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Essays on Sovereign Risk Management in African Economies

by

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Supervisor:

Professor Christopher Malikane

The thesis is submitted to the School of Economics and Business Sciences, Faculty of Commerce, Law and Management, Witwatersrand University as a Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Economics.

DECLARATION

I declare that this thesis is my own unaided work. It is submitted for the award of the degree of Doctor of Philosophy in Economics, at the Witwatersrand University in Johannesburg. It has not been submitted to this university or any other university for any other degree.

Jane John Mpapalika
Signed: .....
Date:

DEDICATION

This work is dedicated to my Heavenly Father and to my lovely family.

ACKNOWLEDGEMENTS

This thesis investigates sovereign risk management in selected African economies. I am highly grateful to God, the Almighty, for imbuing me with unceasing strength and hope while accomplishing this program. Furthermore, I am sincerely thankful to my supervisor, Professor Christopher Malikane, for his supervision, consistent encouragement and guidance throughout this journey. I also extend my appreciation to the University of the Witwatersrand, for giving me the Post Graduate Merit Award.

This thesis would not have been possible without the consistent backing of my family and friends. My special thanks goes to my family, especially my father Dr. John, my dear husband, Kelvin and my young brother, Andrew for their unceasing support and prayers and towards my fellow PhD students at the University of the Witwatersrand for their moral support.

ABSTRACT

This thesis investigates sovereign risk management in selected African economies. Recently, sovereign risk management practices have become a vital tool for attaining strategic debt benchmarks and are now an integral part of wider strategic sovereign debt management policies. The primary objective of sovereign debt management is to minimise the long-term cost of borrowing at a given level of risk. These strategic cost-risk objectives constitute the basis of the standard micro-portfolio theory to sovereign debt management. According to the principles of portfolio theory, this cost-risk trade-off requires the use of a wider cost concept and the associated borrowing requirements. From a portfolio perspective, the sovereign asset and liability management (SALM) approach may detect the sovereign risks in the sovereign balance sheet. Therefore, the sovereign debt crisis of 1980s, which was preceded by a high level of sovereign risks, has triggered a growing debate on the need for sound sovereign risk management in developing countries.

The persistent high level of sovereign risk in highly indebted poor countries is attributed to the tendency of borrowing abroad in foreign currency and servicing the debt using the government tax revenue, which is in local currency. In turn, this creates a currency mismatch when the exchange rate depreciates in a country with floating exchange rate regime. An increase in currency mismatch leads to debt accumulation and consequently, may raise the probability of a sovereign debt crisis. Sovereign debt crisis occurs when a country fails to pay the interest rate on its debt obligations because it is either illiquid or insolvent. In theory, it is suggested that the currency mismatch can be offset by matching the currency composition of foreign liabilities and the currency composition of foreign reserves. In addition, several studies highlight that the currency composition of foreign debt can be used as a perfect natural hedge to adverse exogenous shocks, in particular, the exchange rate shocks. Our study employs panel dynamic OLS and panel fixed effects to investigate the aspects of sovereign risk management in African countries. As a robustness check, we employ the seemingly unrelated regression model and the generalized method of moments with instrumental variables.

This study has three main contributions across the three aspects of sovereign risk management. The first aspect is the currency composition of foreign debt. The second aspect is the sovereign risk premium, which is the yield difference between the government bond and the 10-year US Treasury bond. The third aspect is a proposal for the use of alternative hedging instruments that can minimise the cost of debt and sovereign risks. The thesis has five chapters.

Chapter 1 is the general introduction. Chapters 2, 3, and 4 are the main chapters on sovereign risk management. Chapter 5 concludes with policy recommendations and the suggestion for further areas of research.

Chapter 2 investigates the currency composition of foreign debt in the selected African countries. I derive the foreign debt portfolio management model to determine the deviation of the debt portfolios from the optimality. In addition, I estimate our model using the panel dynamic Ordinary Least Squares. For robustness, I use the time-series Seemingly Unrelated Regression model for cross-country analysis. The findings show that the foreign debt management policies are sub-optimal in hedging external shocks. Foreign currency debt shares are significantly affected by the cross-currency exchange rate movement in British Pound/US Dollar and Japanese Yen/US Dollar. The Swiss Francs/US Dollar exchange rate is insignificant. On the other hand, the trade patterns and the structure of the economy proxied by the manufacturing sector/GDP ratio are significant in affecting the optimality of foreign currency debt portfolios in the selected in African economies. A cross-country analysis is carried out using the time-series SUR model.

Chapter 3 investigates the determinants of the sovereign risk premium in African countries. We employ the dynamic fixed effects model to determine the key drivers of sovereign bond spreads. Country-specific effects are fixed and the inclusion of dummy variables using the Bai-Perron multiple structural break test is significant at 5% level. For robustness, the time-series generalized method of moments (GMM) is used where the null hypothesis of the Sargan Test of over-identifying restrictions (OIR) and the Arellano-Bond Test of no autocorrelation are not rejected. This implies that the instruments used are valid and relevant. In addition, there is no autocorrelation in the error terms. Our results show that the exchange rate, M2/GDP ratio and trade are insignificant; hence, they are dropped out. Furthermore, our findings indicate that public debt/GDP ratio; GDP growth; inflation rate; foreign exchange reserves; commodity price and market sentiment are significant at 5% and 10% level. However, the identified structural break dates are 1979 and 1980 which are attributed to the commodity price shocks. Meanwhile, the structural breaks in 2001 and 2002 are due to the commodity super cycles. The structural breaks in 2007 and 2008 are attributed to the global financial crisis of 2007.

Chapter 4 investigates instruments for financing economic development and hedging sovereign risks in African countries. We review the current risk management instruments that are used in sub-Saharan Africa and the current status quo of African financial markets, which will assist in designing appropriate hedging instruments. Furthermore, we propose alternative and innovative hedging instruments that can be used to minimise the cost of sovereign debt and hedge sovereign risks.

Chapter 5 shows that these results have several important implications for policymakers in developing countries. From the risk management perspective, sovereign risk management should be based on the cost-risk criteria to hedge government's budgetary risks from exogenous shocks. The other implication is that policymakers should avoid risky debt structures that could raise the likelihood of future sovereign defaults. Instead, they should adopt sound risk and debt management policies to prevent macroeconomic instabilities and consequently, sovereign debt crisis. Another implication is that strengthening of the domestic financial sector policies, such as stock market development, will deepen the small and illiquid local bond markets to enable borrowing in local currency and access alternative hedging instruments. Local currency borrowing reduces exposure to currency mismatches and currency risks. Furthermore, an important policy recommendation for African countries is the adoption of fixed exchange rate targeting to smooth out exchange rate shocks.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the study

The sovereign debt crisis, which occurred in the 1980s, is attributed to imprudent borrowing policies by sovereign borrowers coupled with unfavorable exogenous shocks. Initially, the early 1970s experienced favorable commodity prices, low foreign interest rates, and stable exchange rates, which stimulated the tendency of over-borrowing. As observed by Senhadji (1997), low-income countries borrowed heavily in the international bond market, because they assume that these favorable conditions would last a long time. In contrast, Senhadji (2003), notes that the commodity price booms of the 1973 and 1974 were short-lived and the period of low interest rates ended by the early 1980s. Many African countries responded to the initial increase in oil prices by sharply expanding public expenditure with the expectations that commodity export earnings will be used to finance their growing fiscal deficits. However, Kaminsky and Pereira (1996), point out that advanced economies responded to the oil-price shocks in 1979, with an expansionary fiscal policy and contractionary monetary policies that sharply raised the real interest rate.

Hence, an increasing share of the debt service shifted to high interest payments. As shown by Demirguc-Kunt and Detragiache (1994), the rise in interest rate on loans from 1973 to 1980, increased the debt-service burden of highly indebted poor countries. Moreover, Ajayi (1991), mentions that between 1973 and 1975, less than 1% of the total debt was at a floating rate. This share steadily rose to about 49% from 1980 to1982, leading to an increase in sovereign debt risk. For instance, Kaminsky and Schmukler (1999), find that changes in foreign interest rate increases the cost of borrowing, which in turn, may lead to high probability of sovereign defaults. The likelihood of a sovereign debt crisis occurring can be measured by the size of debt service ratio or debt to exports ratio. For instance, in Nigeria, the debt is contracted at floating interest rates, and a decrease in the share of official loans. Moreover, Edo (2002), who analyses the debt dynamics in both Nigeria and Morocco, notes that the debt/export ratio for Nigeria remained at 42% and 32%, thereafter declining to 6% in 1976.

Meanwhile, Morocco's foreign debt rose from 2.7 per cent in 1980 to 3.9 per cent in 1981. Similarly, the ratio of external debt/exports, rose from 185.9 per cent in 1980 to a peak of 478.9 per cent in 1989, but declined to 145.6 per cent in 1999. Further observations by Adegbite et al. (2008), reveal that Nigeria, just like other developing countries, defaulted on its debt, because it was relatively highly indebted. Meanwhile Danielson and Mjema (1994) explain that in Tanzania, the debt crisis started in 1984,

when the worsening balance of payments position was linked to the unsustainable foreign debt. In addition, the inability to generate sufficient foreign exchange to finance imports and service debt prompted Tanzania to borrow from abroad. On the other hand, the Democratic Republic of Congo and South Sudan had a debt service ratio of more than 100 per cent in the mid-1980s. According to Sonko (1990), some countries such as the South Sudan, debt/GNP ratio exceeds 100 per cent, while Democratic Republic of Congo, exceed 200 per cent. As highlighted by Easterly (2002), South Sudan and Democratic Republic of Congo, among others, experienced difficulties in servicing their debt in the 1970s and 1980s.

However, Bromley and Bush (1994), note that Egypt accumulated huge balance of payments deficits around 15 per cent of GDP in 1986 raising the debt service obligations to around 40 per cent. More recently, Abutaleb and Hamad (2012), clarify that the debt crisis of 1987 resulted from the Egyptian economy's inability to generate sufficient foreign exchange earnings. Hence, Egypt shifted its borrowing behavior from foreign borrowing in order to borrow domestically. On the other hand, Chemingui and El-Said (2007), point out that despite the second oil price shock in 1998, the Algerian economy achieved a real GDP growth rate of 5.1 per cent mainly owing to improvement in agriculture and manufacturing sector. Similarly, Corden (1993), point out that the excessive expansionary policies adopted in Kenya from 1970 to 1971 led to balance of payment crisis.

Further analysis by Were (2001), shows that the Kenya's external debt/GDP ratio and debt/exports ratio rose from an average of 38.5% and 121.1% between 1970 and 1980 to 89.2% and 268.2% between 1991 and 1999. Other studies, e.g. Dillman (1998), explain that Tunisia experienced balance of payments problems, high level of external debt and budget deficits in the early 1980s. This in turn, raised the debt service ratio from 17% to 30% between 1981 and 1986, with the total foreign debt reaching 50% of GDP. Moreover, Pfeifer (1999), who studied the structural adjustment programmes in Morocco and Tunisia, finds that Morocco and Tunisia's debt service burdens increased in the 1990s. Egypt and Morocco have a lower debt burden in 1996 than in 1980. Currently, the indebtedness ratios are sustainable in most of the African countries signaling the reduction in the likelihood of future sovereign defaults. A study by Muhanji and Ojah (2011), indicates that the external debt to GDP ratios of 60 to 80% are sustainable for Africa, implying that when African countries contract debt, they should ensure that the debt does not exceed 80% of GDP.

Several studies show that an increase in these debt ratios is detrimental to investment and output which is consistent with the debt-overhang hypothesis. As investigated by Sturzenegger (2004), sovereign debt defaults are characterised by a decline in output

that is from 0.6% to 2.2%. Similarly, Borensztein and Panizza (2009), find that sovereign defaults are associated with a decline in GDP growth of 1.2% per year. They estimated the impact of debt crises on GDP growth using a two-step GMM-system estimator. According to Fosu (1996), the debt overhang hypothesis that a country facing large debt service payments relative to its available resources is likely to reduce growth and consequently, discourages saving and investment. Similarly, Reinhart and Rogoff (2012), find that debt is a drag on growth when the ratio exceeds the 90% threshold. More recently, Pescatori et al. (2014), indicate that high levels of debt are associated with particularly large negative effects on growth.

Due to these high debt ratios, most of the sovereign debt crises in African economies have episodes of sovereign defaults, which are associated with insolvency and illiquidity. In particular, Manasse and Roubini (2009), demonstrate that sovereign issuers default when a government fails to meet principal or interest payment on an external obligation on a due date. Countries may either be unable to repay their debt, because they are insolvent or illiquid, or that they may be unwilling to repay their debt, based on a consideration of the relative costs and benefits of default. Several studies have shown evidence of sovereign defaults in African countries. For instance, Furceri and Zdzienicka (2012); Laeven and Valencia (2013), have identified sovereign defaults in the Democratic Republic of Congo in 1976; Egypt in 1984; Gabon in 1986 and 2002; Nigeria in 1983; South Sudan in 1979 and Tanzania in 1984. After sovereign defaults, attempts were made to restructure their bilateral and multilateral debts by undertaking structural adjustment programmes in the late 1980s and early 1990s.

1.2 Significance of the study

An understanding of the nature of sovereign risks enables policymakers to formulate sound debt risk management policies to achieve the targeted debt and risk benchmarks that will prevent sovereign defaults. In essence, Dooley (2000), suggests that minimising the cost of servicing debt is highly likely to be an inefficient policy for low-income countries, because such a policy raises the cost of sovereign default. However, sound sovereign risk management provides fiscal insurance against macroeconomic volatility, which in turn, reduces default risks and boosts economic performance. For instance, Muhanji and Ojah (2011), note that African countries are highly exposed to sovereign risks, due to the ineffective management of external shocks. As agreed by Easterly (2002), the external debt problem in heavily indebted poor countries is attributed to the poor management of sovereign risks.

However, this study contributes to the existing knowledge in terms of the key aspects of sovereign risk management across three dimensions. The first contribution is on the currency composition of foreign debt in African countries in a sovereign debt

portfolio framework. This chapter extends the work of Hussein and Mello (2001), who only consider the exchange rate risks to investigate the optimality of foreign debt portfolios. I extend the analysis by including trade patterns and the structure of the economy. The second contribution is on the determinants of sovereign risk premium which builds on the works of (Martinez et al. 2013). They determine the key drivers of the sovereign risk premium in the Latin American countries. Most of the studies e.g. Cuadra et al. (2010), Comelli (2012), Csonto and Ivaschenko (2013), focus their analysis on sovereign spread determinants in the emerging market economies. We extend this study to African countries by using the generalized method of moments with instrumental variables. The third contribution is that our study extends existing financing instruments, by proposing the alternative financing instruments that can hedge sovereign risks and minimise the cost of sovereign debt in African countries.

1.3 Motivation of the study

This study aims to address the dearth of studies investigating the management of sovereign risks for each of the African economies. A few studies e.g. Claessens and Qian (1991) highlight that risk management instruments, in particular, commodity linked bonds can diversify sovereign risks and reduce the cost of debt. Another study by Claessens (1992), only examines one aspect of sovereign risk management that is the currency composition of foreign debt. Despite the high level of indebtedness in African economies, limited empirical studies have been done on sovereign debt risk management in Africa.

In addition, this study is motivated by the evidence of sovereign defaults in African countries. Several studies such as Ciarlone and Trebeschi, (2005); Manasse and Roubini (2009) identify sovereign defaults in Algeria from 1991 to 1997; Congo Democratic Republic in 1970, 1975 and 1985; Egypt in 1980- 1991, and in 1995; Morocco in 1983-1992 and in 1999; Nigeria in 1972, 1983, 1986-1987; Kenya in 1990; South Sudan in 1976 and Tunisia in 1991. Most of these sovereign debt defaults were attributed to poor sovereign debt management policies.

1.4 Research hypothesis

(i) The currency composition of foreign debt can be used as a hedging instrument against exogenous shocks in African economies.

(ii) The sovereign risk premium is determined by both the fundamental factors and the global factors in African economies.

(iii) Alternative hedging instruments minimise the cost of debt and sovereign risks in African countries.

1.5 Financial markets in the African countries

The development of financial markets in sub-Saharan Africa differ from one country to another due to differences in their economic development. Several studies have analyzed the link between financial market development, in particular, the stock market development and economic growth. Studies such as Nieuwerburgh et al. (2006), find strong evidence that a deeper financial system stimulates economic growth in both developed and developing countries. In addition to stimulating economic growth, Demirguc-Kunt and Levine (1996), clarify that larger stock markets are less risky and highly integrated with the international capital market than they are with smaller markets. Although, the development of stock markets leads to economic growth, some studies argue that financial markets in African countries are still illiquid, and too shallow to meet the growing financing requirements across the region.

For instance, Allen et al. (2011), note that the financial markets in most of the African countries are still shallow and have less access to the international capital market. More recently, Mu et al. (2013), maintain that domestic debt markets in these countries have short-term maturities, lack reliable yield curves and are relatively small in size. With the exception of South Africa, Nigeria, Kenya and Egypt, African stock markets are underdeveloped in terms of listed companies and market capitalization. The stock exchanges in South Sudan; Gabon; Democratic Republic of Congo; Tanzania and Algeria are still very small and illiquid. The Dar es Salaam stock exchange in Tanzania remains shallow because the sovereign bond market is still short-term. More recently, Allen et al. (2011), indicate that African markets remain illiquid due to the few listed companies.

Further investigation by Sugimoto et al. (2014), reveal that the investor's base is narrow, in particular, the participation of institutional investors e.g. mutual funds and pension funds in African securities markets is generally limited. As explained by Borensztein and Panizza (2009), institutional investors incur more cost on government debt, which prompts them to enter international capital markets, because they are unable to raise the amount required from the underdeveloped local bond markets. However, only a few countries enjoy the active participation of foreign investors in their debt markets, which may be as a result of underdeveloped capital markets and high sovereign risks. Importantly, Christensen (2005), argues that

broadening of the investor's base is a crucial aspect in debt market development, where a diversified investor's base will prevent excessive reliance on bank borrowing. As a result, it reduces the crowding out effect. For instance, Abbas and Christensen (2010), point out that the issuing of domestic debt may also lead to severe crowding out effect on private sector investment.

Another criticism is that domestic debt is viewed as more expensive, due to its short-term maturity in most of the low-income countries. As noted by Adelegan and Radzewicz-Bak (2008), sub-Saharan African countries are faced with a significant liquidity risk due to roll-over debt. On the other hand, Bua et al. (2014), is in favour of domestic debt, because it has lower exposure to currency risk. Generally, the long-term domestic debt reduces currency and maturity mismatches only in the presence of sound institutional and macroeconomic policies. In practice, Enisan and Olufisayo (2009), specify that short-term maturity e.g. three month T-bills, dominates debt markets in Africa. However, in theory, the length of the maturity structure can be viewed as a measure of the degree of market development.

In recent years, some countries have made substantial changes from relying on multilateral loans and bank borrowing, to bond financing. According to Allen et al. (2011), there were only five stock exchanges in North African countries. More recently, Presbitero et al. (2016), point out that sovereign bond issuances by African countries in the international capital market rose, whereby African economies issued 22 sovereign bonds from 1995 to 2012. According to Olabisi and Stein (2015), Ghana was the first African country to issue sovereign bonds in the international capital market in 2007 followed by Tanzania and Zambia. In 2014, Kenya issued long-term bonds five-year up to 10-year maturities worth $2 billion. As a result, these sovereign bonds issues were oversubscribed. The bond markets in South Africa are relatively well developed for government securities, where nominal sovereign bonds are highly liquid than linked bonds. Hence, this reflects the investor's behavior of buying and holding stocks regardless of the market fluctuations.

Most of the African economies have been attracted to capital market so that they can access long-term debt. Moreover, Presbitero et al. (2016), indicate that from 2005 to 2013, developing countries, specifically those in sub-Saharan Africa, issued 11 international sovereign bonds. Nevertheless, in 2015, the issuance of bonds declined due to low export earnings in developing countries. Countries such as South Africa, Kenya, Nigeria and Egypt have relied on domestic financing to avoid currency risks associated with foreign currency borrowing. On the other hand, Abbas and Christensen (2006), suggest that Gabon, Sudan, Democratic Republic of Congo and Algeria have recently developed domestic debt markets. The increase in the Eurobond issuance is due to the changes in the lending conditions imposed by

multilateral institutions such as the International Monetary Fund. It required borrowing on non-concessional rates for low-income countries. As investigated by Dreher (2006), the IMF imposed more stringent conditions on its loans because of the increasing demand during the Asian financial crisis.

From the macroeconomic policy perspective, Ul Haque (2002), reveals that the development of domestic bond markets requires sound macroeconomic policies, e.g. fixed exchange rate targeting and fiscal policy rules. Further analysis by Burger and Warnock (2007), indicates that deeper bond markets will provide innovative hedging instruments that will enable investors to hedge their exchange rate risk, which in turn increases the competitiveness of these markets. An interesting observation by Frankel et al. (2008) is that South Africa, being one of the few developing countries with deep and liquid financial markets is able to borrow in rands, unlike the rest of the African countries, who are obliged to borrow in foreign currencies. But, given the current nature of most of the bond markets in African economies, it is unlikely that African countries will develop their bond market to accommodate the growing financing needs and to broaden the investor's base. One reason that Kapingura and Makhetha-Kosi (2014), stress is that debt markets are shallow, with non-existent corporate bond markets.

1.6 Stylised financial facts about African countries

Table 1: Indicators of stock market development in Africa (averages from 1971-2012)

Country	Stock market capitalisation	Number of listed companies	Stocks traded total value (% of GDP)	Stocks traded turnover ratio (%)
Algeria	-	-	-	-
DRC(Congo)	-	-	-	-
Egypt	37.54	810.2	22.02	39.44
Gabon	-	-	-	-
Kenya	44.82	100	2.83	9.21
Morocco	18.68	119.8	17.58	2.22
Nigeria	36.20	313.6	3.60	13.97
South Africa	198.12	549.30	95.41	53.79
South Sudan	-	-	-	-
Tanzania	0.78	1.1	0.01	0.38
Tunisia	10.75	31.2	1.74	6.63

Source: World Bank development indicators. (i) Market capitalisation is the size of the stock market/GDP ratio (ii) Number of counters refers to the number of listed companies in the respective stock markets.

Table 1 illustrates that Egypt has the highest number of listed companies, that is, 810.2, followed by 549.30, 313.6 and 119.8 for South Africa, Nigeria and Morocco. Several studies use the stock market capitalization to GDP ratio, the total value of stocks traded to GDP ratio and the stocks turnover ratio as a measure for stock market development. As explained by Bayraktar (2014), stock market capitalisation

is an indicator of stock market's ability to diversify investor's risk whereas the stocks traded to GDP and turnover ratios are indicators of market liquidity. Cross-country observation shows that the Johannesburg stock exchange (JSE) in South Africa dominates the region in terms of market capitalization, but the stock exchange in Egypt has significantly improved their stock market performance. Generally, Eichengreen and Luengnaruemitchai (2004), state that well capitalized financial systems are an important catalyst for bond market development.

The capital market in sub-Saharan Africa is relatively small when compared to advanced economies with the exception of South Africa. In the early 1990s, the financial sector expanded from having nine to eighteen markets in the early 2000s. Clearly, Adjasi and Biekpe (2005), indicate that there are over 20 stock markets in Africa. More recently, Cooray (2010) confirms that the size of the capital market as measured by the stock market capitalisation to GDP ratio is 124.5 in African economies. Further observations by Kappingura and Makhetha-Kosi (2014), prove that government bond market capitalisation as a percentage of GDP, is 14.8% in 2010. In addition, Mu et al. (2013), observe that the government bond as a share of total market capitalisation is 89.2% compared to 10.2% of corporate bonds.

However, Andrianaivo and Yartey (2009), suggest that that the number of listed companies in the African stock markets is still small, with the exception of South Africa, Nigeria and Egypt. Both South Africa and Egypt account for more than 50% of all listed companies in the sub-Saharan African region, whereas institutional investors have limited participation in the secondary market. In contrast, Claessens et al. (2007), explain that larger and advanced economies encourage the active participation of institutional investors e.g. pension funds, which is an important aspect of stock market development. This evidence confirms the crowding out effect hypothesis in developing countries, which is attributed to increased participation of the public sector in the market.

Generally, the different countries in Africa portray both relatively low ratios of market capitalization and a less developed corporate bond market compared to the government bond market. For instance, Demirguc-Kunt and Levine (1996), confirm that South Africa, had market capitalisation ratios greater than 1.00 from 1986 to 1993, while Nigeria, had market capitalisation ratios of less than 0.10 in the same period of time. In Nigeria, the total value traded/GDP ratio was about 0.01 from 1986 to 1993, whereas in South Africa, there was a turnover ratio below 0.05. Moreover, Yartey (2008) shows that the value traded/GDP ratio in South Africa rose from 10% in 1990 to 8%. In theory, an active but relatively small capital market will have a high turnover with a small market capitalisation.

1.7 Problem statement of the study

The sovereign debt crisis in the 1980s highlights the need for sovereign risk management in commodity exporting countries in order to prevent sovereign defaults. However, relatively few studies, e.g. those of Claessens (1991); Claessens and Qian (1992), investigate risk management in Sub-Saharan Africa. This is despite of the evidence of sovereign defaults in sub-Saharan Africa. For instance, Reinhart and Rogoff (2004), find that Algeria defaulted from 1991 to 1997; Democratic Republic of Congo defaulted in 1970, 1975 and 1985; Egypt defaulted from 1980 to 1991, and in 1995; Morocco defaulted from 1983 to 1992 and in 1999; Nigeria defaulted in 1972, 1983, and from 1986 to 1987; Kenya defaulted in 1990; South Sudan defaulted in 1976, and Tunisia defaulted in 1991.

Most of the studies on the African debt crisis such as those of Deaton (1999) and Senhadji (2003), confirm oil price shocks as the major factor contributing to the external debt problem. From 1973 to 1974, the oil price for a number of commodities rose sharply, followed by a decline later in the 1970s. The initial temporary increase in commodity export earnings encouraged many African countries to raise their public expenditures and the associated fiscal deficit. Further observation by Lekomola (2010) shows that when the commodity prices fall governments were required to pursue additional borrowing to maintain expenditure levels due to insufficient domestic savings to finance fiscal deficits.

Insufficient domestic savings can be justified by the "dual-gap theory", which stipulates that domestic savings are insufficient to support investment and the level of economic development. Hence, Michael and Sulaiman (2012), maintain that this savings-investment gap must be filled by foreign borrowing. In response, developing countries were required to opt for foreign borrowing from multilateral and bilateral institutions, which extended their loans on concessional terms and at a relatively low interest rate. As shown by Fosu (1996), the bulk of loans to African nations in 1970s were long-term and on concessional terms. Further to this, Adegbite et al. (2008), explain that usually, the external financing takes place in the form of external loans, which have long-term maturity and are on concessional terms. However, when the export earnings declined and the foreign interest rates e.g. the LIBOR rose, most of the low-income countries were unable to absorb the shock in the late 1970s, which worsened their indebtedness.

In turn, this indebtedness led to sovereign defaults and a decline in aggregate output, which prompted several studies to investigate the link between external indebtedness and output in the "debt overhang hypothesis". For instance, Kasidi and Said (2013), find that the size of the debt relative to the size of the economy is high. Theoretically,

Reinhart et al. (2012), find that when the public debt/GDP exceeds the threshold of 90%, then the public debt becomes unsustainable, and is associated with lower growth, which is detrimental to economic improvement. Other studies such as those by Edo (2002) and Cleassens et al. (1996), give empirical evidence of the existence of debt overhang hypothesis in African economies. Importantly, Bordo et al. (2010), point out that the increase in foreign debt raises the likelihood of sovereign debt defaults.

From the policy perspective, Muhanji and Ojah (2011), note that the high external debt accumulation in African countries is attributed to poor macroeconomic policies. In this case, sound sovereign risk management will ensure that the optimality of foreign debt portfolios is attained, easy access to alternative hedging instruments and macroeconomic stability. In turn, the likelihood of sovereign defaults will be minimized. As noted by Mu et al. (2013), without access to alternative sources of finance in the international capital markets, many African countries will find it difficult to meet their financing requirements. Some studies such as that by Claessens (1992), propose the use of currency composition of foreign debt as a natural hedging instrument. Other studies e.g. Lu and Neftci (2008); Atta-Mensah (2004), suggest the use of linked-bonds e.g. commodity-linked bonds or GDP-linked bonds or bonds embedded with put options to hedge sovereign risks. Lastly, Dooley (2000), suggests that developing countries ought to avoid risky public debt structures, such as floating-rate debts or short-term foreign currency debt to prevent defaulting on their debts.

1.8 Organisation of the study

The rest of the study is organised as follows. Chapter 2 investigates the optimality of foreign debt portfolios in African economies. Chapter 3 investigates the determinants of sovereign risk premium in African economies. Chapter 4 proposes alternative risk management and financing instruments in African countries. Chapter 5 concludes with policy recommendations.

CHAPTER TWO: IS THE FOREIGN DEBT PORTFOLIO OPTIMAL IN AFRICAN ECONOMIES?

2.1 Introduction

This study investigates the degree of optimality of foreign debt portfolios in the selected African countries. The optimality of foreign debt portfolios depends on the type of shocks hitting the economy. In particular, Eichengreen et al. (2007), point out that if a country's debt obligation is denominated in foreign currency, then real exchange rate depreciation will make it more difficult to service that debt. According to Furceri and Zdzienicka (2012), this inability to borrow in domestic currency in developing countries is referred to as "the original sin hypothesis". Thus, in a floating exchange rate regime, the depreciation of the exchange rate creates currency mismatch between sovereign assets and liabilities. In turn, Jankovic and Zivkovic (2014), observe that currency mismatch raises the financial instability and the probability of sovereign debt crisis. Therefore, a key policy issue facing policymakers is the trade-off between cost and risk minimisation, which forms the basis of the standard micro-portfolio theory.

A thorough understanding on the degree of optimality of foreign debt portfolios is important to policymakers in designing appropriate policies for minimising the cost of debt. As pointed out by Hussein and Mello (2001), sound debt risk management policies oriented towards optimality of debt portfolios can minimise the cost of servicing debt. An important aspect of sovereign debt risk management is the currency composition of foreign debt. Several studies such as Claessens (1992), argue that an optimal currency composition of foreign debt can be used as a hedging instrument against exogenous shocks. However, the main contribution of this study is to investigate the degree of optimality of foreign debt portfolios in an optimal foreign debt portfolio framework. This study is built on the works of Hussein and Mello (2001), and extends their model to incorporate trade patterns and the structure of the economy, which is proxied by the manufacturing sector/GDP ratio. In addition, we estimate our model using dynamic OLS. As a robustness, we employ the seemingly unrelated model to capture cross-country differences.

An important gap that this chapter fills is that the existing studies on the currency composition of foreign debt as an aspect of sovereign risk management are still limited. The few extant studies such as those by Kroner and Claessens (1991); Atta-

Mensah (2004); Cassard and Folkerts-Landau (1997), focus on the analysis of emerging market economies' sovereign risk management. This is despite the fact that a large proportion of highly indebted countries are in Africa. A few studies, e.g. those of Kose and Riezman (2001), Muhanji and Ojah (2011), focus on the role of exogenous shocks in increasing the accumulation of foreign debt by African economies. These studies identify the interest rate, the commodity price and the trade shocks as the unhedged external risks that affect the accumulation of foreign debt accumulation in African economies. Therefore, this study will add knowledge to the existing studies by analyzing the aspect of currency composition of foreign debt in African economies.

The structure of the paper is as follows: Section 2.2 reviews the literature; section 2.3 derives the theoretical framework; section 2.4 provides the empirical methodology; section 2.5 analyzes stylized facts; section 2.6 describes data; section 2.7 presents the empirical results; and section 2.8 concludes with some policy recommendations.

2.2 Literature review

The sovereign debt crisis of the 1980s has renewed interest on the sovereign risk management literature in developing countries. Given the importance of sovereign risk management in developing countries, there are limited empirical studies on this issue. For instance, Cassard and Folkerts-Landau (1997), point out that effective management of sovereign risks requires sound institutional frameworks that will offer suitable incentive structures for sovereign debt management. In addition, the study identifies the key institutional framework of sovereign risk management to be the derivation of strategic benchmarks. This involves specifying the preferred currency composition of the foreign debt; the debt maturity either short-term or long-term; fixed rate or floating rate. As a policy implication, their study suggests reforms in the institutional arrangements governing asset and liability management policies. Such an objective is best achieved if debt management is assigned to an independent debt management agency with a degree of autonomy.

Another study was done by Claessens and Qian (1991), who investigated the sovereign risk exposure particularly in sub-Saharan Africa. They estimated the optimal portfolio of financial instruments for sub-Saharan Africa using the vector-autoregressive model (VAR). This study used annual data over the period 1965-1988 for five commodities. They find that commodity price risk to be the most significant sovereign risk affecting sub-Saharan Africa. From the risk management perspective, they propose commodity price linked bonds as a hedging and financing instrument in the region. In addition, Claessens (1992), examined the effect of exchange rate risk on the optimality of the currency composition of foreign debt, using monthly data

over the period 1970s and 1980s on Brazil and Mexico. The authors find that Mexico and Brazil can lower their external exposure by continuously altering the currency composition of foreign debt portfolios.

According to Hussein and Mello (2001), an interesting feature about asset and liability management models is that they are now applied in optimal debt portfolio management. These models suggest that the share of an asset portfolio ought to be equal to its rate of return, and that risk-averse investors should hedge against fluctuations in the liability. This is line with the modern portfolio theory developed by Markowitz (1952) and Tobin (1963), in which risk-averse investors choose a portfolio that will maximize their expected return and minimise risks. Mean-variance (MV) efficiency is the classical paradigm for portfolio optimization and the foundation of modern portfolio theory. This development of portfolio theory has been applied in the asset and liability framework, which is integrated into debt management policies in order to achieve optimal debt portfolios based on the cost and risk criteria.

The traditional asset and liability management approach focuses on exchange rate risk and liquidity risk, because they predominantly affect the sovereign's balance sheet. As pointed out by Das et al. (2012), emerging market economies are increasingly exposed to exchange rate and rollover risks, because they were unable to borrow in their own currencies. Moreover, Jankovic and Zivkovic (2014), explain that when the exchange rate depreciates, a currency mismatch occurs between the sovereigns' liabilities, which are in foreign currencies, and the assets, which are largely in local currencies. As a result, currency mismatch increases financial vulnerabilities, and the likelihood of a sovereign default. Therefore, sovereign risk management is important to sovereigns whose balance sheets are affected by currency mismatches, due to the differences in the currency composition of their assets and debts.

Subsequent literature identifies two conflicting objectives of sovereign debt management that is cost minimisation and risk minimisation. In his seminal paper, Tobin (1963), assigns debt management policy with the dual objectives of minimising the cost of debt and maintaining macroeconomic stability. In instances where the conflicting dual objectives arise, then the cost minimisation objective will be viewed as the secondary objective to the stabilisation role. However, the primary objective of debt management should be consistent with monetary and fiscal policy in order to achieve the same goal of macroeconomic stabilisation. Similarly, Boothe and Reid (1992), point out that the debt management policy as a counter-cyclical fiscal policy instrument requires financing decisions of the fiscal authority to independently influence the level of domestic interest rates. More recently, Melecky

(2012), argues that the objectives of sovereign debt management are both cost and risk minimisation. In contrast, Dooley (2000), suggests that minimising debt service costs is likely to be a highly inefficient policy for governments of developing countries, because such a policy increases the cost of default.

A related strand of literature highlights that debt management and monetary policy are jointly instruments of macroeconomic stabilisation. For instance, Cassard and Folkerts-Landau (2000), thoroughly analyzed the conflict of interest between monetary policy and debt management if the central bank assumes an active participation in the debt markets. More recently, Singh (2015), has stressed out that the central bank may decide not to raise the short-term interest rate in the face of rising inflation, for fear of raising the rollover risks. In addition, the central bank's sterilized intervention policy may be in conflict with managing the liquidity of the foreign debt. On the other hand, the Ministry of Finance maintains its operational role in managing debt. Moreover, Cassard and Folkerts-Landau (1997), note that such separation of responsibilities in managing sovereign assets and liabilities is viewed as optimal by policy makers because of their potential conflicts of interest between monetary policy and debt management, which may compromise central bank independence.

Building on the optimal taxation literature by Bohn (1990), most of the debt management models emphasise on the risk minimisation objective that supports the efforts of sovereign debt management in smoothing taxes. According to Faraglia et al. (2008), this risk minimisation objective, that indicates the smoothing out of the sovereign budget against macroeconomic instabilities, is referred to as the "fiscal insurance theory" of sovereign debt management. Thus, Missale (1999), observes that despite the fact that the macroeconomic literature argues in favour of the cost minimisation objective, interestingly, empirical findings in favour of this objective are rare. In addition, sovereign debt management should reflect on the macroeconomic risks, which determine the degree of fiscal insurance and fiscal vulnerability. As argued by Missale (1997), debt management ought to emphasise the objective of minimising the government budget exposure to macroeconomic risks, unless this objective is costly. For instance, inflation-indexed bonds usually hedge the budgetary effects of adverse demand side shocks.

However, Missale (2012), note that the issuance of inflation-linked bonds does not solve the time inconsistency problem, because the government has an incentive to render the value of inflation-linked debt ineffective by inducing depreciation in the real exchange rate. Moreover, time-inconsistency problem arise when the government has an incentive to deviate from the initial path of taxes announced by the previous government. In turn, it can lead to welfare loss. As suggested by

Falcetti and Missale (2002), the government can issue long-term fixed rate nominal debts by making unexpected changes in tax policy. This option can be costly because of the distortionary effects caused by time-varying inflationary rates and the associated welfare loss. Also, the government can issue foreign currency debt, but it cannot inflate its debt obligations in order to do away with them.

The tax-smoothing literature emphasises the minimisation of the increase in taxes or in the value of debt. According to the Ricardian equivalence theory, taxes and debt are perfect substitutes in financing. An important observation by Bohn (1990) is that if taxes are distortionary, tax smoothing becomes a vital factor in determining the level of debt. Furthermore, Smart (1998), notes that if an increase in tax leads to welfare loss (deadweight loss), then the optimal policy objetive would be to minimise tax and select the portfolio that yields the the highest returns e.g. long-term indexed debt. However, Bohn (1994) specify that the optimal taxation theory holds that sovereigns should minimise budget uncertainty, so as to offset the risk of tax adjustments. In addition, they should be ready to pay a premium to avoid risk, provided that such premium reflects a fair price for insurance. Some studies, such as those by Giavazzi and Missale (2004), Mendonca and Pessanha (2014), have suggested fixed rules e.g. exchange rate targeting and inflation targeting for policy rather than discretion.

An important aspect of sovereign risk management is the currency composition of foreign debt. As shown by Melecky (2010), policymaker's objective is to choose an optimal currency composition of foreign debt in which the exchange rate vis-a-vis the domestic currency is relatively stable. Choosing an optimal currency composition of foreign debt is crucial, because it minimises the cost of debt. Furthermore, Kroner and Claessens (1991), specify that the optimal currency composition of foreign debt is primarily determined by the relative magnitudes of variances of exchange rates and covariances between domestic fundamentals and the exchange rates. As noted by Hussein and Mello (2001), if a country's debt is, for example, denominated in US dollars and Japanese Yen, then, the appreciation of the yen relative to the US Dollar will cause the US Dollar value of the share of debt denominated in yen to increase.

This is in line with Cassard and Folkerts-Landau (1997); Corsetti et al. (1999), who find that the sovereign debt crises in Asia and emerging market economies were triggered by the adverse movements in the US Dollar/Yen exchange rate. However, in a purely neo-classical theory, exchange rate movements are expected to have no effect on the debt shares, due to the assumption of flexible prices and perfect competitive markets. This implies that changes in price will offset exchange rate fluctuations so that the law of one price can hold. Meanwhile, Melecky (2010), notes that altering the currency composition of a country's foreign debt portfolio exhibits

some rigidity. According to Shioji (2006), if a country choose to trade with the US, therefore, their financial transactions will be predominantly denominated in the US Dollar. In addition, a high share of official loans e.g. multilateral and bilateral loans may also lead to rigidity.

The literature following the debt crisis in the early 1980s has focus on the country's inability to issue debt in their own currencies, known as the "the original sin". The "original sin hypothesis," is defined as the inability of a country to borrow abroad in domestic currency. This literature, as evidenced by examples such as Eichengreen et al. (2002), Hausmann and Panizza (2003), generally finds that institutional and macroeconomic factors explain the ability of countries to issue in domestic currency. In a different study, Jeanne (2003), observes that monetary credibility is crucial for liability dollarization. In another study, Loayza et al. (2007), attribute the "original sin" to illiquid domestic bond markets and lack of a reliable investor base. More recently, Claessens et al. (2007), made a thorough analysis of both advanced economies and developing economies. This study finds that economies with deeper domestic financial markets as proxied by stock market capitalisation issue less foreign currency debt, hence, they do not suffer from the "original sin" problem.

Other studies such as those by Eichengreen et al. (2003), argue that the inability to issue debt in domestic currency is due to unwillingness of foreign investors to hold debt of developing countries because of the high-risk premium. Meanwhile, Ebeke and Lu (2015), point out that risk-averse borrowers would prefer to borrow either in foreign currency or local currency if the country's central bank is committed to either exchange rate stability or interest rate stability. Another possible reason for countries to opt for foreign currency borrowing can be explained by the dual gap theory or the saving-investment gap. This theory postulates that investment is a function of savings, and that in developing countries, the level of domestic savings is not sufficient to finance investment. In principle, Ajayi and Khan (2000), have stated that countries can borrow abroad as long as the funds acquired generate a rate of return that is higher than the cost of borrowing the foreign funds.

However, findings by Edo (2002), portray that foreign currency debt affects economic growth in Nigeria. This is consistent with the theoretical literature pointing to the existence of "debt overhang" in African economies. For instance, Edo (2002), finds evidence of "debt overhang" in Nigeria and Morocco. Similarly, Bebczuk et al. (2006), Bordo et al. (2010) have indicated that foreign currency debts are associated with lower growth rates, and that there is likelihood of financial crisis in emerging market economies, such as the Mexican tequila crisis of 1994. Using a cross-country analysis on emerging market firms, Kamil (2012), finds that the heavy reliance on foreign-borrowing is a source of financial vulnerabilities, especially when a country

switches to a fixed exchange rate regime. In contrast, Bordo and Meissner (2006), show that the exposure to foreign currency debt does not necessarily affect output and raise financial vulnerabilities, citing some countries, like Canada and Australia, who did not suffer from financial fragility despite their state of 'original sin'. In fact, if foreign currency debt is effectively managed, it can be productive.

An important observation in the literature is that foreign currency debt can be used as a hedging instrument. Findings by Kedia and Mozumdar (2003) reveal that firms prefer foreign currency borrowing to hedge their exchange rate risk exposure both in closely related currencies and the underlying currency. Their study affirms that firms should issue debt in the currencies of countries in which they operate to hedge the underlying exchange rate risk exposure. For instance, a British subsidiary of a French firm generates the firm's revenue in British pounds. This in turn, exposes the French firm to French francs/British pound exchange rate. By issuing debt denominated in British pounds, Allayanis and Ofek (2001); Elliott et al. (2003), note that the French firm can hedge this exchange rate exposure.

2.3 Theoretical framework

This study builds on the works of Hussein and Mello (2001), who developed an optimal debt portfolio management model, where a country's foreign currency debt is affected by adverse exchange rate movement. Hence, our model extends Hussein and Mello's model by incorporating the trade patterns and differences in the structure of the selected country's economies. Assume that a country's foreign debt is denominated in *n* currencies. Let currency *n* be the numeraire, then the cross-currency exchange rate e_i is defined as the value of currency *i* per unit of currency *n*. In turn, the optimality of the currency composition of foreign debt will depend on the type of exchange rate shocks, trading partners, and the structure of their economies.

As observed by Kroner and Claessens (1991), Claessens et al. (2007), most developing countries are exposed to exchange rate uncertainty. In addition, Shioji (2006), state that if a country choose to trade with the US, their financial transactions will be predominantly denominated in the trading partner's currency that is in the US Dollar. In this sense, a country can effectively use the currency composition of external debt to hedge these exogenous shocks. Therefore, Boothe and Reid (1992), state that the objective of sovereign debt management policy is to minimise the cost of debt defined as $\min_{D_{it}} C_t(A_t; D_{it})$, where A_t and D_{it} represent foreign assets and foreign debt denoted in currency *i*. Hence, the policymaker's objective subjected to the following constraint is given by:

$$\min_{D_{it}} C_t\left(A_t; D_{it}\right)$$

subject to constraint $D_t = \sum_{i=1}^{n} \frac{D_{it}}{e_{it}}$

where C_t represent the cost of debt at time t. The total foreign assets at time t is denoted by A_t and the foreign debt denominated in currency *i* is represented by D_{it}. The exchange rate is represented by e_{it}, which is defined as the value of foreign currencies per unit of the US Dollar. However, D_t is defined as the total value of debt denominated in foreign currencies. Note that the cost of minimising foreign debt can be written as:

$$C_t = \frac{1}{2}\left[A_t - \sum_{i=1}^{n}\left(\frac{D_{it}}{e_{it}}\right)^2 - \sum_{i=1}^{n}\left(\frac{D_{it}}{S_{it}}\right)^2 - \sum_{i=1}^{n}\left(\frac{D_{it}}{T_{it}}\right)^2 \right] \quad (1)$$

Equation (1) is a cost minimisation function with e_{it} as the cross currency exchange rate, S_{it} as the structure of the economy, proxied by the manufacturing sector/GDP ratio, and T_{it} as the trade patterns. As pointed out by Claessens and Qian (1991), currency risks arise because sub-Saharan African economies borrow in foreign currencies such as in US dollars, French francs, Japan yen and other multiple currencies. This means that the cost of servicing debt for sub-Saharan Africa measured in any of the foreign currencies will be affected by changes in the cross currency exchange rates between these hard currencies. Similarly, Hussein and Mello (2001), find that borrowing in a variety of foreign currencies implies that cross-currency exchange rate movements in US Dollar, Japanese Yen and Euro may affect the burden of debt.

On the other hand, Claessens et al. (2007), find that institutional and macroeconomic factors affect the currency composition of government debt. As specified by Wang (2007), Africa's changing trading patterns confirms China's growing trade share, which is clearly below that of the U.S. and E.U. Furthermore, Africa's imports from China comprise mainly of manufactured products. As suggested by Tull (2006), China's involvement in Africa has been increasing over the years, but US and UK remains the main trading partners in sub-Saharan Africa. On the other hand, Kose and Riezman (2001), highlight that Africa's manufacturing sector is relatively small compared to the share of agricultural sector. Therefore, the policymaker's cost minimisation problem is solved by the following Langrangian equation:

$$L_t = \frac{1}{2}\left[A_t - \sum_{i=1}^{n}\left(\frac{D_{it}}{e_{it}} \right)^2 \right] - \lambda_t \left[\left(D_t - \sum_{i=1}^{n} \frac{D_{it}}{e_{it}} - \sum_{i=1}^{n} \frac{D_{it}}{S_{it}} - \sum_{i=1}^{n} \frac{D_{it}}{T_{it}} \right) \right]$$

(2)

Solving the first order condition for cost minimisation with respect to the debt shares in currency $_i$ yield the following:

$$\frac{\partial C_t}{\partial D_{it}} = -\frac{D_{it}}{{e_{it}}^2} - \frac{D_{it}}{S_{it}^2} - \frac{D_{it}}{T_{it}^2} - \lambda_t \left(\frac{1}{e_{it}} + \frac{1}{S_{it}} + \frac{1}{T_{it}} \right)$$

(3)

$$\lambda_t \left(\frac{S_{it}T_{it} + e_{it}T_{it} + e_{it}S_{it}}{e_{it}S_{it}T_{it}} \right) = \left(-\frac{D_{it}}{e_{it}^2} - \frac{D_{it}}{S_{it}^2} - \frac{D_{it}}{T_{it}^2} \right)$$

(4)

$$\lambda_t = \frac{-\left(\frac{D_{it}}{e_{it}^2} - \frac{D_{it}}{S_{it}^2} - \frac{D_{it}}{T_{it}^2} \right)}{\left(\frac{S_{it}T_{it} + e_{it}T_{it} + e_{it}S_{it}}{e_{it}S_{it}T_{it}} \right)}$$

(5)

Note that currency n is the base currency where the exchange rate $e_{nt}/e_{nt} = 1$. Hence, the debt shares denominated in currency 1, 2, …., n is given by

$$\lambda_1 = \frac{-\left(\frac{D_{1t}}{e_{1t}^2} - \frac{D_{1t}}{S_{1t}^2} - \frac{D_{1t}}{T_{1t}^2} \right)}{\left(\frac{S_{1t}T_{1t} + e_{1t}T_{1t} + e_{1t}S_{1t}}{e_{1t}S_{1t}T_{1t}} \right)}$$

$$\lambda_2 = \frac{-\left(\frac{D_{2t}}{e_{2t}^2} - \frac{D_{2t}}{S_{2t}^2} - \frac{D_{2t}}{T_{2t}^2} \right)}{\left(\frac{S_{2t}T_{2t} + e_{2t}T_{2t} + e_{2t}S_{2t}}{e_{2t}S_{2t}T_{2t}} \right)}$$

$$\lambda_n = \frac{-\left(\frac{D_{nt}}{e_{nt}^2} - \frac{D_{nt}}{S_{nt}^2} - \frac{D_{nt}}{T_{nt}^2}\right)}{\left(\frac{S_{nt}T_{nt} + e_{nt}T_{nt} + e_{nt}S_{nt}}{e_{nt}S_{nt}T_{nt}}\right)}$$

From eq. (4) and (6), it follows that the optimal currency composition of foreign debt is given by the following marginal cost of debt:

$$\frac{D_{2t}}{D_{nt}} = \frac{S_{2t}T_{2t}}{e_{2t}S_{2t}T_{2t}(T_{2t} - e_{2t}T_{2t} - e_{2t}S_{2t})}$$

(6)

Eq. (6) implies that debt shares denominated in n currencies are negatively related to the exchange rate, but give mixed signs for trade patterns and the manufacturing sector/GDP ratio. In a floating exchange rate regime, when the exchange rate depreciates, the debt share of the depreciated currency must fall relative to other currencies. As shown by Claessens et al. (2007), determining the optimal currency composition of foreign debt requires a careful investigation of the relationship between the cross-currency exchange rates, terms of trade and exports. For instance, Kroner and Claessens (1991), indicate that the currency composition of long-term debt can be used in a cost-effective way to hedge against external risks. However, Bordo and Meissner (2006), argue that foreign currency borrowing creates currency mismatches in the sovereign balance sheet, because the revenues are denominated in local currencies.

In addition, Jeanne (2005), note that sovereigns can be constrained in issuing domestic currency debt because of partial dollarization, which affects the monetary policy credibility. In this case, policymakers can pursue a less flexible exchange rate regime as a way of regaining credibility. Other studies find that there is rigidity in altering the currency composition of foreign debt. One reason clarified by Cassard and Folkerts-Landau (1997), Hussein and Mello (2001) is that if a country's financial transactions are denominated in the trading partner's currencies, then it becomes difficult to alter the currency composition of foreign debt. For instance, Mundell (2002), stress out that most of the African countries have strong trade links to Japan, US and UK. Hence, their financial transactions will be predominantly in Japanese yen, British pounds and US dollars.

2.4 Empirical methodology:

2.4.1 Panel unit root test

Most of the economic time series are non-stationary. If a regression will be run on a non-stationary time series data, then it will lead to spurious or meaningless regression results. However, Entorf (1997), notes that in order to attain consistent, unbiased and reliable results, the non-stationary data must be transformed into stationary data, by taking the first difference, second difference or higher order differencing of the series. As noted by Kwiatkowski et al. (1992), the standard unit root tests have low statistical power against the alternative hypothesis. Hence, Im et al. (2003), developed alternative unit root tests. In particular, Hussein and Mello (2001), Strauss and Yigit (2003) indicate that the IPS unit root solves the low power problem associated with the single-equation ADF tests, by averaging the test statistics across the panel data series.

The IPS test possess substantially more power than single-equation ADF test, by averaging independent ADF regressions. On the other hand, Levin, Lin and Chu (2002) assume that the persistence parameters are common across cross-sections. The LLC test assumes a common unit root $\rho_i = \rho$ across all cross-sections. Therefore, the general specification of an Augmented Dicky-Fuller function (ADF) is as follows:

$$\Delta\varepsilon_{i,t} = \alpha \ + \beta_i \varepsilon_{i,t-1} + \sum_{j=1}^{p_i} \beta_{i,j} \Delta\varepsilon_{i,t-j} + x_{it}^{'}\gamma + e_{it} \quad (7)$$

where α = ρ -1 and the lag length across cross-section, may differ. Importantly, Im, Pesaran and Shin assume that the individual unit root varies across cross-sections. However, Im et al. (1997), propose unit root tests for heterogeneous panels that are more powerful than the alternative tests developed by Levin and Lin (1993) and Quah (1994). The IPS tests that allow for the heterogeneity of error variances across different groups is given by

$$\gamma_i = \frac{\sqrt{N\left(t_{N,T} - E\left[\bar{t}_{N,T}(p,0)\right]\right)}}{\sqrt{Var\left(\bar{t}_{N,T}\right)}} \quad (8)$$

where $\bar{t}_{N,T} = \left(1/N\right)\sum_{i}^{N} = 1^{t}{}_{i}, t_i$ is the t-statistic for the OLS estimate for the *t*th unit of the cross-section, and $\left[t_{N,T}\left(p,0\right)\middle|\beta_i = 0\right]$ are the mean and the variance set out by IPS (1997) for different time-series dimensions and cross-sections.

2.4.2 Residual-based Pedroni co-integration test

Economic theory usually suggests that economic variables should have a long-run economic relationship. When the underlying variables of interest are non-stationary, then, the co-integration test can be carried out. This study uses residual-based co-integration tests suggested by Pedroni (1999) and Kao (1999). These tests are based on the residuals derived from the Engle and Granger (1987) co-integration Test. The residual based tests are robust in nullifying the spurious regression problem. However, the null hypothesis for Pedroni co-integration Test is that there is no co-integration, whereas the null hypothesis for McCoskey and Kao's test is that there is co-integration. Consider the following panel regression:

$$y_{it} = \alpha_i + \delta_i t + \beta_i x_{it}^{'} + e_{it}$$

(9)

Where $\beta_i = \left(\beta_{1i,}\beta_{2i,}...,\beta_{Mi}\right)^{'}, x_{it} = \left(x_{1it}, x_{2it,}..., x_{Mit}\right)^{'}$, t = 1....T; i = 1….N.

Note that the coefficients β_i and the fixed effect parameter α_i vary across individual groups. These tests use the residuals from the co-integration regression.

After establishing the co-integrating relationship that is the null hypothesis of no co-integration is rejected, the coefficients of the long-run relationships can be estimated by using the dynamic OLS estimator. The DOLS estimator is based on the Stock and Watson (1993) estimator for time series. Furthermore, Stock and Watson (1993) show that DOLS is more suitable, particularly in small samples, compared to a number of alternative estimators of long-run parameters, including those proposed by Engle and Granger (1987); Johansen (1988); Phillips and Hansen (1990). This study uses the seemingly unrelated regression model (SUR) for robustness. In addition, the DOLS estimator is based on the error decomposition. The DOLS procedure involves running the following regression:

$$y_{it} = \alpha_i + \beta_i x_{it}^{'} + \sum_{j=1}^{p_1} c_{ij}\Delta x_{i,t-j} + \sum_{j=1}^{p_1}\gamma_{ij}\Delta x_{i,t+j} + e_{it,}$$

(10)

Where t =1,...,T and i = 1,…., N

Note that Eq. (10) is an extension of Eq. (7), where lags and leads of Δx_{it} are included in the co-integrating regressions in order to produce asymptotically unbiased estimators. The dependent variable is y_{it} which is the share of foreign debt denominated in n currencies. The x'_{it}, $\Delta x_{i,t-k}$ and $\Delta x_{i,t+k}$ are the changes in lags and leads of independent variables that affect the foreign debt shares.

The lags and leads of $\Delta x_{i,t}$ are included to control the endogeneity problem between the debt shares and the exogenous variables. The addition of leads and lags eliminates the adverse effects that short-run dynamics of the equilibrium process have on the estimate of the co-integrating vector η. For instance, Chang and Velasco (2000), Korinek (2011), emphasise that there is endogeneity between the currency denomination of debt and the exchange rate. In addition, Bordo et al. (2010), point out that the inclusion of sufficient lags of the selected variables may solve the endogeneity problem. However, the error term is denoted by ε_{it} and all variables are log-differenced. As shown by Kao (1999), the DOLS estimator outperforms both OLS and FM estimators.

For robustness, a seemingly unrelated regression model is employed when N is relatively small (less than 10), and T is relatively large. The SUR suggested by Zellner (1962), is a generalization of a linear regression model, consisting of several regression equations, each with its own dependent variable and different exogenous variables. This model can be estimated using the standard ordinary least squares or generalized least squares. The SUR model is usually estimated using the generalized least squares, which is more efficient than the ordinary least squares. If the error term has constant variance and the errors are uncorrelated, then $\mathbf{W} = \sigma^2\mathbf{I}$ and the general linear regression model reduces to the classical linear regression model. According to Liu (2002), the seemingly unrelated regression (SUR) equation is given by

$$y_i = X_i\beta_i + \varepsilon_i$$

where β_i is a vector of unknown coefficients; and e_i is the error term. However, the SUR model allows non-zero covariance between the error terms ε_{ij} and ε_{ij} for a given individual i across equations j and k. Assuming that the i^{th} individual is given by the following relationship:

$$y_{it} = \beta_{i1}x_{it1} + \beta_{i2}x_{it2} + ... + \beta_{i\,k\,i}x_{itki} + \varepsilon_{it} \quad (11)$$

The coefficients are allowed to vary across the individuals but they are constant over time. Each individual equation has its own β_i's but the equations may be related through the disturbance term which captures the effect of other factors.

2.5 Stylized facts:

2.5.1 Optimality of foreign debt portfolios

Table 2.1 Optimal portfolios of foreign debt in African countries (1971-2011)

	Actual portfolio threshold					Optimal portfolio threshold					
	Deviation from the optimal portfolio threshold										
Countries	U.S. Dollar	British Pound	Yen	Swiss Francs	Total	British Pound	Yen	Swiss Francs	British Pound	Yen	Swiss Francs
Algeria	74.98	3.58	19.70	1.72	100%	0.42	0.05	-5.55	3.16	19.65	7.27
DRC	89.44	3.51	6.60	0.43	100%	-0.42	-0.01	2.46	3.93	6.61	-2.03
Egypt	80.76	2.77	13.24	3.22	100%	14.89	0.29	0.73	17.66	12.95	2.49
Gabon	86.74	9.46	2.35	1.43	100%	0.02	3.36	-3.70	9.44	-1.01	5.13
Kenya	61.35	16.98	18.54	3.11	100%	0.78	-2.12	0.04	16.2	20.66	3.07
Morocco	91.35	0.55	0.007	0.56	100%	0.04	29.50	0.036	0.546	-29.49	0.524
Nigeria	73.25	15.31	10.29	1.13	100%	0.05	37.20	7.20	15.26	-26.91	-6.07
South Sudan	73.81	7.17	2.63	16.36	100%	0.46	53.91	0.59	6.71	-51.55	15.77
Tanzania	51.06	9.36	38.98	0.31	100%	0.16	-25.96	0.21	9.2	64.94	0.1
Tunisia	70.75	0.50	27.46	1.28	100%	0.18	-23.60	0.37	0.32	51.06	0.91

Table 2.1 presents the optimality of foreign debt portfolios in the selected African countries. An important stylized fact is that more than 50% of the actual debt portfolio is predominantly denominated in the US Dollar followed by Japanese yen and British pounds. As pointed out by Kroner and Claessens (1991), the high share of the US Dollar-denominated debt in African countries is due to the fact that primary export earnings are in US Dollar and most of the countries peg their exchange rate to the US Dollar. For instance, Jadresic et al. (2001); Levy-yeyati and Sturzenegger (2003), find that more than half of African economies have their exchange rates pegged to the French Francs, the Japanese Yen and the US Dollar. Moreover, Ghura and Grennes (1993), note that the Franc zone countries peg their exchange rates to the French Franc.

Findings by Chang and Velasco (2000), Slavov (2013), show that most of the African countries peg their exchange rates due to the "fear of floating" and lack of monetary policy credibility. Another observation by Hussein and Mello (2001), suggest that developing countries carry out most of their financial transactions in the US Dollar, hence, they are likely to have a high share of US Dollar-denominated debt. In addition, Shioji (2006), notes that if a country choose to trade with the US, their financial transactions will be predominantly denominated in the US Dollar. Hence, commodity-exporting countries peg to the US Dollar and this may signify that commodity exports are invoiced in US Dollars.

The optimal debt portfolio threshold suggests that Algeria, Egypt, Gabon, Kenya, Morocco, Nigeria, South Sudan, Tanzania and Tunisia should adjust their debt by giving more weight to British pounds by 42%, 14.89%, 2%, 78%, 4%, 5%, 46%, 16% and 18%, respectively. This in turn, will minimise the British Pound/US Dollar exchange rate risks. In a floating exchange rate regime, Bebczuk et al. (2006) and Bordo et al. (2010), indicate that foreign currency debt is associated with a high likelihood of a sovereign debt crisis e.g. the 1994 Mexican tequila crisis. More recently, Kamil (2012), finds that heavy reliance on external financing is a source of financial vulnerabilities and currency mismatches in the sovereign balance sheet, especially when a country shifts to a fixed exchange rate regime. On the other hand, more weight should be given to yen denominated debt in Algeria, Egypt, Gabon, Morocco, Nigeria and South Sudan by 5%, 29%, 3.36%, 29.50%, 37.20% and 53.91% to hedge the Yen/US Dollar exchange rate risks.

For instance, Cassard and Folkerts-Landau (1997), Claessens et al. (2007), claim that most of the Asian crises were precipitated by the unhedged Yen/US Dollar exchange rate risks. As a result, Hussein and Mello (2001), argue that if a country's debt is denominated in US dollars and Japanese yen, then, the appreciation of the yen relative to the US Dollar will cause the US Dollar value of the share of debt denominated in yen to increase. Several studies have shown that the currency composition of foreign debt can be used as hedging instrument against exchange rate risks. As noted by Allayanis and Ofek (2001); Kedia and Mozumdar (2003); Elliot et al. (2003); if a firm or a country is exposed to French Franc/British Pound exchange rate risk, then the firm should issue debt denominated in British Pound so as to hedge the underlying exchange rate risk. This implies that African countries ought to alter the currency composition of their debt portfolios, by giving more weight to debt shares in Japanese yen and British pounds, so as to hedge the Japanese yen/US Dollar and British Pound/US Dollar exchange rate risks.

Therefore, debt denominated in Swiss Francs is below the optimal threshold deviation level in DRC and in Nigeria by 2.03% and 6.07%. Meanwhile, the

Japanese yen-debt denominated is below the optimal threshold deviation level in Gabon, Morocco, Nigeria and South Sudan by 1.01%, 29.44%, 26.91% and 51.55%. This is consistent with Abutaleb and Hamad (2012), who investigated Egypt. They find that the actual debt was higher than the optimal debt. After sometime, the actual debt and the optimal debt started to merge. The rest of the countries' debt denominated in British Pounds, Japanese Yen and Swiss Francs are above the optimal threshold deviation level. However, Claessens and Qian (1991), note that giving more weight to the US Dollar denominated debt will provide a hedge against cross-exchange rate movements such as British Pound/US Dollar and Japanese Yen/US Dollar.

2.5.2 Correlation analysis

Table 2.2 presents the correlation analysis between the debt shares and exchange rates, trade patterns as well as the manufacturing sector to GDP ratio in African economies. The results show that there is low correlation between the series. The debt share in Swiss francs is positively correlated to the Swiss Franc/US Dollar exchange rates. These findings are in line with Hussein and Mello's (2001) study, where the depreciation of the Swiss Franc/US Dollar exchange rate does not reflect a reduction of the debt share in Swiss francs. Similarly, the debt share in British pounds is positively correlated with the British Pound/US Dollar exchange rate. Findings by Kedia and Mozumdar (2003), reveal that sovereigns who prefer foreign currency borrowing ought to hedge their currency risk exposure both in closely related currencies and in the underlying currency.

Their study specifies that a firm or a country ought to issue debt in a currency exposed to it. For instance, if a country is exposed to British Pound/US Dollar exchange rate, then it should issue more debt in British Pound to perfectly hedge the underlying exchange rate risk. In addition, Allayanis and Ofek (2001), Elliott et al (2003) explain that foreign currency debt complements foreign currency derivatives in hedging currency risk. Hence, sovereign borrowers can use foreign currency derivative as a hedging instrument to offset adverse exchange rate fluctuations.

Table 2.2: Correlation analysis

	Debt Pound	Debt Yen	Debt sfr	Yen/US Dollar	SFr/US Dollar	Pound/US Dollar	Manufacturing sector/GDP	Trade patter
Debt $_{Pound}$	1							
Debt $_{Yen}$	0.340**	1						
Debt $_{SFr}$	0.712**	-0.157**	1					
Yen/US Dollar	-0.241**	-0.280***	-0.089**	1				
SFr/US Dollar	-0.060**	0.007**	0.042**	-0.059**	1			
Pound/US Dollar	0.181**	0.247**	0.054**	-0.340**	0.232***	1		
Trade patterns	0.123***	-0.008**	0.076**	0.261**	0.054**	0.327**	1	
Manufacturing/GDP	-0.299**	-0.048**	-0.183**	-0.116**	-0.168**	-0.198**	0.143**	1

(i)Statistical significance at 5% and 10% is denoted by (**) and (***), (ii) The null hypothesis of no correlation is zero. Note: sfr is the Swiss francs

The debt share in Japanese Yen is negatively correlated to the Japanese Yen/US Dollar exchange rate. As investigated by Bird and Rajan (2002), the appreciation of Japanese Yen relative to the US Dollar must be offset by the appreciation of the local currency. Otherwise, it might lead to difficulties in servicing the debt burden and the resultant high sovereign risks. For instance, Cassard and Folkerts-Landau (1997), point out that the exposure to Japanese Yen currency in South-East Asian countries is responsible for the debt crisis and sovereign defaults. The high share of Yen-denominated debt is mainly attributed to the increase in concessional loans from Japan to South-East Asian countries. However, Dimitriou and Kenourgios (2013), note that developing countries can use the correlation analysis between currencies for hedging purposes as a crucial feature of foreign debt management.

There is negative correlation between the manufacturing sector and debt shares. This possibly implies that improvement in the manufacturing sector may lead to a reduction the foreign debt burden in African economies. For instance, Chakravarty and Mitra (2009), Haraguchi et al. (2017) have recently found that an increase in the share of manufacturing sector, in particular, the value-added stimulates economic growth. This in turn, discourages debt accumulation. As explained by Oseni (2016), import-dependent African economies ought to adopt import-substitution and export promotion policies so as to minimise the cost of financing imports. This, therefore, will reduce foreign currency debt. As a result, an increase in manufacturing output further drives up economic growth and development.

Trade patterns give mixed signals. If African countries have strong trade links with the US and the UK, then the debt shares in US Dollars and British Pound will be high in their own debt portfolio, relative to other currencies. For instance, Eisenman (2012), observes that China-Africa's trade is flourishing recently as part of China's domestic development strategy. China's comparative advantage in labor-intensive and capital-intensive production, and on the other hand, Africa's abundant natural resource endowments, largely explains their surging trade. Hence, the currency composition shifts more weight to the Chinese Yuan. However, Cassard and Folkerts-Landau (1997), stress out that if a country's financial transactions are denominated in the trading partner's currencies, then it becomes difficult to smoothly alter the currency composition of foreign debt.

2.5.3 Exchange rate management

The monetary authorities can manage the exchange rate by intervening in the foreign exchange market. As shown by Cadenillas and Zapatero (1999), intervention can take place through adjusting the money supply, manipulating the short-term interest rate at the targeted level (interest rate targeting), and capital controls. Such an intervention may or may not be sterilized. As pointed out by Kaminsky and Lewis

(1996), sterilized interventions do not affect money supply or the monetary base. According to Bhattacharya and Weller (1997), Dominguez (1998), the standard monetary models of exchange rate specify that sterilized intervention is ineffective in influencing the level of the exchange rate, because it can increase the exchange rate volatility. Therefore, Klein and Rosengren (1991), argue that despite empirical evidence on ineffectiveness of intervention policies, the central bank may still intervene to signal a willingness to alter monetary policy.

On the other hand, Calvo and Mishkin (2003) stress that, in a purely flexible exchange rate regime, the central bank cannot intervene in the foreign exchange market. Hence, the exchange rate is determined by the market forces of demand and supply. In practice, however, such a neo-classical view is unacceptable, especially in the short run, which is associated with targeting in the nominal variables e.g. the money supply or the exchange rate. A number of studies, such as those by Obstfeld and Rogoff (1995); Reinhart and Rogoff (2004), find that countries that say they are floating their exchange rates, actually display the "fear of floating". This is known as "deeds versus words". Another monetary policy instrument that is largely used by the central bank to influence the exchange rate is the interest rate, in the context of an inflation-forecast targeting regime.

As noted by Svensson (1999), inflation-forecast targeting aims at stabilising inflation around the 2% inflation target and the output gap. However, Svensson (2000), points out that in inflation-targeting economies, the interest rate policy aims at smoothing exchange rate fluctuations, which have a prominent role in the transmission mechanism of monetary policy. Moreover, Svensson (1997), stresses that monetary policy affects the aggregate demand by manipulating the short-term interest rate. In particular, Taylor and Davradakis (2006), observe that the advantage of Taylor rule is that it captures the salient dynamics of the relevant short-term interest rate. When inflation is around the target level, the monetary authorities pursue a largely accommodating monetary policy, so that changes in the interest rate are more or less random. However, in practice, many monetary authorities are concerned about the fluctuations in exchange rate fluctuations, whereby they raise the interest rate to prevent the contractionary effect of depreciation.

The standard theory of choosing an exchange rate regime is mainly based on the theory of optimal currency areas (OCA) of Mundell (1961) and Poole (1970). The consensus in these early studies favored the pursuit of fixed exchange rates, with the theory of optimal currency area, suggesting that small open economies are highly likely to pursue fixed exchange rates. More recently, Ghosh et al. (2014) specify that the OCA theory was established in an era when international capital movements were relatively limited. Furthermore, the policy trilemma or the impossible trinity

paradigm suggests that nations with capital controls are more likely to choose a fixed regime, since this allows preserving monetary policy autonomy. As highlighted by Shambaugh (2004), this impossible trinity assumes that it is impossible to simultaneously pursue the three goals of a fixed exchange rate, an independent or autonomous monetary policy and the free movement of capital.

For instance, Obstfeld et al. (2005), indicate that the exchange rate regime is usually constrained by this monetary policy trilemma, which creates a trade-off among exchange rate stability, monetary policy independence and capital market openness. As investigated by Shambaugh (2004), the trilemma describes that countries can pursue two of three options, that is fixed exchange rates, domestic monetary policy autonomy and capital mobility. Countries pursuing fixed exchange rate targeting have no autonomous monetary policy, because fixed exchange rate is highly correlated to the base country. Some studies e.g. that of Hausmann et al. (2001), claim that to a lesser extent, countries pursuing floating exchange rate are correlated with the base country. As suggested by Frankel et al. (2001), even floating exchange rate economies do not have monetary flexibility and thus, are faced with only a dilemma, and not a trilemma.

Importantly, to have a better understanding on the evolution of exchange rate regimes, one must have knowledge on the dynamics of the international monetary and financial systems. As explained by Wang (2009), the international monetary system includes the classical gold standard (1875-1914). The establishment of the gold standard was in response to an upsurge of international trade, which was attributed to the industrial revolution. This gold standard was a fixed exchange rate regime, where countries pegged their currencies to gold, and the exchange rate between two currencies was fixed in terms of a specific amount of gold. The following period was marked with interim instability (1914-1943), where the supply of gold was highly limited and most the countries abandoned the gold standard, because it prevented them from printing more money.

However, the decision of printing money led to galloping inflation. In turn, the fixed exchange rate regime under the gold standard was unsuitable. As a result, the Bretton Woods system (1944-1971) was established due to concerns regarding the exchange rate instability and was similar to the gold standard era under the fixed exchange rate regime. It gave rise to the IMF and the World Bank, where the US Dollar was pegged to gold and had monetary autonomy. According to Obstfeld et al. (2008), Bretton Wood's system collapsed due to the increasing difficulty of preventing capital mobility. Other studies, such as those of Kato and Uctum (2008), suggest that the Bretton Woods system collapse is attributed to the rise in the U.S. domestic inflation, the persistent balance of payments deficits and the US Dollar crisis.

In the post-Bretton Woods period, Jordaan (2015), observes the choice of a country's exchange rate regime, expanded between freely floating regimes to exchange rate peg. Most of the countries shifted toward the more flexible regime in the mid-1980s. Currently, there is still inconclusive consensus over the optimal choice of regimes. For instance, Frankel (1999), emphasise that there is no single exchange rate regime that is appropriate for all countries or at all times. However, the International Monetary Fund based its exchange rate regime classifications on official statements of *de jure* classification. The three credible alternatives to *de jure* classifications are those established by Levy-Yeyati and Sturzenegger (2003), "LYS", Reinhart and Rogoff (2004) and Shambaugh (2004).

Levy-Yeyati and Sturzenegger (2005) considers data on foreign exchange reserves and exchange rates to account for exchange rate fluctuations and foreign exchange market intervention. However, Reinhart and Rogoff (2004), depends on the changes in exchange rates. Furthermore, Shambaugh (2004) classifies a country's peg if its official exchange rate stays within a small band over time. The three classifications are based on *de facto* behavior and all reveal that the *de jure* classification is unreliable most of the time. Therefore, these classifications range from floating (LYS) through a narrow crawl (RR) to peg (Shambaugh). So there are now four classifications of exchange rate regimes: official IMF, LYS, RR, and Shambaugh. Clearly, Shambaugh (2004), summarized that there is fixed, intermediate, and floating using the four different classifications.

Furthermore, Bordo (2003), argues that the IMF's initial *de facto* classification had eight-way arrangements, with no individual legal tender, that is, monetary unions; currency boards; horizontal bands; crawling bands; conventional pegs (including single currency and basket); crawling pegs; pure floats and managed floats. According to IMF (2008), these classification arrangements have been reviewed slightly since 2008. For instance, Ghosh et al. (2014), note that the IMF's initial eight-way *de facto* classification follows the three *de facto* classifications, namely LYS, RR and Shambaugh. Generally, Mussa (2000); Kamar and Bakardzhieva (2005), point out that the IMF advocates the bipolar view that the two corner solutions are either fixed or floating, and that the intermediary exchange rate regime has been hollowed out. Moreover, Fischer (2001), says that intermediary exchange rate policies between floating and hard pegs are inefficient and unsustainable.

In the "deeds versus words" hypothesis, Eichengreen et al. (2006), highlights that the bipolar view classifies countries by what they say. Meanwhile, in the intermediary approach, as described by Levy-Yeyati and Sturznegger (2005), most of the countries usually do not do what they say they do that is the "fear of floating". This may be due to lack of credibility or high pass-through from exchange rates to prices. Many

countries that are portrayed as floating their exchange rate, actually intervene in the foreign exchange market. One reason given by Hagen and Zhou (2007) is that most of the developing economies fear purely floating, because of exchange rate risk exposure, announcing it officially only to appear to be satisfying the IMF recommendations. In fact, their real exchange rate policy is much closer to "soft pegs", or heavily managed floats. In this case, Obstfeld and Rogoff (1995), Calvo and Reinhart (2001) suggest that the preferred approach is to investigate what countries actually do, their deeds, rather than their words.

Usually, the choice between fixed exchange rate and flexible exchange rate depends on the trade-off between gaining credibility and losing flexibility. For instance, Frankel (2012) clarifies that fixed exchange rate is a tool for macroeconomic stability, whereas flexible exchange rate pose some difficulties in swiftly smoothing domestic price and wages to minimise inflation. In contrast, Levy-Yeyati and Sturzenegger (2003), suggest that less flexible regimes are associated with slower growth, as well as greater output volatility. Generally, Ouyang and Rajan (2014), find that countries with flexible exchange rate and greater reserve accumulation are more likely to have high ratios of foreign currency debt. Findings by Jeanne and Ranciere (2011), show that countries with large foreign exchange reserve holdings have a policy to keep exchange rates stable. The favorable argument for pursuing a flexible exchange rate is that it allows monetary policy independence.

However, Hausmann et al. (2001), confirm that there are relatively limited studies on whether flexible exchange rate regimes actually allow monetary policy independence. This is in the sense that the domestic interest rate in countries with floating exchange rate regime is insensitive to foreign interest rates. In addition, Borensztein et al. (2001), verify that floating exchange rates limit inflationary tendencies, and raise the possibility for monetary authorities to pursue countercyclical monetary policy. If the monetary authorities lack credibility in terms of their commitment to price stability, then monetary policy becomes ineffective. More recently, Tobin and Weber (2013), Gnimassoun (2015), maintain that floating exchange regimes stimulate economic growth and improve current account deficit. Despite these advantages, Clarida et al. (1998), highlight that this regime allows excessive discretion to monetary policy, which may be an insufficient nominal anchor.

In practice, independently floating exchange rate regimes are still rare in developing countries. Instead, Hagen and Zhou (2007), highlight that countries have adopted various types of intermediate arrangements integrated with policy flexibility and the exchange rate stability. According to Fischer (2001), intermediate regimes and managed floats are more prone to financial crisis than free floats. On the other hand,

Leblang (2003), Calvo and Mishkin (2003), clarify that countries with fixed exchange rate have low inflation, low exchange rate risk or uncertainty that can discourage international trade and investment. However, a fixed exchange rate has a disadvantage. As noted by Frankel et al. (2001), fixed exchange rates lead to loss of the monetary policy autonomy.

Table 2.3: Evolution of exchange rate regimes for selected African countries

Country	1975	1980	1985	1990	1995	2000	2005	2008
Algeria	Fix	Fix	Fix	Floats	Floats	Managed floats	Managed floats	Managed floats
DRC	Fix	interim	Fix	Interim	Fix	Independent float	Independent float	Independent float
Egypt	Fix	Fix	Fix	Fix	Managed floats	Managed floats	Managed floats	Managed floats
Gabon	Fix	Fix	Fix	Fix	Fix	Currency board	Currency board	Conventional peg
Kenya	Fix	Fix	Fix	Fix	Fix	Managed float	Managed float	Managed float
Morocco	Fix	Fix	Fix	Fix	Managed float	Managed float	Independent float	Conventional peg
Nigeria	Interim	Float	Float	fix		Managed float	Managed float	Managed float
South Africa	Float	Fix	Interim	Fix	Float	Float	Independent float	Independent float
South Sudan	Fix	Fix	Interim	Interim	Managed floats	Managed floats	Managed floats	Managed floats
Tanzania	Fix	Fix	Float	Interim	Interim	Independent float	Independent float	Managed float
Tunisia	Fix	Fix	Fix	interim	Interim	Managed floats	Managed floats	Managed floats

Source: IMF staff reports (various); (i) interim stands for intermediate regime; (ii) float implies the active intervention in foreign exchange market by the monetary authority; (iii) currency board implies that the monetary regime based on explicit legislative commitment; (iv) conventional peg means that the country pegs its currency at a fixed rate to another currency where the exchange rate fluctuates within a narrow margin; (v) a crawling peg is where the currency is adjusted periodically in small amounts at a fixed rate.

Table 2.3 shows the evolution of exchange rate regimes for the selected African countries. From 1970s to 1990s, where most countries, such as Morocco and Kenya, the CFA Franc Zone like Gabon, South Africa, South Sudan, Algeria and Egypt, had fixed exchange rate regimes. According to Masson and Pattillo (2005), this indicates the "fear of floating" hypothesis to be a fact in many African countries. More

recently, Slavov (2013), finds that African economies which prefer to fix their exchange rates to a single currency or a basket of currencies show signs of "fear of floating". The countries investigated are Kenya, Tanzania, Algeria, Gabon, and Democratic Republic of Congo. One reason identified by Chang and Velasco (2000), is that the sovereign debt crises of the 1980s not only led to abandonment of exchange rate pegs, but also reflects the currency crisis to be highly associated with financial vulnerabilities.

In addition, lack of credibility and the presence of shallow domestic capital markets may be attributed to the "fear of floating". However, Levy-yeyati and Sturzenegger (2003), find that less flexible exchange rate regimes discourage growth in heavily indebted poor countries. In fact, more than half of African economies have their exchange rates pegged to French francs, the Euro and the US Dollar. For instance, Ghura and Grennes (1993), find that the Franc zone countries peg to the French Franc. In particular, commodity-exporting countries peg to the US Dollar. This may highlight that commodity exports are invoiced in US dollars. Furthermore, Loureiro et al. (2011), claim that exchange rate pegs are associated with inflation stability in sub-Saharan Africa, which is consistent with the monetary policy rule, e.g. inflation-forecast targeting and policy credibility.

Generally, Masson and Pattillo (2005) demonstrate that Nigeria and Democratic Republic of Congo shifted from *de jure* floats to less flexible exchange rate regimes. On the other hand, Ebaidalla (2014), observe that South Sudan had fixed its exchange rate until the end of 1970s, followed by floats thereafter. However, Jadresic et al. (2001) point out that the CFA Franc Zone countries peg to the French Franc and currently, to the Euro. They also note that Kenya's exchange fixed exchange rate was maintained in the 1970s, with the currency being over-valued, followed by managed floats in the 1990s. Other studies e.g. Masson and Pattillo (2006), find that, since the 1970s, Egypt has adopted a fixed exchange rate, followed by managed floats, incorporated with foreign exchange controls. A different study by Calvo and Reinhardt (2002), assessed intermediate regimes to be predominant in most of the African economies, because of the increased capital controls and low integration with the world capital markets.

In the 2000s, many of the countries in our sample shifted to managed floats and independent floats. In particular, Yinusa (2008) identified Nigeria, which shifted to a less flexible exchange rate. Another study by Slavov (2013) find that Tanzania pursued floating exchange rates under both *de jure* and *de facto* regimes. Many African countries are currently classified by the IMF as having flexible exchange rate regimes. This finding is supported by Gosh et al. (1996), who claim that floating

exchange rate regimes result in high economic growth compared to fixed exchange rate regimes.

2.6 Data description

The annualized data covers the period 1971 to 2011 for ten African countries. The ten African economies that we investigate are Algeria, the Democratic Republic of the Congo, Egypt Arab Republic, Gabon, Kenya, Morocco, Nigeria, South Sudan, Tanzania and Tunisia. The data is sourced from the World Bank's Development Indicators, the IMF International Financial Statistics database, the Federal Reserve Bank of St. Louis and UNCTAD Statistics. The variables used include the cross-currency exchange rate defined according to Hussein and Mello (2001), as units of foreign currencies per the domestic currency. The currency composition of foreign debt is the share of country *i*'s foreign currency debt denominated in US Dollar, British Pound, Swiss Franc and Japanese Yen. The structure of the economy is proxied by the manufacturing sector/GDP ratio.

The selected countries are chosen because they are considered as heavily-indebted poor countries (HIPC) by the World Bank and have experienced sovereign defaults in the 1980s. According to Bromley and Bush (1994), Abutaleb and Hamad (2012), Egypt suffered from the debt crisis in the 1980s. Another study by Edo (2002) identified two countries in Africa, namely Nigeria and Morocco, which are debt-ridden and have been listed by the IMF and the World Bank among the world's top fifteen externally indebted poor countries. A comprehensive analysis done by Ndikumana and Boyce (2003), find that Democratic Republic of Congo, Gabon, Kenya, Nigeria and South Sudan are classified as severely indebted low-income countries. Other studies Danielson and Mjema (1994), who explain that the debt crisis in Tanzania started in 1984, when the worsening balance of payments position was linked to the unsustainable foreign debt.

In addition, their study finds that the DRC and South Sudan had a debt-service ratio of greater than 100% in the mid-1980s. Moreover, Sonko (1990), argues that South Sudan's debt/GNP ratio exceeded 100%, while DRC's debt/GNP ratio exceeded 200 percent. As highlighted by Easterly (2002), South Sudan and DRC are among those countries that experienced difficulties in servicing their debt in the 1970s and 1980s. On the other hand, Chemingui and El-Said (2007), point out that the second oil price shock in Algeria worsened their debt servicing burden, leading to indebtedness. Similarly, Bevan et al. (1990), point out that the excessive expansionary policies adapted in Kenya from 1970 to 1971 led to balance of payment crisis which in turn, worsened their debt burden.

Also, Dillman (1998), notes the increasing indebtedness in Tunisia after the balance of payment problem. Thus, studies such as Furceri and Zdzienicka (2012), Laeven and Valencia (2013), have shown evidence of sovereign defaults in the selected African countries. South Africa is not included in the data, because it is not regarded as heavily indebted poor country (HIPCs) by the World Bank. In addition, South Africa is the only country in Sub-Saharan Africa that borrows abroad in its local currency, the Rand. Empirical finding by Hausmann and Panizza (2003), shows that South Africa has the lowest ratio of "original sin" (ratio of foreign currency debt), which stands at 0.95.

2.7 Empirical results:

2.7.1 Unit root tests (IPS and LLC)

Table 2.4: IPS and LLC unit root test

	Level (Without trend)		First difference (With linear trend)	
	Levin, Lin and Chu	Im, Pesaran and Shin	Levin, Lin and Chu	Im, Pesaran and Shin
Debt share in British Pounds	-10.08**	-8.07**	-6.82**	-5.31**
Debt share in Japanese Yen	0.97	-1.428	11.44***	-10.27**
Debt share in Swiss Francs	1.338	-1.65**	-0.87**	-5.57**
British Pound/US Dollar exchange rate	-8.59**	-7.26**	-8.48**	-5.54**
Japanese Yen/US Dollar exchange rate	-21.17**	-17.18**	20.63**	-16.26**
Swiss Franc/US Dollar exchange rate	-1.99**	-1.72**	-4.95**	-5.261**
Manufacturing sector/GDP	5.58**	-7.79**	-3.32**	-5.26**
Trade patterns	0.64	-0.67	-13.84**	-9.44

(i)** and *** are significant at 5% and 10% level.

Table 2.4 presents the panel unit root results for the underlying series of interest. We conduct the unit root tests using the Levin, Lin and Chu (2002) test that assumes common unit root process and the Im, Pesaran and Shin (2003) test that assumes individual unit root process. The optimal lag length selection is chosen based on Schwarz Information Criterion (SIC) and the optimal bandwidths of LLC and IPS unit root tests are determined based on the Newey-West criterion. Our results show that most of the underlying series contain unit root but after first differencing. The null hypothesis of unit root test is rejected at 5 percent. These results are consistent with Hussein and Mello (2001).

For instance, the debt share in Japanese yen; the debt share in Swiss francs; the Swiss Franc/US Dollar exchange rate and the trade patterns became stationary after first differencing them. Other series, such as the debt share in British pounds; the Japanese Yen/US Dollar exchange rate; the British Pound/US Dollar exchange rate and the manufacturing sector/GDP, are stationary at level. It is observed that these series are stationary, I(0) at 5% significance level using both techniques, the LLC and IPS with and without individual linear trend as shown in Table 2.4.

2.7.2 Pedroni panel residual-based cointegration test

Table 2.5: Pedroni cointegration test

	Within dimension		Between dimension	
	Without trend	With trend	Without trend	With trend
Debt share in Japanese yen	-4.73**	-3.69**	-4.39**	-2.59**
Debt share in British pounds	-5.16**	-3.71**	-4.35**	-2.62**
Debt share in Swiss francs	-5.11**	-3.75***	-4.35**	-3.05**

Statistical significance at 5% and 10% is donated by ** and ***.

Table 2.5 presents the residual based cointegration test suggested by Pedroni (1999) and Kao (1999). Our results show that the null hypothesis of no cointegration is rejected at 5% significance level which is consistent with the findings of Claessens (1992), Hussein and Mello (2001). This implies that there is a long-run relationship between the debt shares and the cross-currency exchange rates in British Pound/US Dollar; Japanese Yen/US Dollar; Swiss Franc/US Dollar; trade patterns and manufacturing sector/GDP ratio. This study will use the Dynamic OLS estimator and the seemingly unrelated regression to investigate the optimality of the foreign debt portfolios.

2.7.3 Dynamic OLS estimation

Table 2.6 reports the results for dynamic OLS estimation. The estimated coefficients indicate that the foreign debt portfolios are sub-optimal for the selected African countries. These results are consistent with Claessens (1991) and Kroner, Claessens (1992), who find that the currency composition of foreign debt is not a perfect hedging instrument. Table 2.6, Column (1), (2) and (3), represents the debt shares in the British Pound, Japanese Yen and Swiss Franc. Our findings show that the Swiss Franc/US Dollar exchange rate is insignificant. By way of contrast, Hussein and Mello (2001), find that emerging market economies are significantly affected by the Swiss Francs/US Dollar cross-currency exchange rate movements. However, our results show that the debt share in British Pound is significantly affected by the British Pound/US Dollar exchange rate movement at the 5% level. It implies that a 1% appreciation of the British Pound/US Dollar exchange rate leads to an increase in

volume of debt denominated in the appreciating currency, that is, the British Pound, by 4.35 percent. On the contrary, Wang and Yang (2009), find that the appreciation of the British Pound/US Dollar exchange rate reduces the debt share in British Pound.

Table 2.6: Dynamic Ordinary Least Squares estimation

	Debt share in British Pound	Debt share in Japanese Yen	Debt share in Swiss Francs
British Pound/US Dollar exchange rate	4.35(2.315)***	2.07(0.49)**	-5.80(0.95)**
Japanese Yen/US Dollar exchange rate	-2.50(0.44)**	-0.44(0.10)**	-1.59(0.16)**
Swiss Francs/US Dollar exchange rate			
Trade patterns	11.50(2.82)**	-0.44(0.10)**	
Manufacturing sector sector/GDP	-2.64(0.44)**	0.79(0.10)	-1.33(0.17)**
Δ British Pound/US Dollar exchange rate $_{t-2}$	5.28(2.38)**	0.94(0.40)**	8.67(0.99)**
Δ Swiss Francs/US Dollar exchange rate $_{t-2}$			-4.28(0.87)**
Δ Japanese Yen/US Dollar exchange rate $_{t-2}$			
Δ Trade patterns $_{t-2}$		-3.59(0.55)**	
Δ Manufacturing sector/GDP $_{t-2}$		-5.30(0.81)**	7.02(1.20)**
Δ British Pound/US Dollar exchange rate $_{t+1}$	-12.64(4.01)**		
Δ Japanese Yen/US Dollar exchange rate $_{t+1}$	1.06(0.23)**	0.25(0.07)**	0.77(0.13)**
Δ Swiss Francs/US Dollar exchange rate $_{t+1}$	12.81(3.25)**		4.14(0.96)**
Δ Trade patterns $_{t+1}$		2.67(0.62)**	
Δ Manufacturing sector/GDP $_{t+1}$			-5.64(1.62)**
R2	0.53	0.57	0.50

(i)** and *** are 5% and 10% significant levels. (ii) Standard errors are in parentheses.

On the other hand, a 1% increase in Japanese Yen/US Dollar exchange rate leads to a 0.44% reduction in the Japanese Yen debt share. Empirical findings by Cassard and Folkerts-Landau (1997), show that the adverse movements in the Japanese Yen/US Dollar exchange rate are responsible for the Asian sovereign debt crises. According to IMF (1998b), the difficulty of servicing foreign debt burden rose significantly in

the Asian countries because of the region's unhedged exposure to the Japanese Yen, which appreciated sharply against the US Dollar in the early 1990s. As suggested by Eichengreen et al. (2003), sovereigns ought to hold a high proportion of debt share in the currency, in which they are exposed to or in currencies that are highly correlated with the currency of their exposure. Moreover, Kedia and Mozumdar (2003), confirm that foreign currency debt can be used to hedge the exchange rate risk both in closely correlated currencies and underlying currencies. Again, pegging to the currency of the main partners reduces exchange rate risk, which encourages international trade and foreign investment.

Generally, this sub-optimality of foreign debt portfolios in African economies may be attributed to the poor sovereign risk management policies in minimising the relatively risky debt structures. Several studies, such as that of Dooley (2000), argue that sound management of sovereign's balance sheets might considerably reduce the sovereign risks and consequently, preventing sovereign debt crisis. In addition, Melecky (2010), points out that this sub-optimality of debt portfolios may result from some rigidity in altering the currency composition of a country's foreign debt. According to Shioji (2006), if a country chooses to trade with the US, their financial transactions will be predominantly denominated in the US Dollar. In this case, it will pose some difficulties in changing their debt portfolio to alternative currencies. Our results show that the coefficient on the trade patterns is significant at the 5% level but with mixed signs. Other studies such as those by Hussein and Mello (2001), find that the sub-optimality may be due to the high proportion of official lending from the multilateral institutions, IMF and World Bank.

Foreign currency debt is associated with considerable sovereign risks when the exchange rate depreciates. In a floating exchange rate regime, when foreign currency borrowing is exposed to exchange rate depreciation, currency mismatches in the sovereign balance sheet may lead to sovereign debt crisis. More recently, Jankovic and Zivkovic (2014), declare that the currency mismatches raise the probability of a sovereign debt crisis. As recommended by Bordo et al. (2010), reforms in the exchange rate policy consistent with prudent debt management policies will reduce foreign currency debt risks. This, therefore, makes exchange rate management policy crucial for managing these risky debt structures in African economies. In theory, Klein and Rosengren (1991); Bhattacharya and Weller (1997), argue that sterilized intervention is ineffective in influencing the level of the exchange rate, because it can increase the exchange rate volatility. In addition, Kaminsky and Lewis (1996); Cadenillas and Zapatero (1999), explain that monetary authorities can manipulate the short-term interest rate at the targeted level (interest rate targeting).

In practice, however, African countries fear floating their exchange rates because less flexible exchange rate regimes are associated with more issuance of foreign currency debt. Some studies such as that of Jeanne (2005), claim that foreign currency borrowing is preferred where there is a lack of monetary credibility. In this case, the government is required to opt for fixed exchange rate regime in order to signal the credibility of their regime by issuing relatively more foreign currency debt. Most of the heavily-indebted poor countries have limited domestic investor base, hence they issue more foreign currency debt which is exposed to high exchange rate risk. As pointed out by Bordo and Meissner (2006), although foreign exchange risk in emerging market economies is high, the use of foreign currency derivatives for hedging is limited. For this reason, Burger and Warnock (2007), stress out the role of sound sovereign debt risk management in minimising the inherent sovereign risks. Therefore, in this case, a country can opt to match its currency composition of foreign debt and foreign exchange reserves in a sovereign asset and liability management approach.

The coefficient on the manufacturing sector/GDP ratio has the prior expected sign, negative and is significant at the 5% significance level. This implies that a 1% improvement in the manufacturing sector leads to a reduction in the debt burden in British pounds by 2.64% and in Japanese Yen by 0.79%. As shown by Lawrence (2005), the share of manufacturing exports in sub-Saharan Africa is around 8% in the period 1980-2000. Meanwhile, the share of manufacturing sector/GDP ranges from 1 to 23 percent. The African manufacturing sector has a relatively limited size and depends on the imported inputs/goods for its domestic industries. Tybout (2000) explain that this dependency on imported inputs prompts the government to draw down its foreign exchange reserves in order to finance its imports hence raising the demand for foreign currency.

Thus, low reserves to imports ratio may lead to liquidity crisis in the long-run and a likelihood of sovereign debt default. As a consequence, Ben-Bassat and Gottlieb (1992), Levy-Yeyati (2008), indicate that the running out of reserves forces the government to adjust immediately its external disequilibria through expenditure cuts, thereby increasing real internal disturbances. In a borrowing country, a sudden depletion of foreign exchange reserve implies an increase in foreign debt burden and the loss of creditors' confidence in the borrowing country's ability to service its debt. However, the included lags and leads are significant at 5% and 10% significant level except for the lags and leads on the Swiss Francs/US Dollar and the Japanese Yen/US Dollar exchange rates. As specified by Bordo et al. (2010), adding a sufficient number of leads and lags minimises the endogeneity problem and provide consistent estimates of the coefficients.

Moreover, Hussein and Mello (2001) stress that adding lags and leads on the explanatory variables produces asymptotically unbiased estimators. Our results show that the past and future values of British Pound/US Dollar exchange rate, trade patterns and manufacturing sector to GDP ratio significantly affect the burden of foreign debt in African countries. In addition, diagnostic checks were carried out. The Durbin-Watson test shows no autocorrelation. The coefficient of determination and the R-squared signals that the model explains well the variance in the debt shares that is predictable from the explanatory variables. Hence, the model is a good fit.

2.7.4 Robustness check: Seemingly unrelated regression model

Table 2.7: SUR estimation results

	British Pound/US Dollar exchange rate	Japanese Yen/US Dollar exchange rate	Swiss Francs/US Dollar exchange rate	Trade patterns	Manufacturing sector/GDP
Algeria		11.00***		-5.69(1.79)**	
Democratic republic of Congo		-0.51(0.30)***			-0.60(0.32)***
Egypt				2.44(0.62)**	-2.38(0.92)**
Gabon	-7.16(2.13)**				
Kenya	2.61(0.91)**			-1.59(0.77)**	-2.97(1.06)**
Morocco		-1.33(0.39)**		-3.04(1.19)**	
Nigeria		-0.63(0.31)**			
South Sudan	-7.47(2.74)**				
Tanzania	-2.08(0.70)**	-1.05(0.47)**			
Tunisia		0.23(0.12)***			-3.77(0.98)***

(i)** and *** are 5% and 10% significant levels. (ii) Standard errors are in parentheses. (iii) All regressions include country-specific fixed effects.

As a robustness, the time-series seemingly unrelated regression model is employed because there is contemporaneous correlation between the error terms. Hence, the justification for using SUR is efficient. Table 2.7 shows the cross-country analysis on the optimality of foreign debt portfolios in the selected African economies. Our findings show that the foreign debt shares are significantly affected by the cross-currency exchange rate movements, trade patterns and the manufacturing sector/GDP

ratio. Algeria, the Democratic Republic of Congo, Morocco, Nigeria, Tanzania and Tunisia are exposed to Yen/US Dollar exchange rate shocks. The results shown in Table 2.6 are robust to the previous findings that foreign debt portfolio management is sub-optimal in the African countries. The Japanese Yen/US Dollar exchange rate is significant at 5%, but does not have the expected positive sign. However, Rajan (2012), confirms that when the Yen appreciates against major currencies, it generates a current account deficit, which in turn leads to debt accumulation.

A possible interpretation could be that the Yen currency is sub-optimal in hedging exchange rate risks, because the depreciation of the Japan Yen currency against the US Dollar should lead to a reduction in the debt share of Yen. This is consistent with Hussein and Mello (2001), who hold that the debt share denominated in the depreciated currency must be reduced to offset the contractionary effects of exchange rate depreciation. Similarly, Cassard and Folkerts-Landau (1997), find that the South-east Asian countries' indebtedness increased because of their exposure to the Yen. On the other hand, Gabon, Kenya, South Sudan and Tanzania are significantly exposed to British Pound/US Dollar exchange rate shocks. The empirical findings by Wang and Yang (2009), confirm that the depreciation of the British Pound/US Dollar exchange rate usually raises the British Pound denominated debt. Moreover, Bordo et al. (2010), note that when the exchange rate depreciates, the debt-servicing cost increases, leading to a high likelihood of sovereign defaults. Due to these contractionary effects of exchange rate depreciation, heavily indebted poor countries like sub-Saharan Africa opt for managed floats or soft pegs, although the empirical evidence shows otherwise. Studies, such as those by Calvo and Reinhart (2002), Slavov (2013) find that developing countries exhibit "the fear of floating".

However, the exchange rate regimes in sub-Saharan African countries vary greatly, and have evolved over time. As observed by Chang and Velasco (2000), most developing countries have adopted either managed floats or flexible exchange rate regimes. In particular, Yinusa (2008), identifies Nigeria, which has shifted to flexible exchange rate. In addition, Levy-Yeyati and Sturzenegger (2003), find that less flexible exchange rate regimes are associated with lower growth rates and higher output volatility in developing countries. However, Tunisia is pegged to the special drawing rights, which imply a crawling peg in nominal terms. Meanwhile, Masson and Pattillo (2005), highlight that Egypt adopted a 'fixed adjustable peg' to the US Dollar followed with multiple exchange rate regimes from the late 1970s to the early 1990s. As mentioned by Slavov (2013), commodity export-dependent countries such as Tanzania, Kenya and Nigeria peg their currencies to the U.S. Dollar. This may reflect that commodities are mainly invoiced in the US Dollar. On the other hand, Kovanen (2014), indicate that the CFA Franc Zone countries peg their currencies to the Euro and French Franc.

The coefficient on the manufacturing sector/GDP ratio is statistically significant at the 5% level, with the expected negative sign in Congo, Egypt, Kenya and Tunisia. This indicates that a 1% improvement in the manufacturing sector/GDP ratio, will lead to a reduction in the debt burden by 0.60% in Congo; 2.38% in Egypt; 2.97% in Kenya and 3.77% in Tunisia. An important observation made by Moseley (1992), Biesebroeck (2005), is that the African industrial sector is highly import-dependent and accounts for a relatively small share of GDP, ranging between 3.8% and 11%. This ratio is small when compared to the 30% up to 40% ratio in industrialized countries such as Japan, South Korea and China, which reflects the development state hypothesis. The lagging behind of the manufacturing sector is due to the low level of economic development in the region. However, Teal (1999), notes that the import substitution and export promotion policies pursued in African countries failed to create a conducive environment for the manufacturing sector to take-off.

Import substitution industrialization policies were adopted in Egypt, Ghana and Nigeria, although this strategy was unsuccessful in developing infant-domestic industries. As a result, Kose and Riezman (2001), explain that most African countries are heavily indebted, and a significant fraction of their export revenues is used to meet their debt service obligations. African economies' industrial structures also make them highly vulnerable to trade shocks, because they have relatively smaller industrial and service sectors. However, the coefficient on the trade patterns is highly significant in Algeria, Egypt, Kenya and Morocco.

Table 2.8: Spatial dependence test

Lags	LM-Stat	P-value
1	3.542	0.06
2	8.9112	0.0634
3	2.828	0.093
4	8.1867	0.0850

i) Null hypothesis of spatial dependence test is that there is no serial correlation

Table 2.8 report the spatial dependence test. The Lagrange Multiplier is used to test the presence of spatial autocorrelation. Our result show that the null hypothesis of no autocorrelation is not rejected. This implies that there is no spatial autocorrelation of the residuals. As illustrated by Anselin and Bera (1998), He and Lin (2013), spatial dependence may be in the form of either spatial error autocorrelation which allows the unobserved error terms to be spatially correlated or spatial lag

dependence. In addition, Anselin et al. (1996), suggested that spatial dependence test can be carried out using simple diagnostic tests based on ordinary least squares residuals. In this case, they refer to spatial error autocorrelation in the presence of a spatially lagged dependent variable and spatial lag dependence in the presence of spatial error autocorrelation by applying the modified Lagrange multiplier (LM) test developed by Bera and Yoon (1993). Using Monte Carlo simulations, they find that the LM tests are more suitable for the identification of the source of dependence that is either lag or error. LM test has higher power than the Moran's I test in large samples and both LM lag and LM error are robust for large sample size. An interesting feature observed by Born and Breitung (2006), is that both the LM and Moran's I tests are based on estimates obtained from ordinary least squares estimation (OLS), that is, when the null hypothesis of no spatial autocorrelation is assumed to be valid. In terms of selecting between spatial error autocorrelation and a spatial lag, the Lagrange multiplier tests are the most appropriate.

2.9 Conclusion

This study investigates the degree of optimality of foreign debt portfolios in African economies. As shown by Claessens (1992), Claessens et al. (2007), the actual debt portfolio of developing countries is mostly denominated in foreign currencies, particularly the US Dollar. This means that they borrow mostly in the US Dollar and their financial transactions are predominantly in their main trading partner's currency, the US Dollar. In addition, Tybout (2000) explain that since the manufacturing sector in developing countries is relatively small-sized, the domestic industries depend on imported inputs. Hence, the government has to use foreign currency to finance the imported inputs. For this reason, this high proportion of US Dollar in the debt portfolio is a policy concern, especially when altering the currency composition of foreign debt in order to achieve the optimal debt threshold. As a result, Shioji (2006) confirm that the currency composition of a debt portfolio is sub-optimal. Our study employs the dynamic OLS estimator to investigate the optimality of debt portfolios.

Our findings show that the debt shares in British pounds, Swiss francs and Japanese yen are sub-optimal in hedging exogenous shocks. These findings are consistent with Hussein and Mello (2001), who find that foreign debt management is sub-optimal in hedging the adverse cross-currency exchange rate movements in emerging market economies. Moreover, Cassard and Folkerts-Landau (1997), point out that the exposure of Asian countries to yen currency is responsible for their indebtedness. In contrast, findings by Kedia and Mozumdar (2003), Elliot et al. (2003) show that firms and sovereigns alike can use the foreign currency debt as a hedging instrument, both in closely related currencies and the underlying currency. However, the Swiss Franc/US Dollar exchange rate is insignificant. In addition, our results indicate that

trade patterns and the manufacturing sector/GDP significantly influence the optimality of the foreign debt portfolios.

Our results have several policy implications. Firstly, African countries should develop their local bond markets to access innovative hedging instruments. According to Bordo et al. (2010), economies with deeper and developed local capital markets are faced with less exchange rate volatility, because they issue less short-term foreign currency debt. For instance, Mu et al. (2013) propose that in order to achieve less risky debt structure, an important policy objective is to develop a deeper domestic market, especially for long-term local currency debt instruments. Second, issuing long-term local-currency debt requires monetary and fiscal credibility. In part, Claessens et al. (2007) argue that this can be achieved through institutional reforms that include medium-term monetary and fiscal policy frameworks such as fiscal policy rules, fixed exchange rate targeting, inflation-forecast targeting and central bank independence. However, from the sovereign asset and liability management perspective, Burger and Warnock (2007), suggest that policymakers can match the currency composition of sovereign debt and foreign reserves to avoid currency mismatches. Third, policymakers should formulate effective exchange rate management policies such as fixed exchange rate targeting or the use of foreign currency derivatives.

3 CHAPTER THREE: THE DETERMINANTS OF SOVEREIGN RISK PREMIUM IN AFRICAN ECONOMIES

3.1 Introduction

This study investigates the determinants of sovereign risk premium in the selected African countries. As defined by Hilscher and Nosbusch (2010), sovereign risk premium is the difference between the interest rate on the sovereign bond and the interest rate on risk-free U.S. Treasury bond of comparable maturity. According to Tkalec et al. (2014), the sovereign bond spread is the compensation to investors for default risk, in case the realized welfare loss from default exceeds the expected welfare loss. Sovereign spreads are a proxy for the country risk premium that is a measure of the risk associated with the probability that a country will default on its debts. In general, Olabisi and Stein (2015), note that developing economies are subjected to persistent macroeconomic instabilities hence have a higher sovereign risk premium than advanced economies. From the sovereign risk management perspective, it is therefore important for policy makers to control the key drivers that influence a country's risk.

Understanding the sovereign risk premium determinants will assist policymakers in formulating sovereign risk management policies oriented towards minimising sovereign default risks. For instance, Cassard and Folkerts-Landau (1997) argue that the objective of sovereign risk management is to ensure that the government's financing needs are met at the lowest possible cost of debt at a certain level of risk. Therefore, developing sound sovereign risk management policies to determine the key drivers of bond spread is essential to minimising risks and achieving macroeconomic stability of the overall economy. In addition, Korinek (2011) points out that the risk premium is an important factor in determining the choice between local currency debt and foreign currency debt, which is crucial to policy makers. However, the main contribution of the study is to investigate the key drivers of sovereign risk premium in African countries. Our study builds on the works of Martinez et al. (2013), who employ a panel fixed effects model to examine the country risk premium determinants in emerging market economies. For robustness, we employ the generalised method of moments with instrumental variables.

Despite the evidence of sovereign defaults in African economies, limited studies have been done on the determinants of sovereign high-risk premium in African countries. Studies such as Furceri and Zdzienicka (2012) have shown evidence of sovereign defaults in the selected African countries. However, Siklos (2011), points out that most of the studies focus on the determinants of bond spread in emerging market economies and developed economies. For instance, Kaminsky and Schmukler

(1999), find that changes in the foreign interest rate increases the country spread, and that the impact is high in countries with low credit ratings. Other studies, such as those by Mendonca and Nunes (2011), find that domestic variables are responsible for determining the risk premium. Hence, the gap that this study seeks to fill is that there are few studies focusing on the determinants of the sovereign risk premium in sub-Saharan Africa.

The rest of the paper is structured as follows: section 3.2 reviews the literature; section 3.3 presents the model; section 3.4 provides the empirical methodology; section 3.5 summarizes stylized facts; section 3.6 describes data; 3.7 analyses empirical findings; and section 3.8 concludes with some policy recommendations.

3.2 Related Literature

The literature on country risk premium determinants in sub-Saharan Africa is relatively scant, despite the empirical evidence of sovereign defaults. Most of the studies, such as that by Martinez et al. (2012), focus on the determinants of sovereign bond spreads in emerging market economies. This study use quarterly data to estimate panel fixed effects model on the seven Latin American countries, to investigate the determinants of bond spread. Their study find inflation, terms of trade, the external debt and international reserves/GDP to be key drivers of sovereign bond spreads. Using panel data on emerging market economies, Baldacci and Kumar (2010) investigate the effect of fiscal deficits and public debt on long-term interest rates. They find that higher deficits and public debt lead to a significant increase in long-term interest rates. These self-fulfilling mechanisms suggest that higher fiscal deficits and public debts are likely to raise the sovereign risk premium, and hence, default risks.

According to the theory of fiscal insurance forwarded by Uribe (2006), under certain monetary and fiscal policy regimes, the sovereign risk default is inevitable. In fact, some of the monetary policy rules e.g. interest rate targeting and inflation targeting, are inconsistent with the central bank's objective of price stability. For instance, assume that a country is characterised with chronic fiscal deficits and the central bank's objective is price stability. Then, under this scenario, the probability of a country to default on its sovereign debt is high. More recently, Cuadra et al. (2010) realize that fiscal policy is still procyclical, and that defaulting occurs more often in recessions. If the government ran a deficit budget, it has the option of financing this deficit by borrowing from abroad, though at a high interest rate. As observed by Bi (2012), if taxes are more distortionary, it will be more likely that the government will raise its foreign borrowing, and hence, a high likelihood to sovereign default risk.

There has been inconclusive evidence regarding the determinants of sovereign risk premium in developing countries. While some studies, such as those by Baldacci et al. (2011), Iara and Wolff (2014), indicate that domestic fundamentals are responsible for changes in the sovereign risk premium. For instance, Tkalec et al. (2014) demonstrate that an increase in current account deficit raise the level of sovereign risk premium. In addition, Grauwe and Ji (2012) point out that a high ratio of public debt/GDP increases the debt-servicing burden, which in turn raises debt-servicing costs, along with the likelihood of a sovereign default. Other studies find market sentiment to be the key driver of sovereign bond spread, in particular, global risk aversion. As noted by Audzeyeva and Schenk-Hoppé (2010), the investor's sentiments significantly affect the bond spread. Similarly, Siklos (2011), highlight that the degree of investor's risk aversion is an important factor in explaining bond spread variations.

The economic literature has identified that most of the variations in the sovereign bond spread are explained by GDP growth. Findings by Sturzenegger (2004), prove that an increase in debt defaults are associated with a fall in output growth of about 0.6–2.2 percent. This implies that an improvement in the economic performance of a country contributes to macroeconomic stability, as a result, the probability of sovereign default to occur is minimal. A high level of GDP growth raises the country's ability to service its debt burden, which leads to a reduction in the level of risk premium. Using a two-step GMM estimator, Borensztein and Panizza (2009), show that sovereign default risks are associated with decrease in GDP growth by 1.2 percent. Generally, Maltritz and Molchanov (2014), observe that as long as the GDP growth rate is higher than the cost of servicing debt, the sovereign default risk will be significantly reduced. Similarly, Siklos (2011) point out that higher real GDP growth reduces the sovereign bond spread.

Several studies have examined the significance of the exchange rate regime in influencing the sovereign risk premium. The exchange rate in developing countries is highly volatile, making sovereign default more likely to occur in a floating exchange rate regime. Galindo et al. (2003) argue that the contractionary effects of the exchange rate depreciation are associated with currency mismatches and sudden stops, which may lead to financial instability. According to Calvo and Reinhart (2002), this is the main reason many developing countries exhibit the "fear of floating", and therefore, adopt managed floats or soft pegs. However, Martinez et al. (2013)'s findings indicate that the exchange rate is insignificant in emerging market economies. On the other hand, Gumus (2011), claims that countries with fixed exchange rates have lower spreads than countries with flexible exchange rates.

Other studies such as that of Baldacci et al. (2011) identify inflation rate which is an indicator of macroeconomic stability as significant in influencing the sovereign risks. As described by Martinez et al. (2013), a high inflation rate may be attributed to the monetization of the fiscal deficit and the need for higher interest rates. Hence, Min et al. (2003), illustrate that an increase in inflation rate signaling macroeconomic instability, will lead to an increase in sovereign risk premium. However, the default risk will be high in an inflation-targeting economy, if the government will not raise the short-term interest rate through the central bank to curb inflationary tendencies. Some studies, e.g. that of Tkalec et al. (2014) find that in the long run, sovereign risk premium increases in response to higher inflation. The expected sign of inflation on the risk premium is positive.

Foreign exchange reserve/GDP is also an important factor in determining the level of risk premium. Accumulation of foreign exchange reserves should reduce it. Hence, the hypothesized sign is negative. Following Tkalec et al. (2014), accumulation of foreign reserves lowers the bond spread. As noted by Bellas et al. (2010) and Martinez et al. (2013), a country's foreign exchange reserves are used to service foreign debt. Therefore, if there is a low ratio of foreign reserves/GDP growth, then there is a high likelihood of sovereign default and liquidity risks. In addition, Ouyan and Rajan (2014), stress out that the accumulation of foreign exchange reserves act as an insurance against sovereign defaults.

Other studies argue that global factors such as global liquidity, risk appetite and contagion effects are important in determining the country risk. This is in line with findings by González and Levy-Yeyati (2008) that the level of the risk reflects the risk aversion of the international investor. In addition, Dailami et al. (2008), point out that global risk aversion increases its effect over sovereign bond spreads through the contagion effect. Moreover, Kamin and Von Kleist (1999), find that bond spreads are mainly explained by the shifts in market sentiments, rather than by variations in fundamentals. Similarly, Maltritz and Molchanov (2014), conclude that market sentiments play an important role in determining the sovereign bond spread over time. However, it is generally argued that developing countries are riskier than advanced economies. The expected sign of market sentiment on the country risk is positive.

Another strand of the literature shows that the risk premium is also affected by the public debt/GDP ratio. The increase in the public debt relative to GDP growth leads to a high cost of servicing the debt, which contributes to an increase in the country risk premium. Findings by Tkalec et al. (2014), indicate that high public debt/GDP ratios are associated with high sovereign risk premium. In addition, Grauwe and Ji (2012) point out that there is a positive correlation between the risk premium and the

public debt/GDP ratio. A high ratio of public debt/GDP raises the debt-servicing burden which in turn contributes to debt accumulation overtime. This rise in indebtedness, which is attributed to poor debt management policies, may lead to a high probability of sovereign defaults. However, Martinez et al. (2013) note that the expected sign for public debt/GDP growth rate is positive.

An important variable considered as a sovereign risk premium determinant is the foreign debt. A number of studies, such as those of Ferrucci (2003), Hilscher and Nosbusch (2010), indicate that accumulation of foreign currency debt is associated with high risk of sovereign defaults. Sovereign defaults on foreign currency bonds appear to be more frequent than sovereign defaults on local currency bonds. Findings by Reinhart and Rogoff (2009), identify more cases of sovereign defaults on foreign debt than sovereign defaults on local currency debt. Sovereign debt in local currency is often viewed as presenting a low default risk level because governments have the possibility to monetize their debt when the fiscal situation deteriorates. In contrast, debt denominated in foreign currency is generally viewed as relatively risky, given the volatility of exchange rates. In a floating exchange rate regime, Dell'Erba et al. (2013), mention that depreciation of the exchange rate creates currency mismatch in the sovereign balance sheet, this in turn, raises the sovereign risk premium. However, empirical evidence indicates that local and foreign currency debts are equally risky in increasing the likelihood of sovereign defaults.

3.3 The model

Following Ferrucci (2003) and Comelli (2012), a conventional approach to sovereign bond yield is the assumption that the yield spread is a function of the likelihood that a default will occur and the welfare loss following a default. This likelihood of a default occurring depends on a set of macroeconomic fundamentals e.g. the public debt/GDP ratio; inflation; real exchange rate, and fiscal deficits. Other studies, such as those by González and Levy-Yeyati (2008); Kamin and Von Kleist (1999); Maltritz and Molchanov (2014) conclude that market sentiments play an important role in determining the sovereign bond spread over time. In addition, Uribe (2006), makes an important observation regarding the probability of default risks that under certain monetary and fiscal policy regimes, the sovereign risk default is inevitable. This is due to the conflicting objectives of fiscal and monetary policy regimes, which are inconsistent.

Therefore, Jankovic and Zivkovic (2014), declare that the bond yield spreads, which reflect the investors' perception regarding the probability of default and the welfare loss is negatively correlated with the foreign debt sustainability. As developed by Edwards (1984), the sufficient condition for the optimal share of the investor's funds is given by:

$$(1+r_f)=p_w+(1-p)(1+r^L)$$

(12)

where r_f is the risk-free interest rate, p is the default probability of the debtor country, p_w is the debtor's payment to the investor in case a default occurs, and r^L is the rate of return on investment. Then, Bellas et al. (2010), suggest that the probability of default on emerging market sovereign bonds and the risk-free interest rate have the same maturity. In the long-run, however, the probability of sovereign default is constant. Hence, the bond spread over the U.S. Treasury bond, *s*, is given by:

$$s=r^L-r_f=\frac{p}{1-p}(1+r_f)$$

(13)

With respect to Edward (1984), the probability of default in a logistic form is specified as:

$$p=\frac{\exp\left(\sum_{j=1}^{J}\beta_j x_j\right)}{1+\exp\left(\sum_{j=1}^{J}\beta_j x_j\right)}$$

(14)

By combining equations (13) and (14), and after taking the logarithm, the sovereign risk premium is provided by:

$$\log s=\log(1+r_f)+\sum_{j=1}^{J}\beta_j x_j+\varepsilon_{it}$$

(15)

Eq. (15) shows that the sovereign bond spread at time t is affected by the country's fundamentals x_j and the risk-free interest rate, r_f. Expressing Eq. (15) in logs will generate the following log-linear specification with fixed individual effects that we need to estimate:

$$\log(embig_{it}) = \alpha_0 + \sum_{j=1}^{n} \alpha_j x_{ijt} + \gamma_j + \lambda_t + \varepsilon_{it}$$

(16)

where $embig_{it}$ is the sovereign bond yield spread for country *i* in time *t*, x_{ijt} is a vector of independent variables that includes country-specific and global factors, μ_i is the country-specific fixed effects, and ε_{it} are the error terms, which are independently and identically distributed.

3.4 Empirical methodology

3.4.1 Panel unit root tests: LLC and IPS

It is important to carry out the unit root tests in order to determine the order of integration. Moreover, regression of non-stationary time series data is likely to give spurious results. As noted by Strauss and Yigit (2003), panel unit root tests e.g. Im et al. (1997), address the low power problem in individual-equation Augmented Dicky Fuller Test by averaging the t-statistics across the panel and assumes that the disturbance terms are normally distributed. This study will use panel unit root tests developed by Levin et al. (2002) and Im et al. (2003) to determine the order of integration of the underlying variables of interest. The null hypothesis for these unit root tests is that all panels contain a unit root, I(1), except the null hypothesis for Hadri Unit Root Test, that assumes all panels are stationary, I(0). The Im, Pesaran and Shin (2003), based on the Dickey-Fuller procedure specifies each cross-section with individual effects and no time trend as follows:

$$\Delta y_{it} = \alpha_i + \gamma_i y_{i,t-1} + \sum_{j=1}^{p_i} \chi_{ij} \Delta y_{i,t-j} + \varepsilon_{it}$$

(17)

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$

The IPS uses separate unit root tests for the *N* cross-section units. After estimating the separate ADF regressions, the average of t-statistics for p_1 from the individual ADF regressions, that is:

$$\bar{t}_{NT} = \frac{1}{N} \sum_{i=1}^{N} t_{iT}(p_i \beta_i)$$

The *t*-bar statistics is then standardised and converges to the standard normal distribution as N and T tends to infinity. As shown by IPS (1997), the t-bar statistics performs better when N and T are small.

3.4.2 Residual-based panel cointegration test

If the null hypothesis of a unit root test is not rejected, then the cointegration test can be performed to determine the long-run relationship in the underlying variables. In a conventional way, cointegration refers to the set of variables that are individually integrated of order one, some linear combination of these variables can be described as stationary, I(0). Earlier works of Pedroni (1995), investigates the properties of residual-based tests for the null of no cointegration for both homogeneous and heterogeneous panels. An interesting observation by McCoskey and Kao (1998) suggests that testing the null hypothesis of cointegration rather than the null hypothesis of no cointegration is interesting especially in applications, where cointegration is forecasted a priori by economic theory.

However, Pedroni (1999), note that residual-based tests are more robust even in small samples although they cannot determine the number of co-integrated relationships. Our study uses the Pedroni cointegration test suggested by Pedroni (1999). The procedures proposed by Pedroni make use of estimated residual from the hypothesised long-run regression in its general form is given by:

$$y_{it} = \alpha_i + \delta_i t + \beta_i x_{it}^{'} + e_{it} \quad (18)$$

where i = 1,…, N over time periods t = 1, …, T. The variables y_{it} and X_{it} are assumed to be integrated of order one, denoted by I (1), and under the null of no cointegration, the residual will also be I(1). The parameters α_i and δ_i allow for the possibility of specific fixed effects and deterministic trends. The slope coefficient β_i is also allowed to vary so that the cointegrating vectors may be heterogeneous across the panel.

Pedroni (1999) suggests the heterogeneous group mean panel test statistics to test for panel cointegration asymptotic distribution of individual t-statistics given by the following form:

$$\frac{X_{N,T} \quad \mu\sqrt{N}}{\sqrt{v}} \Rightarrow N(0,1)$$

where $X_{N,T}$ correspond to test statistics, while μ and v are the mean and variance of each test, respectively.

If the variables are cointegrated, which implies there is a long-run relationship between the underlying variables, then, we proceed to estimate equation (16) using the panel dynamic fixed effects method. We build our model on the works of Martinez et al. (2013), who investigate the determinants of sovereign risk premium in emerging market economies using panel fixed effects. Panel fixed effect models control for unobservable individual and time-specific effects. According to Csonto and Ivaschenko (2013), a panel model takes into account the individual dimension and the time dimension. As noted by Judson and Owen (1999), the fixed effects model is more robust than the random effects model, because it also controls endogeneity problems. However, the general model of bond spread determinants for country *i* at time *t* is given by the following dynamic fixed effects model:

$$y_{it} = \gamma y_{i,t-1} + \sum_{j=1}^{n} \alpha_j x_{ijt} + \gamma_j + \lambda_t + \varepsilon_{it} \quad \text{For} \quad i = 1\ldots\text{N} \quad \text{and} \quad t = 1\ldots\text{T} \tag{19}$$

where y_{it} is the sovereign risk premium measured by the interest rate on the sovereign bonds and the 10-year US Treasury bond, which is the benchmark and default-free. Most of the studies use the JP Morgan Emerging Markets Global Bond Index, which is the most comprehensive emerging markets benchmark. Despite the fact that this index incorporates bonds issued in emerging market economies, Asia, Africa and Europe, it seldom includes all the low-income countries. According to Ebner (2009), some European countries are not included in the JPMBIG index. On the other hand, this benchmark index includes African countries, such as Egypt, South Africa, Nigeria and Morocco.

However, Ferrucci (2003) and Ebner (2009), use the emerging market benchmark. The vector of independent variables that includes country-specific and global factors is represented by χ_{it}. As shown by Comelli (2012) and Martinez et al. (2013), sound country-specific factors are associated with lower bond spreads. An appreciation of the real exchange rate decreases the country risk premium. Therefore, the expected sign for the exchange rate is negative. In addition, some studies, such as those by Baek et al. (2005), Bellas et al. (2010) and Siklos (2011), find that high GDP growth, greater amounts of reserves and an increase in money supply lower the sovereign bond spread. Hence, this study expects a negative impact on sovereign bond spreads. Other studies, such as Gylfason (1991), point out that higher inflation rates contribute to higher sovereign default risks.

The risk premium is high in heavily indebted countries because of the worsening of fiscal deficit and an increase in investor's sentiments. The hypothesised sign is

positive. In addition, the increase in the investors' risk aversion raises the risk premium. In this sense, Bernoth et al. (2012) are of the opinion that in times of uncertain economic conditions, rational investors move to less risky assets, which in turn raises the bond spread. In order to control for global factors, the market sentiment is proxied by the consumer's sentiment. Some studies, such as those by Aristei and Martelli (2014), have used direct proxies for market sentiment based on consumer confidence. ζ_i represents the individual country-specific effects, γ_t the time effect, and ε_{it} the error term. This study has also considered two dummy variables in order to capture the effects of the debt crisis. The individual country-specific effect is denoted by γ_i and the time-varying unobservable time effect is denoted by λ_t. The error term is represented by ε_{it}. In addition, we investigate the structural breaks by adding dummy variables.

As a means of robustness, this study uses the system generalized method of moments (GMM) established by Arellano-Bover (1995) and Blundell-Bond (1998). It enhances the difference GMM estimator by creating an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects. The two-step estimator is more efficient than the one-step system GMM and performs better than the differenced GMM and within-group estimators. To address endogeneity and simultaneity bias issues, the explanatory variable are lagged to more than two periods which are used as instruments. If the moment conditions are valid, Blundell and Bond (1998) show that, in Monte Carlo simulations, the GMM-system estimators perform better than the GMM-difference estimator.

We test the validity of the moment conditions by using the Sargan test of over-identifying restrictions. Further tests include an Autoregressive (AR) test to check if the differenced error terms are first and second order serially correlated. The principle of this method is to choose instruments, which satisfy a set of orthogonality conditions, whereby the number of instruments ought not to exceed the number of panels. The order condition requires that the number of instruments must be at least equal the number of endogenous components, such that $r < K$. Roodman (2009), note that using many moment conditions can improve efficiency but makes the GMM inferences inaccurate. Bound et al. (1995) argue that the use of instrumental variable in the case of a weak relationship between instruments and the endogenous explanatory variable causes large inconsistencies in the estimated instrumental variables.

Table 3.1: Correlation analysis

	Risk Premium	Reserves/GDP	M2/GDP	Inflation rate	Real GDP	Exchange rate	Public debt/GDP	Consumer sentiment	Current account/GDP
Risk Premium	1								
Reserves/GDP	-0.176**	1							
M2/GDP	0.648**	-0.416**	1						
Inflation rate	0.165**	-0.032***	0.186**	1					
Real GDP	-0.216**	0.149**	0.163**	-0.152**	1				
Real exchange rate	-0.723**	-0.518**	0.893**	0.146**	0.02***	1			
Public debt/GDP	0.006***	-0.637**	0.088**	0.09**	0.702**	0.18**	1		
Consumer sentiment	0.203**	-0.229**	-0.355**	-0.267**	-0.17**	-0.30**	0.400**	1	
Current account/GDP	-0.431**	-0.44**	0.85**	0.009***	0.057***	0.842**	0.134**	-0.223**	1

** and *** denotes statistical significance at 5% and 10% level

Table 3.1 reports the correlations between the sovereign risk premium and its determinants in African countries. The correlation results show that most of the series are highly correlated with each other. For instance, the correlation between M2/GDP and exchange rate is 0.89; M2/GDP and current account/GDP is 0.85; real GDP and public debt/GDP is 0.70 as well as the exchange rate and current account/GDP is 0.84. In this case, some insignificant variables will be dropped to avoid the problem of multicollinearity. Most of the studies, e.g. those by Comelli (2012), find negative correlation between the bond spread and its determinants. This implies that improvement in country-specific fundamentals, such as GDP growth, is associated with low sovereign risk premium. Our results show that there is a negative correlation between the GDP growth rate and the bond spread. The increase in the economic growth raises the tax revenue used for servicing debt and therefore there is a decline in default risks. This is in line with studies by Siklos (2011) and Maltritz and Molchanov (2014), who show that the bond spread reduces in response to improvement in GDP growth rate.

There is a negative correlation between foreign exchange reserves/GDP and bond spread. If the level of reserve accumulation declines, then the likelihood of a sovereign default is high. These results are consistent with Tkalec et al. (2014), who show that the accumulation of foreign exchange reserves raises a country's liquidity level, thereby lowering the sovereign bond spread. In practice, foreign exchange reserves are accumulated to raise a country's ability to meet its external debt obligations. More recently, Maltritz and Molchanov (2014), find that foreign reserves/GDP growth is negatively correlated with the sovereign risk premium. In addition, Bellas et al. (2010) and Martinez et al. (2013) argue that a country's foreign exchange reserves can be used to service foreign debt and fix the exchange rate. Hence, the hypothesised sign is negative.

M2/GDP is positively correlated with the sovereign bond spread. Money supply is a key economic indicator used to forecast the inflation rate where more money supply raises the inflation rate, as a result, the sovereign risk premium rise. In addition, Makin (2013), observe that high level of money supply leads to exchange rate depreciation, which in turn generates the trade deficit and a likelihood of sovereign defaults. According to Calvo et al. (1996), the government reduces the growth of money supply by issuing government bonds through the central bank to discourage the expansionary effects of the monetary policy. As a consequence, this stimulates macroeconomic and financial stability, thereby lowering the country risk premium. This is in contrast with studies by Martinez et al. (2013), who find a negative correlation between money supply and sovereign bond spread.

There is positive correlation between the inflation rate and the sovereign bond spread. A high inflation rate reflects macroeconomic instability and consequently, a rise in country risk premium. As noted by Calvo et al. (1996), an effective inflation-targeting policy will reduce macroeconomic instabilities by managing the inflationary tendencies, which may lead to capital outflows. On the other hand, Baldacci et al. (2011), observe that a rise in the inflation rate, which is attributed to the adoption of expansionary monetary policy, contributes to a high likelihood of sovereign risks. Other studies, such as those by Martinez et al. (2013), find that the inflation rate is significant at 1% and exhibits the expected positive sign. This means that the bond spread will increase in response to inflationary pressure. More recently, Tkalec et al. (2014) show that sovereign risk premium increases in response to higher inflation in the long run.

However, the correlation between the exchange rate and the country risk premium is negative. This implies that the exchange rate depreciation raises the debt servicing cost, which may actually lead to a high probability of sovereign defaults. Studies such as those by Ades et al. (2000) and Ebner (2009), demonstrate that an appreciation of the exchange rate should translate to a lower sovereign bond spread. Moreover, Garcia and Gonzalez (2013) point out that developing countries have high risk premium because of their exposure to significant exchange rate shocks. According to Kodongo and Ojah (2013), the exchange rate depreciation makes exports cheaper, resulting to improvement in the country's balance of payments position, driving down the sovereign bond spread. In addition, Gumus (2011) clarifies that countries with fixed or pegged exchange rates have lower risk premium than countries with flexible exchange rates.

The public debt/GDP ratio is positively correlated to the bond spread. It clearly suggests that an increase in public debt/GDP ratio contributes to a rise in the level of sovereign risk premium. This is consistent with Bernoth et al. (2012), who observe a positive relationship between bond yield spreads and fiscal variables. Similarly, Tkalec et al. (2014), find that the country risk premium increase in response to higher total debt to GDP ratio, which is attributed to high cost of debt servicing. In addition, Grauwe and Ji (2012), affirm that the debt to GDP ratio has a priori expected positive sign towards the bond spread. As noted further by Bi (2012), when the level of public debt is beyond the fiscal limit, sovereign default is likely to occur. On the other hand, the current account balance/GDP ratio is negatively correlated to the sovereign risk premium. According to Ozatay et al. (2009) and Martinez et al. (2013), this means that the increase in current account balance/GDP that is current account surplus reduces the probability of sovereign defaults.

Furthermore, market sentiments and bond spreads are positively correlated, which implies that the increase in the investor's risk aversion raises the sovereign risk premium. This is in contrast with Gonzalez-Rozada and Levy-Yeyati (2008), who observe that the emerging market bond spread is negatively correlated with the international risk appetite. Other studies e.g. Dailami et al. (2008), reveal that an increase in global risk aversion raise the sovereign bond spreads through the contagion effect. An increase in market sentiments is reflected by the improvement in the sovereign credit rating on a country. As shown by Ebner (2009) and Zinna (2013), emerging market sovereign risk is driven by the degree of investors risk aversion.

3.6 Data description

This study employs annual data covering the period 1971 to 2011 for ten African countries. The countries selected include Burundi, Egypt, Gambia, Kenya, Mauritania, Nigeria, Sierra Leone, Swaziland, South Africa, and Zambia. Data is sourced from the IMF's International Financial Statistics; the World Bank development indicators; the UNCTAD statistics; the Federal Reserve Bank of St. Louis and each country's central bank. The country risk premium is measured by the difference between the interest rate on the sovereign bond denominated in US Dollar and the interest rate on the 10-year US Treasury bond, which is the benchmark and default free. Data on the interest rate of sovereign bond in African countries is obtained from the country's central bank and the Federal Reserve Bank of St. Louis. The 10-year US T-bond is sourced from the Federal Reserve Bank of St. Louis. In addition to JPEMBIG index, Comelli (2012), point out that this index includes Egypt and South Africa whereas Bunda et al. (2009), the index includes Morocco as well.

The selection of the countries is based on the fact that these countries have domestic debt market where information on sovereign bond is available. As noted by Christensen (2005), who investigated the domestic debt markets in sub-Saharan Africa, their choice of countries was limited to non-CFA countries, since CFA countries, until very recently, did not have any domestic debt markets. Among the non-CFA countries, Angola, Botswana, the Democratic Republic of the Congo, Mozambique, and São Tomé and Príncipe did not have domestic government debt markets at the time of collection, that is, in 2005. In cases where these were insufficient, central bank reports or IMF country desk economists helped to fill their gaps.

Inflation is measured by the consumer price index. The exchange rate is defined as the value of domestic currency per unit of foreign currency. GDP growth rate is the real GDP at 2005 prices. Total reserves/GDP is the ratio of reserves to GDP.

M2/GDP is the ratio of money supply to GDP where M2 includes M1with all savings and time-related deposits. Fiscal deficit is measured by the public debt/GDP ratio. Current account/GDP is the sum of the balance of trade, net factor income from abroad and net cash transfers to GDP growth rate. In order to control for global factors, the proxy for market sentiment is given by the consumer's sentiment. Studies such as Aristei and Martelli (2014) have used direct proxies for market sentiment based on consumer confidence.

3.7 Empirical results

3.7.1 IPS and LLC unit root tests

Table 3.2: Panel unit root test

	Level (without trend)		Difference (with trend)	
	Levin, Lin and Chu	Im, Pesaran and Shin	Levin, Lin and Chu	Im, Pesaran and Shin
GDP	-22.38**	-21.06**	-19.66**	-19.63**
Exchange rate	1.86***	5.51***	-9.03**	-5.03**
Inflation rate	-17.57**	-14.24**	-16.85**	-12.71**
M2/GDP	0.01***	2.05***	-25.03**	-29.26**
Public debt/GDP			-23.00**	-24.34**
Foreign exchange reserves			-10.27**	-13.41**
Risk premium	-2.29**	-2.79**		
Market sentiment	-6**	-7.8**		
Trade/GDP			-11.03**	-18.77**
Commodity price	-3.09**	-7.29**		

(i) The null hypothesis of no unit root is rejected if p-value < 0.05. (ii) ** and *** denotes 5% and 10*** significance level.

Table 3.2 presents the panel unit root tests using the Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003). The optimal lag length selection is chosen based on Schwarz Information Criterion (SIC) and the optimal bandwidths of LLC, IPS unit root tests are determined based on the Newey-West criterion. Unit root test procedures are designed to investigate the stationarity of each individual series in the panel. Most of the variables e.g. the exchange rate, M2/GDP ratio, public debt, foreign exchange reserve and trade accept the null hypothesis of a unit root. However, after first differencing these series, they become stationary at the 5% significance level, with individual linear trends. This is consistent with the findings of Martinez et al. (2012). Other series such as the GDP growth rates, inflation rates,

market sentiment, sovereign risk premium and commodity prices are stationary at level. We then carry out the Pedroni residual-based cointegration after having stationary series.

3.7.2 Panel residual-based cointegration test

Table 3.3: Pedroni residual-based cointegration test

	Without deterministic trend	With deterministic trend
Sovereign risk premium	-2.66**	-2.38**

(i)** and *** denotes 5% and 10% significant levels. (ii). Null hypothesis is rejected if p-value<0.05.

Table 3.3 reports the residual-based panel co-integration results. According to Pedroni (1999) and Kao (1999), the advantage of residual-based test over the maximum-likelihood based co-integration test is that they are robust, even in small samples. However, Banerjee (1999), points out that they are unable to determine the number of co-integrated relationships. Our test shows that the null hypothesis of no co-integration is strongly rejected in the series under investigation. Since there are co-integrating relationships between the bond spread and its determinants, we proceed to estimate the key drivers of sovereign bond spread in African countries using the dynamic fixed effects methodology and the generalized method of moments for robustness.

3.7.3 The multiple structural break tests

We capture the presence of multiple structural breaks by using the Bai and Perron (2003) multiple break point test. Bai-Perron multiple structural break test allows for a maximum number of structural breaks and is robust at determining the sequential breaks. In addition, it considers estimating multiple structural breaks in a linear form. The results of this study indicate that the structural breaks are highly significant at 5 percent. The identified structural break dates by the Bai and Perron multiple structural break test are 1979, 1980, 2001, 2007 and 2008. The late 1970s was a period during which sub-Saharan Africa experienced commodity oil price shocks. According to Senhadji (2003), external shocks of 1970s were responsible for over-borrowing, which in turn, led to debt accumulation, followed by sovereign debt crises.

On the other hand, the early 2000's reflect the effects of commodity super cycles in African economies. As noted by Kablan et al. (2017), the business cycles are highly correlated with cycles in commodity prices. This unique feature of these economies has led to multiple notable observations since the 2000s. More importantly, Davis et al. (2001) gives evidence to support these effects, showing that economic performance indicators in commodity-exporting countries tend to co-vary with

commodity price cycles. In particular, commodity prices declined significantly from the second half of the 1970s until the early 2000s. Since the early 2000s, commodities prices have rebounded. Other studies e.g. Kilian (2009), find that the economic growth in emerging market economies affected commodity prices in the 2000s where commodity prices rebounded.

The 2007 and 2008 signals the outbreak of the global financial crisis. This is in line with Grauwe and Ji (2012), who employ the Chow test and identify the structural break in 2008. Most of the African financial markets were affected by contagion effects, contributing to large losses in capital outflows. In addition, Allen and Giovannetti (2011), find that the global financial crisis affected food-importing and oil-importing Sub-Saharan Africa by pushing down their foreign exchange reserves and making it difficult for them to pay for imported products. Furthermore, the crisis contributed to output volatility, discouraging the private-sector investments in the long-run. Other effects include declining demand for exports and export prices as well as foreign direct investments.

3.7.4 Dynamic fixed effects estimation

Table 3.4: Dynamic fixed effects estimation results

	(1)	(2)	(3)
$Risk_{t-1}$	0.65(0.04)**	0.72(0.03)**	0.63(0.04)**
GDP	0.07(0.01)**	0.04(0.01)**	0.07(0.01)**
Exchange rate	-0.06(0.09)		
Inflation rate	0.04(0.01)**	0.03(0.01)**	0.04(0.01)**
M2/GDP	0.06(0.06)		
Public debt/GDP	0.03(0.007)**	0.01(0.007)**	0.03(0.007)**
Foreign exchange reserves	-0.06(0.01)**	-0.06(0.01)**	-0.06(0.017)**
Market sentiment	0.19(0.09)**	0.21(0.10)**	0.17(0.09)***
Trade/GDP	-0.07(0.05)**	-0.11(0.05)**	
Commodity price	-0.11(0.03)**	-0.15(0.03)**	-0.12(0.03)**
D1979			0.16(0.04)**
D1980			0.16(0.04)**
D2001			0.17(0.04)**
D2007			0.20(0.04)**
D2008			0.13(0.04)**
R^2	0.64	0.61	0.67
Durbin-Watson statistics	1.79	1.65	1.83
Observations	344	344	344
Prob(F-statistics)	0.0000	0.0000	0.0000

Notes: (i) ** and *** indicates statistical significant at 5% and 10%, respectively. (ii) Standard errors in parentheses.

Table 3.4 reports the estimation results for dynamic fixed effects on the sovereign risk premium determinants. The specification allows country-fixed effects to account for cross-country heterogeneity that affect all countries. As pointed out by Bordo et al. (2010), dynamic fixed effects estimator is robust to heteroscedasticity and serial correlation in the individual dimension. In Table 3.4, column (1) is the baseline specification, which includes all the variables of interest, where the exchange rate and M2/GDP are insignificant. Column (2) drops the insignificant variables. Column (3) incorporates the dummy variables. It turns out that the inclusion of time dummies affects the significance of trade/GDP ratio, where it becomes insignificant. Our results are consistent with Martinez et al. (2013), who confirm that the exchange rate is insignificant in emerging market economies. In contrast, Ebner (2009), find that the exchange rate is highly significant in African countries.

The results of this study show that a 1% increase in GDP growth, contributes to a decline in the sovereign risk premium by 0.65 percent. The coefficient on the GDP growth is statistically significant at 5%, and displays the expected negative sign. In contrast, Martinez et al. (2013) find that the GDP growth and the public debt/GDP ratio are statistically insignificant, although they present the correct sign. However, our findings are in line with those of Baek et al. (2005); Siklos (2011); Maltritz and Molchanov (2014), who note that high growth rates reduce the sovereign default risk. This means that the increase in the general economic performance of a country raises the macroeconomic stability in the fiscal variables hence, lowering the probability of a sovereign default. For instance, Guillaumont et al. (1999), indicate that macroeconomic fluctuations lower economic growth in African countries. Intuitively, the coefficient on real GDP growth shows that low-growth countries are penalized when issuing bonds as they tend to do so at higher spreads.

The coefficient on the inflation rate is significant and has the positive sign. This implies that a 1 percent increase in the inflation rate leads to an increase in the sovereign risk premium by 4 percent. This is in contrast with the findings of Mendonca and Nunes (2011), Maltritz (2012), where inflation is statistically insignificant in influencing the level of risk premium. However, our findings are consistent with Baldacci et al. (2011), who find that a rise in sovereign bond spread leads to high inflation rate. In practice, there is a strong link between inflationary tendencies and sovereign defaults. For instance, Reinhart and Rogoff (2011) singled out Zimbabwe, which has weak fiscal and monetary institutions, and is significantly exposed to high inflation and the risk of a sovereign default. Using an inflation threshold of 20%, their study finds that Zimbabwe's annual inflation rate exceeds 500 percent. On the other hand, Eichengreen et al. (2002), cites inflation-forecast

targeting countries like South Africa and Chile, which have strong monetary, fiscal and financial institutions, normally experience a lower sovereign risk premium. However, further analysis indicates that Egypt, Ghana and South Africa are effectively implementing inflation targeting as a monetary policy rule, so as to keep inflation in check. Some studies, such as those by Aron and Muellbauer (2007), find that since the Reserve Bank of South Africa implemented inflation targeting to manage its inflation in the 2000s, monetary policy credibility increased and the GDP growth improved, resulting to lower sovereign risks. Similarly, Kyereboah-Coleman (2012), confirms that inflation targeting is successful in managing inflation, lowering the exchange rate pass-through, and improving the credibility of the monetary policy in Ghana. On the contrary, Malikane and Mokoka (2012) find that since the implementation of inflation targeting, monetary policy is not credible when managing inflation. Countries with high inflation rates do not need to issue large amounts of debt, as the inflation tax is a major source of government revenue. For instance, Claessens et al. (2007), show that high inflation is associated with macroeconomic instability, and occasionally, with general government defaults.

A 1% increase in public debt/GDP ratio raises the sovereign risk premium by 0.03% and the coefficient on the public debt/GDP is highly significant. This suggests that as the public debt/GDP ratio increases, the debt-servicing burden also rises. In turn, indebtedness affects the sovereign's creditworthiness, which leads to a high level of country risks. This observation is in contrast with the findings by Bernoth et al. (2012), Bernoth and Edorgan (2012), where the coefficients on the debt variable are insignificant. Similarly, Jahjah and Yue (2004) find that the debt/GDP ratio has no significant effect on the bond spread. On the other hand, our findings are consistent with those of Min et al. (2003), Aristei and Martelli (2014), who show that high bond spread is due to an increase in the outstanding public debt. Importantly, it is advisable that a low public debt/GDP ratio is desirable so as to maintain macroeconomic stability in the fiscal variables.

The study findings further confirm the existence of the "debt-overhang hypothesis" in Sub-Saharan Africa. The fact that most African economies with the exception of South Africa have high shares of foreign currency liabilities, it reflects the presence of poor sovereign debt risk management policies and weak institutions. As stressed by Baldacci and Kumar (2010), Beirne and Fratzscher (2013), high public debt and fiscal deficits are associated with high sovereign default risks. In this case, stricter fiscal rules, backed by proper fiscal institutions, will improve fiscal performance and credibility in attaining public debt sustainability. In addition, Ahmad and Aworinde (2015), suggest that countries with high fiscal deficits such as South Sudan and Morocco need to undertake fiscal adjustment. The government could offset the

effects of fiscal adjustment on economic growth through a less restrictive monetary policy.

A 1% reduction in foreign exchange reserves leads to an increase in the sovereign risk premium by 0.06%, and is significant at 5% level. The accumulation of foreign exchange reserves is associated with the increase in liquidity, which in turn reduces the bond spread. The results of this study contrast with those of Heinemann et al. (2014), who find that the foreign exchange reserve is insignificant in all specifications. However, our findings are consistent with those of Tkalec et al. (2014), Maltritz and Molchanov (2014), who demonstrated the decline in the sovereign bond spread following an increase in reserve accumulation. However, Gelos et al. (2011), Olabisi and Stein (2015), reserve accumulation as a monetary policy instrument for providing liquidity acts as an insurance against sovereign defaults. Monetary authorities usually use foreign exchange reserves when there is high exchange rate volatility, in order to fix the exchange rate. Another motive identified by Jeanne and Ranciere (2011) is that countries hold reserves covering three months' worth of imports.

The coefficient on the market sentiment has the expected positive sign and is statistically significant at 5%. This indicates that the bond spread increases by 0.19% (19 basis points) in response to a 1% reduction in the investor's risk aversion. These results are in line with Bernoth et al. (2012) who note that the increase in bond spread is caused by the rise in the investors' risk aversion. More recently, Tkalec et al. (2014) confirm that the sovereign risk premium rises in response to high market sentiments. In addition, Cuadra et al. (2010) observe that when investors perceive the likelihood of sovereign defaults, country risks will start rising. In this case, a rise in investor's sentiments could be interpreted as lack of sound risk management strategies to maintain macroeconomic stability. However, our findings also show that African countries are significantly exposed to commodity price shocks. As investigated by Claessens (1992), African economies depend heavily on the undiversified primary export commodities, which are highly volatile.

Using dynamic stochastic general equilibrium model, Muhanji and Ojah (2011), note that to a larger extent, the commodity price shock lead to external debt accumulation in sub-Saharan Africa. Furthermore, an analysis by Deaton and Miller (1996), reveals that African economies have economic structures that are characteristically exposed to exogenous risks e.g. trade shocks and commodity price shocks, because they rely heavily on primary commodities for their export earnings and have relatively small-sized manufacturing sector. Moreover, Kose and Riezman (2001), explain that export revenues are highly unstable, due to sharp fluctuations in primary commodity prices. This in turn exposes African countries to uncertain trends in the

world interest rate. Generally, adopting sound sovereign risk management policies would thus tend to be a key element in reducing the sovereign risk premium. For instance, heavily indebted poor countries with significant fiscal deficits tend to rely on multilateral assistance to finance their deficits and service their debts. According to Eichengreen et al. (2007), relying on external financing leads to 'original sin', which is referred to as the inability to borrow in domestic currency.

In turn, this liability dollarisation in HIPCs exposes them to currency risks and reversals in capital flows, leading to financial instability and high country risks. Several studies e.g. Hausmann et al. (2006) and Bua et al. (2014), are in favour of domestic borrowing, as it lowers currency risks and reversals in capital flows in developing countries. Moreover, Guscina (2008) notes that emerging market economies are less susceptible to external risks, because of domestic borrowing. However, diagnostic checks, such as the Durbin-Watson Test statistics, show no autocorrelation, and the R-squared shows that the model fits well our data. The R-squared increases due to additional explanatory variables. Similarly, Hilscher and Nosbusch (2010) find that adding country-specific variables leads to a substantial increase in adjusted R-squared. The inclusion of dummy variables is significant in all the specifications.

3.7.5 Robustness check: GMM

Table 3.5: Generalized method of moment estimation results

	Inflation rate	GDP	Public debt/GDP	Reserves	Sentiment	Trade/GDP	Commodity price
Burundi	0.14(0.04)**		0.02(0.01)***				-0.5(0.18)**
Egypt	0.12(0.07)**				3.44(0.57)**		
Gambia	-0.31(0.13)**						
Kenya		0.97(0.5)***			4.18(2.24)***		
Mauritania				-0.31(0.15)**	0.99(0.34)**		
Nigeria		-0.26(0.09)**		0.86(0.21)**			
Sierra Leone	0.47(0.10)**			0.97(0.18)**	1.64(0.87)***		
Swaziland				-0.19(0.05)**			-0.32(0.09)**
South Africa							
Zambia	0.73(0.11)**	0.29(0.10)**					

(i) ** and *** indicates statistical significant at 5% and 10%, respectively. (ii) Standard errors in parentheses. (iii) Instrumental variables include lagged risk premium, lagged exchange rate, lagged M2/GDP, lagged GDP growth, lagged trade/GDP, lagged inflation rate, lagged public debt/GDP, lagged market sentiment and lagged commodity price (instrumented to one lag).

Table 3.5 reports the time-series analysis based on the GMM model, to determine the key drivers of sovereign risk premium in sub-Saharan Africa. Our results show that the exchange rate, M2/GDP and trade are insignificant in influencing the sovereign risk premium. This is consistent with the findings of Martinez et al. (2012). We perform the Hansen J-Test of over-identifying restrictions for OIR proposed by Sargan (1958), which tests for the overall validity and relevance of the instruments used. In addition, we carry out the Arellano-Bond Test of no autocorrelation in the error terms. The null hypothesis for Hansen J-Test is that the instruments are valid and relevant. While, the null hypothesis of the Arellano and Bond autocorrelation tests of first and second order AR (1) and AR (2), is that there is no autocorrelation. Our results do not reject the null hypothesis of these tests. To address endogeneity issues, Blundell and Bond (1998) suggest the use of instrumental variables by lagging the explanatory variables to two or more lags.

An important rule of thumb when choosing the number of instruments is that the number of instruments should be at least or equal to the number of regressors, in order not to violate the order condition and limit the number of lags of endogenous variables to t-1 and t-2. But for instruments to be valid, they should be strictly exogenous. According to Stock et al. (2002), weak instruments arise when the instruments are weakly correlated with the endogenous variables. The model uses lagged values of the endogenous variable and differences of independent variables as valid instruments. In addition, the exchange rate and M2/GDP ratio are used as instruments. The instrumental variables used are correlated with the endogenous variable such that there is reverse causality. For instance, Devereux and Lane (2003), demonstrate that there is potential endogeneity between risk premium and the exchange rate, as well as M2/GDP ratio. However, the seven fundamental variables and five time dummies are taken as strictly exogenous. According to Kennedy (1998), the instrumental variable technique provides consistent estimates.

The coefficient estimate on the inflation rate is significant at 5% level in Burundi, Egypt, Gambia, Sierra Leone and Zambia. This is in line with the findings by Ferrucci (2003), who respectively suggest that macroeconomic variables such as domestic inflation rates to be significant determinants of sovereign risk spreads. However, several studies, e.g. Fischer (1993) and Barro (1995), show a negative correlation between inflation and growth, because countries that experience poor growth performance normally have high inflation rates. Again, they respond to growth slumps by printing more money. Bua et al. (2014) explain that printing

money might fuel inflationary tendencies in a country. In theory, the seignorage government revenue obtained from printing money can become an important means of deficit financing in the short-run. As noted by Guerrero (2006), the average rate of inflation in Zambia is 82.79%, in Sierra Leone is 27.55%, in Burundi, is 10.36%, in Gambia is 8.72%, and in Egypt is 7.68 percent.

An observation by Nkurunziza (2005), is that economic instability in Burundi in the 1990s led to a decline in government revenue, which induced the government to rely more on inflation tax. Burundi, which has unstable government, may prefer high inflation. In turn, Nkurunziza (2001), emphasise that high inflation may signal poor policies and institutions, which cannot implement inflation-reducing policies, such as inflation-forecast targeting policy rules. A study by Boyd et al. (2001) summarize the causes of high inflation in Burundi that were attributed to an increase in food prices. As a result, inflation rose from an average of 5% annually in the 1970s and 1980s to 16% in the 1990s. Another study by Cukierma et al. (1992), show that the increase in the price of imported goods prompted the government to devalue its official exchange rate at the time. In this case, the drawing down of foreign exchange reserves increased the sovereign risk premium. On the other hand, Deme and Fayissa (1995) points out that in the early 1980s in Egypt, inflation steadily rose, reaching an annual growth rate of 14.6 percent.

According to a monetarist approach, a rise in the growth of money supply positively influences the domestic inflation for Egypt. This suggests that monetary policy can be applied to control inflation in Egypt. However, Bruno and Easterly (1998), emphasise that a country is considered to be in an inflation crisis if it is above the 40% threshold level of inflation. At this point, growth turns sharply negative, until the end of the inflation crisis period. Countries that had hyperinflation like Zimbabwe experienced negative economic growth. As suggested by Hegerty (2012), sub-Saharan Africa should improve its macroeconomic performance by adopting inflation targeting. In practice, however, most African economies are still using monetary aggregate targeting, and only a few countries like Ghana and South Africa have shifted to rule-based inflation-forecast targeting. Econometric analyses by Aliyu and Englama (2009); Sriram (2009) have recommended that Nigeria and Gambia adopt an inflation-targeting regime. On the other hand, Heintz and Ndikumana (2010) disagree with the suggestion of implementing inflation-targeting policy in sub-Saharan Africa.

Another study by Kallon (1994), find high inflationary tendencies in Sierra Leone. In particular, the average inflation rate rose from 15.33% in the 1970s to 63% in the 1980s. Despite the fact that the Sierra Leonean economy is an open economy, and relatively small in size, Sierra Leone is still exposed to significant external risks. On

the other hand, Odhiambo (2012) investigates the effects of inflation on financial development in Zambia during the period between 1980 and 2011. Since the 1990s, Baldini et al. (2012) points out that Zambian monetary policy focuses on achieving macroeconomic stability through price stability and exchange rate stability. By way of contrast, the country's inflation rate has been noticeably high. This is attributed to deteriorating terms of trade, due to a decline in copper prices during the period 2008 and 2009; exchange rate volatility; high public debt, and supply shocks. Generally, Onafowora (1996), finds that African economies experience a substantial decline in its economic performance, as a result, contributes to high money growth, and consequently, high rates of inflation.

The coefficient on the public debt to GDP is significant at 10% level in Burundi, and has a positive sign. This is similar to Teles and Mussolini (2014), who observe that the increase in public debt/GDP ratio can negatively affect economic growth and hence, pushes up the sovereign risk premium. Moreover, Hatchondo et al. (2012) point out that in countries with undiversified export base like Burundi, a high public debt/GDP ratio may be interpreted as the outcome of implementing stricter fiscal rules, in order to restore their credibility. However, Kourtellos et al. (2013), find strong evidence that higher public debt results in lower growth for countries. on the other hand, Reinhart and Rogoff (2010) find that there is a weak correlation between the government public debt and economic growth in countries with below the 90% threshold level. Countries with a public debt/GDP ratio greater than 90%, can have an adverse impact on economic growth. In addition, Panizza and Presbitero (2014), indicate that government debt is not welfare-improving when it is above the threshold level of 85% of GDP.

We obtain significant coefficient on the commodity price in Burundi and the hypothesised negative sign. A rise in commodity prices increases export earnings used to service debt burden, hence, low sovereign risks. This is in line with the findings by Collier (2007). On the other hand, Bruckner and Ciccone (2010) find that a decline in commodity price worsens the economic conditions in African economies, and that as a result, sovereign risks increase. Moreover, Muhanji and Ojah (2011) note that African countries rely on few primary export commodities, which are highly volatile. For instance, Addison et al. (2016), point out that the contribution of Burundi's agriculture is 36.4% of GDP, while its main export commodity, coffee, accounts for 70% of foreign exchange earnings. This dependency on coffee makes Burundi vulnerable to commodity price shocks. A further analysis by Senhadji (1997), argues that favorable commodity prices prompt developing countries to over-borrow with the perception that these favorable commodity prices will last long. But commodity prices are usually uncertain, if taking into account circumstances like the oil price shocks of 1970s. In turn, commodity price booms are

short-lived, and as a result, low commodity export earnings leads to high debt accumulation.

The coefficient on GDP growth is significant at 5% and 10% level in Kenya, Nigeria, Zambia, South Africa and has mixed signs. As explained by Siklos (2011), this implies that an improvement in economic performance may either increase or decrease the sovereign risk premium. Our results show that the improvement in economic growth reduces sovereign risks in Nigeria and South Africa, whereas it doesn't reduce sovereign risks in Zambia and Kenya. As observed by Carmody (2002), in highly diversified economies such as South Africa, its economic growth is driven by the manufacturing sector and mineral commodity exports e.g. platinum and gold. Hence, South Africa manages to keep its sovereign risks low.

Our findings are in line with those of Baek et al. (2005), and Maltritz and Molchanov (2014), who note that high growth rate reduces the sovereign default risk. However, the economic performance in African countries is highly volatile, due to macroeconomic shocks, especially the exogenous shocks responsible for output volatility. For instance, Guillaumont et al. (1999), specify that macroeconomic fluctuations lower economic growth in African countries, thus, an increase in sovereign risks. For instance, Hoffmaister et al. (1998) observe that in CFA Franc countries, where the exchange rate is pegged to the French Franc, economic growth is higher when compared to that of non-CFA Franc countries. This accounts for the differences in the level of sovereign risk between CFA countries and non-CFA countries.

Generally, our results confirm that the "resource curse hypothesis" exist in African economies. This means that African economies have a high sovereign risk premium, due to low economic growth, despite the fact that they are richly endowed with the kind of resources that could boost their export earnings. In particular, Auty (2007), defines the "natural resource curse" as the situation where countries endowed with natural resources experience low economic growth. The empirical evidence on the effects of natural resource endowment on economic growth is inconclusive. Some studies, such as those by Sachs and Warner (1999), Gylfason et al. (1999), confirm the negative effects on economic growth. On the contrary, Alexeev and Conrad (2009), disagree. However, Mehrara (2009), stress out that there is significant evidence to support the "resource-curse hypothesis" in resource abundant countries like the Democratic Republic of Congo, Nigeria, and Algeria. In addition, Brunnschweiler (2008), reveals that natural resource-abundant countries tend to grow more slowly than do resource-scarce countries.

However, Auty and Pontara (2007) find that despite of Mauritania being a resource-rich country and oil-driven growth, its economy displays clear signs of Dutch disease effects. On the other hand, Jerven (2010), show that Kenya and Zambia are clearly associated with negative economic growth which in turn, raises sovereign risks. Zambia is dependent on copper earnings, while Mwega and Ndung'u (2008) have noted that Kenya's relatively good growth performance is widely attributed to 'capitalist' development. Further findings by Akinlo and Egbetunde (2010), show that financial development leads to economic growth in Kenya, Nigeria, Zambia and South Africa, as a result, sovereign risks decline. Odhiambo (2004) find evidence in support of finance-led growth hypothesis in Kenya and South Africa, which postulates that financial development plays a major role in economic growth. The hypothesis contends that financial development has a stimulating impact on the economy. Other studies e.g. Fedderke and Simkins (2012), point out that the South African manufacturing sector makes the highest contribution to GDP compared to agricultural sectors, the mining industry and the service industries. These sectors show a declining trend in terms of productivity.

The coefficient on the foreign exchange reserve is significant in Mauritania, Nigeria, Sierra Leone and Swaziland. As pointed out by Dreher and Vaubel (2009), accumulation of foreign exchange reserve is expected to increase with the economic size and the volume of a country's foreign transactions. Countries with diversified export base and open economies with high growth rates are expected to hold more reserves. In addition, Bordo et al. (2010) suggest that since foreign currency debt is associated with currency risks, which in turn, push up the sovereign bond spread, holding more reserves might minimise the negative effects of exchange rate risks. Similarly, Hviding (2004) confirms that holding an adequate amount of reserves is associated with exchange rate management policies.

Arguments in favour of reserve accumulation have advocated that holding reserves is beneficial in guaranteeing the stability of the economy. For instance, Steiner (2013) finds that foreign exchange reserves reduce the net sovereign debt in the sovereign balance sheet. Consequently, Kaminsky and Lewis (1996) argue that a high level of reserves reduces the probability of a currency crisis and a sovereign default. Some empirical studies, such as Aizenman et al. (2012), suggest that holding reserves may lower the output costs associated with sudden stops. In addition, Manasse and Roubini (2009), Bordo et al. (2010), suggest that a strong reserve position relative to imports or short-term foreign currency debt may lower the likelihood of a sovereign default. Moreover, Alfaro and Kanczuk (2009), assume that optimal reserve management ought to cushion the economy against exogenous shocks, sudden stops and capital flows reversals. In theory, countries engage in reserve accumulation to

seek self-insurance against the potential tightening of international financial constraints.

Cross-country analysis shows that reserve accumulation offsets the likelihood of sovereign defaults. In the case of Nigeria, Abdullateef and Waheed (2010), find that changes in external reserve position in Nigeria has no effects on the rate of inflation but again, money supply ought to be a control variable to regulate the domestic inflation rate, in order to prevent sovereign defaults. As explained by Mendoza (2004), developing countries' reserves have significantly increased, growing dramatically by over 60%, hence, off-setting the negative effects of short-term debt. On the contrary, their study finds that the recent financial crises in the emerging market economies of Argentina (2001), Brazil (1999), Mexico (1994–1995) and Russia (1999), can be attributed to a lack of adequate international reserves, which significantly contributes to financial vulnerability. Generally, Ben-Bassat and Gottlieb (1992) as well as Levy-Yeyati (2008) specify that a sudden drain on reserves may be interpreted as a country's difficulty in servicing its debt burden; hence, the supply of foreign credit may be lowered which may further translate to reserve draining and consequently, a liquidity crisis.

The coefficient on the market sentiment is significant at 5% and 10% in Kenya, Mauritania and Sierra Leone. This is in line with González and Levy-Yeyati (2008) as well as Bernoth et al. (2012), who find that the increase in sovereign bond spread is attributed to fluctuations in the investor's risk aversion. High investor's sentiments are interpreted as an increase in macroeconomic instability, which cause investors to demand for a higher risk premium. More recently, Teles and Leme (2010), argue that ratings are used as a guide to investors, where a low sovereign credit rating implies the country carries considerable risk, scaring away potential investors. However, countries with a history of recent defaults have been rated as less risky than countries that have never defaulted. According to Julius et al. (2010), investor's confidence is important when determining the riskiness of a country. Ensuring investor's confidence enhances investors' participation in the market and encourages capital accumulation. On the other hand, Adjasi and Biekpe (2006) find a positive correlation between stock market development and investor confidence in Kenya.

Table 3.6: Arellano and Bond Test in first difference

Variable	Coefficient	P-value
Commodity price	0.2922	0.0715
Inflation rate	-0.6974	0.089
Trade	0.5800	0.067
Public debt/GDP	0.062	0.08
GDP growth	-0.0070	0.06
Market sentiment	-9.964	0.098
Exchange rate	0.2119	0.078
M2/GDP	-0.075	0.08
Reserves	0.356	0.073

i) The Arellano – Bond test for autocorrelation has a null hypothesis of no autocorrelation

Table 3.6 presents Arellano and Bond in first difference results. Our results show that the null hypothesis of no autocorrelation is accepted. The Arellano–Bond test for autocorrelation has a null hypothesis of no autocorrelation and is applied to the differenced residuals. However, system GMM uses more instruments than the differenced GMM. It may not be appropriate to use system GMM on a dataset with small number of countries around ten countries in this case. Intuitively, when the number of instruments is greater than the number of countries the Sargan test may be weak. On the contrary, Ahn and Schmidt (1995); Blundell et al. (2000), note that the standard GMM estimator performs poorly for highly autoregressive panel series. Meanwhile, the system GMM estimator gives precise estimations and significantly reduces the finite sample bias.

As shown by Arellano and Bond (1991), Alonso-Borrego and Arellano (1999), the standard approach is to first-difference the equation to omit unobserved heterogeneity and to use lagged values as instruments for endogenous variables in first-differences. Generally, Bond (2002), argue that the instruments available for the equations in first-differences are likely to be weak when the individual series have near unit root properties. Instrumental variable estimators can be subject to serious finite sample biases when the instruments used are weak.

3.8 Conclusion

This study investigates the key drivers of sovereign risk premium in African countries. The country risk premium is an important factor in determining the choice between foreign currency borrowing and local currency borrowing. As noted by Olabisi and Stein (2015), high-risk premium in African countries prompts sovereign borrowers to opt for foreign currency borrowing, which exposes them to exchange

rate risks and currency mismatches. In particular, Korinek (2011) demonstrates that developing countries are exposed to high sovereign risks due to macroeconomic volatility, which may increase the probability of a sovereign debt crisis. According to the theory of fiscal insurance forwarded by Uribe (2006), under certain monetary and fiscal policy regimes, sovereign risk default is inevitable. From the sovereign risk management perspective, Baldacci and Kumar (2010), indicate that it is therefore important for policy makers to control the key drivers that influence a country's risk. However, our study uses a panel-dynamic fixed effects model to identify the key drivers of a country's risk premium.

Our findings indicate that public debt/GDP; GDP growth; inflation rate; foreign exchange reserve; market sentiment and commodity price are highly significant in influencing the sovereign risk premium. This is consistent with González-Rozada and Levy-Yeyati (2008), Ferucci (2003), Csonto and Ivaschenko (2013), who note that both the fundamental factors and market sentiment influence the sovereign risk premium. In contrast, Martinez at al. (2013), find that the GDP growth and the public debt/GDP ratio are statistically insignificant, although they present the correct sign. Further analysis reveals that the exchange rate, M2/GDP ratio and trade/GDP ratio are insignificant. On the contrary, Claessens (1992) and Ebner (2009) find that the exchange rate is highly significant in African countries. Generally, countries with sound sovereign risk management policies and strong fiscal institutions experience lower sovereign risks.

The results of the current study have a number of important policy implications for African countries. Policy makers should design appropriate sovereign risk management policies oriented towards achieving institutional reforms that will ensure macroeconomic stability is sustainable. For instance, Claessens et al. (2007), claim that the institutional and macroeconomic framework including the monetary, financial, and fiscal aspects may reflect the level of sovereign risks. In addition, Morgan (2001) suggests that policymakers should set up institutional mechanisms that will manage commodity price uncertainty through issuing commodity-linked bonds and diversifying their export base. Similarly, Myers (1992) argues for developing countries to consider issuing indexed bonds such as inflation-indexed bonds that expose the borrower to less uncertainty when compared to foreign currency debt, or commodity price-linked bonds. Another policy option is to implement export promotion and import substitution policies.

4 CHAPTER FOUR: INSTRUMENTS FOR FINANCING DEVELOPMENT AND HEDGING SOVEREIGN RISKS IN AFRICAN ECONOMIES

4.1 Introduction

This study investigates the alternative instruments for financing economic development and hedging sovereign risks in African countries. Most African countries opt for foreign currency borrowing as a financing instrument. According to Eichengreen et al. (2002), Hausmann and Panizza (2003), the increase in foreign currency borrowing, that is, the inability of a country to borrow abroad in local currency, is attributed to institutional and macroeconomic factors. As a result, Bordo et al. (2010) confirm that foreign currency borrowing is exposed to exchange rate risks, which create currency mismatches, and consequently, raise the likelihood of a sovereign debt crisis. However, several studies, such as those by Allayanis and Ofek (2001), Kedia and Mozumdar (2003), maintain that foreign currency debt can be used as a hedging instrument against exchange rate risks.

In addition, Christensen (2005) declares that foreign financing has a very low interest rate and long maturity. According to Korinek (2011), these terms make foreign currency debt more preferable than domestic borrowing, because domestic debt is associated with higher interest rate in form of risk premium and has a shorter maturity. Another advantage of foreign currency debt is that it raises the supply of foreign exchange, which is important for import requirements. Moreover, Beaugrand et al. (2002) find that highly concessional foreign loans are preferential to finance budget deficits, even if there are significant devaluation risks, given the high levels of domestic interest rates. Therefore, from the sovereign risk management perspective, policy makers should design policies oriented to stock market development that will improve the access to alternative hedging instruments.

The understanding of alternative financing instruments is important for policy makers. An efficient selection of financing instruments will assist policy makers in minimising the cost of servicing debt, which in turn reduces the likelihood of sovereign default risks. Moreover, Claessens and Qian (1991) observe that risk management instruments diversify risks and minimise the cost of debt. In addition, Lu and Neftci (2008) note that the issuing of optimal debt instruments such as indexed bonds will reduce government borrowing costs and sovereign risks. The main contribution of this study is to assess the alternative instruments for financing development and hedging sovereign risks in African economies. This study builds on the works of Lu and Neftci (2008), who investigate alternative hedging instruments in developing countries. Other studies, such as those by Brenner et al. (2006) and Rampini et al. (2014), show that the role of financing instruments has shifted from financing economic development to diversifying sovereign risks.

Despite the increasing need of financing requirements, there have been few studies focusing on innovative financing instruments in African countries. Most of these studies, such as that of Mu et al. (2013) and Collier (2014), focus on the existing financing instruments in African countries, for example, the public and private sector partnerships, as well as sovereign bonds to finance economic development. Other studies, including that of Hale (2007), focus on the emerging market financing instruments used by sovereign borrowers to prevent sovereign default risks. Meanwhile, Ismailescu and Phillips (2015) note that the introduction of innovative financial instruments, such as the credit default swap (CDS), improves the cost of servicing debt. Therefore, an important gap that this study fills is the limited availability of alternative financing instruments in sub-Saharan Africa, which has been a policy concern for sovereign risk management.

The structure of the paper is as follows. Section 4.2 presents the stylised facts. Section 4.3 reviews literature. Section 4.4 discusses the macroeconomic indicators and financing instruments. Section 4.5 concludes with policy recommendations.

4.2 Stylised facts

This section presents stylised facts of the current status of existing financing instruments used in African economies. As shown by Helleiner (1992), most sub-Saharan African countries have been relying on concessional loans from multilateral institutions. More recently, Berensmann et al. (2015) highlight that official multilateral loans account for 21% of total external debt obligations in Africa in 2012. This reliance on multilateral loans is due to the fact that African economies have shallow and illiquid capital markets, where the market capitalisation/GDP ratio is 14.8% in 2010. Hence, this limits the access to innovative financing instruments. As observed by Gilbert et al. (1999), the World Bank and IMF loans to Africa have a low interest rate which stimulates investment, thereby closing the financing gap. However, IMF loans are highly criticised for the strict conditions as well as high and fixed interest rate attached to their loans. Several studies, e.g. Bordo and James (2000), find that IMF loans contribute to foreign debt accumulation.

An important stylised fact by Bua et al. (2013), indicate that until recently, foreign currency debt has the largest share of the public debt in low-income countries. As explained by Claessens and Qians (1991), the foreign currency debt of Sub-Saharan Africa consists of 33% of floating rate debt or short-term debt, which is subjected to refinancing or rollover risks. This share of variable rate debt is substantially below the share of all developing countries, which may be attributed to the large share of concessional and official debt that is fixed rate. However, the medium and long-term debt of Sub-Saharan Africa is more than 50% denominated in US dollars, followed by Japanese yen and British pounds. As shown by Kroner and Claessens (1991), the

high share of the US Dollar-denominated debt in African countries is due to the fact that primary export earnings are in US dollars, and most of the countries peg their exchange rate to the US Dollar.

For instance, Jadresic et al. (2001), Levy-Yeyati and Sturzenegger (2003), find that more than half of African economies have their exchange rates pegged to French Francs, Japanese Yen and the US Dollar. Moreover, Ghura and Grennes (1993), note that the Franc Zone countries peg their exchange rates to the French Franc. This implies that the debt service for sub-Saharan African economies will be affected by movements in the cross-currency rates between these hard currencies. However, in recent years, African countries are able to borrow in international financial markets, by issuing Eurobond, which is usually denominated in foreign currencies. As noted by Allen et al. (2011), despite the continent being largely economically under-developed, there is a growing interest in issuing sovereign bonds. Before 2006, Kenny and Moss (1998), indicate that only South Africa had issued a sovereign bond. Since then, a number of countries such as Ghana, Gabon, Côte d'Ivoire, Angola, Democratic Republic of Congo, Kenya, Nigeria and Tanzania, managed to raise funds in international capital markets.

Table 4.1: Financing instruments and requirements in the selected African countries

Countries	Sovereign bonds (% of GDP)	Public-private partnerships (% of GDP)	Multilateral loans (% of external debt)	Financing requirements
Algeria	-	3	12.36	-
DRC	0.01	10	2.02	$480 million in 2007
Egypt	18	7	20.3	$500 million, $1,000 million and $1,000 million in 2001 with 5 and 10 year maturity
Gabon	4	5	1.19	$1.5 million in 2013
Kenya	3	20	6.63	$2 billion in 2014 with 5 and 10 year maturity
Morocco	8	12	21.19	$1 billion in 2014 with 10 year maturity
Nigeria	21	8	26.34	$500 million in 2011, $500 million in 2013, $500 million in 2013 with 5 and 10 year maturity
South Sudan	-	-	7	-
Tanzania	7	7	3.94	$600 million floating rate note in 2013 in private placement
Tunisia	-	14	5.92	-

Source:World bank development indicators. Note:(i) Financing requirements were obtained from Olabisi and Stein (2015), Gueye and Sy (2015), Das et al. (2008) and Presbitero et al. (2016).

Table 4.1 presents the existing financing instruments that are used in African economies. Sovereign bonds are used a great deal in Egypt and Nigeria, amounting to 18% and 21%, respectively. This is consistent with the findings of Gueye and Sy (2015), who claim that the surge in issuing sovereign bonds is attributed to the growing need to finance development in Sub-Saharan Africa. Our study also shows that public-private partnerships are frequently used in Kenya, Morocco, Tunisia and Democratic Republic of Congo. However, Butkiewicz and Yanikkaya (2005), demonstrate that foreign borrowing has been a major source for financing the development, because African local capital markets are narrow and illiquid to supply the long-term financing needs.

Multilateral institutions, such as the IMF, assist countries with short-term liquidity needs and the balance of payment problems. In addition, Fink and Scholl (2016) claim that multilateral institutions provide financial assistance with stringent conditions in periods of financial instability. However, empirical evidence finds that IMF loans are detrimental to economic growth, and increase sovereign defaults. For instance, Barro and Lee (2005), Bordo and James (2000) and Goldstein (2003) are against IMF lending, as the credit facilities have a negative impact on economic performance. More recently, Jorra (2012) found that IMF loans significantly raise the likelihood of sovereign defaults. However, the development of local bond markets is necessary to close the growing financing gap in heavily indebted countries.

According to Mu et al. (2013), Olabisi and Stein (2015), African countries have been issuing sovereign bonds to finance development. This is due to the presence of shallow and illiquid local bond markets in developing countries to enable the accessibility of alternative hedging instruments. A key stylised fact is on the financing requirements in African economies. According to Mu et al. (2013), the African Development Bank recently announced that it would be raising US$ 40 billion in closing development gap. This in turn, leads to the growing need for active bond markets in financing development in sub-Saharan Africa. Since 2005, Presbitero et al. (2016), mentions that out of the 15 developing countries that have issued international sovereign bonds, 11 are to be found in Sub-Saharan Africa. Meanwhile, during the last decade, Das et al. (2008) observe that Gabon issued US$1 billion in 2007 and in 2014, while Kenya raised $2 billion with a maturity of both 5 and 10 years.

More recently, Presbitero et al. (2016), show that Ghana issued 750 million, which pays a coupon rate of 8.5% placed a $1 billion bond. They further find that these countries' existing foreign debt, by contrast, carried an average interest rate of 1.6% with an average maturity of 28.7 years. From 2006 to 2014, Olabisi and Stein (2015), observe that these countries issued a total of $15 billion, compared to $10.9 billion for South Africa. SSA issued 5% of developing country sovereign-bond issues in

2013. Including South Africa, sub-Saharan sovereigns issued more than $7 billion of foreign-currency denominated bonds in 2014. It is clear that sovereign bonds carry significantly higher borrowing costs than do concessional loans.

Developing countries also depend on public-private partnerships to finance developmental projects. Public-private partnerships are structured in a way that either the private sector or both the private and public sectors jointly finance the facility. For instance, Dailami and Klein (1997) observe that public-private partnerships in developing countries grew from $1.3 billion in 1986 to $27 billion in 1996. In addition, Dailami and Leipziger (1998) note that private capital flows to developing countries account for 86% of total aggregate net long-term flows. As investigated by Auzzir et al. (2014) and Chou et al. (2015), the role of the private sector is to supplement the financing needs of the public sector, which is attributed to the government budget constraint. Moreover, Rossi and Civitillo (2014) explain that the joint provision of service delivery involves fair sharing of risks, which is an important aspect of risk management. However, Sanni and Hashim (2014) have shown that partnerships are actively implemented in South Africa, although there is inadequate capacity for service delivery.

This may be attributed to the high level of economic growth in these countries, which allows effective private sector participation. As affirmed by Essers et al. (2016), sub-Saharan Africa needs additional resources for financing its development. Accordingly, local bond markets could help to mobilise the existing financing instruments and alternative hedging instruments to close the financing gap. There is a surge in issuing sovereign bonds, which is attributed to the improvement in economic growth and financial stability, thereby attracting foreign investors. As shown by Claessens et al. (2007), an increase in issuing of sovereign bonds is attributed to institutional and macroeconomic factors such as improvement in fiscal and monetary policy credibility.

4.3 Related literature

The literature on the instruments for managing sovereign debt crisis focuses on minimising the sovereign risks. In practice, Claessens and Qian (1991), note that sovereign risks may arise from interest rate risks, exchange rate risks, commodity price uncertainty and generally, instability in the fiscal variables. They suggest that instruments linked to commodity prices would significantly reduce commodity price risk in sub-Saharan Africa. Another study by Atta-Mensah (2004), points out that commodity-linked bond such as gold-linked bonds could be used as hedging instruments, as they have the option feature. The issuing of commodity-linked bonds would reduce the debt burden, along with declines in export prices. Importantly, Miura and Yamauchi (1998) show that pricing commodity-linked bonds will provide insight for policy makers on hedging commodity price shocks.

In addition, Myers (1992) argues that developing countries can effectively use commodity price-linked bonds, as they rely heavily on the undiversified primary export commodities, which in turn exposes them to significant commodity price shocks. Moreover, Deaton (1999), Muhanji and Ojah (2011), explain that sub-Saharan African countries are vulnerable to exogenous shocks because of their relatively undiversified primary export commodities and are highly volatile. In commodity-exporting countries with a floating exchange rate regime, if a country's export earnings are in US dollars, then borrowing in US dollars gives a natural hedge when the exchange rate depreciates. Despite the potential advantages of commodity-linked bonds, developing countries rarely use these instruments, because the transaction cost and the sovereign risk premium is very high. Furthermore, it may be difficult for most African countries to access the market for these instruments.

A related strand of literature shows that resource funds or sovereign wealth funds can minimise commodity price risks. For instance, Cashin et al. (1999) agree that some countries created resource funds in order to minimise uncertainty in commodity export earnings when prices are high. In particular, Daniel (2002) singles out Mexico as the world's most successful country in hedging commodity price risks and minimising export earnings uncertainty. As observed by Lu and Neftci (2008), sovereign wealth funds are effective in saving resources for future generations, and may assist in smoothing out commodity price fluctuations in the international capital market. However, Daniel (2002) finds that stabilisation funds are inadequate in some countries, because they are subjected to output and price shocks. Therefore, given that low-income countries have limited access to international capital markets, the establishment of SWFs can minimise commodity price swings, smooth consumption and further, sterilise exchange rate fluctuations.

Other instruments that can be used in managing price volatility are plain vanilla options and barrier options. Lu and Neftci (2008) specify that sovereign risks can also be hedged by using structured products such as sovereign Eurobonds embedded in a put option, with a knock-in credit default swap linked to the commodity price. A commodity derivative such as the plain vanilla put option can be attached to the sovereign Eurobond to minimise sovereign credit risks. When commodity prices are rising, the default risk and borrowing cost are reduced. On the other hand, Hull (2002) explains that the knock-in and knock-out features make options cheaper and more suitable for hedging commodity price risk. Knock-in and knock-out features in the barrier options are an added advantage, above risk reversals and plain vanilla options, as they are cheaper and offset shortcomings of other options. Phillips (1995), Lien and Zhang (2008), explain that generally, commodity derivatives are regarded as effective and risk minimising financial instruments for dealing with commodity price volatility.

A study by Morgan (2001), reviews policies designed to mitigate the adverse effects of commodity price volatility and the role of commodity futures market in developing countries. They find that market-based financial instruments, commodity-linked bonds, commodity swaps, commodity futures and commodity options are highly effective in managing commodity price risk in the international commodity markets. Using commodity price data for from 1980 to 1989, Claessens and Coleman (1991) verify that a hedging strategy using futures contracts could minimise the intra-year fluctuations of coffee prices from 10% to 4%, signaling that producers are insulated from intra-year coffee price fluctuations. However, Dornbusch et al. (2000) highlight that among the market-based financial instruments, commodity futures and commodity options can alleviate the primary commodity price risks in the short-term, while commodity swaps could be used to alleviate commodity price risks in the long-term.

Subsequent studies show that a commodity derivative such as the plain vanilla put option can be attached to the sovereign Eurobond to minimise the country's credit risk. Derivatives enhance market liquidity and offer insurance against risks. Several studies show that many commodity exporting countries are using commodity derivatives to hedge the price risk. As noted by Calistru (2012), credit derivatives manage the credit risk of financial institutions. Moreover, Hull et al. (2004) affirm that credit default swaps allow sovereigns to manage credit risks by insuring them against the default of borrowers. As shown by Lu and Neftci (2008), when commodity prices are increasing, the default risk and borrowing cost decreases. In general, the improvement in commodity price reduces the probability of sovereign defaults, and therefore in the event of a default, the bond holder will be compensated by paying the default swap spread.

A number of other studies suggest that the exposure of sub-Saharan African economies to currency risk can be managed by using foreign currency derivatives. For instance, Lien and Zhang (2008) highlight that South Africa has the most liquid over-the-counter (OTC) currency derivatives markets among the emerging market economies. In practice, firms – unlike sovereign entities – are faced with less exchange rate exposure, because they make extensive use of foreign currency derivatives and foreign currency debt to insulate themselves from uncertainty in exchange rate movements. Allayanis and Ofek (2001), investigate the role of foreign currency derivatives in firms. Using a sample of non-financial firms for 1993, they find that firms use foreign currency derivatives for hedging, and in turn, the firm's exchange rate exposure is significantly reduced. As suggested by Caporin et al. (2014), the advantage of currency hedging is that it significantly reduces risks and diversifies a given portfolio. A relatively cheaper strategy for hedging foreign exchange risk is the use of currency futures markets.

By way of contrast, Albuquerque (2007) considers currency forwards to be more efficient in hedging the exposure to downside than currency options. A risk-averse investor can also choose between currency forward and currency futures contracts when hedging against currency risk. According to Lioui and Poncet (2002), the disadvantage of futures contracts is that they are difficult to price them than forward contracts. As examined by Wong (2003), exchange risk management enables the attainment of an optimal hedging decision given the exchange rate risk. Generally, Allayannis and Weston (2000), Allayannis and Ofek (2001), find that financial derivatives significantly minimise the exposure to exchange rate risks. However, the use of derivative instruments in developing countries is still limited and illiquid signaling that derivative markets are underdeveloped. Several studies investigate the theory of optimal hedging regarding the use of foreign currency derivatives. In fact, there is inconclusive empirical evidence that derivatives are actually used to hedge.

For instance, Hentschel and Kothari (1997) investigate the firms' use of foreign currency derivatives, they find only weak evidence that derivatives are used for hedging. Similarly, Geczy et al. (1997) find that large-scale firms are more likely to use foreign currency derivatives, which is consistent with the "optimal theory of hedging" (see Froot et al. 1993). However, just like firms, a country can also use foreign currency debt to hedge against currency risks. As argued by Bordo et al. (2010), a country with revenues in hard currencies (cash inflows) can issue foreign currency debt since this creates a stream of cash out-flows in foreign currencies. These results are consistent with our hypothesis that firms use both foreign debt and foreign currency derivatives to hedge their exchange rate exposure.

Other studies, such as that of Berkman et al. (1997), Hakkarainen et al. (1997), confirm that firms use foreign currency debt as a hedging instrument. If a foreign currency debt is considered for hedging reasons, then it is a substitute, whereas if it is considered for financing reasons and hedged with a swap, it is taken as a complement. In this case, several studies have investigated whether foreign currency debt is a substitute or complement to foreign currency derivatives. For instance, Bartram et al. (2009) find a positive relationship between foreign currency debt and foreign currency derivatives. In turn, this is in line with foreign currency debt being either a complement to foreign currency derivatives. Findings by Elliott et al. (2003) suggest that foreign currency debt and foreign currency derivatives are substitutes in hedging foreign operations. In general, foreign currency debt can act as both a complement and a substitute to foreign currency derivatives for hedging.

Heavily indebted poor countries can minimize the interest rate risks through interest rate swaps. As argued by Yu et al. (2004), policymakers can minimise the cost of borrowing by considering either a floating or a fixed interest rate swap. A lower sovereign-rated country can hedge its interest rate risks at a floating rate by swapping

its flexible rate loan in exchange with a fixed rate loan, which is considered to be less risky. An important observation by Titman (1992), is that a firm may prefer short-term loans than long-term loans to hedge itself from interest rate shocks. In support of interest rate swaps, Jaffe (2003), say that interest rate swaps enable sovereign borrowers to minimise their interest rate exposure, and swap their floating rate loans into less risky fixed-rate loans. Other studies such as those by Jaffe (2003), support the fact that interest rate swap can be used as a hedging instrument against interest rate risks.

However, credit risks can be minimised by using the credit default swap, which provides insurance against a default by a sovereign entity and enhance financial stability. For instance, Batten and Hogan (2002), claim that credit derivatives are financial instruments that prevent default risk and the likelihood of a sovereign debt crisis. Similar suggestions by Duffee and Zhou (2001), Terzi and Ulucay (2011) show that credit default swaps enable the issuing country to transfer or redistribute its credit risks, which in turn, increases the level of liquidity thereby reducing default risks. The bond holder therefore receives a positive payoff from holding the credit default swap instrument. In addition, Hull et al. (2004) and Calistru (2012) points out that credit default swaps, which are actually put options, provide insurance in the event of a credit default.

As noted by Ericsson et al. (2009), theoretically, there is a relationship between credit default swap spreads and bond yield spreads, where by default, swap spreads may effectively signal changes in credit risk than corporate bond yield spreads. Blanco et al. (2005) provide evidence that changes in the credit quality of the underlying name are likely to be reflected more quickly in the default swap spread than in the bond yield spread. Related to this, trading in default swap markets has increased, although, relatively few empirical studies have focused on default swap markets. The few studies that have done so include Berndt et al. (2012), who employs the default swap data to investigate the default risk premia. Using a simple reduced-form model, Houweling and Vorst (2005) focus on the pricing performance of the reduced-form model and the choice of benchmark yield curve. In addition, Hull et al. (2004) analyse the effects of rating announcements on the pricing of default swaps. Meanwhile, Longstaff et al. (2005) document the difference between credit default swap spreads and corporate bond yield spreads, using different risk-free benchmarks.

GDP-linked bonds, in which the coupon payments are tied to the GDP of the issuing country, are effectively considered to manage sovereign risks. The issuing of a bond whose coupon payment is indexed to GDP growth is similar to issuing a plain vanilla option. According to Schroder et al. (2004), GDP-linked bonds outperform conventional bonds, as growth rate-indexed bonds are associated with debt

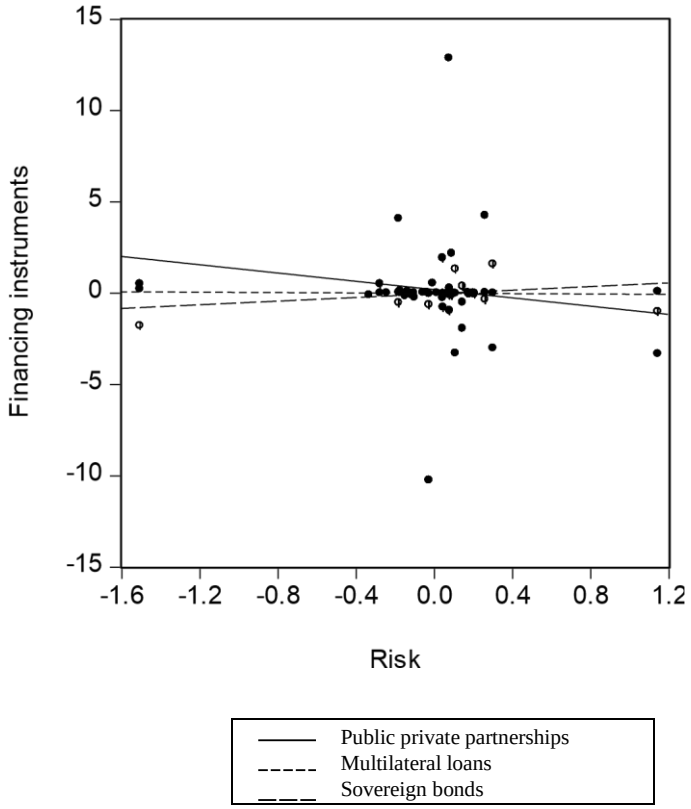
sustainability and are welfare-improving. An important advantage of issuing a growth-indexed bond is that it significantly reduces the sovereign risk, when the GDP of a country improves. In this instance, Chamon and Mauro (2006) confirm that growth-indexed bonds are a way of reducing the likelihood of sovereign defaults. In contrast, Borensztein and Mauro (2004) disagree, and argue that growth-indexed bonds have disadvantages, such as the potential difficulties in pricing them. Similarly, Kruse et al. (2006), claim that the disadvantage of this financing instrument is that the pricing of GDP-linked bonds is complex.

Other strands of literature suggest that inflation-linked bonds can provide investors with protection against inflation risks. Recent studies, such as that of Briere and Signori (2009), Reschreiter (2010) argue in favour of inflation-indexed bonds, because they protect investors against inflation, while conventional bonds are exposed to changing monetary conditions. Similarly, Auckenthaler et al. (2015), highly recommend that inflation-indexed bonds are useful for risk-averse investors, as they offer portfolio diversification. Another study by Price (1997), shows that advanced economies use inflation-indexed bonds in response to high inflation rates. In fact, inflation-indexed bonds issued in high inflation periods reduce the debt burden by paying the inflation risk premium. On the other hand, Campbell and Viceira (2001), indicate that the provision of inflation-linked bond has substantial welfare-improving gains for long-term investors, due to the fact that it eliminates inflation risk. However, Roll (2004), finds the liquidity of inflation-linked bonds to be still limited in developing countries.

4.4 Macroeconomic indicators and financing instruments

Panel 1 shows that countries with high public debt, high current account deficits and a likelihood of sovereign defaults, tend to decrease the attractiveness of private sector participation in financing development projects. The private sector is attracted to participating in financing projects when the government is experiencing macroeconomic stability. Moreover, Grimsey and Lewis (2002) note that many low-income countries have partnered with the private sector to finance development, due to limited resources. As has been pointed out by Auzzir et al. (2014) and Chou et al. (2015) respectively, as a result of government budget constraints, the public sector is supported by the private sector in closing the financing gap. In this sense, public-private partnerships enhance economic development as well as efficiency in service delivery. In addition, public-private partnerships are necessary in those countries that have less liquid local bond markets to minimise risks.

Figure 4.1: Panel (a): Risk premium and financing instruments



A relatively stable macroeconomic environment is necessary for an effective implementation of public-private partnerships. In advanced countries, public-private partnerships are common, and have positive outcomes on economic growth. In African countries, some of the North African countries e.g. Morocco, Tunisia, Egypt are notably gaining from project financing. While Allayannis and Weston (2000) find that financial stability is an important aspect in influencing the involvement of the private sector, Sharma (2011) notes that countries with developed and liquid markets are likely to attract the private sector in financing development projects. Moreover, Percoco (2012) observes that public-private sector arrangements act as a catalyst in improving economic growth and development. Generally, strong institutions and sound policies are a pre-requisite for attracting private investment in infrastructure projects and improving economic growth.

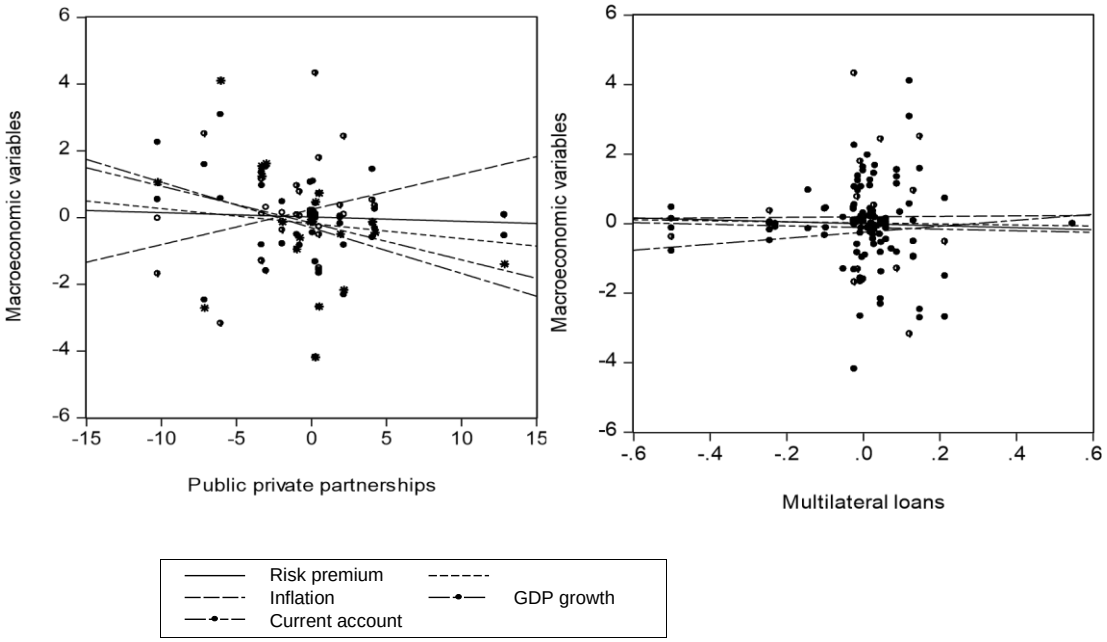
However, public-private partnerships are associated with currency risks. Project financing is exposed to currency risk, because project revenues are denominated in local currency. The currency risk arises when the exchange rate depreciates, which in turn makes servicing of foreign capital difficult for foreign investors. Claessens

(1992) considers that the unhedged exchange rate shocks are attributed to limited hedging instruments. By way of contrast, Claessens et al. (2007) points out that economies with deeper and developed local capital markets are faced with low exchange rate volatility, because they can access hedging instruments. More recently, Caporin et al. (2014) have indicated that currency risks can be hedged by using currency futures. Loosemore (2007) further highlights that exchange rate risk can be mitigated by guaranteeing exchange rates. Furthermore, Grimsey and Lewis (2002) examine risk associated with project financing, for example, financial risk and default risk. Default risk can be hedged using credit default swaps.

Developing countries with small and less liquid local capital markets issue sovereign bonds denominated in foreign currencies, because of the high risk premium on the local currency. As pointed out by Jeanneret and Souissi (2016), default risk embedded in the local currency denominated debt is high. More importantly, the issuing of sovereign bonds stimulates investment and economic growth, reducing sovereign defaults and financial instabilities. However, sovereign bonds are exposed to currency risks. According to Bordo and Meissner (2006), the accumulation of foreign debt raises financial instability and a high likelihood of sovereign defaults. On the other hand, Olabisi and Stein (2015) argue that sovereign bonds are exposed to interest rate risks, because the sovereign risk premium is high on bonds issued in sub-Saharan Africa. For instance, heavily indebted poor countries with high public debt/GDP ratios are expected to incur an additional cost of borrowing.

The high cost of borrowing reduces investment and economic growth. As noted by Easterly (2002), the indebtedness of developing countries is attributed to inefficient macroeconomic policies. Similarly, Bebczuk et al. (2006) find significant negative effects of foreign currency debt on the economic growth, when the exchange rate depreciates are due to poor macroeconomic policies. However, Bordo et al. (2010) suggest that the high proportion of foreign currency debt is assumed to increase financial stability. In this instance, exchange rate management policies are important to hedge exchange rate risks. Another option is to develop the small local capital market in order to discourage more borrowing in foreign currencies. Developed economies are able to borrow in their local currencies, because they have well-established capital markets. Hence, they experience minimal effects of exchange rate shocks. According to Bordo and Meissner (2006), foreign currency debt does not necessarily contribute to sovereign defaults.

Figure 4.2: Panel (b): Macroeconomic variables and financing instruments



Panel 2 shows macroeconomic variables and financing instruments. According to Butkiewicz and Yanikkaya (2005), the International Monetary Fund and the World Bank extend loans to developing nations to stimulate growth and public investment. However, Agostino (2008) has indicated the negative effects of multilateral lending on economic growth. Similarly, Dreher (2006) explains that the International Monetary Fund (IMF) facilities reduce growth rates, because the Fund attaches stringent policy conditions to its loans. Several studies oppose the IMF conditionality on its loans. In addition, Kaminsky and Pereira (1996) note the burden of servicing the debt to be an important aspect in explaining the reduction in economic growth. IMF and World Bank loans are extended to countries with macroeconomic instability and liquidity needs.

For instance, Gelos et al. (2011) have demonstrated that multilateral assistance helps countries overcome liquidity problems. The IMF assists countries suffering from current account imbalances, through its Standby Arrangements and Extended Fund Facility. As shown by Krueger (1998), the IMF lends to developing countries with current account imbalances. On the other hand, Barkbu et al. (2012) support IMF programmes, because they restore macroeconomic stability and decrease liquidity risks. As shown by Vinayagathasan (2013), low-income countries suffer from macroeconomic instability, and thus tend to rely on the World Bank and IMF to stabilise their economies. For instance, Côte d'Ivoire and Zambia received loans

from the IMF and World Bank when they were experiencing high current account, high inflation and negative economic growth.

The increase in multilateral loans reduces macroeconomic instability and consequently, the likelihood of sovereign defaults. While several studies, for example those by De Grauwe and Ji (2012) and Maltriz and Molchanov (2013) find that instability in macroeconomic indicators such as public debt/GDP ratio and current account deficit, are associated with increases in servicing debt burden, leading to high sovereign default risks, where others, such as those by Jorra (2012) and Olabisi and Stein (2015) believe that external financing from multilateral institutions raises the risk of debt crises. Most African countries defaulted in the 1970s, because of high interest rate on foreign debt, coupled with stringent conditions that harmed economic development. In general, IMF financial assistance significantly increases the probability of sovereign defaults. As shown by Plaut and Melnik (2003), IMF loans are detrimental to fiscal stability, especially in heavily indebted recipient countries.

On the other hand, the graph indicates that the increase in public-private sector partnerships as a financing instrument improves the economic performance of a country. Public-private sector partnerships minimise risks, because they allocate risks efficiently between the public sector and the private sector. As investigated by Kleimeier and Versteeg (2010), the role of project finance is to boost the economic growth in low-income countries where there are weak institutions and poor policies. Although these partnerships are beneficial to the least developed economies as they are able to compensate for a lack of domestic financial development, Collier (2014) notes that the role of the private sector in financing development is limited in sub-Saharan Africa. As highlighted by Hamman et al. (2006), public-private partnerships are common in heavily indebted countries. Generally, empirical evidence suggests that macroeconomic stability is a key aspect for efficient functioning of public-private partnerships, because most of the partnerships are better in countries with low inflation and fiscal deficits.

4.5 Conclusion

This study investigates alternative financing instruments that can be used to minimise default risks and finance development in African economies. The presence of shallow local bond markets makes it difficult for HIPCs to access hedging and financing instruments. According to Mu et al. (2013), African bond markets are still too small and underdeveloped to be integrated into the world capital market, and to access hedging instruments. As pointed out by Demirguc-Kunt and Detrigiache (1994), most developing countries heavily depend on multilateral concessional loans

and sovereign bonds to finance current account deficit. However, substantial financing needs require access to alternative innovative financing instruments to hedge sovereign risks.

From the risk management perspective, this study shows that developing countries can use alternative hedging and financing instruments to minimize the cost of debt. For instance, barrier and plain vanilla options could be used to hedge commodity price risk and currency risk, owing to exchange rate depreciation. As noted by Lu and Neftci (2008), barrier options, especially up-and out barrier put options, are the most cost-effective financing instruments, as they have knock-in and knock-out features. However, O'Hara et al. (2013) specifies that hedging becomes difficult for up-and-out call options, because in the event that an asset price falls, the call cannot be exercised. Furthermore, Carr and Wu (2003) stress out that short-term options, for example, OTM put options are more liquid than OTM call options. In addition, credit derivatives and indexed bonds can be used to hedge credit risks, inflation risk and commodity price risks. The debt crisis problem calls for effective risk management instruments. For instance, Claessens et al. (2007), emphasise that economies with deeper local bond markets are likely to issue less of the foreign currency debt. Moreover, Essers et al. (2016) argue that the shift from foreign currency debt to domestic debt will reduce the role of foreign shocks and the associated sudden stops as well as currency mismatches.

5 CHAPTER FIVE: CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This thesis has three objectives. The first is to investigate the optimality of foreign debt portfolios in African countries. The second is to determine the key drivers of sovereign risk premium in African countries. The third is to propose alternative financing instruments that can be used to finance development and hedge sovereign risks in African countries.

5.2 Is the foreign debt portfolio management optimal in African countries?

Chapter 2 investigates the optimality of the currency composition of foreign debt in ten African countries over the period 1971 to 2012. The actual debt portfolio shows that the US Dollar has the highest weight in African economies' debt portfolio. According to Cassard and Folkerts-Landau (1997); Hussein and Mello (2001), the high share of the US Dollar is attributed to the nature of a country's trading partners, the share of official lending, and their financial transactions. This, therefore, creates rigidity when altering the currency composition of foreign debt. In turn, debt portfolios are rendered sub-optimal. However, the dynamic Ordinary Least Squares and fixed effects methodology are employed to determine the optimality of foreign debt portfolios.

This study finds that the cross-currency exchange rate shocks, trade patterns and manufacturing sector/GDP are significant in influencing the optimality of debt shares in African economies. This implies that the currency composition of external debt is suboptimal in hedging adverse exchange rate shocks. In this instance, Jankovic and Zivkovic (2014), argue that exchange rate depreciation does not lead to a reduction in the share of the depreciated currency, thereby contributing to foreign debt accumulation. This is consistent with the findings by Korinek (2011) that exchange rate depreciation has contractionary effects on the balance sheet, which raises sovereign default risks. Similarly, Carranza et al. (2003) confirm that firms that have dollarised liability experience currency mismatch when the exchange rate depreciates, leading to a reduction in the firm's net worth. On the other hand, Galindo et al. (2003) and Babczuk et al. (2006) point out that if firms are optimally hedged against exogenous shocks, then currency depreciation will not necessarily have a negative effect on their balance sheets.

Due to the negative effects of exchange rate depreciation, some developing countries have opted for the floating exchange rate regime. According to Tobin and Weber (2013), Gnimassoun (2015), a flexible exchange rate is preferable, as it improves economic growth and the current account deficit. Despite the advantages of the floating exchange rate, an economy with high foreign currency debt and limited exchange rate pass-through renders this exchange rate regime ineffective as prices do not adjust swiftly. However, Calvo and Reinhart (2002) point out that most emerging markets exhibit 'fear of floating', despite the fact that they seem to allow their exchange rates to free-float. Empirical findings such as those by Slavov (2013) and Ye et al. (2014), show that many African countries adopt soft pegs, and display 'fear of floating'. This study therefore recommends that African countries alter their currency composition to hedge currency risks. In addition, they should deepen their local bond markets in order to borrow more in local currencies and access alternative hedging instruments to minimise sovereign default risks.

5.3 The determinants of the sovereign risk premium in African countries

In Chapter Three, this study determines the key drivers of sovereign risk premium in African countries using the sub-sample periods covering 1971 to 1989 and 1995 to 2011. This study builds on the works of Martinez et al. (2013), who employ the dynamic fixed effects model to estimate the determinants of sovereign risk premium in emerging market economies. They find that the inflation rate, terms of trade and external debt are the key drivers of sovereign bond spread. However, the fixed effects methodology is robust in controlling the endogeneity problem, and captures the heterogeneity across countries. As noted by Judson and Owen (1999), the fixed effects model is more robust than the random effects model, because it also controls endogeneity problems. In addition, Csonto and Ivaschenko (2013) point out that panel models take the individual dimension and time dimension into account. In order to capture the structural shocks, this study uses dummy variables.

The results of this study show that the GDP growth, inflation rate, public debt/GDP ratio, market sentiment, commodity price and foreign exchange reserve are highly significant. Further analysis indicates that the exchange rate, trade/GDP ratio and M2/GDP ratio are insignificant. These results are similar to those by Martinez et al. (2013), who find that the exchange rate is insignificant. Moreover, Geyer et al. (2004) point out that the current account balance is usually insignificant. The dummy variables 1979, 1980, 2001, 2007 and 2008 are highly significant at 5 percent. Possible reasons for the identified structural breaks may be the effects of commodity price shocks in the 1970s, the commodity super cycles of the 2000s, and the 2007/2008 global financial crisis. As shown by Senhadji (2003), over-borrowing

during the 1970s was attributed to commodity price boom, which was, however, short-lived, and raised the sovereign default risks in HIPCs. On the other hand, Allen and Giovannetti (2011) point out that the global financial crisis affected food-importing and heavily-indebted oil-importing countries in sub-Saharan Africa, by pushing down their foreign exchange reserves and making it difficult for them to pay for imported products.

5.4 Instruments of financing development and hedging sovereign risks

Chapter 4 proposes alternative financing instruments in African countries. Due to unhedged foreign shocks, developing countries need to access alternative financing and hedging instruments to minimise the cost of debt and hedge sovereign risks. As pointed out by Demirguc-Kunt and Detrigiache (1994) and Muhanji and Ojah (2011), most low-income countries are exposed to interest rate and commodity price shocks. However, the presence of shallow local bond markets makes it difficult for HIPCs to access hedging and financing instruments. According to Mu et al. (2013), African bond markets are still too small and underdeveloped to be integrated into the world capital market, and to access hedging instruments. On the other hand, Lu and Neftci (2008) show that emerging market economies use innovative instruments, e.g. barrier options, credit default swaps and linked bonds, to hedge risks. In particular, Atta-Mensah (2004) notes that the issuing of commodity-linked bonds would enable developing countries to hedge against commodity price shocks.

5.5 Policy implications and recommendations

The results of this study have several crucial policy implications for African countries. Firstly, due to the high sovereign risk premium, which is partly attributable to unhedged foreign shocks, it is important for policy makers to design sound foreign debt management and sovereign risk management in order to hedge sovereign risks and restore macroeconomic stability. Secondly, African countries should diversify their export commodities and link their bonds to commodity prices in order to minimise commodity price shocks. Thirdly, African countries can develop their small and illiquid local bond markets to enable borrowing in local currency and access alternative hedging instruments. Local currency borrowing reduces exposure to currency mismatch and currency risks. Furthermore, an important policy recommendation for African countries is the reduction of foreign currency borrowing and the deepening of their local capital markets.

The deepening of local bond markets will raise the accessibility of alternative financing instruments, such as derivatives to finance development. In addition, deep local bond markets will enable heavily indebted countries to borrow in local currency, thereby reducing currency risks. On the other hand, the reduction of foreign currency borrowing will minimise the risks associated with exchange rate

depreciation. Moreover, reducing foreign currency debt raises the financial stability of the economy. In this instance, prudent debt management policies should focus on ways to minimise the cost of servicing cost in order to avoid sovereign defaults. Most of the sovereign defaults that occurred in developing countries are attributed to inefficient debt management policies, which in turn expose low-income countries to unhedged external shocks.

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