after the global financial crisis. Specifically post Lehman brothers bankruptcy in September 2008.

Thereafter, empirical studies, particularly in Europe were motivated to understand the financial impact of CRA announcements post the European debt crisis in 2011/12. For instance, Sturmans (2013) analysis on eurozone countries using an event study daily data for 2002- 2012. As will most studies, the starting point is shortest event windows (-1,1) but still report the results of longer event windows. The results showed still significant responses of sovereign bond yields, CDS spreads, and exchange rates in response to changes in credit rating events. The responses were stronger for negative rating events. Similarly, Huber (2014) focus on the effect of sovereign credit rating changes by S&P on the debt market during the European debt

crisis, with comparisons to rating changes by other agencies using event study. Their results show that rating changes (downgrades) significantly increased yield spreads in PIG countries- Portugal, Ireland and Greece. However, the results are not consistent across the CRAs. Also found some evidence that positive events decreased yields for Greece and Portugal. For all other countries there is no significant effect.

In the last few years which are all post the global financial crisis and the European debt crisis, the effect of CRAs announcements on bond markets have continued to be questioned. To what extent do CRAs announcements still have new information content. That is, CRAs announcements effects appear to be fading or at least the impact varies across different rating categories. For instance, Binici *et al* (2018) start from the premise that responses to CRAs announcements have diminished since the global financial crisis. Using event study with daily data 2005-2012 for 55 countries, examined the impact of CRAs announcements on CDS spreads. Their results showed that CRAs announcements still significantly impact on CDS spreads after the global financial crisis. However, the magnitude of impact is declining and thus the information value. Negative events have a larger impact than positive events.

Orrico (2017) examines the impact of credit rating agencies on junk sovereign debt. That is credit events of 15 countries who crossed into or out of junk status to test changes in bond yields. The argument is that CRAs no longer provide any new information on publicly traded securities. On average, their results showed that there is no evidence of changes in sovereign ratings from investment grade to junk impacting on bond spreads. Orrico argues that markets already have lots of public information on individual sovereign issuers, so downgrades would not transmit much new information. Consequently, the usefulness of ratings as a primary source of credit worthiness is diminished. Markets respond before the event rather than post the event

meaning rating decisions will be anticipated and already factored into the bond prices before ratings are released.

In a similar vein, Mutize and Gossel (2019) examined whether a sovereign credit rating announcement influences excess bond and equity returns in 24 African countries 1994-2014 using event study analysis. The results show that CRAs announcements weakly impact bonds and stock returns. But also depends on the direction of rating, level of rating (investment grade vs non-investment grade)- with non-investment grade suffering the most from illiquidity. On the other hand, Olabisi and Stein (2015) also review the question on whether African countries pay more to borrow focusing on the coupon payments for twenty-four Eurobonds issued by thirteen African countries over January 2006 - December 2014. Olabisi and Stein (2015) review whether there is a specific risk premium associated with Africa as a region. Their results show that, yes, coupon payments are about 2.9% more than what macro-economic fundamentals and sovereign credit ratings suggest. Olabisi and Stein (2015) departure from other empirical studies is to assume that the starting point of determining bond yields is the credit fundamentals or the actual sovereign ratings provided by Fitch. If that is the starting point, then the coupon payments or bond yields should directly relate to the credit rating assigned by the CRAs. In this case, they found a premium over and above what the ratings suggest. Thus, ratings do affect cost of borrowing but there is more to it than just the sovereign credit ratings.

Kang and Min (2016) study the effect of the sovereign credit ratings on the economies of seven East Asian countries, applying panel vector autoregression (VAR) on quarterly data between 2000-2013. Their analysis found ratings to have little explanatory power over changes in the economic variables-economic growth, stock market indices, among others. However, when they distinguish by direction of ratings, their results also show that positive rating changes have

stronger effects on CDS spreads, stock indexes, and GDP growth rates than negative rating changes, and the effects of positive rating changes became greater after the financial crisis in 2008.

The empirical review suggests that changes in sovereign ratings still impact on bond markets- Cantor and Parker (1996), Reisen and Maltzan (1999) and Afonso *et al* (2011). However, there can be variations of impact between positive and negative ratings as well as crossing the investment grade divide. For example, Ismailescu and Kazemi (2010) and Afonso *et al* (2011) found negative rating actions have a stronger impact on bond markets while positive events are generally anticipated. On the other hand, recent studies, such as Orrico (2017) and Mutize and Gossel (2019) results imply the impact of rating changes are declining. Mutize and Gossel (2019) is one of the few studies that specifically focused on African countries. However, they utilised local currency bond yields which we think are rarely influenced by international credit ratings. It is usually domestic factors unless you have a substantial share of non-resident holders. So, as a departure, we target Eurobond yields as no country can issue a Eurobond without an international credit rating, thus it is beneficial to isolate Eurobond yields. Olabisi and Stein (2015) also exclusively focused on Eurobonds in their quest to understand if African countries paid a premium more than what sovereign ratings suggested.

Considering the discussion above, we question whether the impact of CRAs in African financial markets is overplayed. Before we empirically examine the impact of changes in ratings, our next sections consider historical evolution of credit ratings and the political economy questions surrounding CRAs.

4.3 Political Economy of Credit Rating Agencies

4.3.1. Background and trends on sovereign credit ratings in Africa

Globally, the history of credit ratings started late in the 19th century. The founder of S&P Global Ratings was Henry Varnum Poor when he first published his “History of Railroads and Canals in the United States" in 1860 before forming Standard Statistics in 1906 and merging with Poor’s Publishing company in 1941 to have what is commonly known as Standard & Poor’s and now S&P Global ratings. On the other hand, Moody’s was formed by John Moody in 1900 when he first published his “Moody’s Manual” which was followed in 1909 with “Moody's Analyses of Railroad Investments” and the creation of Moody’s Investors service in 1914. Lastly Fitch ratings was initiated by John Knowles Fitch who started Fitch Publishing company in 1913 and published “The Fitch Stock and Bond Manual” and “The Fitch Bond Book”. As fully-fledged credit rating agencies, S&P Global started in 1966, Moody’s started in the 1970s and Fitch only in the 1990s. It is in the 1970s that CRAs started to be recognised as NRSRO by USA’s SEC as described in the regulatory role section in the theoretical review. These three agencies dominate with at least 90% market share. In Africa history of credit ratings started in the early 1990s with sovereign ratings.

Table 4.1, below, shows the historical timeline for all African sovereigns that have received credit ratings over the years. **Table 4.1** illustrates that only five countries were rated in the 1990s, that is South Africa, Tunisia, Mauritius, Egypt and Morocco. The take-off came in the 2000s with about twenty sovereigns receiving sovereign credit ratings for the first time. By the end of the 2000s, twenty-five countries had received a rating by either of the main rating agencies. In the 2010s, a further nine countries received credit ratings. In 2019, about thirty-four sovereigns have received public credit ratings at one point in time, which makes that at least 60% or more than half of African sovereigns have received credit ratings. However, four

sovereign ratings (Gambia, Libya, Malawi, and Mali) were discontinued along the years, which means twenty-nine countries have sovereign ratings from at least one credit rating agency.

Table 4.1: Timeline of Assigning Sovereign Ratings in Africa

Country	Fitch	Moody's	S&P
Angola		2010-	2010-
Benin		2018-	2003-2013, 2018-
Botswana		2001-	2001-
Burkina Faso			2004-
Cameroon	2003-	2016-	2003-
Cape Verde	2003-		2003-
Congo (republic)	2013	2013-	2013-
D.R.C		2013-	2013-
Egypt	1997-	1996-	1997-
Ethiopia	2014-	2014-	2014-
Gabon	2007-	2014-	2007-2016
*Gambia**	2002-2007		
Ghana	2003	2012-	2003-
Ivory Coast	2014	2014-	
Kenya	2007	2012-	2006-
Lesotho	2002		
*Libya**	2009-2011		2009-2011
*Malawi**	2003-2009		
Mauritius		1996-	
*Mali**	2004-2009		2004-2008
Morocco		1999-	1998-
Mozambique	2003-	2013-	2004-
Namibia	2005-	2011-	
Nigeria	2006-	2012-	2006-
Rwanda	2006-	2016-	2011-
Senegal		2011-	2000-
Seychelles	2010-		2006-2009
South Africa	1994	1994-	1994-
Swaziland		2017-	
Tanzania		2018-	
Togo			2019-
Tunisia	1995	1995-	1997-2013
Uganda	2005	2013-	2008-
Zambia	2011	2012-	2011-

*Source: CRAs, * is for no longer rated, -rating is still current.*

From the thirty-four sovereigns that have received credit ratings, eight of these have received investment grade ratings in their lifetime which makes up 25% of the sovereign ratings universe in Africa. However, only four still maintain investment grade while the other four have fallen

off investment grade at various stages. A country is counted as investment grade if at least one rating agency has assigned an investment grade rating. For example, South Africa is counted as investment grade[7] (by Moody's) despite other two agencies classifying it as non-investment grade. Similarly, Morocco is counted as investment grade as it is rated at this level by S&P while Moody's rates it in non-investment grade.

Table 4.2: Investment Grade vs Non-Investment Grade Ratings in Africa

Current Investment grade ratings	No longer rated investment grade
Botswana	Egypt
Morocco	Libya
Mauritius	Namibia
South Africa	Tunisia

Sources: Compilation from Fitch, Moody's and S&P Global data as at February 2020.

4.3.2. Rise of Eurobonds

After the surge in credit ratings, came the surge in Eurobonds. Credit ratings allowed sovereigns to be able to borrow internationally on a commercial basis. While sovereign ratings took off in the 2000s decade, the commercial debt issuance surge took off in the 2010s. Excluding South Africa which had been a regular issuer, the first country to issue a Eurobond was Seychelles in 2006. Thereafter, Republic of Congo, Gabon, and Ghana followed suit in 2007. Over the 2010s more countries have issued Eurobonds with sizes increasing.

From **Figure 4.1** below, eurobond issuances started at a slow pace between 2006 and 2013, with the exception of 2010 when eurobond issuances exceeded USD5 billion. Eurobond issuances have since been ramped up significantly in the last three years. As at December 2019,

[7] South Africa is no longer investment grade as it was downgraded by Moody's in March 2020.

about twenty countries have accessed the international eurobond markets with cumulative issuances exceeding USD100 billion.

Figure 4.2 and **Figure 4.3** show the ramping up Eurobond issuances since 2016 and that Egypt and South Africa have the highest cumulative issuances in nominal terms. Nigeria, Ghana and Kenya follow with sizeable issuances. Multiple countries such as Seychelles, Congo republic, Rwanda, Ethiopia and Benin have each issued once in small sizes, thus their levels of Eurobonds are very low.

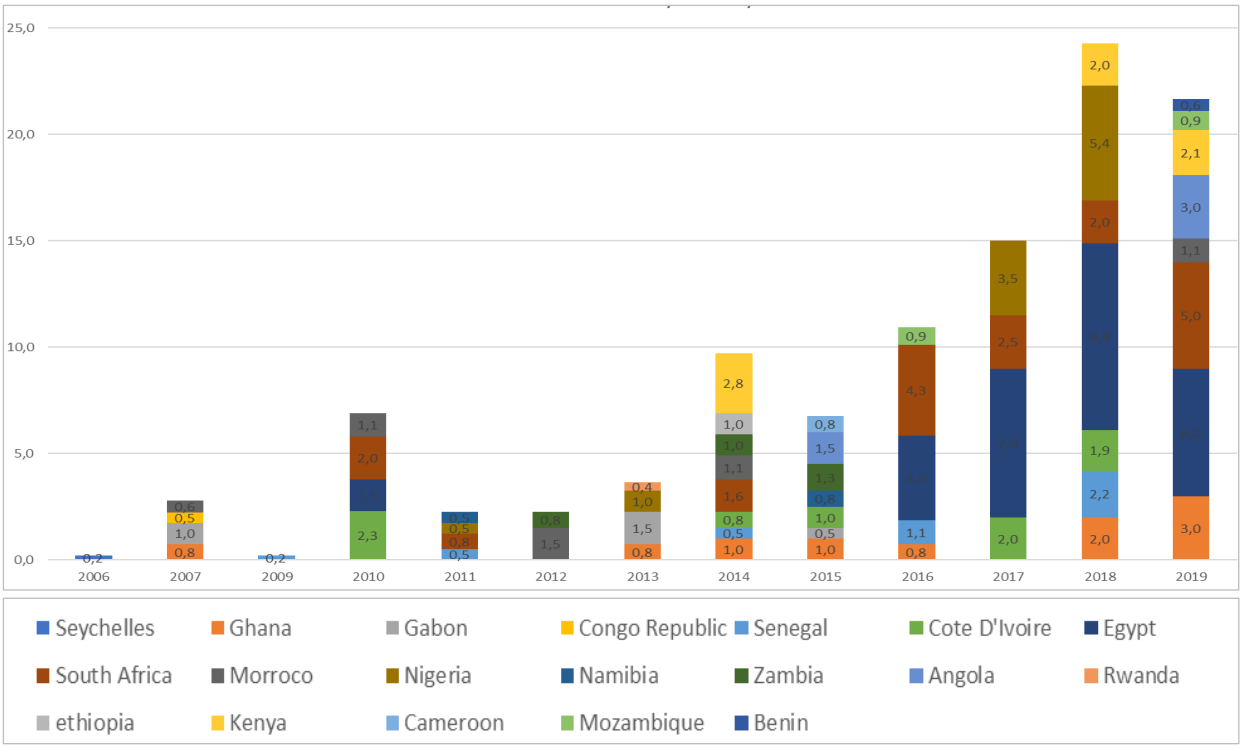


Figure 4.1: Annual Eurobond Issues by Country USD Billions

Source: Author's compilation from Reuters, Bloomberg, Fitch, Moody's and S&P Global Reports

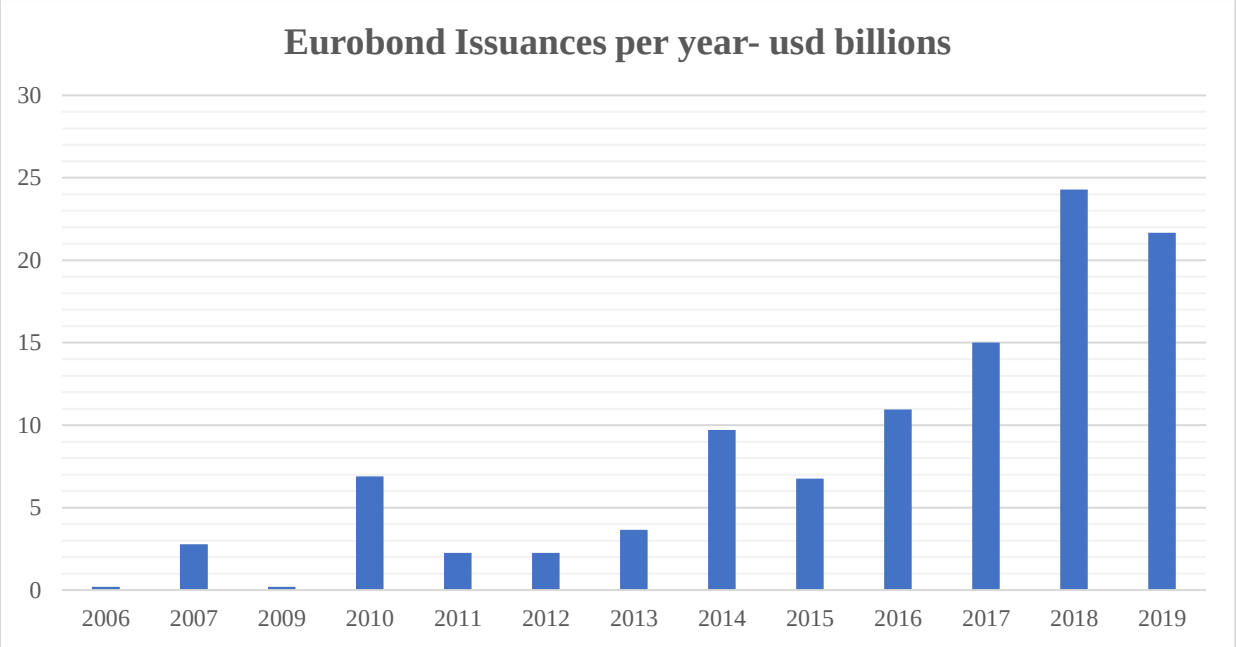


Figure 4.2: Eurobond Issuances per year (USD Billions)

Source: Author's compilation from Reuters, Bloomberg, Fitch, Moody's and S&P Global Reports

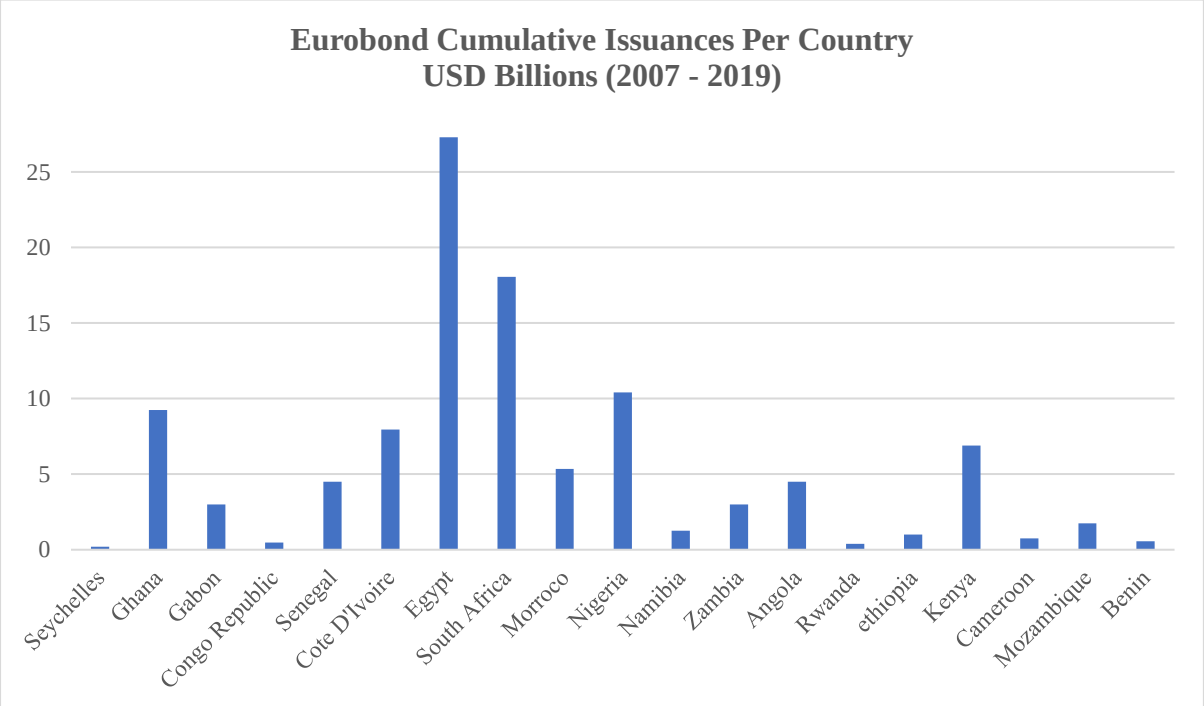


Figure 4.3: Cumulative Eurobond Issuances per country (USD Billions)

Source: Author's compilation from Reuters, Bloomberg, Fitch, Moody's and S&P Global Reports

Out of the thirty-four African countries that have received credit ratings at one point in their lifetime, twelve countries have never or not yet issued Eurobonds. These are Botswana, Burkina Faso, Cape Verde, DRC, Gambia, Lesotho, Libya, Malawi, Mali, Mauritius, Swaziland and Uganda. Thus, the sample of countries that can be analysed is reduced to about twenty-two sovereigns who have issued dollar/euro denominated debt. Further on, about five of the sovereigns have only issued Eurobonds in the last three years, with Benin being the most recent first-time issuer, only issued in March 2019. As a result, not much data on bond yields to be analysed yet. The third point relates to rating changes. Our study endeavours to analyse the impact of rating changes on bond yields. If ratings do not change, then there is no impact to assess. Which is the case with Ethiopia, among others, whose ratings have stayed at the same level since being assigned in 2014.

4.3.3. CRAs' Criticisms and Validity

Having established the role of rating agencies in the theoretical framework, our next step is to assess the "influence", perceived "political power" or impact CRAs have in a political economy setting. CRAs have been blamed for being partly responsible for some of the recent financial crisis. Similarly, for individual countries, CRAs have been blamed for exacerbating various economic crisis. Regulators have thus moved to regulate and improve the operations of the industry. We take a look at various criticisms levelled against CRAs and evaluate their validity. These criticisms range from the nature of the industry, the payment model and philosophies that CRAs subscribe to in providing their rankings of relative creditworthiness. More importantly are criticisms that stem from their mistakes in the past and how they apply their methodologies, in particular, in rating African countries.

4.3.3.1. Nature of the industry

The first layer of arguments is largely about the nature of the CRAs industry which relates to the competitive landscape, the payment model, and philosophical biases, among others. A number of researchers argue that the fact that there are only three dominant CRAs globally makes the industry less competitive. For instance, Paudyn (2014) characterises the industry as a monopoly and lumps all three CRAs as one homogenous entity that is free from any regulations. Although there are many smaller CRAs globally registered with various regulators, the big 3 remain the dominant ones. In Africa, it is the big three CRAs that provide most of the sovereign ratings. Out of the twenty-nine outstanding sovereign ratings, Moody's rates the highest number twenty-five sovereigns followed by S&P twenty-one sovereigns and Fitch nineteen sovereigns. This reflects that countries have a combination of all three CRAs or at least two of the CRAs. Thirteen countries are rated by all three CRAs. Either there are high barriers to entry which could be reduced by regulators or the cost of competing with established CRAs is very high. When issuing Eurobonds, it is a regulatory requirement that these bonds must be assigned ratings by at least two internationally recognised CRAs.

Who is responsible for changing the oligopolistic nature of the industry? Perhaps, regulators and governments can encourage new players which appears to be the case. Some governments, China and Russia for example, have actively promoted smaller agencies. For instance, Dagong, China based, is now partially owned by a government entity (China Reform Holdings)- has been a dominant player in the Chinese market rating 12% of the outstanding market debt in China according to the Financial Times (2018). However, its licence was temporarily suspended by the local securities regulator effective August 2018 for a year, due to issues related to conflict of interest and quality control. In Russia, there are Analytical Credit Rating

Agency (ACRA) and Expert RA who only issue ratings in the domestic market and not outside Russia.

In Africa smaller rating agencies have emerged. For example, Agusto & co (Nigeria), West Africa Rating Agency (WARA) and Global Credit Ratings Co (South Africa) issue local ratings that are not internationally comparable and have not been able to compete with the established CRAs. None of the smaller CRAs issue sovereign ratings in Africa. As it stands, there are limited prospects of smaller rating agencies competing with the big three unless there is a process of mergers and acquisitions across regions such as Europe, Asia and America who have internationally recognised regulators and licences. The mergers and acquisitions process would also entail harmonising the relative rankings and methodologies used to arrive at the ratings. However, it may be a difficult path as ratings are businesses pursued by private enterprises rather than a public good that can best be served by bringing different stakeholders to the same table.

4.3.3.2. The Payment Model

The second nature of the arguments is the payment model that CRAs operate in and the resulting perceived conflict of interest. Researchers argue the issuer pays model perhaps is part of the causes of conflict of interest. That is, if CRAs provide ratings to their clients, there is some interest to provide an inflated rating to please and retain the client. The alternative being the investor pays model, which was the case before the Securities Exchange Commission was created in 1934 in the US. White (2010) argued that the advent of technology created a free rider problem. According to White (2010), the introduction of photocopiers meant that rating manuals could be photocopied easily creating less incentive for investors to pay for ratings when they could access the materials without paying for them. In addition, the bankruptcy of

Penn-Central railroad in 1970 also contributed to the change to the issuer pays model. The debt issuers realised the need to convey their own true risk level to investors and were willing to pay for the ratings. As a result, the issuer pays model started in the US in the early 1970s according to White (2010).

Nevertheless, the current issuer pays model is assumed to create moral hazard as CRAs can have conflict of interest and end up inflating ratings. With conflict of interest, the starting point is that although CRAs are supposed to bridge information asymmetry gaps, the issuer who pays for the rating receives the rating, which, could compromise a CRA to provide a favourable rating. This is one of the most common arguments used for sub-prime crisis that CRAs provided favourable ratings to structured finance transactions that were not worthy of the high ratings. But on balance, issuer pays model has worked well in many of the different asset classes including sovereign ratings. If the model was flawed, then there would be no or limited downgrades, as CRAs would theoretically keep ratings inflation for business revenue reasons. However, this is not the case. The ratings failure discussion in forthcoming sections also show that ratings can be adjusted too quickly as was the case in the Arab spring but has no relationship to the payment model. The arguments for contributing to the European debt crisis or Africa ratings being too low would not arise, which we turn to in forthcoming sections.

4.3.3.3. Philosophical Criticisms

The third nature of the criticisms is where academics juxtapose CRAs as part of the neoliberalism construct. Paudyn (2014) argues CRAs impose neoliberal politics of limits, that is fiscal rectitude. Specifically, he says “sovereign ratings function as socio-technical devices of control in the constitution of a neoliberal politics of limits”. However, we think that the arguments do not fully consider the basic tenets of economics- which is about scarcity and

exercising choices within a limited budget constraint. Nevertheless, politicians and government officials in various countries have latched on to the philosophical debates, and argue that by downgrading countries, CRAs are imposing limits on how sovereign governments should operate. For instance, US downgrade in August 2011 based on the then government's inability to adjust debt ceiling, Greece austerity programme during the European debt crisis or South Africa's successive downgrades in recent years in the absence of economic growth and deteriorating government finances. On the other hand, the same politicians and government officials praise the same CRAs for recognising their work when ratings are upgraded.

4.3.3.4. Own CRAs' Mistakes

The other layer of criticism reviews the actual ratings performances (ratings accuracy in predicting defaults) and argues about mistakes that CRAs have contributed in evolution of various crisis across the globe (ratings failures). Bhatia (2002), S&P (2010), and IMF (2010) define rating failures as downgrades by three or more notches. Ratings are supposed to be forward looking, which implies that they should withstand crisis situations. If they do adjust quickly and responding to crisis, they become procyclical. What is more, is when they adjust too quickly over a short period of time probably signals that credit risks had been missed by the CRAs. Bhatia (2002) definition limits rating changes at least three times within twelve-month period. Deb *et al* (2011) blamed the CRAs for missing the 1997-98 Asian financial crisis. IMF (2010) provides rating failures in Asian financial crisis in 1997/98 for eight countries, namely, Indonesia, Korea, Malaysia, Romania, Russia, Thailand and Venezuela whose ratings changed by at least three notches among the three main CRAs during the crisis period.

After the Asian financial crisis, there were a couple of corporate defaults where companies had higher ratings when their financial positions were actually weaker. For instance, Enron had investment grade ratings until five days before its bankruptcy in 2001 while Lehman brothers had investment grade the morning of its own bankruptcy in September 2008, among other examples. Prior to the global financial crisis of 2007/08, CRAs were also criticised on ratings assigned to structured finance transactions such as subprime mortgages. That is higher ratings on asset backed securities, followed by quick and destabilising downgrades within a short period of time. CRAs were also accused of being involved in structuring deals they were rating creating a moral hazard. The corporate and structured finance ratings examples relate to the concepts of lack of ratings accuracy and ratings failure. Ratings accuracy definition requires that if a sovereign default while in non-investment grade, then the ratings were correct. In other words, ratings have passed the accuracy test. IMF (2010) admits that CRAs sovereign default statistics actually show that most defaults have happened only at lower ranked sovereigns, which could imply that sovereign risk is being measured correctly.

IMF (2010) also provides a series of rating failures over 2007-10 crisis for 6 countries, namely, Greece, Iceland, Ireland, Latvia, Lithuania and San Marino whose ratings changed by at least three notches over the crisis period. For example, Greece defaulted in 2012 but was in single A category until April 2010 when Fitch downgraded by two notches to BBB-, S&P by three notches to BB+ and Moody's by four notches to Ba1 in June 2010. Perhaps Greece had inflated ratings due to its Eurozone membership and perceived credit support.

CRAs have also been criticised for reacting too quickly in 2011/12 European debt crisis. Here the arguments against CRAs are completely divergent from the global financial crisis criticism. Global financial crisis criticisms were based on over inflated ratings while the European debt

crisis is based on CRAs acting too fast causing the crisis. For example, S&P downgraded nine European sovereign ratings in a single day in January 2012. White (2013) further argues that some countries suffered more downgrades than others. More specifically European periphery suffered the most downgrades PIIGS- Portugal, Ireland, Italy, Greece and Spain. Greece went on to default. Some argue CRAs were late/slow in downgrading Greece in 2008/09 when evidence of large fiscal deficits beyond the 3% EU limit surfaced. What started as a banking crisis ended up as sovereign debt crisis as governments were bailing their financial sectors to stabilise banking systems.

Post the various crises, regulation has involved in attempts to reduce the negative impact of CRAs activities. For instance, the US Credit Reform Act of 2006 which provided the SEC with power to regulate the CRAs. This was followed up with the Dodd Frank Act 2010 which gave more power to the SEC to enforce CRAs to improve internal controls, methodologies, processes and overall transparency. Thus, to improve and manage conflict of interest in CRAs. We turn to the African countries' specific discussion in the next section.

4.3.3.5. Are African sovereign ratings too low?

The question of under-rating African sovereigns arises for many reasons. Firstly, out of the twenty-nine public sovereign ratings in Africa, only four countries are currently rated investment grade. For the twenty-five sovereigns in non-investment grade, about twenty are considered to be in single B range across all rating agencies. Do rating agencies deliberately limit African sovereigns from being investment grade and deliberately cluster them in single B range? We try and understand why this is the case and if there any merits to this categorisation. We start by reviewing the arguments on methodological biases before moving to sovereign rating performances.

CRAs on sovereign ratings seek to provide an independent opinion on the capabilities of governments to repay their commercial obligations on time and in full. While this mandate may be narrow, CRAs use a broad set of factors to assess governments capabilities. The broad set of factors are applied globally for all rated sovereigns without distinguishing for different regions. The similar factors in sovereign methodologies are assigned different weights or emphasis by each of the CRAs, which sometimes lead others to different rating outcomes. For instance, Moody's does not have an external sector assessment which S&P has while Moody's have an event risk assessment which S&P does not have. The differences in fiscal weights, among other factors contribute to final ratings. Other researchers such as Paudyn (2014) still argue ratings methodologies are still black boxes. However, CRAs now make their methodologies publicly available and even scores of different sections of sovereign rating criteria in specific country reports. This is primarily due to regulatory requirements for CRAs to provide more clarity/basis in their rating assumptions.

Investment grade question- While African countries ratings are generally low, there are some countries that are rated investment grade. For instance, as at March 2020, Botswana, Morocco, Mauritius and South Africa are currently investment grade while Egypt, Libya, Namibia and Tunisia were formerly investment grade. The eight countries make up close to 25% of sovereign ratings that are outstanding. Perhaps, what is more important is to understand what distinguishes the investment grade ratings in Africa with non-investment grade. For instance, Botswana has the highest credit ratings in A category. CRAs argue Botswana's governance is relatively stronger than peers, benefit from diamond resources which have allowed the country to save its diamond revenues, runs twin surpluses-fiscal and current account and a stable

exchange rate regime. Botswana does not have a Eurobond and she does not need one, at least for now.

Until March 2020, South Africa was investment grade with Moody's but non-investment grade with the other two agencies. CRAs generally consider South Africa to be more advanced, relative to peer countries, with better checks and balances in its governance system. However, an underperforming economy, weakening fiscal and debt burden and weakening governance standards have resulted in successive downgrades over the last seven years. Similarly, Namibia lost investment grade ratings in 2017 with both Fitch and Moody's. Thus, it may be more to do with country specific issues than a broad brush of CRAs bias on Africa.

A different lens to consider, is also to review the single B ratings across the globe. As at August 7, 2019, S&P has forty-two sovereigns with the single category (B+, B and B-) which makes about a third of total sovereigns rated by S&P. African sovereigns in this category are sixteen or 35% of the total single B category with the remainder spread across Latin America (20%), Europe (17%), Asia (10%), Middle East (10%) and Australia (5%). While African countries are the dominant in this category, they are distributed across other regions too. Perhaps, the point here is that it does not appear to be systematic under-rating of African countries, as other countries are rated in this category too. Rather, it may be related to specific characteristics that are scored lower in rating methodologies for African countries and Latin American sovereigns.

Another layer to view lower sovereign ratings in Africa, is to directly assess why a lot of African countries ratings are clustered around the Single B categories. Some of the reasons include poverty, higher financing needs and weak governance assessments. Ratings methodologies by design tend to favour rich countries and those with very low financing needs.

Precisely because CRAs assess capability to pay so wealthier countries are assumed to be better able to pay than poorer countries or at least wealthier countries have a better tax base to extract revenues from, in difficult times compared to poorer countries.

There are also arguments questioning the measurement of standard economic variables such as GDP. For instance, Coyle (2014) argues that accurate GDP measurement is a difficult science, with GDP rebasing exercises in countries such as Greece and Ghana resulting in a significantly large increase in the size of the economy in one point reflecting the previously under-calculated contribution of the economy. The informal economy in poorer developing countries could be as high as 33-44% of official GDP recorded in official statistics according to Coyle (2014). If that is the case, GDP is understated in multiple developing countries including African countries. Then to what extent do these standard measures accurately capture the wealth levels- which are based on GDP divided by population size- in most Sub-Saharan African economies. If standard measures, do not accurately capture the correct statistics, then the validity of analysis based on same statistics can be questioned.

Nevertheless, the concept of wealth or income level as part of credit assessment is universally applied across all credit assessments whether it is countries, companies or banks. As the methodologies are applied globally, other regions with low wealth levels and high financing needs have received low ratings. That is, Latin America, and Eastern Europe as examples, demonstrating that it is not a targeted bias against Africa. However, it could be methodological weaknesses which disadvantage low-income countries, irrespective of where they are located. For example, Bustillo *et al* (2018) who study twenty-seven sovereign ratings in Latin America and the Caribbean also show that most of the ratings are actually non-investment grade.

If Latam countries are also rated low, then it is more to do with methodological shortcomings than a bias against a specific region. Both Africa and Latam have low wealth levels and supposedly weak governance. Both factors are given a higher weighting as they form structural elements compared to say fiscal and debt trends. If high debt burden had similar weight to wealth level and weak governance then ratings in advanced countries could be lower than the current levels. Conversely, ratings will be higher in Africa and all other developing economies as they have lower debt burdens compared to advanced countries.

For instance, Olabisi and Stein (2015) have argued first that African countries pay a higher premium on their sovereign Eurobonds than yields suggested by assigned CRAs. Secondly, that a number of African countries have experienced high economic growth rates but have not resulted in higher ratings. For instance, fast growing economies such as Rwanda, Ethiopia, Cote D'Ivoire, Kenya and Uganda among others are rated at the lower end of the non-investment grade levels. The arguments focus on one factor among other factors considered by CRAs. In most cases, economic growth has come with higher fiscal spending, increased imports related to fiscally induced investment projects, which ultimately result in larger current account deficits and higher external financing needs.

The external sector weaknesses usually lead to exchange rate weaknesses/depreciation. Excessive depreciations and population growth then limit the potential improvement in wealth levels, measured by GDP per capita. In USD terms, GDP per capita does not increase as much, despite high economic growth, due to currency depreciation and population growth. If wealth levels were to increase significantly and move to next categories due to high economic growth while fiscal and external imbalances were to remain the same or reduce, ratings would likely be at higher levels. While there are benefits to higher economic growth, they are also bringing

strains in fiscal and debt burdens as well as larger current account deficits which are constraining higher ratings.

In addition, not all countries that are currently in single Bs were always in that category. The oil producing countries (Angola, Gabon, and Nigeria) were in BB categories before June 2014 when oil prices started falling dramatically. The real issues may be declining credit quality. Conversely, African sovereigns that are not in single B category, have higher wealth levels, lower financing needs and better governance ratings. Nevertheless, CRAs should strive to do better in distinguishing credit quality among the single Bs despite having three categories. In our view, it is not a bias against African countries per se, but methodological weaknesses biases against poor countries (irrespective of geographic location), have large financing needs and weak governance scores.

4.3.4. Testing for ratings accuracy and ratings failures in Africa

These two concepts were developed in the criticisms on CRAs on their mistakes in Asian crisis, global financial crisis and European debt crisis which we now tailor make for African countries.

4.3.4.1. Ratings accuracy

The concept of ratings accuracy is an attempt to measure how ratings accurately predict defaults. Since most of the ratings are already in non-investment grade, there is no reputation loss for defaults in those categories. For the African sovereigns that have defaulted in the past they were either non-investment grade (Congo Brazzaville in 2017 and Mozambique April 2016) or not rated at time of default (Seychelles July 2008 and Cote D'Ivoire March 2000 and January 2011). However, we compare the average default rates in African sovereigns relative to global average and assess to what extent they differ and provide explanations. To capture

ratings accuracy, we use approach proposed by Bhatia (2002) which is commonly applied in literature as follows:

Number of Sovereign default(s) per year/total non-IG ratings that year.

The next step is to average the annual rate(s) of default over a five-year period. In our case we use two five-year periods where defaults occurred 2008-2012 and 2014-2018. **Table 4.3** below, describes the defaults, reasons for default and rating levels prior to default. **Table 4.4** and **Table 4.5** describe the default rates over the two periods. Since Seychelles was only rated by S&P, we construct default rates for S&P alone over 2008-2012.

The **Table 4.3** below shows that for rated sovereigns, Mozambique and Congo-Brazzaville who defaulted in the last three years were all rated conservatively in the non-investment grade and predominantly in the single B range. Except for Moody's who had Ba3 and Fitch CCC on Congo-Brazzaville twelve months prior to the 2016 and 2017 defaults, all other ratings were in single B category. While ratings may already have been in non-investment grade, Moody's appears to be consistently with higher ratings while S&P is consistently the most conservative with the lowest ratings twelve months prior to default. For instance, Moody's had Ba3 rating on Congo-Brazzaville in April 2016 while S&P was B- which is three notches lower. In this case, S&P would be the agency with most accurate ratings on the path to default.

Table 4.3: Eurobond Defaults in Africa

Country	Year	Reason	S&P rating	Fitch	Moody's
			Ratings 12 months prior to default		
Cote D'Ivoire	March 2000	Brady bonds	Unrated	Unrated	Unrated
Seychelles	Aug 2008	Balance of payment crisis- inability to pay	B	Unrated	Unrated
Cote D'Ivoire	January 2011	civil war after a contested 2010 election	Unrated	Unrated	Unrated
Mozambique	April/Nov 2016	Debt Restructuring	B-	B	B1
Mozambique	Jan 2017	Missed payment- inability to pay	B-	B	B2
Congo-Brazzaville	Aug 2016	Administrative problems to effect payment	B-	B+	Ba3
Congo-Brazzaville	Aug 2017	Administrative problems to effect payment	B-	CCC	B3

Table 4.4 Calculating Sovereign Default Rates for 2008 - 2012

S&P						
Non-IG	2008	2009	2010	2011*	2012	Average 1-yr default probability
Non-IG	1/13 = (7.69%)	0	0	1/13 = (7,69%)	0	3.08%
BB	0	0	0	0	0	0
B	1/10 = (10%)	0	0	0	0	2%
CCC	0	0	0	0	0	0

* *Includes Cote D'Ivoire which was unrated. Sources: Various CRAs*

Table 4.5: Calculating Sovereign Default Rates for 2014 - 2018

Fitch						
Non-IG	2014	2015	2016	2017	2018	Average 1-yr default probability
Non-IG	0	0	2/17 = 11.76%	2/17 = 11.76	0	**4.7%**
BB	0	0	0	0	0	0
B	0	0	2/15 = 13.33%	1/15 = 6.67%	0	4%
CCC	0	0	0	1/1 = 100%	0	20%
Moody's						
Non-IG	0	0	2/19 = 10.53%	2/20 = 10%	0	**4.11%**
BB	0	0	1/3 = 33.33%	0	0	6.67%
B	0	0	1/16 = 6.25%	2/16 = 12.5%	0	3.8%
CCC	0	0	0	0	0	0
S&P						
Non-IG	0	0	2/17 = 11.76%	2/17 = 11.76%	0	**4.7%**
BB	0	0	0	0	0	0
B	0	0	2/16 = 12.5%	2/14 = 14.29%	0	5.36%
CCC	0	0	0	0	0	0

Sources: Various CRAs

Our results show that default rates over the two episodes are higher than the norm for sovereigns worldwide. For instance, Bhatia (2002) suggests that globally 1.5 - 2% of speculative grade ratings default on international bonds within a year. This suggests that African sovereigns therefore have higher default rates. If indeed African sovereigns have higher default rates as shown by our data, this could be a significant factor which contribute to low ratings in Africa. However, the first episode, defaults occurred when Ivory Coast was not rated in 2011. What is more concerning is the second episode where both Congo-Brazzaville and Mozambique were rated by all agencies and defaulted twice in 2016 and 2017. These

defaults weaken the average default statistics for African sovereigns. These only become comparable to corporate defaults globally which range 3 - 5% in a year, on average.

4.3.4.2. Ratings Failure

Next, we turn our attention to understanding the ratings failure concept. There are two approaches of exploring ratings failure. The first option is pursued by Bhatia (2002) which is to categorise ratings failure if there are three or more notches changes in a twelve-month period. With this approach we find that there were rating failures in three countries- Egypt, Libya and Tunisia consistently during the Arab spring in 2011. We have excluded Mozambique and Congo-Brazzaville who had multiple notches changes on path to default.

Table 4.6: Ratings Failure Analysis

Country	Fitch			Moody's			S&P		
	Jan 2011	Dec 2011	Notches	Jan 2011	Dec 2011	Notches	Jan 2011	Dec 2011	Notches
Egypt 2011	BB+	B+	-3	Ba1	B2	-4	BB+	B	-4
Libya 2011	BBB	B	-6	-	-	-	A-	BB	-5
Tunisia	-	-	-	Baa3	Ba3	-3	BBB	BB	-3

Notes: Moody's - Tunisia failures were in 2013. Fitch on Egypt was over 18 months and Libya 6 notches in 2 months. For S&P- Libya in 2 months and Tunisia in 18 months.

The analysis within a twelve-month period suggests either of two things. First, that North African sovereign ratings were over inflated in the past and the swift adjustment within a short period necessitated by weakening governance was the primary reason to correct the over inflated ratings. Secondly, ratings are not as forward looking as the agencies purport them to be since they are not able to accurately anticipate crisis situations. In this case, ratings failed to anticipate the risks related to social tensions that would lead to Arab spring in 2011. Most notably is Libya which had its ratings changed six notches by Fitch and five notches by S&P in the same year. The changes are particularly important as they crossed from high investment

grade ratings to very low non-investment grade within a short pace of time. Tunisia had the least changes of three notches by both Moody's and S&P.

The second approach is by IMF (2010) which extends to more than 12months and focuses on economic cycle changes. Since ratings are supposed to be forward looking, they should be able to absorb shocks at same rating level or absorb with smaller adjustments. In other words, if ratings change significantly and along with the economic cycle, they become procyclical. Using the IMF (2010) approach, we test using two episodes, the Arab spring and the oil price shock to explain two crises that were not anticipated by CRAs which resulted in procyclical adjustment of ratings.

Testing for ratings failures in African oil dependent economies. Oil prices fell from June 2014 and remained at low levels at least until 2017. During the oil price shock, **Table 4.7**shows that both Moody's and S&P experienced ratings failure on Angola while Moody's also experienced ratings failure on Gabon. Fitch ratings did not experience any failure during the period of declining oil prices.

Table 4.7: Effect of Oil Price Shock on Sovereign Ratings

Country	Fitch			Moody's			S&P		
	June 2014	**Dec 2017**	**Notches**	**June 2014**	**Dec 2017**	**Notches**	**June 2014**	**Dec 2017**	**Notches**
Angola	-	-	-	Ba2*	B2	-3	BB-	B-	-3
Gabon	BB-	B	-2	Ba3	B3	-3	BB-	B	-2
Nigeria	BB-	B+	-1	Ba3	B2	-2	BB-	B	-2

**-Aug 2014 when Moody's actually upgraded*

So CRAs failed on the Arab spring which affected rating changes in 3 North African sovereigns- Tunisia, Libya, and Egypt. In the Middle East Yemen, Syria and Bahrain were also

affected but we focus our attention on three African countries. The effects of the Arab spring started in 2011 right up to 2013. No one predicted the oncoming crisis prior to the revolution.

Table 4.8: Effect of Arab Spring on Credit Ratings

Country	Fitch			Moody's			S&P		
	Jan 2011	Dec 2013	Notches	Jan 2011	Dec 2013	Notches	Jan 2011	Dec 2013	Notches
Egypt	BB+	B-	-5	Ba1	Caa1	-6	BB+	B-	-5
Libya	BBB+	B	-7	-	-	-	BBB+	BB	-4
Tunisia	BBB	BB-	-4	Baa2	Ba3	-4	BBB	B	-6

From the analysis of both ratings accuracy and ratings failure we have learnt a few points. Firstly, that ratings are accurate when defaults happen in non-investment grade. Despite this, the different levels in non-investment grade also reflect how each agency was anticipating or not anticipating a default. The higher the ratings within non-investment grade, the less the likelihood that a rating agency was anticipating a default. For instance, Moody's Ba3 on Congo-Brazzaville twelve months before default. Secondly, default rates are higher in African sovereigns than the global average for sovereigns and only comparable to global corporates default rates. Thus, the relatively higher default rates could undermine the argument for low ratings in Africa. Secondly, rating failures are also small and related to particular events not easily foreseen. For instance, the failure of ratings during the Arab spring in three countries- Egypt, Libya and Tunisia- followed by the oil price decline and failure of ratings in the case of Angola and Gabon. Some consider the Arab Spring and oil price decline as black swann events which are generally difficult to predict in advance.

4.4. Data and methodologies

4.4.1. Data and variables definition

For event study, we use daily data for the period 2014 - 2019 for eight countries- Egypt, Ghana, Kenya, Morocco, Namibia, Nigeria, South Africa and Zambia. The event study uses three main variables- bond yields, credit ratings history and a hard currency bond index. We describe each of these variables definitions and how we utilise them in the study below.

With our first variable, bond yields, we use the daily Eurobond yields data which is sourced from Bloomberg. The use of dollar bonds yields is consistent with previous literature and provide a better relationship with credit rating changes than the use of local currency bond yields. Except for South Africa, all of the Eurobond yields chosen are standard ten-year maturities and had already been issued prior to our starting date of sample analysis. The following Eurobond yields were chosen over the sample period. Like other literature studies, we could have also added CDS spreads in addition to bond yields, but they were not available for all countries in the sample. Since CDS is still a developing market in Africa, only Egypt, Nigeria and South Africa had CDS spreads series from Bloomberg over the sample period. More so, there is no market index as yet that incorporates the three countries, which makes it difficult to follow the market model event study approach that we use for bond yields.

Table 4.9: Selected Eurobonds

Country	Eurobond
Egypt	2010 – 2020
Ghana	2013 – 2023
Kenya	2014 – 2024
Morocco	2012 – 2022
Namibia	2011 – 2021
Nigeria	2013 – 2023
South Africa	2012 – 2024
Zambia	2012 – 2022

Source: Author's compilation

With our second variable, credit rating events- the history of sovereign credit ratings is compiled from the publications of all three CRAs- Fitch, Moody's and S&P. We define a credit rating event as a rating action by any of the three CRAs either a change in outlook or actual rating change. Credit ratings are converted into numerical scales to assess their impact on bond yields.

Our aim is to measure impact of changes in credit ratings on Eurobond yields. CRAs may have different ratings for each country which implies different numerical values at certain points. We then listed all the numerical values over our 2014 - 19 sample period and averaged by three where a country is rated by all three. Similarly, we averaged by two or kept the single numerical values where a country is rated by two CRAs and one CRA respectively. The process provided us with average ratings using average numerical values which were then utilised in our estimations of assessing the impact on Eurobond yields for each of our rating events.

Table 4.10: CRAs Conversion to Numerical Scale

Fitch/S&P	Moody's	Numerical
AAA	Aaa	21
AA+	Aa1	20
AA	Aa2	19
AA-	Aa3	18
A+	A1	17
A	A2	16
A-	A3	15
BBB+	Baa1	14
BBB	Baa2	13
BBB-	Baa3	12
BB+	Ba1	11
BB	Ba2	10
BB-	Ba3	9
B+	B1	8
B	B2	7
B-	B3	6
CCC+	Caa1	5
CCC	Caa2	4
CCC-	Caa3	3
CC	Ca	2
C	C	1
SD	D	0

Source: CRAs rating scales

Our third variable is bond index to measure the market performance. Due to our choice of Eurobonds as proxy for bond yields, we also needed to use a bond index that incorporates the Eurobonds for African countries. We chose the hard currency bond index data which is sourced directly from S&P Dow Jones Indices. S&P Hard Currency Index is used as benchmark to calculate normal/expected bond market returns for market model- consists of eight countries

included in the index. Our choice of eight countries have been guided by the market model approach to event study analysis. By taking the S&P Hard Currency Index as the guidance to market return, we restrict the analysis to the eight countries included in the benchmark index. To our knowledge there is no other index that tracks performance of African Eurobonds explicitly. Other indices such as the JP Morgan tracks the broader emerging markets which includes African Eurobonds.

For panel VAR analysis, we use quarterly data over 2010 - 2019 for the same 8 African countries, namely Egypt, Ghana, Kenya, Morocco, Namibia, Nigeria, South Africa and Zambia in balanced panel setting. Our four variables- ratings (RATI), exchange rate (FX), bond yield (GBY) and real GDP growth (RGDP) are used. RATI uses the average ratings from the rating agencies converted to a numerical scale. The original ratings are sourced from all three CRAs. FX is the nominal exchange rate USD to local currency for each of the eight countries sourced from Central bank statistical bulletins. GBY is ten-year local currency government bond yield which is sourced from central bank statistical bulletins. RGDP is year on year economic growth rates sourced from central bank statistical bulletins and statistical agencies.

4.4.1.1. Event Study Techniques

Event studies have been traditionally utilized in equity market analysis (Kaminsky and Schmukler (2002), Ferri *et al* (1999), and Mora (2006) and have gradually been adopted in analyzing changes in the bond market. For instance, event studies have been utilized in the majority of literature we reviewed in the empirical section. That is because it is one of the best tools to analyze the immediate impact of rating events on financial markets within a few days around the event. For instance, the event study methodology helps us to determine if there are

abnormal returns in the bond market associated with unanticipated events. With this analysis, we are able to capture the impact of CRAs announcements directly on bond yields.

Event study assumes markets are efficient and the event was unanticipated. In other words, event study also helps us to test the strength of the semi strong efficient market hypothesis which expects asset prices to fully reflect all publicly available information. If that is the case, investors should not be able to earn abnormal returns by using whichever analysis between fundamental or technical analysis. Similar to most previous literature, we isolate the credit rating events and test if there are excess bond returns around each rating event. We consider excess bond returns are statistically significant if our observed t-values are above the thresholds of 1%, 5% and 10% critical values.

We define our events as credit ratings announcements by either of the three CRAs. We have 71 CRA events over a 5-year period from eight countries that are included in the S&P Hard Currency Index. The 71 events start from June-2014 to June-2019 in line with our benchmark index which measures market (index) performance. As with past literature, we consider a rating event as an announcement on actual rating change, outlook change, credit watch or announcement for review. For example, a change of outlook to negative (positive) from stable is classified loosely as a downgrade (upgrade). Announcements of CreditWatch and reviews for downgrades are also classified as downgrades. **Table 4.11** below shows the distribution of rating events by countries.

Table 4.11: Rating Events by Country and Rating Changes

Country	Upgrades	Downgrades	Total events	Fitch	Moody's	S&P
Egypt	10	2	12	3	3	6
Ghana	4	2	6	1	2	3
Kenya	2	4	6	2	2	2
Morocco	2	2	4	0	3	1
Namibia	0	5	5	3	2	0
Nigeria	1	10	11	4	3	4
South Africa	1	12	13	3	7	3
Zambia	3	11	14	4	5	5
Total	**23**	**48**	**71**	**20**	**27**	**24**

Source: Own data compilation

The statistical overview of our sample rating events shows a couple of points. Firstly, downgrades dominate the events with 68% while the remainder, 32%, are upgrade events. Secondly across the eight countries, the events are on average evenly distributed with four countries having a share of 15-20% each and the remainder of the other four countries having an average of 5% each. The four countries with the highest share of ratings are Zambia, South Africa, Egypt and Nigeria. Out of these four only Egypt has the majority of rating events being positive while the other three are predominantly downgrades. Across the three CRAs, Moody's has the highest share of rating actions with close to 40%, followed by S&P with close to 35% and Fitch below 30%. Both Moody's and S&P dominate the rating events in our sample group.

We utilised three event windows ranging from 3, 5, and 11 days. For instance, a three-day event window means one day before the event, event day being 0 and one day after the event. In line with literature, shorter horizons work better to reduce contamination which can be experienced in longer horizons. After identifying the rating events, our next step is to take bond yields-

defined as Eurobond yields for the eight sovereigns- and analyse how they change in relation to the rating events.

Our next step is calculating the returns, that is normal returns, abnormal returns and cumulative abnormal returns. According to Rielsen and Maltzan (1999) and Afonso *et al* (2011) event study analysis requires linking rating events to abnormal returns. From the bond yields, we construct normal daily bond returns for the full sample period using the following formula:

$$\boldsymbol{R_{it} = \ln\left(\frac{Y_t}{Y_t - 1}\right)} \qquad \textit{(4.1)}$$

Where Rit is return at time t for country I, ln for log of, and Yt is yield for current period and Yt-1 is for yield in the previous period. The next step is to construct the expected returns over the estimation window using the benchmark indices which reflect market returns. We define estimation window as sixty days which translates to twelve weeks or three months prior to rating event. We prefer shorter time horizon consistent with Khotari and Warner (2006). In addition, Binici *et al* (2018) also argue that CRAs tend to capture all information within a three months period.

$$\boldsymbol{E(R_{it}) = E\ (R_m, t)} \qquad \textit{(4.2)}$$

where $\boldsymbol{E(R_{it})}$ is the expected return of country i at time t, which is a function of expected market return at time t, $E\ (R_m, t)$. Calculation of expected market return uses pre-event data, which we define as 60 days prior to event, as the estimated window. The estimation window is used not only to calculate normal expected return, but also the alpha (α) and Beta (β) which are both sensitive to market movements. α and β are calculated using data during event window.

Alpha+ beta (mkt index return) per day= predicted return or expected return throughout the sample period.

Abnormal returns are the differences between the actual return, and the estimated market return. Our market return is the weighted S&P Hard Currency Index return.

$$\boldsymbol{AR_{it} = R_{it} - E(R_{it})} \qquad \textit{(4.3)}$$

$\boldsymbol{AR_{it}}$ is abnormal return on sovereign bond i at time t and $\boldsymbol{R_{it}}$ is the actual sovereign bond return on security i at time t. $\boldsymbol{E(R_{it})}$is the expected return. We proceeded to calculate cumulative abnormal return (CAR)- where cumulative total returns during the event window- sum of country i abnormal returns during the event window. The event windows are our 3, 5, 11-day trading event windows.

$$\boldsymbol{CAR_i(t_1, t_2)} \quad = \sum_{t=t_1}^{t_2} \boldsymbol{AR_{it}} \qquad \textit{(4.4)}$$

The t_1, t_2 time periods refer to our event windows 3,5 and 11-day windows. We then proceeded to test the rating events individually over the three event windows. From our 71 rating events, we are testing the following hypotheses:

H_0: CRAs announcements do not impact sovereign bond yields

H_1: CRAs announcements do impact sovereign bonds yields

From the early studies of Reisen and Maltzan (1999) and Cantor and Parker (1996) it is normal to use a combination of abnormal returns and cumulative abnormal returns. We follow the

approach utilised by Binici *et al* (2018) in primarily using cumulative abnormal returns as the basis of interpretation and analysis.

Our analysis in the next section is based on three statistical tests. T-tests at 1%, 5% and 10% level of significance. We will reject the null hypothesis at the 1% level, if observed t>2.575, at 5% level, t>1.96 and at 10% level, t> 1,645 critical values, which would lead us to conclude that the rating event caused abnormal returns. In such case, rating event would carry new information to the market. Conversely, if observed t-values are lower than the critical values at 1%, 5% and 10% respectively we would fail to reject the null hypothesis and conclude that rating events no longer carry new information. From this guidance, our next step is to present the results and analyse them.

4.4.1.2. Panel VAR analysis

With panel VAR analysis, we attempt to measure changes in sovereign ratings impact on selected economic variables. We are extending the analysis from directly measuring the impact on bond yields but also to assess the impact on exchange rates and economic growth. In this way we are able to expand our analysis and test the significance of sovereign ratings. In this section, we attempt to test a specific hypothesis. That is, to assess changes in sovereign credit ratings impact on economic variables.

PVAR allows us to assess changes in credit ratings impact on economic variables by combining cross-section and time series data to study the relationships. Without a strong theoretical relationship between ratings and economic variables, VAR models are one of the best tools to utilise in this analysis as they do not assume any theoretical relationships among the variables being assessed. According to Brooks (2008) Vector Autoregressions (VAR) were popularised

by Sims (1980) as a systems regression model where there are no pre-defined dependent variables. The PVAR approach allows us to get VAR advantages in a panel setting. For instance, PVAR can increase the number of degrees of freedom, by employing information on the dynamic behaviour by combining multiple countries at the same time, and thus the power of the test.

The main advantages of VAR models by Brooks (2008) are that firstly, there is no need to specify which variables are endogenous or exogenous as all variables treated as endogenous. Secondly, VARs allow the value of a variable to depend on more than just its own lags or combinations of white noise terms. Thus, VAR models can therefore offer a very rich structure, implying that they may be able to capture more features of the data. Thirdly, no contemporaneous terms imply no possibility for feedback from any of the left-hand side variables to any of the right hand side variables as all the variables on the right-hand side are known at a point, t, in time. That is, all the pre-determined variables include all exogenous variables and lagged values of the endogenous variables.

However, VARs also have drawbacks. For instance, the absence of theoretical underpinnings can sometimes be its achilles heel. For instance, the results may be difficult to use in policy recommendations compared to standard structural models. To reduce this problem, block significance tests, impulse responses and variance decompositions are also utilised to strengthen the VAR model. Issues with determining appropriate lag length can be solved by using the information criteria which do not place any restrictions on the distributions of the errors. Stationarity problem- in order to make correct interpretations, all variables need to be stationary. But achieving stationarity through first differencing could take away some of the long run properties in the relationships. Since there are no theoretical underpinnings, we would

like to establish the short run relationships and not necessarily the long run relationships. Thus, we are able to transform the variables and establish our short run dynamics.

We set to estimate the following generic equation using steps below:

$$\boldsymbol{Y_{it} = v_i + A(L)Y_{it-1} + e_{it}} \qquad (4.5)$$

Y_{it} is a vector of endogenous variables- credit rating (RATI), exchange rate (FX), bond yields (GBY) and economic growth (RGDP), for country i at time t, v_i is a vector of intercepts, A(L) is a matrix polynomial in the lag operator, L, with countries i=1…,8. e_{it} is a vector of error terms.

We start out analysis by carrying out panel unit root tests- the preliminary step for analysis is to determine the existence of unit roots. We use three panel unit root tests namely- Levin–Lin–Chu (LLC) (2002), Im–Pesaran–Shin (IPS) (2003), and Fisher-type (Choi 2001) tests which have as the null hypothesis that all the panels contain a unit root. All variables need to be stationary after first differencing. IPS (2003) is based on the Dickey-Fuller test which is well known in literature. In the case of mixed results, literature guidance suggests choosing the majority results. Then also test under 1st difference as second step. After 1st difference, all methods should now be showing stationary I (1).

The next step is to use panel cointegration tests to ascertain if there are long run relationships among our variables. Panel cointegration tests utilises Pedroni (1999, 2004) which is an Engle-granger based cointegration tests. Pedroni (1999) uses 7 panel cointegration tests with 11 outcomes. Pedroni (1999) utilises the heterogeneous panel and heterogeneous group mean panel test statistics to test for panel cointegration. The first set of four individual tests, *v*, *ρ*,

Philips-Perron and ADF panel t-test statistics are based on pooling the residuals along the within dimension of the panel. They also provide 8 results with both unweighted and weighted results among the four tests. The second set of test statistics focus on the group mean of the individual conventional time series statistics- group ρ, group PP and group ADF test statistics. These tests are applied to the estimated residuals from a cointegration regression. If there are differences among the 11 outcomes, literature recommends to take the majority results in order to proceed. We explore with both options of intercept with no trend, and intercept with trend. With our H0: no cointegration in the model. If t-value is small or p value greater than 5% then we accept null and proceed to run PVAR model only.

We then proceed to panel VAR. We use the VAR to estimate our equation. With guidance from unit root tests, we use the differences of the logged values of our four endogenous variables in the VAR equation. RATI and FX are non-stationary in levels and require first differencing to be stationary. On the other hand, GBY and RGDP were already stationary in levels and do not require further transformations. Thus, we explored the VAR estimations with two variables in difference form, two variables undifferenced and all four variables in difference form. Although first differencing variables in a VAR may take away the long run properties, our data properties for RATI and FX already suggested the need to first difference to achieve stationarity. The lag length selection is guided by the various information criteria. If the information criteria provide conflicting selections, lag length selection can be ultimately determined by economic significance and the level that utilises the minimum lags.

From our VAR outcomes, and interpretations of coefficients, we further carry out causality tests, impulse response and variance decomposition analysis. The Granger causality tests are utilised to test if changes in RATI granger cause changes in each of the three variables- FX,

GBY, and RGDP. We utilise the Granger Causality/Block Exogeneity Wald Tests which has a null hypothesis that changes in ratings do not granger cause changes in FX, gby, and real GDP. The null hypothesis is rejected if probability value is greater than 5% suggesting that ratings granger cause a particular variable.

According to Brooks (2008) impulse responses trace out the responsiveness of the dependent variables in the VAR to shocks to each of the variables. In our case, we are testing the responses of FX, GBY and RGDP responses to a unit shock in RATI using the Cholesky decomposition. Variance decompositions provide the proportion of the movements in the dependent variables that are due to their 'own' shocks, versus shocks to the other variables. That is the contribution of a shock in RATI to changes in FX, GBY or RGDP which are the endogenous variables.

Ordering of the variables' maters for both impulse response functions and variance decompositions. We explore alternative ordering of variables- RATI-GBY-FX-RGDP then RAT-EXCH-GBY-RGDP etc- for robustness of results. For instance, we are placing GBY and FX first as they are likely to be impacted immediately by a rating change relative to economic growth.

4.5. Empirical results and analysis

4.5.1. Estimation Results from Event Studies

From **Error! Not a valid bookmark self-reference.**, 23 rating events (7 upgrades and 16 downgrades) out of 71 events were statistically significant. This represents 32% of total rating events being statistically significant. Thus, 30% of total rating events actually directly impacted Eurobond yields within our event windows. That is for every rating action by each of the CRAs, there is a one third chance that they could significantly impact on Eurobond yields.

Table 4.12: Rating Events Distribution

Country	Total Events	Significant Upgrades	Significant Downgrades	Fitch	Moody's	S&P
Egypt	12	6	0	1	2	3
Ghana	6	0	0	0	0	0
Kenya	6	1	2	2	1	0
Morocco	4	0	0	0	0	0
Namibia	5	0	2	0	2	0
Nigeria	11	0	4	3	1	0
South Africa	13	0	5	1	2	2
Zambia	14	0	3	1	1	1
Total	**71**	**7**	**16**	**8**	**9**	**6**

Source: Results output

Of the eight countries utilised in our analysis, two countries, Ghana and Morocco, did not have any statistically significant events. That is, for all the ten combined events in both countries, none of them were statistically significant to impact the bond yields over the event period. In the case of Morocco, which had four events with two upgrades and two downgrades, CRAs sent mixed signals to bond investors. The first two events were by Moody's which were both positive on improving the outlook. Moody's rates Morocco in non-investment grade while S&P rates Morocco in investment grade. While Moody's signalled their intention to potentially upgrade Morocco by improving its outlook in February 2017, the next rating event was by S&P in October 2018 who revised their outlook to negative signalling their intention to potentially downgrade Morocco to non-investment grade. Moody's subsequently pulled back and revised their outlook back to stable from positive. Perhaps bond investors reactions remained conservative and did not follow the mixed signalling from CRAs as much. Ghana on the other hand had six events, with two downgrades and four upgrades. Perhaps much of Ghana's upgrades were already anticipated by market participants such that by the time CRAs improved

their ratings, bond yields had already adjusted in line with the semi strong efficient market hypothesis. Thus, CRAs were behind the curve on Ghana.

We tested the events across the 3,5 and 11-day windows to provide a comprehensive assessment across the very short windows and moderate windows. Our results show that much of the significant events were primarily in the 5-day and 11-day windows. That is, at least half of the significant events, were significant at the latter windows relative to the 3-day window. Perhaps this could mean that it is not always the shortest possible window that can derive excessive abnormal returns. Only in one case, South Africa, where bond yields reacted significantly across all three windows, which in our view reflects the importance of the rating action to South Africa-the downgrade to non-investment grade by both S&P and Fitch in April 2017. On average, the standard 5-day event window utilised in literature works very well. However, it is also important to use the shorter window such as the 3-day and relatively longer window the 11-day window which can both transmit new information not fully reflected in the 5-day window.

In addition to utilising three options of event windows, we also adopted the similar approach in the test of significance all three levels, that is, 1%, 5% and 10%. About seven events are significant exclusively at the 10% level. If we were to exclude the 10% level of significance, we would be left with about 16 events and our total ratio of significant events would drop to about 22.5% from above 30%. Nevertheless, we still remain with at least 20% of the whole sample showing significant statistical reaction of bond yields to changes in ratings. Thus, our main conclusion that CRAs rating changes weakly impact on bond yields still holds. The power and impact of CRAs rating changes may be overestimated in financial markets in Africa.

With regards to whether changes in ratings do impact bond yields when crossing the investment grade divide, our sample period includes South Africa and Namibia who lost investment grade from Fitch and S&P in the case of South Africa and from Fitch and Moody's in the case of Namibia. Starting with South Africa, our results show that bond yields reacted strongly around the 3 April 2017 downgrade by S&P across all event windows at both 1% and 5% significant levels. Fitch ratings also downgraded South Africa on April 7, in the same week as S&P. The result implies that bond investors reacted strongly for South Africa downgrades to non-investment grade. Perhaps, the rating actions were unanticipated as all CRAs are operating with calendars for their announcements. This particular period in April was outside the scheduled calendar dates. The reactions by bond investors also gives credence to the semi strong form of efficient market hypothesis, where the rating changes were unanticipated and thus not fully reflected in prices. In the case of Namibia, Moody's downgraded to non-investment grade on August 11, 2017 and bond yields reacted strongly at all windows at the 1% significance level. However, Fitch ratings downgrade of Namibia later in November 2017 did not yield statistically significant changes in bond yields. Perhaps bond investors had already adjusted the prices when the first mover, Moody's, changed its ratings a few months earlier.

Among the three agencies, is there one that stands out in significantly influencing bond yields when ratings change? On balance, all agencies show similar averages in impacting significant events. Moody's had the highest number of rating actions with about 40% share, followed by Fitch with 35% share and S&P with the lowest at around 25%. S&P rating actions impacted the least number of countries, three, from the eight countries in the full sample. Half of the S&P actions were on Egypt (largely positive) followed by South Africa and Zambia (both negative) at the lowest. On the other hand, Moody's had the highest impact with rating actions impacting bond yields in 6 countries. That is excluding Ghana and Morocco where none of the

CRAs changes impacted bond yields at all, Moody's rating changes impacted the rest of the countries in the sample period. Fitch rating actions impacted the bond yields for five countries. Thus, our analysis here shows Moody's has the highest impact on bond yields reflecting that their rating actions may have been unanticipated. On the hand, S&P rating actions have the least impact on bond yields reflecting the market anticipates the rating actions of S&P more than the other two rating agencies.

If we take the four countries- Zambia, South Africa, Egypt and Nigeria that had the highest number of events, we observe that only Egypt had 50% of the total events being statistically significant. The other three countries all had ratios ranging between 20 - 40%. Despite the increased frequency of rating changes in these countries not all of them impact bond yields. Of the Egypt statistically significant rating actions half of them were from S&P which were all positive actions. On Nigeria's statistically significant rating actions, 75% of them were from Fitch which were all negative rating actions. Moody's appear to have a consistently wider reach across many countries than S&P.

When we compare with the few studies on African countries. For instance, Mutize and Gossel (2019) results that rating announcements weakly impact bond yields on average are similar. However, our rationale for the results differs. Unlike Mutize and Gossel (2019) who ascribe illiquidity in African financial markets, we think that the reasons may be more to do with the European Securities Markets Authority (ESMA) driven regulatory calendar that takes away the unanticipated nature of rating actions. Since CRAs are providing guidance on expected publication dates, fixed income markets are already adjusting ahead of announcement dates.

4.5.2. Panel VAR results

We utilised three-unit root tests namely, IPS, LLC and Fisher Unit Root tests. Out of the 4 variables, two variables- RATI and FX are well behaved across all the tests. That is non stationary in levels with constant and constant and trend as well as stationary after first differencing. However, the other two variables are not as well behaved. That is GBY and RGDP are already stationary in levels and still stationary after first differencing across constant and constant plus trend.

Table 4.13: Im-Pesaran-Shin Unit Root Test Results

Variable	Level		First Difference	
	Constant	**Constant + trend**	**Constant**	**Constant + trend**
RAT	3.24457 (0.9994)	0.93554 (0.8252)	-6.75959*** (0.0000)	-7.75560**** (0.0000)
GBY	-2.32601*** (0.0100)	-1.96651*** (0.0246)	-13.0271*** (0.000)	-10.9757**** (0.0000)
FX	3.03794 (0.9988)	0.00025 (0.4999)	-10.0682*** (0.0000)	-8.51865*** (0.0000)
RGDP	-4.43371*** (0.0000)	-6.01569*** (0.0000)	-14.2207*** (0.0000)	-12.8697*** (0.0000)

*Notes: figures in parenthesis, ( ) are p-values, *** indicate significance at 1% level.*

Table 4.14: Levin-Lin-Chui Unit Root Test Results

Variable	Level		First Difference	
	Constant	**Constant + trend**	**Constant**	**Constant + trend**
RAT	0.90836 (0.8182)	0.04023 (0.5160)	-7.09545*** (0.0000)	-8.01531*** (0.0000)
GBY	-2.26482*** (0.0117)	-2.42019*** (0.0078)	-14.8335*** (0.0000)	-12.9141*** (0.0000)
FX	1.11697 (0.8680)	-0.51208 (0.3043)	-11.7205*** (0.0000)	-10.6603*** (0.0000)
RGDP	-2.18377*** (0.0145)	-3.11557*** (0.0009)	-8.96096*** (0.0000)	-6.66711*** (0.0000)

*Notes: figures in parenthesis, ( ) are p-values, *** indicate significance at 1% level.*

Table 4.15: Fisher Unit Root Test (ADF) Test Results

Variable	Level		First Difference	
	Constant	Constant + trend	Constant	Constant + trend
RAT	9.47389 (0.8926)	9.87487 (0.8731)	76.9014*** (0.0000)	88.0101*** (0.0000)
GBY	28.6726*** (0.0262)	26.4944*** (0.0475)	155.864*** (0.0000)	136.631*** (0.0000)
FX	3.88231 (0.9991)	12.9816 (0.6741)	118.172*** (0.000)	90.0990*** (0.0000)
RGDP	54.1677*** (0.0000)	72.0416*** (0.0000)	180.933*** (0.0000)	163.791*** (0.0000)

*Notes: figures in parenthesis, ( ) are p-values, *** indicate significance at 1% level.*

After establishing the data properties, we proceeded to test for cointegration. But we established that two variables GBY and RGDP are stationary in levels, that is do not contain a unit root. Ideally cointegration is pursued with non-stationary variables in levels. However, all variables become stationary after first differencing. Perhaps we don't need to pursue cointegration at all given the data properties of stationarity in levels as well as not much theoretical relationships among our variables. We still proceeded with cointegration for academic purposes. However, we restrict analysis of the relationships to short run interpretations.

Out of the eleven tests in **Table 4.16** below, only five rejected the null hypothesis of no cointegration while the majority 6 accepted the null. The majority result allows us to say that there is no cointegration, and can therefore proceed to analyse short run dynamics by estimating a VAR model in a panel setting.

Table 4.16: Panel Cointegration Test - Pedroni (1999)

Test	Constant	Weighted	Constant + Trend	Weighted
Panel v-Statistic	1.120729 (0.1312)	-1.646210 (0.9501)	1.046411 (0.1477)	0.249977 0.4013
Panel rho (ρ)-Statistic	-1.852887*** (0.0319)	1.313159 (0.9054)	-1.481008 (0.0693)	1.301940 (0.9035)
Panel PP-t-Statistic	-2.991727*** (0.0014)	0.493517 (0.6892)	-3.560304*** (0.0002)	0.152146 (0.5605)
Panel ADF-t-Statistic	-2.938584*** (0.0016)	0.417665 (0.6619)	-3.651576*** (0.0001)	-0.542436 (0.2938)
Group rho-Statistic	1.881996 (0.9701)		2.078261 (0.9812)	
Group PP-t-Statistic	0.281518 (0.6108)		0.492391 (0.6888)	
Group ADF-t-Statistic	-0.050535 (0.4798)		-0.319889 (0.3745)	

Sources: Estimation results output

VAR estimations require us to choose lag length optimally. Our lag length selection criteria utilise five information criteria tests provided various options on lag length selection. All the lag length selection tests chose lag one as maximum lag length. We then estimated our final model with one lag that eliminates serial correlation.

Our panel VAR results in
Table 4.17 below, show that only FX has a statistically significant relationship with changes in ratings. No other variables are affected by changes in ratings. We also changed the ordering of variables in order to back-test the robustness of our estimation result, but did not yield any material changes to our results. For instance, GBY was moved to second and FX to third, or RATI moved down in the pecking order. The statistically significant result on exchange rate is also confirmed in our block causality tests, which we discuss next.

Table 4.17: PVAR Table of Results

	D(LRATI)	D(LFX)	D(LGBY)	D(LRGDP)
D(LRATI (-1))	0.357273 [5.71635]	-0.372435 [-2.13037] **	0.41337 [1.07408]	2.840707 [1.55446]
Diagnostics				
Block exogeneity		4.538456 (0.0331) **	1.153654 (0.2828)	2.416351 (0.1201)
Serial correlation	15.89970 (0.4600)			
Heteroscedasticity	310.7807 (0.0000) ***			
Normality test	13069.12 (0.0000) ***			

*Notes: figures in parenthesis, [ ] are t-values, ( ) are p-values, ***, **, * indicate significance levels at 1%, 5% and 10% respectively.*

Using the VAR Granger Causality/Block Exogeneity Wald Tests with null hypothesis that changes in RATIs do not granger cause changes in FX, GBY, and RGDP, our results show that only changes in ratings granger cause FX changes. With a probability value of 3.3% the null is rejected. Other variables showed no significant causality. The diagnostic tests are well behaved with no serial correlation and residuals normally distributed. However, heteroscedasticity still exists as residuals are not homoscedastic.

Impulse response functions results are reported in Appendix 4.2 with a specific focus on the responses of FX, GBY, RGDP to shocks in ratings. Not much responses of economic variables to changes in ratings which confirm the results of the panel var estimation. RATI- a one period standard deviation shock on RATI has a significant and positive effect on itself which persists for about five quarters before dying off. FX- negative relationship, which suggest a one-unit

shock to the RATI result in a negative response of the FX. That is an improvement in ratings will result in the exchange rate decreasing (appreciation). However, the response does not last more than three periods. GBY- which suggest a unit shock to the RATI variable will result in an initially negative response by GBY which turn positive in the second quarter, but is very small and close to zero. This is aligned to the VAR estimates which found that bond yields do not react much to changes in ratings. Similarly, for RGDP, it remains around zero with an initial negative response which turns positive in second quarter but has no persistence after three periods.

The variance decomposition analysis also shows that a shock to ratings does not yield any significant proportional changes to other economic variables except for itself by close to 100%. For instance, 97% of the variation in ratings explained by itself after 10 quarters. Less than 3% of changes in FX are explained by changes in ratings. Thus, not much meaningful interpretations can be made for variance decomposition analysis.

4.5.3. Discussion of Results

Our political economy analysis suggested that the oligopolistic nature of the industry is unlikely to change, unless there are conscious steps taken by stakeholders. Stakeholders includes governments, regulators, private investors promoting and seeking alternative views from smaller CRAs or establishing new CRAs to compete and provide an alternative opinion. What could be the next steps and outlook of this industry over the next decade. As a start, Rhee (2015) proposes to preserve the credit rating system and erect prescription for improving its performance. He says both market and regulatory functions are public functions. They are gatekeepers of capital markets. Essentially Rhee (2015) argues to keep CRAs but subject them to greater regulatory scrutiny similar to auditors and securities exchanges. We differ in our

approach. In our African context, we think that the ratings culture is developing and needs to be promoted. While at its infancy, we already observe that not all rating actions by CRAs impact on bond yields.

Our empirical analysis showed that ratings are no longer carrying new information in line with the efficient market hypothesis. By the time rating actions are announced they would have been factored into the bond yields. First reason could be the impact of the growth of the fixed income market, where bond yields adjust on real time as new information is absorbed in the financial markets as asset managers carry out their own internal analysis. The growth of the fixed income market also suggests that the reliance on sovereign credit ratings as the sole arbiter of credit ratings has declined over the years, and market participants are carrying out their own analysis. The second reason could be to do with the regulatory calendar that has been externally imposed by EU regulation. The disclosure of calendar dates in advance and changes in outlooks that CRAs signal on likely direction of ratings, now make them more predictable and contain less new information relative to when they are not anticipated by the market. For instance, the South Africa downgrades in April 2017, which were unanticipated, outside the regulatory calendar review had the highest impact across all event windows at the strongest levels of significance. If the view is for rating actions to have stronger impact on markets, then doing away with the regulatory calendar can help re-introduce the unanticipated release of ratings.

African countries do not yet have any regulatory guidance to CRAs except for South Africa's Financial Services and Conduct Authority (FSCA) (formerly Financial Services Board) which is highly linked to ESMA through regulatory coordination. What complicates a single regulator for African countries is that the continent is large with fifty-five countries at very different levels of development and different circumstances and approach to CRAs. There have been

efforts to pursue formation of government led credit rating agencies such as the BRICS rating agencies initiative or the African Union led initiative. None of the initiatives have yet to result in the formation of a new CRA to rival the dominant CRAs. Perhaps the focus on African countries should be correcting own credit fundamentals as downgrades outweigh upgrades during our sample period. Increased downgrades reflect weakening credit fundamentals and a path to debt default for some countries.

Regarding the empirical results, we also make a couple of points in the analysis. Empirically we have shown that the power or perceived impact of ratings on bond yields and economic variables is over played. Reality is that the impact is much less than it is perceived to be. However, that does not take away the role of CRAs and still matter, especially in cases where rating changes are unanticipated. For instance, the investment grade and non-investment grade divide is still a very important demarcation to market participants. The strong reactions of bond yields with the downgrades of South Africa and Namibia into non-investment grade resulted in substantial abnormal reactions in financial markets. In both cases the first mover advantage showed the most reactions.

In the case where CRAs have already different ratings across the divide, such as the Morocco case, or the ratings are just too low, such as Ghana case, investors do not rely on CRAs. None of the positive and negative rating changes by the CRAs on Morocco impacted bond yields. In such cases, investors made up their own minds and did not react to rating changes. Ghana also did not have any rating changes that impacted their bond yields. Since Ghana has issued multiple Eurobonds and its debt is widely tradeable, what could be the reasons for non-statistical significance. We postulate that, because the ratings were really low, B- for most of

the period, the fixed income market participants did not take signals from CRAs and used their own analysis to price Ghana government bonds.

We utilised the event study analysis to directly measure the impact of rating changes on bond yields. The technique also requires users to choose event windows that can best capture the abnormal reactions. We used three options-3, 5- and 11-day windows. The majority of our tests were significant at the latter two windows. Thus, the shortest window may not always capture the abnormal reactions correctly. On average, in line with past literature, the 5-day window captures the abnormal reactions better reducing potential contamination that may be exposed to longer event windows in bond markets.

4.6. Concluding Remarks

We set out to review the political economy of sovereign credit ratings in Africa and assesses the perceived power of credit ratings empirically using event study and panel VAR techniques to assess the impact of ratings changes on economic variables. The political economy analysis reflects that CRAs are not systematically under rating African countries relative to other regions. That is, there are differences among the major CRAs across the rating categories while at the lower levels of non-investment grade, it is more to do with methodological weaknesses in credit assessments and rising debt risks in African countries.

Our event study analysis reflects that only 30% of rating actions directly impact bond yields in African countries. The Panel VAR results also showed that only exchange rates respond to sovereign rating changes while other factors are not impacted.

Both sets of empirical results suggest that largely ratings are no longer unanticipated, not carrying new information and perhaps the perceived power of CRAs may be overstated. Perhaps, investors no longer rely solely on the opinions of CRAs as well as a reflection of the growth of the fixed income market with independent analysis by asset managers. More so, the regulatory calendar makes sovereign rating actions anticipated and thus the declining impact on bond yields.

CHAPTER 5: CONCLUDING REMARKS AND POLICY RECOMMENDATIONS

5.1. Introduction

In this concluding chapter, we summarise the key findings of the thesis and discuss policy recommendations in each of the themes explored.

5.2. Summary of Key Findings and Policy Implications

5.2.1. Literature survey and bond market development data

Being able to borrow in your own currency abroad is a good thing, but not many countries are able to do so. Eichengreen and Hausmann (1999) proposed a way of measuring this inability and termed it the original sin. The spirit of the concept is to measure to what extent an individual country's long-term debt is predominantly denominated in its own currency. Ability to borrow long-term in your own currency helps countries to avoid crisis similar to those experienced in the past, such as the Asian financial crisis in the late 1990s or the Mexican currency crisis in the early 1980s. Thus, two factors are essential- issuing long-term and in own local currency.

In order to understand these concepts deeper, we proposed a new way of measuring original sin - modified original sin-long-term domestic debt securities as a ratio of total external and domestic debt securities. Given the data limitations, the modified measure is simpler to calculate and easy to understand and apply in analysis. With this measure, it exposes countries like Ghana, Kenya and Zambia who have more foreign currency debt. Reducing original sin may lead to development of local currency markets.

In 2007, many countries such as, Angola, Malawi, Sierra Leonne, Tanzania, Uganda and Zambia, started with a low share of long-term debt to total domestic securities debt. By 2017, all countries, except for Sierra Leonne, had increased the share of long-term securities to total domestic securities.

On the other hand, the dominant countries South Africa and Nigeria maintain a larger share of long-term local currency debt to domestic debt. As do Ghana, Kenya and Zambia. However, when we test further by broadening the denominator to include external debt, the ratio of long-term local currency debt to total government debt in our modified original sin measure, we make interesting observations. Specifically, for 5 countries that we isolated in **Table 2.8**- Ghana, Kenya, Nigeria, South Africa and Zambia. We observed that South Africa remains at the top with 80% of its total funding remaining in long-term local currency debt and followed by Nigeria with 50-60% of its funding in same long-term local currency debt. The majority funding remaining in long-term local currency debt augurs well for the proposition that domestic original sin is declining in African markets advocated by Essers and Cassimon (2012). More so, when we see that domestic debt to GDP ratios have also increased for most of these countries.

However, for the latter three countries Ghana, Kenya and Zambia the share of local currency debt to total debt ratios fall below 50%. Ghana and Kenya show an average of close to 30% of funding in local currency while Zambia shows close to 20% of funding in local currency. In other words, the three countries still rely more on foreign currency denominated debt than on local currency debt. Thus, the three countries are more exposed to foreign currency debt and are far from being pace setters in bond market development. In other words, in as much as Ghana, Kenya and Zambia have been borrowing in local currency (long-term) they have also

been borrowing more in foreign currency which has resulted in the ratio that includes external debt not improving. Overall, the three countries have not been able to significantly reduce original sin as they increased their foreign currency borrowing at similar rate. If indeed Ghana, Kenya, and Zambia would like to reduce the risks associated with foreign currency denominated debt, they should consider scaling down foreign currency denominated borrowing and focus on domestic centred funding. This would require to start by reducing the sizes of fiscal deficits which drive the extent of borrowing. If fiscal deficits do not reduce, both quantum of domestic and external debt accumulation will likely continue to rise.

We established that development of local currency bond markets is an important element of government financing which reduces the extent of risks associated with foreign currency debt and help to provide long-term debt relative to short-term funding from the banking sector. In our literature survey of determinants of bond market development, we showed that economic size and level of development are important structural factors. Other macroeconomic determinants such as fiscal balance, interest rates, and exchange rate regimes can be dependent on other dynamics in the domestic markets. For instance, increased presence of foreign investors in local currency debt markets, imply that exchange rate regime and changes in the levels of macroeconomic aggregates are likely to drive flows of funds.

A key takeaway for this chapter is that, to measure accurately, the development of local currency bond markets, we also need to include the changes in foreign currency denominated debt along with local currency denominated debt. That way, we are able to distinguish South Africa and Nigeria- who rely predominantly on long-term local currency debt funding, from Ghana, Kenya and Zambia who are increasing both local currency and foreign currency denominated debt. Thus, there is not much a case of reduction of original sin in the latter three

countries. We therefore, recommend that countries that would like to assess how far they have come in reducing original sin, should do so with a measure that includes external debt in the total debt measure as the denominator.

5.2.2. Foreign participation

Since 2010, the share of foreign participation has increased remarkably and is generally volatile. The rising trend of foreign participation is driven by factors that include financial integration, international portfolio diversification and better economic management in African countries. for these reasons, foreign inflows into local currency government bond markets have risen substantially over the years. The attractiveness of local currency government bonds as a source of investment has been enhanced by investment banks who have constructed bond indices which help international investors to invest in. For instance the Citibank and JP Morgan government bond indices discussed in the research helped to place South Africa and Nigeria, among others on the investors radar. Specifically, the inclusion in bond market indices by investment banks also influenced the initial rise in foreign participation in 2012 in the case of Nigeria and South Africa. Not only do foreign investors help to diversify the investor base but they also bring different perspectives from traditional banks and pension funds who invest in government bonds in most cases.

Our data analysis showed South Africa has the highest share of foreign participation peaking at 40% in 2018, followed by Ghana. Over the sample period Nigeria, Egypt and Uganda have experienced declining trends in some parts of the periods due to various factors. Both Nigeria and Egypt decline and rapid increase are related to exchange rate policy. That is, fixing in the case of outflows and devaluations to more market determined exchange rate in the case of rapid inflows. In this respect, exchange rate policy and movements are highly linked to the changes

in foreign participation. That is foreign investors will reward governments with market determined exchange rate and punish attempts to influence and control the level of exchange rate as Nigeria and Egypt have learnt. Both countries experienced significant outflows of foreign participation during periods of fixing exchange rates. As soon as respective governments liberalised the exchange rate policies, foreign investors responded by coming back and increasing the inflows. In other words, the data trends analysis showed us that foreign capital can reward good policies Conversely bad policies are punished by the outflow of foreign capital. We therefore conclude that foreign capital closely follows exchange rate policy and changes in the value over time in the countries under our study.

Among the most direct and immediate benefits of foreign participation is the point that increase in foreign participation reduces bond yields by diversifying the investor base and increasing competition among investors for government bonds. If increasing foreign participation is positive to diversify the investor base and reduce bond yields, then countries should open up bond markets to allow non-residents to buy local currency government debt. While foreign investors may indeed bring the benefits of declining bond yields, they may come at a cost of increased volatility. The increased volatility comes from the increased activity of foreign investors who do not necessarily hold securities to maturity (as local banks and pension funds could do) but could trade the securities as quickly as possible to exit if there are negative shocks. It is the entry and exit that may cause volatilities in bond yields. However, the impact on bond yields volatility is mixed. In our panel analysis, we did not find any evidence to suggest that increasing foreign participation results in increased bond yields volatility. In South Africa's case, the effects of increasing foreign participation on bond yields is much larger in the long run and comes with the cost of increased volatility in bond yields.

Other than foreign participation, other factors- traditional supply side factors, such as monetary factors- inflation and interest (policy) rates, the lag of bond yields, exchange rate and global factors matter to bond yields. Our dynamic modelling approach using GMM helped us to quantify better the magnitude of foreign participation on bond yields. Firstly 85% of the variation in bond yields was explained by its own lag, then other factors come in including foreign participation. The importance of global factors on impacting bond yields is mixed. In the fixed effects approach the changes in global policy rate matters while they are statistically insignificant when using the dynamic modelling approach. Thus, non-residents inflows may be chasing yields in emerging markets and not necessarily driven by interest rates in home markets. If this is the case, and they go on to invest in short-term securities such as the case in Zambia and Egypt, then it is a worry for policy makers. They are likely to cause more volatilities and exacerbate economic challenges when they exit too frequently.

In the case of investing in long-term bonds, as is the case in South Africa, they add more competition with other long-term investors such as pension funds and asset managers and do indeed diversify the investor base. Perhaps, in most African markets, which are considered high risk premiums, the conditions in home markets do not matter. On the other hand, for South Africa, which has lower risk premium compared to African peers, the global bond yields matter and are statistically significant in our ARDL estimation model. Thus, investors distinguish countries by levels of risk premiums.

On the impact on bond yields volatility the evidence is mixed. In the group panel, increasing foreign participation does not come with cost of increased volatility. However, in South Africa's case, increasing foreign participation comes with cost of increased bond yields volatility. This implies that non-residents purchase and selling govt bonds in South Africa is

influencing changes in bond yields. Thus, the investor base matters and the central bank along with national treasury should pay more attention to changes in this particular investor group.

Lastly, volatility of bond yields in South Africa is largely influenced by volatility in global capital markets. This result probably explains South Africa's deeper financial integration with global financial markets relative to its African peers. Thus, in South Africa's case, we recommend closely following developments in global markets as they influence investor decisions and therefore South Africa's economic and financial markets indicators- bond yields and exchange rates.

5.2.3. Sovereign credit ratings

Sovereign credit ratings in Africa have increased from about five countries in the 1990s to over thirty during this 2010s decade. With sovereign ratings assigned, we established that Eurobonds issuances have increased remarkably in the past decade with more than twenty countries issuing and worth over USD100 billion outstanding. The increase in sovereign credit ratings is tied to increase in eurobonds. Assigning of sovereign credit ratings over the years, have helped a number of African countries to borrow using eurobonds.

Once assigned, ratings have changed over the years with some falling out of investment grade, for instance Egypt, Libya, Namibia and Tunisia. On the other hand, some sovereigns continue to be rated in investment grade- Botswana, Morocco, Mauritius and South Africa. The rest are rated non-investment grade. It is the impact of changes in sovereign ratings on bond yields and other economic variables that has brought scrutiny to the quantitative impact and the political economy surrounding the world of credit ratings. Not least, the various financial crisis-from

Asian financial crisis, global financial crisis, commodity price falls in 2014 and subsequent rating reactions.

A couple of points in the political economy questions. While there are many questions on the industry of CRAs that range from the role of CRAs, the oligopolistic nature of the industry, the payment model, and the various mistakes committed or omitted by CRAs, there are no major changes in sight to any of these questions in the near or medium term. In our view, this is because of two main reasons. The increased regulatory scrutiny from the US SEC and European ESMA have actually entrenched the role and importance of ratings in the financial system. Second, the rise of the Eurobond market in the African context, suggests that sovereign ratings will continue to play an increasingly important role for investors who invest in bonds as the market is expanding along with ratings.

In our analysis, we have established that credit ratings are a key part of financial markets which investors use and are also embedded in regulation. As CRAs play an independent role of assessing the creditworthiness of borrowers for the benefit of investors, their role cannot be easily eliminated. Unless, investors are able to carry out their own analysis, without requiring the help of third parties such as CRAs, or ratings requirements are removed from regulatory frameworks. Neither are unlikely to change nor are there any strong steps to eliminate the industry.

To some extent, investors are already carrying out their own independent analysis which is explained by what we described as the rise of the fixed income market. Asset managers are carrying out their own analysis and actually implement trades faster resulting bond yields to change more frequently even before CRAs have acted on new information. In the case where

roles of CRAs are gradually reduced, the sorting function propagated by Rhee (2015) becomes pivotal in reducing transactions costs as CRAs will remain with a centralised database or collation process for sets of borrowers.

The reliance from a few dominant CRAs is not ideal for competition and perhaps quality of ratings. However, the oligopolistic nature of the CRAs industry is unlikely to change in the near or medium term. Unless, smaller CRAs are able to merge or acquire each other across continents and compete with the big three on a global scale. However, this does not appear to be the case in the near or medium term. The same applies for the question of changing the current payment model from an issuer based to alternatives that include investor pays model. While conflict of interest argument has been raised and discussed, there are no tangible alternatives to the current set up and there is no strong appetite from regulators or investors.

The level of ratings assigned to many African countries came up as a subject to question CRAs. We found out that ratings are low partly due to methodological biases by the big three CRAs, which penalise low economic development and favour richer countries while assigning lower weights to fiscal and debt analysis where wealthier countries would score poorly. In our view, the bias is broader towards countries with low economic development and supposedly weak governance standards rather than a specific undermining of African countries. We demonstrated this point relating to the global universe of sovereign ratings and more specifically the Latin American sovereigns (Bustillo *et al* 2018) and some eastern European sovereigns who have received low ratings precisely for similar reasons as African sovereigns. If there are to be developments in seeking higher ratings, the methods of assessing sovereign creditworthiness need to be gradually refined.

We then tested for ratings accuracy and failures specifically in African countries. If ratings are generally in the non-investment grade category 12 months prior to default, it reflects that ratings are accurate. This is the case in all defaults covered in this study. Either ratings were already in non-investment grade or the country was not rated at the time. Since most countries in Africa are predominantly in non-investment grade, we need greater distinction among the CRAs to identify which ones are better able to predict default than the others. For instance, in the case of Congo-Brazzaville default in August 2016, Moody's had the highest rating at Ba3, while S&P had the lowest at B-. In relative terms, S&P has better record in predicting path to default. That is S&P were anticipating default better than Moody's given the level of ratings within the non-investment grade spectrum.

Empirically ratings accuracy ratio relates to the share of sovereign defaults to non-investment grade sovereign ratings per year averaged over a five-year period or particular cycle. We utilised two periods of 2008 - 2012 and 2014 - 2018 which capture the Seychelles (2008), Cote D'Ivoire 2011, Mozambique (2016,2017), and Congo-Brazzaville (2016, 2017) defaults. The default rates are 3% and 4.7% in the first and second periods respectively, for non-investment grade ratings. These averages are much higher when we compare with international average of sovereign ratings globally of 1.5-2% of non-investment grade ratings. In that case, then conservative ratings on African countries would not be far off the mark as defaults are more frequent and thus ratings accuracy is probably right. However, the sample for African sovereigns is heavily biased by short data compared to global averages. One or two sovereigns defaulting in a year distorts the averages to a large extent. For instance, the two defaults in 2016 and 2017 by both Mozambique and Congo-Brazzaville distorted the averages in the second period. Thus, the ratios should be more carefully approached. A longer time series, would be a better test.

Ratings failure analysis brings interesting results and analysis not readily put out in Africa when criticising CRAs. Using a standard approach of defining ratings failure as a change of ratings by at least three notches within a 12-month period. Our results showed that CRAs failed in 2011 specifically, on the ratings of three countries- Egypt, Libya and Tunisia. Using a second approach of ratings changes during an economic cycle we tested using the Arab spring and the oil price fall since June 2014 for oil producing economies. Our results also showed that CRAs failed on Angola and Gabon where ratings changed by three notches between June 2014 and December 2017. The ratings failures were even more pronounced in the Arab spring. That is Egypt, Libya and Tunisia all by at least -4 to -7 notches downgrades between 2011 to 2013.

Our empirical testing of changes in sovereign credit ratings impact on bond yields showed that only 30% of the rating actions actually resulted in changes in bond yields that were statistically significant. Thus, the power and influence of CRAs may be over stated as they do not always move markets. In fact, in our sample period different CRAs have differing impact on bond yields. That is, for our 71 rating events, Moody's had the highest share of significant events with 39%, followed by Fitch 35% and S&P the lowest with 26%. This suggests that Moodys rating actions move markets more than its competitors. Even more, the Moodys significant events were spread across 6 countries compared to S&P which had the lowest share of 26% significant events mostly centred on Egypt (other than South Africa and Zambia).

On another perspective, Ghana and Morocco ratings events did not have a statistically significant impact. This implies that of all rating actions taken by CRAs, none of them were significant enough to impact on the bond yields. For Ghana it probably explains the classic case that CRAs are slow to upgrade and end up behind the curve. By the time CRAs upgraded

Ghana's rating to B from B-, the bond markets had already factored the likely impact. The Moroccan case also reflects a classic case of mixed signalling by CRAs. On one hand, Moody's rating in non-investment grade was about to go up while S&P on the other hand was investment grade but signalling to go down. Due to this mixed signalling, investors made up their own minds and the rating changes did not provide new information to investors.

However, at critical junctures, such as crossing the investment grade nexus, the bond yields for South Africa and Namibia reacted strongly across the CRAs and the various event windows. Perhaps, in such cases, rating actions do carry some new information which leads to repricing in financial markets. Thus, the role of CRAs remain important, especially at crossing the investment grade position.

Nevertheless, only a small share of ratings actually impacts bond yields. We attribute the declining power and influence of CRAs to two reasons. First, it is the introduction of regulatory calendar which imposes on CRAs to announce review dates for countries in advance. This makes it easier for financial market participants to guess direction of rating changes than if the regulatory calendar did not exist. Secondly, it is the growth of fixed income market and analysis that helped markets predict likely future direction of ratings. Market participants are carrying out their own analysis in real time reflected by frequent changes in bond yields than infrequent ratings reports. If ratings were to continue to be an important tool guiding financing markets pricing, we recommend removal of the regulatory calendar as it takes away the unpredictability and weakens the role of CRAs in financial markets.

We also extended the analysis to other economic variables to assess the impact of changes in sovereign ratings. Only the exchange rate is influenced by changes in sovereign ratings, while

other economic variables such economic growth are not statistically significant. Thus, policymakers should pay attention to changes in bond yields and exchange rate movements whenever sovereign ratings change.

While the industry remains oligopolistic, there is evidence to show that CRAs are not colluding. Put differently there is competition across the CRAs. The number of rating actions and their impact across CRAs differs. The conundrum on South Africa and Morocco being investment grade by some agencies and non-investment grade by others is classic case of good competition or the absence of colluding. Particularly for S&P and Moody's who find themselves on opposite sides of both countries. Thus, it is an opportunity for investors to use their own analysis in addition to opinions provided by CRAs. The competition also reflects that there is no single CRA with absolute power to influence investors or accurately measure credit risk of African governments.

5.3. Options for Future Research

With regards to foreign participation, future research could focus on measuring the asymmetric effects of changes in foreign participation on bond yields. Our analysis was based on increase in foreign participation, while future research could also focus on the impact of decline in foreign participation. It may require different methodologies in a panel setting than the GMM approach we adopted in our study. Despite any different approaches to the ones we have used in this study, any analysis on foreign participation has to rely on countries regularly publishing foreign participation data. Other than South Africa and Ghana which publish the series on a monthly basis, others do on a quarterly basis while Nigeria does not publish this data. A longer time series would always update the views or test the validity of the results in this study.

For sovereign ratings, short data periods limit the various analysis adopted here. For instance, the market model approach in event study analysis meant that the index which measures market performance was only available from 2014 providing only a 5-year period of analysis. Another technique could provide a longer time horizon perhaps starting from the 2010s when most sovereign ratings were assigned. While our results on ratings accuracy showed that African sovereigns had higher defaults rates than global averages, it was heavily influenced by the limited data under the review period. A long time period and larger data set such as the case with global default statistics, would make the results more comparable.

REFERENCES

Adelegan, O.J., and Radzewicz-Bak. B., (2009). What determines bond Market development in Sub-Saharan Africa, *IMF Working Paper,* WP/09/09.

Afonso, A., Furceri, D., and Gomes, P., (2011). Sovereign credit ratings and financial market linkages- application to European data. *European central Bank,* 1347, June 2011.

African Development Bank (2018). *African Development Bank approves ZAR 140-million loan to support African Local Currency Bond Fund.* Accessed https://www.afdb.org/en/news-and-events/african-development-bank-approves-zar-140-million-loan-to-support-african-local-currency-bond-fund-17813

Akerlof, G., (1970). The market for 'Lemons': Quality uncertainty and the market mechanism. *Quarterly Journal of Economics*, 84, 3, 488-500.

Andritzky, M.J.R., (2012). Government bonds and their investors. What are the facts and do they matter? *IMF Working Paper*, 12,158, International Monetary Fund.

Arellano, M., and Bond, S., (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies* 58, 277-297.

Arellano, M., and Bover, O., (1995). Another look at the instrumental variable estimation of Error-Components Models, *Journal of Econometrics* 68, 29-51.

Bae, K., (2012). Determinants of local currency bonds and foreign holdings: implications for bond market development in the people's republic of China, *Asian Development Bank,* 97,2012.

Bank of Zambia (2016). Annual Reports, Various issues 2004-2016. Lusaka: Bank of Zambia.

Bank for International Settlements (2006). International convergence of capital measurement and capital standards, a revised framework (comprehensive version). Basel, *BIS.*

Baldacci, E., and Kumar, M., (2010). Fiscal deficits, public debt and sovereign bond yields, *IMF Working Paper* 10,184. International monetary Fund.

Baluga, A., Dime, R., and Mittra, S., (2011). Foreign investor participation in emerging East Asia local currency bond markets, *ASEAN Economic Bulletin* 28, 2, 221-240.

Beck, T., Dermirguc-Kunt, A., and Levine, R., (2002). Law, endowments and finance. *NBER Working Paper series*, 9089.

Berensmann K., Dafe, F., Lindenberg N., and Volz, U., (2015). Financing global development: The role of local currency bond markets in Sub-Saharan Africa, *German Development Institute*, 11/2015.

Bhatia, A.V., (2002). Sovereign credit ratings methodology: An evaluation. *IMF Working Paper*, WP,02,170.

Biau, C., (2018). Common capital market infrastructure for East Africa: Options for the way forward. Milken Institute. Accessed on https://milkeninstitute.org/sites/default/files/reports-pdf/FINAL-Capital-Market-Infrastructure-in-East-Africa.pdf

Binici, M., Hutchinson, M., and Miao, E.W., (2018). Are credit rating agencies discredited? Measuring market price effects from agency sovereign debt announcements. Bank for International Settlements, *BIS, WP*, 704.

Blundell, R.W, and Bond, S. R., (1998). Initial conditions and moment restrictions in Dynamic Panel Data Models, *Journal of Econometrics*, 87, 115-143

Borensztein, E., Cowan, K., Eichengreen, B., and Panizza, U., (2008). Building bond markets in Latin America: On the verge of a big bang? *MIT Press*.

Bozovic, M., Urosevic B., and Zivkovic B., (2011). Credit rating agencies and moral hazard. *Panoeconomicus*, 2, 219-227.

Brooks, C., (2008). Introductory Econometrics for Finance. *Cambridge University Press*. Second Edition.

Brooks, C., (2014). Introductory Econometrics for Finance. *Cambridge University Press*. Third Edition.

Browne, F., and Manasse, P., (1989). The information content of the term structure of interest rates: theory and practice, *OECD Economics Department Working Papers, 69*, OECD Publishing.

BSE (2016). Botswana Stock Exchange Annual Reports 2006-2016. Gaborone: *BSE*.

Burger, J.D., and Warnock F.E., (2006). Local currency bond markets, *IMF Staff Papers*, 53, 133-146, 2006. International Monetary Fund.

Burger, J.D., and Warnock, F.E., (2006). Foreign participation in local currency bond markets. *Review of Financial Economics* 16, 291-304

Bustillo, I., Perrotti, D.E., and Velloso, H., (2018). Sovereign credit ratings in Latin America and the Caribbean, trends and impact on debt spreads. *Economic Commission for Latin America and the Caribbean, Studies and Perspectives*, 18.

Calvo, G., and Talvi, E., (2005). Sudden stops, financial factors and economic collapses in Latin America: lessons from Argentina and Chile, *NBER Working Paper Series*, 11153.

Cantor, R., and Parker, F., (1996). Determinants and impact of sovereign credit ratings. Federal Reserve Bank of New York *Economic Policy Review*, 2, 37-53, 1996.

Choi, I., (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20, 2, 249-272.

Classens S., Klingebiel D., and Schmukler, S.L., (2007). Government bonds in domestic and foreign currency: the role of institutional and macroeconomic factors. *Review of International Economics*, 15, 2, 370-413.

Clearstream, (2019). Market infrastructure- South Africa. Accessed at https://www.clearstream.com/clearstream-en/products-and-services/market-coverage/middle-east-and-africa/south-africa/market-infrastructure-south-africa-1280892

Coyle, D., (2014). GDP: A brief but affectionate history. *Princeton University Press*. Princeton.

Daniel, L., (2008). Foreign investors participation in emerging market economies domestic bond markets, Banque de France, *Bulletin Digest*, 173.

Darvas, Z., and Schoemaker, D., (2017). Institutional investors and home bias in Europe's capital markets union. *Bruegel Working Paper*, 02, 2017.

Deb, P., Manning, M.J., Murphy, G., Penalver, A., and Toth, A., (2011). Whither the credit ratings industry? *Bank of England Financial Stability Paper*, 09.

De Hoyos, R., and Sarafidis, V., (2006). Testing for cross-sectional dependence in Panel-Data Models. *Stata Journal*, 6. 482-496.

Dodd-Frank Wall Street Reform and Consumer Protection Act 2010, *Public Law* 111–203, July 21, 2010.

Ebeke, C., and Lu, Y., (2014). Emerging market local currency bond yields and foreign holdings in the post-Lehman period- a fortune or misfortune. *IMF Working Paper*, 14, 29. International Monetary Fund.

Ebeke, C., and Lu Y., (2015). Emerging markets local currency bond yields and foreign holdings- A fortune or misfortune? *Journal of International Money and Finance*, 55, 203-219, 2015.

Eichengreen, B., and Hausmann R., (1999). Exchange rates and financial fragility, *National Bureau Economic Research*, NBER, 7418, Cambridge MA.

Eichengreen, B., Hausmann, R., and Panizza U., (2002). The Pain, the Mystery, and the Road to Redemption. *Paper prepared for the conference Currency and Maturity Matchmaking: Redeeming Debt from Original Sin*. 21-22.

Eichengreen, B., Hausmann R., and Panizza, U., (2003). The pain of original sin. In other people's money: Debt denomination and financial instability in emerging market economies, 2003/08, 1-49.

Eichengreen, B., and Luengnaruemitchai, P., (2004). Why doesn't Asia have bigger bond markets? National Bureau of Economic Research, *NBER*,10576.

Eichengreen, B., Paniza, U., and Borensztein, E., (2008). Prospects for Latin American bond markets; A cross country view. In: Borensztein, Cowan, Eichengreen, Panizza (Eds), Bond Markets in Latin America: On the verge of a big bang? *MIT Press*, 247-290.

Engle, R, F., and Granger, C, W, J., (1987). Cointegration and error-correction: representation, estimation and testing, *Econometrica*, 55, 2, 251-276.

Essers, D., and Cassimon, D., (2012). Washing away original sin: vulnerability to crisis and the role of local currency bonds in Sub-Saharan Africa, *Institute of Development Policy Working Papers* 2012, 12, University of Antwerp.

Essers, D., Blommestein H.J., Cassimon, D., & Flores P.I., (2016). Local currency bond market development in Sub-Saharan Africa: A stock-taking exercise and analysis of key drivers, *Emerging Markets Finance and Trade*, 52:5, 1167-1194,

Fama, E.F., (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25,2, 383-417.

Ferri, G., Liu, G., and Stiglitz, J., (1999). The procyclical role of rating agencies: Evidence from the East Asian Crisis. *Economic Notes*, 3, 335-355.

Fidora, M., Fratzscher, M., and Thimann, C., (2006). Home bias in global bond and equity markets, *ECB Working Paper 685*.

Financial Times, (2018). China's Dagong rating agency taken over by state-owned investor, online: available at https://www.ft.com/content/7079c7aa-6265-11e9-b285-3acd5d43599e (Accessed 10 August 2019).

Financial Times, (2012). Sovereign Debt- Is Africa under rated? Accessed on 12 May 2015 at http://blogs.ft.com/beyond-brics/2012/07/03/sovereign-debt-is-africa-underrated/

Fitch (various years), The Fitch bond book. Fitch Publishing Company.

Gande A., and Parsley, D.C., (2005). New spill overs in the sovereign debt market. *Journal of Financial Economics*, 75, 691-734.

Ghysels, E., Santa-Clara, P., Valkanov, R., (2002). The MIDAS touch: mixed data sampling regression models. Working paper, *UNC and UCLA*.

Greene, W.H., (2010). Econometric Analysis. Fifth Edition, New York: *Prentice-Hall*. 2010.

Harris R, J. D., (1995). Using Cointegration Analysis in Econometric Modelling, Harvester *Wheatshef: Prentice Hall*.

Harris, R., and Sollis, R. (2003). Applied Time Series Modelling and Forecasting. *Wiley*, West Sussex.

Hassan, S., (2013). South African capital markets: An overview. *South Africa Reserve Bank*, WP/13/04.

Hayashi, F., (2000). Econometrics. *Princeton University Press*, 2000.

Holtz-Eakin, D, Newey, W., and Rosen, H., (1988). Estimating Vector Autoregressions with Panel Data. *Econometrica*, 56, 6, 1371-95.

Howells, P and Bain K., (2007). Financial Markets and Institutions. *Pearson Education Limited*, Fifth Edition.

Huber, T., (2014). Rating changes and sovereign bond yields during the European debt crisis. Unpublished thesis. Department of Economics, Vanderbilt University, Nashville.

IFC, 2012. IFC Launches Pan-African Bond Program to Support Local Capital Markets. Accessed on https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/ifc_launches_pan_african_bond

IMF, (2010). The uses and abuses of sovereign credit ratings in Global Financial Stability Report, *International Monetary Fund*, October, Accessed at https://www.imf.org/en/Publications/GFSR/Issues/2016/12/31/Sovereigns-Funding-and-Systemic-Liquidity.

IMF, (2014). Issuing international sovereign bonds- opportunities and challenges for Sub-Saharan Africa, *IMF* 2014/02

Im K,S., Pesaran, M, H., and Shin, Y., (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115, 1, 53-74.

Ismaelescu, J.,and Kazemi, H., (2010). "The reaction of emerging market credit default swap spreads to sovereign credit rating changes", *Journal of Banking & Finance*, 34 (12), 2861-2873.

Ioannou, S., (2013). The political economy of credit rating agencies. The case of sovereign ratings. (online): available at https://www.boeckler.de/pdf/v_2013_10_24_ioannou.pdf (Accessed 5 April 2019).

Johansen, S., and Juselius, K., (1990). Maximum likelihood estimation and inference on cointegration- with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52, 2, 169-210.

Kahn, B., (2005). Original sin and bond market development in Sub-Saharan Africa- *In Africa in the world economy*- The national, regional and international challenges. *Fondad*, The Hague.

Kaminsky, G., & Schmukler, S., (2002). Emerging markets instability: Do sovereigns ratings affect country risk and stock returns? *World Bank Economic Review*, 16, 2, 171-195.

Kang, S., and Min, S., (2016). Effect of the sovereign credit ratings in East Asia Countries: Evidence from Panel Vector Autoregression. *Emerging Markets Finance & Trade, 52,* 1121–1144.

Kavli, H., and Viegi, N., (2015). Are determinants of portfolio flows always the same? - South African results from a time varying parameter VAR model, *MPRA Paper*, 66897, University Library of Munich, Germany.

Kenya National Treasury. (2016). *Annual Public Debt Management Report*s, 2004/05-2015/16. Nairobi : National Treasury.

Kenya Capital Markets Authority, (2017), *The CMA Quarterly Capital Markets Statistical Bulletin* – Q1.2017

Khotari, S.P., & Warner, J.B., (2006). Econometrics of event studies. Handbook of Empirical Corporate Finance SET, 2, 3-36.

Kripfganz, S., and Schneider, D., C., (2018). Response surface regressions for critical value bounds and approximate p-values in equilibrium correction models. Manuscript, *University of Exeter and Max Planck Institute for Demographic Research*, www.kripfganz.de/research/Kripfganz_Schneider_ec.html

Kripfganz, S., and Schneider, D., C., (2018). ARDL: Estimating autoregressive distributed lag and equilibrium correction models. *Proceedings of the 2018 London Stata Conference*.

Kumar, M.S., and Tatshuyoshi O., (2011). Dynamics of International Integration of Government Securities' Markets, *Journal of Banking and Finance*, 35,1, 142-154, 2011.

Larrain G., Reisen H., and Maltzan Jv., (1997). Emerging market risk and sovereign credit ratings. *OECD Development Centre*, 124, 1997.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., and Vishny, R., (1998). Law and Finance. *Journal of Politics and Economics* 106, 6, 113-115.

Lee, H.M., (2015). Effects of foreign investor participation on emerging market sovereign bond yields and volatility. *Unpublished thesis*, North-western university.

Levin, A., Lin, C.F., Chu, C, S, J., (2002). Unit root tests in panel data: Asymptotic and finite sample properties, *Journal of Econometrics*, 108, 1-22.

Longstaff, F.A., Pan J., Pedersen, L.H., and Singleton, K.J., (2011). How sovereign is sovereign credit risk? *American Economic Journal: Macroeconomics*, 3, 2, 75-103, 2011.

Markowitz, H., (1959). Portfolio Selection: Efficient Diversification of Investments. *Cowles Foundation Monograph*, 16. John Wiley & Sons, Inc.

Mboweni, T.T., (2006). Deepening Capital Markets: The case of South Africa. *Speech presented at seminar for Deepening Financial Sectors in Africa: Experiences and Policy Options*". Accessed on December 13, 2017 at https://www.resbank.co.za/Lists/Speeches/Attachments/124/IMF-capital+markets-7+nov06a.pdf

Milleva, E., (2007). Using Arellano – Bond Dynamic Panel GMM Estimators in Stata, Economics Department, Fordham University.

Mohanty, M., (2002). Improving liquidity in government bond markets: what can be done? *Bank of International Settlements*, 11, 2002.

Moody's (various years), Moody's Manuals. New York City, USA: Moody's Investor Service.

Moody's (2018). Sovereign default and recovery rates. 1983-2017. New York City, USA: Moody's Investor Service.

Moody's (2004). Sovereign ratings history, March 4, 2004. New York City, USA: Moody's Investor Service.

Moyo, D., (2010). Dead Aid- Why aid is not working and how there is another way for Africa, *Penguin Books*.

Mora, N., (2006). Sovereign credit ratings: Guilty beyond reasonable doubt? *Journal of Banking & Finance*, 2006, 30, 7, 2041-2062.

Mutize, M., and Gossel, S, J., (2019). Sovereign credit rating announcements effects on foreign currency denominated bonds and equity markets in Africa. *Journal of African business*, 20,1, 135-152.

Mu, Y., Phelps, P., and Stotsky J.G., (2013). Bond markets in Africa, *Review of Development Finance*,3,121-135.

Narayan, P. K., (2005). The saving and investment nexus for china: evidence from cointegration tests, *Applied Economics*, 37, 1979-90.

OECD (2015). African Central Government Debt 2014: Statistical Yearbook, *OECD Publishing*, Paris. http://dx.doi.org/10.1787/acgd-2014-en

OECD (2013). African Central Government Debt 2013: Statistical Yearbook, *OECD Publishing*, Paris. http://dx.doi.org/10.1787/acgd-2013-en

OECD (2012). African Central Government Debt 2012: Statistical Yearbook, *OECD Publishing*, Paris. http://dx.doi.org/10.1787/acgd-2012-en

OECD (2011). African Central Government Debt 2011: Statistical Yearbook, *OECD Publishing*, Paris. http://dx.doi.org/10.1787/9789264116511-en

OECD (2010). African Central Government Debt 2010: Statistical Yearbook, *OECD Publishing*, Paris. http://dx.doi.org/10.1787/9789264084445-en

Olabisi, M., & Stein, H., (2015). Sovereign bond issues: Do African countries pay more to borrow? *Journal of African Trade*, 2,1-2, 87-109.

Orrico, F., (2017). The Agencies on junk sovereign debt: the impact of credit rating agencies on junk sovereign debt. *Issues in Political Economy*, 26,2, 225-241.

O'Malley, C., (2015). Bonds without borders- A history of the Eurobond market, *Wiley Publishers*.

Paudyn, B., (2014). Credit Ratings and Sovereign Debt: The political economy od creditworthiness throguh risk and uncertainty. *Palgrave Macmillan***.**

Pedroni, P., (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61, 653–670.

Pedroni, P., (2001). Purchasing Power Parity Tests in Cointegrated Panels, *Review of Economics and Statistics*, 2001,83, 4,727-731.

Pedroni, P., (2004). Panel cointegration; asymptotic and finite sample properties of pooled time series tests, with an application to the PPP hypothesis. *Econometric Theory*, 20:575–625.

Peiris, S.J., (2010). Foreign participation in emerging markets' local currency bond markets, *IMF Working Paper*, 10, 88. International Monetary Fund.

Pesaran, M.H., and Shin, Y., (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis' in S Strom, (ed.), Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium, Cambridge: *Cambridge University Press*.

Pesaran, M.H., Shin, Y., and Smith, R, J., (2001). Bounds Testing Approaches to the Analysis of Level Relationships, *Journal of Applied Econometrics*, 16, 289-326.

Pesaran, M.H., (2004). General diagnostic tests for cross section dependence in panels, *Cambridge Working Papers in Economics*, 0435, Faculty of Economics, University of Cambridge.

Pesaran, M.H., (2006). Estimation and Inference in large heterogenous panels with a multifactor error structure, *Journal of Econometric Society*, 74, 4, 967-1012.

Poor, H.V., (1860). History of the Railroads and Canals of the United States, *Library of early American business & industry*, 34, Augustus, M, Kelley Publishers June 1, 1970.

Reisen, H. and Maltzan, J., (1999). Boom and Bust and Sovereign Ratings, *International Finance*, 2, 273-293.

Remolona, E, Scatigna M, and Wu E., (2008). The dynamic pricing of sovereign risk in emerging markets: Fundamentals and risk aversion. *The Journal of Fixed Income*, 57-71, 2008.

Rhee, RJ., (2015). Why credit rating agenceis exist. *Economic Notes*, 44,2, 161-175.

Roldos, Jorge E., (2004). Emerging Local Bond Markets, in Emerging Local Securities and Derivatives Markets, *World Economic and Financial Surveys*, IMF.

Roodman, D., (2009). How to do xtabond2: an introduction to "Difference" and "System" GMM in Stata. *The Stata Journal*, 2009, 1, 86-136.

Sharpe, W, F., (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19, 3, 425-442.

Shedlock, M, (2010). S&P Rating vs. CDS Implied Rating of European Sovereign Credit; Huge Flaws in the Bond Rating Methodology, Accessed on 12 May at http://globaleconomicanalysis.blogspot.com/2010/11/s-rating-vs-cds-implied-rating-of.html

Sienart, A., (2012). Foreign investment in local currency bonds- considerations for emerging market public debt managers. *World Bank Working Paper Series*, 6284, World Bank.

Smaoui, H., Grandes, M., and Akindele, A., (2017). The determinants of bond market development: Further evidence from emerging and developed Countries, *Emerging Markets Review*, 2017

Smith, G., (2019). African Eurobonds: An evolving and now $100 billion asset class. Reinnaisance Capital. Accessed on https://www.africanbondmarkets.org/en/news-events/africa-financial-markets-news/article/african-eurobonds-an-evolving-and-now-100-billion-asset-class-158468/

Sturmans, A.M.T., (2013). The impact of credit ratings on sovereign bond yields: A case study for countries in the eurozone. Unpublished thesis. Department of Finance, Tilburg University.

S&P Global Dow Jones Indices (2019). S&P Africa Hard Currency Sovereign Bond Index.

S&P Global Ratings (2010). Another Perspective on Rating comparability and performance. *RatingsDirect*, April 9, 2010.

S&P Global Ratings (2012). The role of credit ratings in the financial system. *RatingsDirect*, May 17, 2012.

S&P Global Ratings (2019). Sovereign Ratings History. *RatingsDirect.* Aug 7, 2019.

White, L.J., (2010). Markets: The Credit Rating Agencies. *The Journal of Economic Perspectives*, 24, 2, 211-226.

White, L.J., (2013). Credit rating agencies: an overview. *Annual Review of Financial Economics*, 5, 1, 93-122**.**

World Bank (2018). Heavily Indebted Poor Country (HIPC) Initiative. *World Bank Brief*, January 11, 2018. Accessed https://www.worldbank.org/en/topic/debt/brief/hipc

APPENDICES

Appendix 3.1 - Sources and Description of South Africa Data

Gby	Government bond yield- 10 year (2003m)	SARB
Fpart	Share of foreign participation in government securities	National Treasury
Cab	Current account balance ratio to GDP (5380k)	SARB
Fb	Fiscal balance (4420k)	SARB
Debt	Government debt ratio to GDP (4116k)	SARB
Infl	Inflation (7170q)	SARB
Ms	Money supply growth – M3- (1374a)	SARB
Rgdp	Real gross domestic product growth (6006)	SARB
polr	Policy rate (1401)	SARB
logfx	Log of foreign exchange rate USD-ZAR (5339m)	SARB
ffr	Federal funds rate	Federal Reserve Bank of St Louis
Gby_glob	US 10-year bond yield	Federal Reserve Bank of St Louis
VIX	Chicago Board Options Exchange Volatility Index	Federal Reserve Bank of St Louis

Appendix 3.2: Ghana Data Sources

FP_GH	BoG	Table 13- Statistical Bulletin
PolR_GH	BoG	Table 9/10- Statistical Bulletin
GBY_GH	BoG	Table 13- Statistical Bulletin (5yr yield)
FB_GH	MoF	Fiscal tables
Debt_GH	MoF	Debt Stock publications+ Quarterly CB bulletins
CAB_GH	BoG	Annexures Monetary Policy Reviews
INFL_GH	BoG	Selected indicators- Statistical Bulletin
M2_GH	BoG	Selected indicators- Statistical Bulletin
RGDP_GH	Ghana Statistical Services	Quarterly GDP Bulletin
FX_ghana	BoG	Table 18- Statistical bulletin

Appendix 3.3: Nigeria Data Sources

FP_NIG	Stanbic Economics	
M2_NIG	CBN	Economic Reports
INFL_NIG	CBN	Economic Reports
FB_NIG	CBN	Economic Reports
CAB_NIG	CBN	Statistics database
Debt_NIG	DMO	Quarterly statistics
RGDP_NIG	NBS Nigeria	GDP data
GBY_NIG	Bloomberg	10yr yield
FX_NIG	CBN	Statistical bulletin

Appendix 3.4: Uganda Data Sources

FP_UG	BoU financial markets	Statistics
M3_UG	BoU	Statistics
INFL_UG	BoU	Statistics
POLR_UG	BoU	Statistics
FB_UG	BoU	Statistical Abstract
Debt_UG	BoU	Statistical Abstract
CAB_UG	boU	Statistics
RGDP_UG	UBoS	Statistics
GBY_UG	BoU/MoF	Debt Statistical Bulletin 5yr)
FX_UG	boU	Statistics

Appendix 3.5: Zambia Data Sources

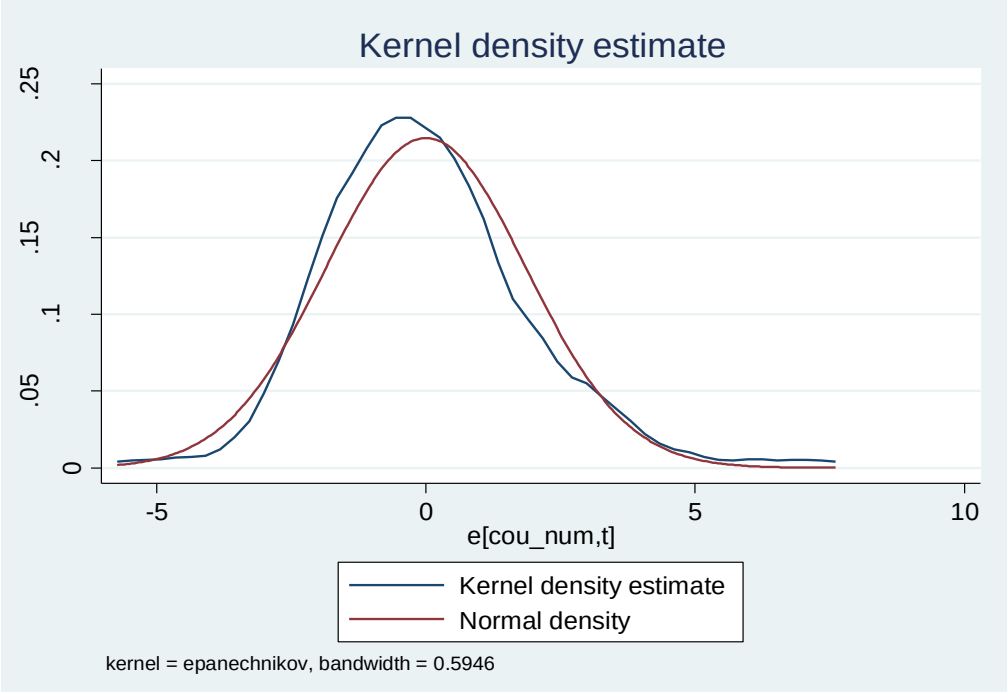
INFL_ZAM	CSO	Monthly Statistics April 2018, p 30.
RGDP_ZAM	CSO	Monthly Statistics April 2018 p 42
CAB_ZAM	BoZ	BOP statistics
GBY_ZAM	BoZ	Fortnightly statistics 5-year bond
M3_ZAM	BoZ	fortnightly statistics
POLR_ZAM	BoZ	fortnightly statistics
Debt_ZAM	MoF	Economic Reports
FB_ZAM	Not available	Not available
FP_ZAM	BoZ	Email

Appendix 3.6: South Africa Monthly Data: Unit root tests

	ADF		PP		DF-GLS	
	Level	1st diff	Level	1st diff	Level	1st diff
Gby_sa	*-2.257*	-7.282	-2.688	-8.096	-2.314	-5.144
fp	*-2.982*	-5.441	-2.393	-8.448	-1.313	-4.274
polr,	-1.484	-5.213	-1.575	-9.346	-1.421	-4.553
m3	*-3.144*	-7.156	*-3.689*	-11.058	*-3.260*	-5.453
ffr	1.886	-6.288	2.362	-7.400	0.464	-6.117
Gby_glob	*-3.133*	-5.941	-2.290	-7.825	-1.564	-5.003
vix	*-3.276*	-7.360	*-3.837*	-9.324	*-3.554*	-6.459
fb	*-10.446*	-17.457	*-15.772*	-35.199	*-3.462*	-6.023
tradeb	*-5.500*	-15.230	*-7.463*	-19.248	-3.020	-6.808
reer	-1.383	-7.264	-1.427	-8.046	-0.972	-4.596
1% critical value	-2.371	-2.372	-4.069	-4.071	-3.626	-3.629
5% critical value	-1.663	-1.663	-3.463	-3.464	-3.025	-3.046
10% critical value	-1.292	-1.292	-3.158	-3.158	-2.734	-2.753

Italised means variable is stationary in levels at 5%

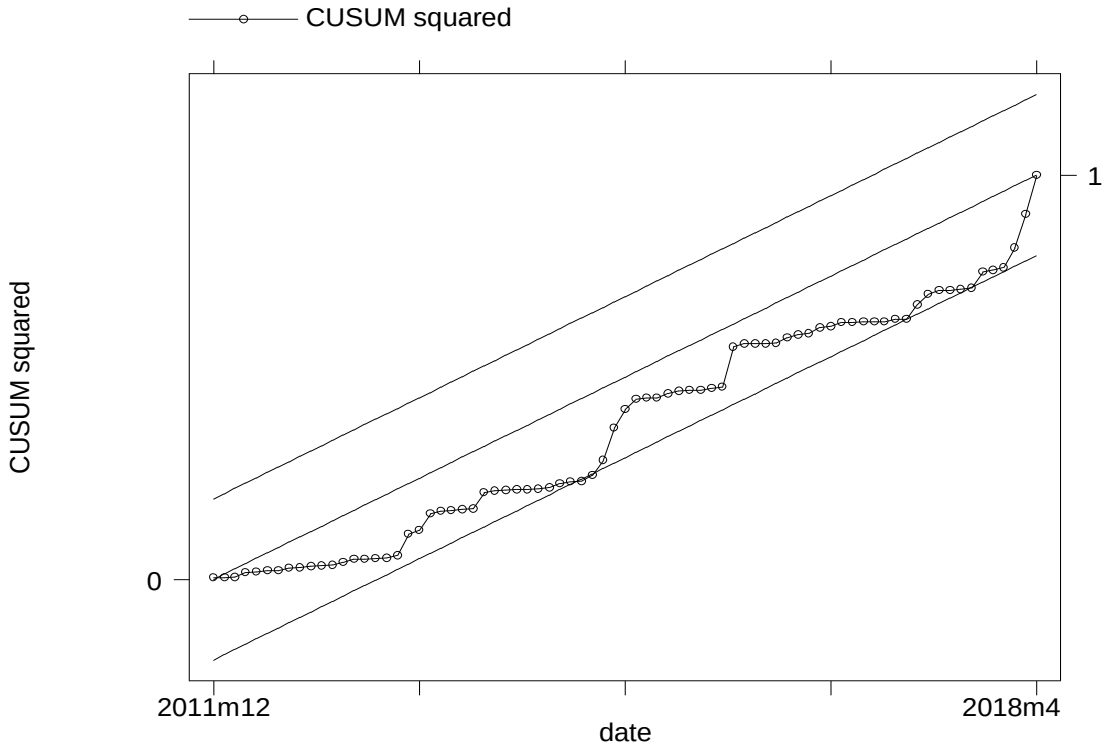
Appendix 3.7: Normality Test Results for Panel Fixed Effects Estimations



Appendix 3.8: Akaike Information Criteria Automatic Lag Selection

Variable	Gby	Fp	Polr	Ffr	Gby_glob	Fb	tradeB	reer
Lag length	2	2	0	0	1	0	0	2

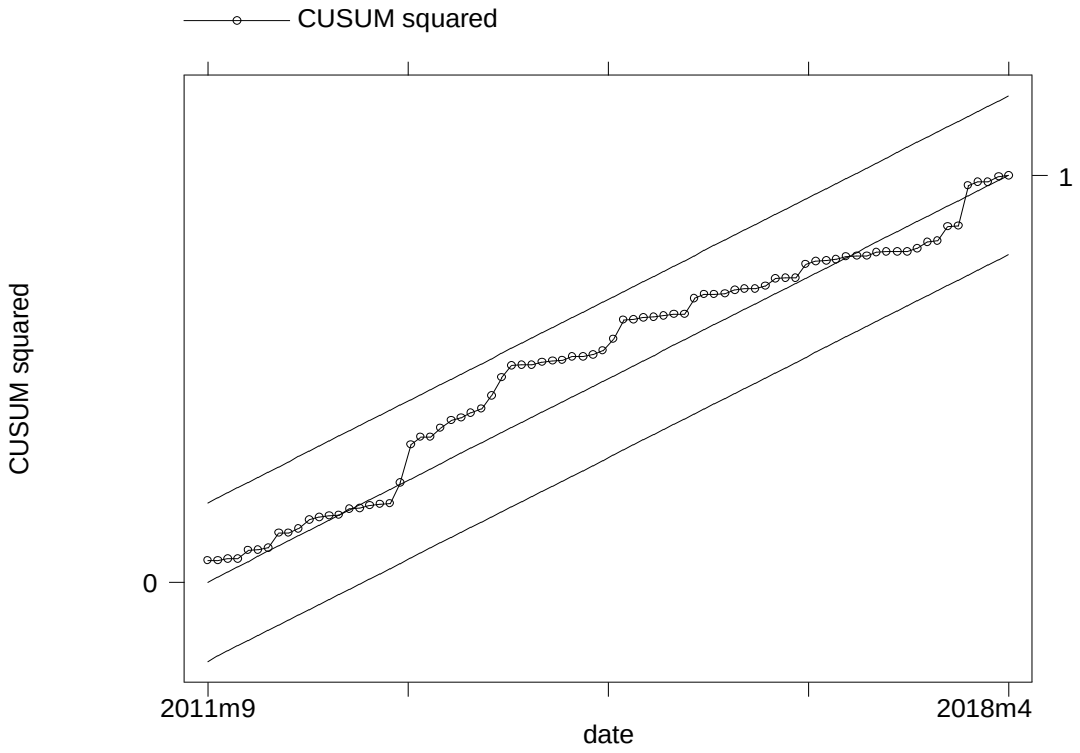
Appendix 3.9: Model Stability Test Results for Bond Yields.



Appendix 3.10; AIC Automatic Lag Selection

Variable	sdev	Fp	Polr	vix	Fb	Tradeb	Reer
Lag length	1	1	0	0	0	0	0

Appendix 3.11; Model Stability Test Results for Bond Yields Volatility



Appendix 3.12 - Summary of Empirical Studies

Author	Method	Variables	Proxy	Sign and/or significance
Baldacci and Kumar 2010- 31 advanced and EM countries	Panel data analysis- 1980-2008	short term interest rate	policy rate	positive and significant
		government bond yield	10year bond yield	dependent variable
		inflation	cpi	positive and significant
		fiscal balance	fiscal deficit to gdp	positive and significant
		government debt	GG debt to gdp	insignificant
		output growth	real GDP growth	insignificant
Peiris (2010)- 10 Ems	panel data analysis, quarterly 2000-2009	Foreign participation	Share of outstanding stock of government securities held by non-residents	negative and significant (4-6basis points)
		government bond yield	10year bond yield	dependent variable
		short term interest rate	policy rate	positive and significant
		inflation	inflation rates	positive and significant
		fiscal balance	deficit to GDP	positive and significant
		government debt	debt to GDP	insignificant
		Broad money growth		insignificant
		economic growth	real GDP growth	insignificant
		US long term yields	US 10yr bond yield	positive and significant
		current account	current account balance	positive and significant
		Domestic Volatility	Garch 1,1 construction	mixed evidence depending with country
Andritzky 2012- 20 advanced countries	Pooled panel regressions and PVAR analysis, quarterly	Foreign participation	Share of outstanding stock of government securities held by non-residents	negative and significant (3-4bps or up to 6,6bps for Euro area)
		short term interbank rate	interest rate	positive and significant
		economic growth	real GDP growth	significant but sign ambiguous
		government debt	debt outstanding to GDP	insignificant
		budget balance	budget deficit	insignificant
		Domestic Volatility	4 quarter rolling standard deviation	positive and significant
		inflation	inflation rates	insignificant
		exchange rates	nominal exchange rates	insignificant
		global volatility	Chicago VIX	insignificant
Ebeke and Lu 2014- 12 Ems	panel, ECM and Garch- quarterly 2009-2013	bond yields	5 year LCBY	dependent variable
		Foreign participation	Share of outstanding stock of government securities held by non-residents	negative and significant (7-9bps)
		policy interest rate	policy rate	positive and significant
		inflation	inflation rate	insignificant
		economic growth	changes in real GDP growth	insignificant
		government debt	public debt to GDP	insignificant
		current account balance	CAB to GDP	insignificant
		foreign reserves	FX reserves to GDP	significant
		global volatility	Chicago VIX	insignificant
		global interest rates	US federal funds rate	negative and significant
		Domestic Volatility	standard deviation of weekly changes in 5yr bonds over each quarter	negative and significant
		exchange rate	nominal exchange rates	positive and significant
Lee (2014)- 24 countries	Pooled panel regressions, quarterly 2005-2013	government bond yield	10yr bonds on average but some shorter maturities	
unpublished thesis		foreign participation	Share of outstanding stock of government securities held by non-residents	negative and significant (3bps yields reduction)
		exchange rate	nominal exchange rates	positive and significant
		global volatility	VIX index	positive and significant
		global yield	US 10yr yield	insignificant
		global rates	US federal funds rate	negative and significant
		debt	debt to GDP	insignificant
		inflation	inflation rates	positive and significnat
		domestic volatility	4quarter rolling standard deviation	insignificant

Appendix 4.1: Significant Events Breakdown by Country

Country - Egypt	Event Window(s)	Level of significance
28 Aug - 2018	5 day	10%
11 May - 2018	3 day	5%
10 Nov - 2017	3 & 5-day	10%
11 Nov - 2016		
7 April - 2015	5 day	10%
19 Dec - 2014	11 day	1%

Country - Zambia	Event Window(s)	Level of significance
24 Aug - 2018	11 day	10%
19 April - 2016	5 day	5%
24 Feb - 2016	5 day	10%

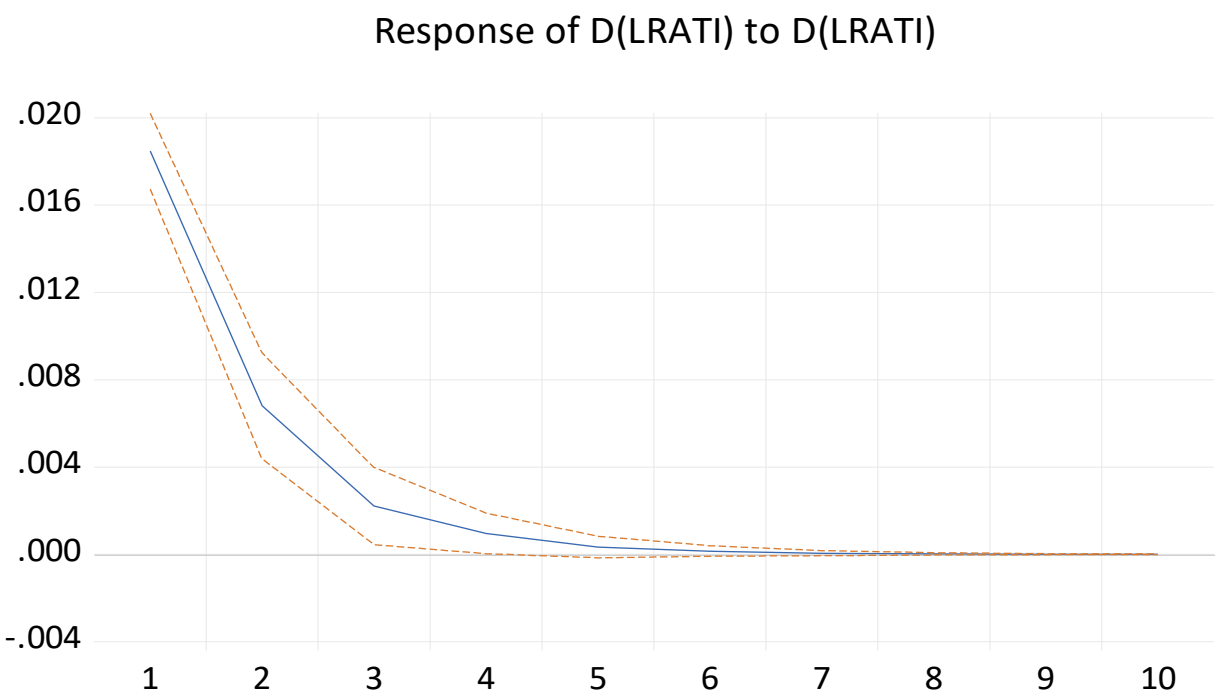
Country - South Africa	Event Window(s)	Level of significance
3 April 2017 (*2)	3, 5 & 11 day	1% & 5%
4 Dec 2015 (*2)	11 day	5%
6 Nov 2014	11 day	10%

Country - Namibia	Event Window(s)	Level of significance
2 Dec 2016	11 day	10%
11 Aug 2017	3, 5 & 11 day	1% & 5%

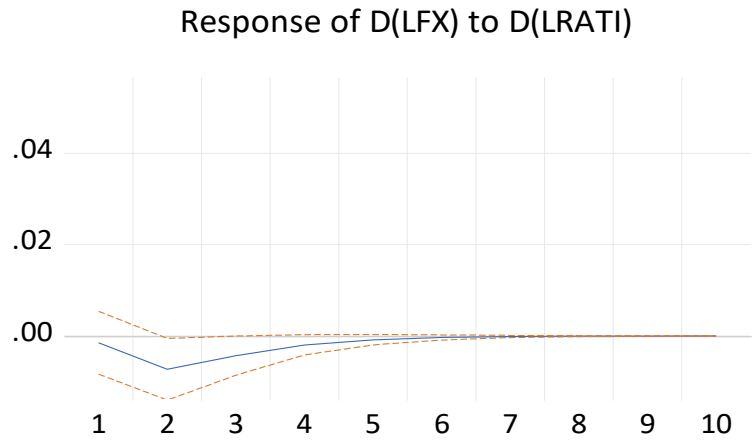
Country - Kenya	Event Window(s)	Level of significance
13 Feb 2018	5 day	5%
9 Feb 2018	11 day	5%
17 July 2015	11 day	1%

Country - Nigeria	Event Window(s)	Level of significance
25 Jan 2017	5 & 11 day	1% & 10%
23 June 2016	3 & 5 day	5% & 10%
29 April 2016	3 & 5 day	5% & 10%
30 March 2015	5 & 11day	5% & 5%

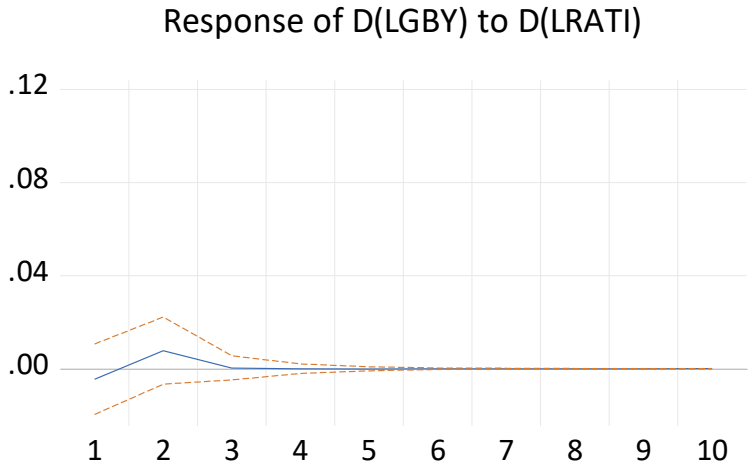
Appendix 4.2: Impulse Response Functions Analysis



Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.



Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.



Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.