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The Effects of Global Financial Crisis on Asset Allocation: An analysis of the priorities of East African Central Banks reserves management objectives

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ABSTRACT

The Global Financial Crisis (GFC) of 2008 had a significant impact on the financial landscape that has led to changes in reserve management practices. Central Banks in particular, have to choose an appropriate asset allocation of the foreign reserves in agreement with policy objectives which are safety, liquidity and returns. Asset allocation is a high level decision which reflects the institution's overall risk tolerance and investment objectives and constraints over the planning horizon. This underlined the need to carry out the study on the effects of Global Financial Crisis on Asset Allocation based on data from East African Central Banks. The major problem that guided this study was to explore the ways in which priorities of East African Central Banks' objectives changed during the GFC and thus sought to answer the following question: to what extent are the priorities of East African Central Banks' reserves management objectives changed during the Global Financial Crisis?

Both qualitative and quantitative approaches have been deployed and findings are based on the data derived from East African Central Banks. Primary data was collected through the use of a questionnaire and an experience survey to a clustered sample of Central Bank officers in the Directorates of Financial Markets. The study also utilized secondary data, which was gathered through literature search and document analysis. Likewise, conclusions have been drawn from both theoretical and quantitative analysis of data. The Chi square analysis and hypotheses testing were also applied to the responses received from the respondents.

This way, the analysis led to the conclusion that, given the effects of the global financial crisis of 2008; all East African Central Banks did not change priorities of the key reserves management objectives. Instead, they re-allocated financial assets by investing a portion of their reserves in non-traditional currencies as a way of diversifying from developed economies and to enhance return. On the other hand, the study suggests that Central Banks risk management practices and procedures need to be improved because many of the disastrous losses would have been avoided if proper risk management practices were in place. Also, it emphasizes on the need to take good care when diversification of assets to non-traditional countries and currencies with high credit ratings is made.

***Key subjects**: Global Financial Crisis, East African Central Banks, Asset Allocation, Reserves management objectives.*

1.0 Introduction

It has been almost a decade that Global Financial Crisis (GFC) has become the significant subject of scientific research across the globe (IMF, 2009; 2011; Nichlas and Niklas, 2008; Shane, 2013). Various economists believe that it was the worst crisis since the great depression, and argue that many factors catalyzed the emerging of the 2008 financial crisis; among which were credit market failures, inefficient regulatory framework and under-estimation of risk by credit rating agencies (Aryeetey and Ackah 2011; Michael, 2008). The collapse of Lehman Brothers in September 2008 sent a wave of fear around the world financial markets. After the collapse, banks stopped lending to each other and risk premium on inter bank borrowing rose sharply to 5 percent where as it was close to zero (see also Warwich and Stoeckel, 2009). The speed and transmission of the crisis was particularly aided by global financial linkages across national boundaries and by inter-sectoral linkages within countries. This view is supported by IMF (2009) in which, it is argued that global financial crisis originated from rapid defaults on subprime mortgage loans in the U.S. housing market and spread rapidly to other sectors of the economy.

In recent years, the growth in official foreign exchange reserves has led to renewed interest in the way reserve management decisions are taken and their possible impact on financial markets (Borio, Galati and Heath, 2008). This trend of increased reserve levels was particularly noticeable in Emerging Market Countries (EMCs) especially in the BRICS as compared to advanced economies (IMF, 2011).

According to Morahan and Mulder (2013) the magnitude and management of these vast resources can have a profound effect on markets and Central Bank balance sheets. Reserve managers face important decisions on their asset allocations, including currency composition and asset classes, to ensure that the reserves meet the key goals of safety, liquidity and return. Asset allocation is a high level decision on how to allocate reserves to the broad asset classes such as stocks, bonds and cash (Idzorek, 2006). The so called strategic asset allocation which determines currency composition, maturity structure and asset classes, has long term effects on Central Bank's (CBs) balance sheets and it forms a back ground against which they respond to the crisis environment (IMF, 2013).

The effects of the global financial crisis on developing countries, East African countries included, were forecasted to be comparable to those on developed countries (Lunogelo, Mbilinyi and Hangi, 2009). In spite of the negative impact of the GFC, East Africa posted 5.8% real GDP growth in 2009 and has already recovered some of the lost growth momentum in 2010 and 2012 (see also IMF, 2010). In this regard; Rwanda, Tanzania, and Uganda have led the regional economic expansion whereas Kenya, which grew rapidly in 2006 and 2007, suffered a setback in 2008 due to the violence that broke out after the elections at the end of 2007. Among the EAC's members, only Burundi's growth has been low throughout the 2000s, reflecting in part the country's fragility (Aryeetey and Ackah, 2011).

The integrated nature of the global economy means that East Africa region has not been spared as future growth prospects are dependent, to an important degree, on global developments (see also Warwick and Stoeckel, 2009; Were, 2012; IMF, 2009). The GFC affected East African countries through three primary channels. First, as growth in trading partners slowed, EAC economies suffered from a decline in external demand for their good and services. Second, growth in domestic demand was dampened due to reduced income and low prices of commodities, and third, reduction in capital flow including foreign direct investments constrained and dampened growth prospects (IMF, 2009).

In response, Central Banks around the world including East African CBs took actions like cuts in interest rates, the provision of ample liquidity and other unconventional measures. Further, Nakaso (2013) postulates that, Central Banks in their respective countries acted as the lender and market maker of last resort. In pursuing this, the author insists that Central Banks used their foreign exchange reserves. This is in line with IMF (2013) who revealed that, Central Banks hold foreign reserves to protect a country from external vulnerability by maintaining sufficient liquidity to absorb shocks during financial crisis. Hence, the robustness of foreign reserves is important for the stability of the domestic currency and confidence in the economy.

On the other hand, Central Banks do manage reserves by investing part of it in deposits and fixed income securities of foreign banks (IMF, 2010). Also, until the start of the GFC in 2007 a large share of CBs reserves were held as deposits in foreign banks; and IMF (2010) proved that when the crisis hit, many Central Banks withdrew these investments. Louis (2010) goes as far as maintaining that, during the GFC Central Banks walked to safety by reducing the weight allocated to commercial bank deposits and increased treasury and agency bill holdings and when Lehman defaulted, they shifted from "walk to safety" to "flight to quality" where they increased treasury holdings. In view of this, the financial crisis posed a great challenge to foreign exchange reserve managers as it reminded them on how to deal with emergencies (see also BIS, 2009:9).

Nevertheless, the extent to which Central Banks have been susceptible to financial crisis varies depending on the specific circumstance (Bakker and Ingmar, 2007). In this context, Central Banks have to choose an appropriate asset allocation of the foreign reserves in agreement with policy objectives. Thus, CBs use Strategic Asset Allocation process to distribute reserves into various asset classes to achieve their long-term investment objectives. Strategic Asset Allocation reflects the institution's overall risk tolerance and investment objectives and constraints over the planning horizon (Cardon and Coche, 2004).

Although literature suggests that EAC grew faster than the rest of the continent both before and during the GFC, notwithstanding the lack of natural resources (see for example; El Sayed and Hegazi, 2013) but, most of the studies on asset allocation in response to the effects of the global financial crisis have largely focused on advanced economies, leaving out African perspective particularly in East Africa (see also Morahan and Mulder

2013; IMF, 2011; Nichlas and Nicklas 2012; Srimany et al. 2011; and Were, 2012). Therefore, the present study builds on previous work and identifies the effect of the global financial crisis on asset allocation in East African Central Banks. In particular, the study explores the ways in which priorities of East African Central Banks' objectives changed during the GFC and thus sought to answer the following question: to what extent are the priorities of East African Central Banks' reserves management objectives changed during the Global Financial Crisis?

1.1 Research contributions and organization of the paper

Since the objective of this study is centered around the analysis of the effects of the global financial crisis on East African CBs asset allocation; then the study adds to new knowledge and literature on how Central Banks in developing economies such as Tanzania, Uganda, Rwanda, Burundi and Kenya dealt with asset allocation of their reserves during the crisis. Based on this, Central Banks and other decision makers can use research findings and policy recommendations to make an informed and effective investment decisions in case of similar situations in future. The study findings also contribute to the creation of sufficient information and knowledge required as a basis for further research in the Central Banks of developing economies. Imperiously, various effects posed by GFC on asset allocation are effectively addressed. In this case, the basis for strengthening the financial sector in line with CBs policy objectives is emphasized.

The study is organized and structured as follows: The first section covers the background to the study and problem definition. The second section consists of a literature review and conceptual framework including formulation of a hypothesis and definitions of important terms. The third section describes the research methodology/designs employed during surveys. This is followed by section four in which, the analysis of our research findings and results are presented. The fifth section depicts recommendations, conclusion and avenues for further research. It also underscores the limitations of the study, acronyms and other back pages.

2.0 Literature Review

2.1 The Global Financial Crisis

Global Financial Crisis (GFC) is defined as a situation when, for reasons that may not necessarily grounded in accurate information or apparent logic, parties to financial contracts in many nations simultaneously conclude that the contracts they hold are unlikely be honored by counterparties or that the financial assets that they hold are likely to be worth substantially less than previously thought (see for example; Hull, 2007; Schumpeter, 1961).

As a result these parties, such as banks, typically cease to advance funds to others, demand early repayment of loans and other financial instruments, liquidate holdings of financial assets that can be sold, increase collateral requirements etc. to a degree that is outside the prior expectations of market participants. The result is what is often referred to as "frozen" financial markets, where trading volumes fall considerably and parties often cannot be induced to trade financial instruments no matter what prices are offered.

Likewise, private individuals, fearing for their wealth, contribute to such crises by demanding that banks and other financial institutions repay as much as possible and typically seek to hold accepted stores of value, such as gold and cash (Bernad, 2009). Meeting their customers' demands cause banks and other financial institutions to call in their loans and to liquidate holdings of financial assets, further adding to the downward pressure on prices of financial assets, which in turn impairs the balance sheets of financial institutions.

Generally, the GFC of 2008 threatened the total collapse of large financial institutions, which was prevented by the bailout of banks by national governments, but stock markets still dropped worldwide. In many areas, the housing market also suffered, resulting in evictions, foreclosures and prolonged unemployment. The GFC of 2008 is considered by many economists to have been the worst financial crisis since the Great Depression of the 1930s (Reuters, 2009).

The crisis played a significant role in the failure of key businesses, declines in consumer wealth estimated in trillions of U.S. dollars, and a downturn in economic activity leading to the 2008–2012 global recession and contributing to the European sovereign-debt crisis (See also Williams & Carol, 2012). The active phase of the crisis, which manifested as a liquidity crisis, can be dated from August 9, 2007, when BNP Paribas terminated withdrawals from three hedge funds citing a complete evaporation of liquidity (*The Guardian*, 2012; Michael, 2008).

2.2 Strategic Asset Allocation defined

Strategic asset allocation is a traditional approach to determining how much of your money should be where in order to achieve your long term investing goals. It starts with assessing your tolerance for risk, and your investing time frame (Reilly and Ebsworth, 2013). Similarly, Asset allocation, with regard to investing, refers to the mix of the 3 basic investment types (stocks, bonds and cash). Asset allocation can also be described, usually by percentage, how these assets are divided in an investment portfolio (Idzorek, 2006).
For example, a mutual fund investor might have 3 different mutual funds in her investment portfolio: Half of her money is invested in a stock mutual fund and the other half is divided equally among two other funds-a bond fund and a money tolerance that you desire.

Once your risk tolerance and time frame are understood, a recommended allocation is devised by creating an allocation of investments that, when combined, should match the long term returns and risk Strategic asset allocation approaches determine how much of your money should be in each asset class by looking at the long term expected returns and risk levels of each asset class.
Then a recommendation is made as to how much of your money should be in cash, bonds and stocks, for example. Each asset class is also broken down into additional categories; stocks for example would be broken down into large cap, small cap, U.S., international or emerging markets, just to name a few sub-categories (Nichlas and Niklas, 2005)

Once your strategic asset allocation is determined, the portfolio is typically rebalanced on a pre-determined basis, annually for example, back to its original allocation (IMF, 2009).
Strategic asset allocation approaches recommend sticking with your original allocation over long periods of time rather than reacting to what is currently occurring in the markets (Shane, 2013)

2.3 Theoretical framework and hypothesis

Given the recent impact of the global financial crisis and subsequent European sovereign debt crisis, both the professionals and academicians have witnessed a growing literature on Strategic Asset Allocation (SAA)[1] for foreign exchange reserves. According to Idzorek (2006) SAA is a set of long term target allocations to applicable investable asset classes with the highest likelihood of meeting long term investment goals. It is the choice of equities, bonds or alternative assets that an investor wishes to hold for the long run, usually from 10 to 50 years (see for example, Karl et al. 2011).

Recently, Morahan and Mulder (2013) conducted a survey on how Central Banks arrived at their asset allocation and the way in which they executed their risk management frameworks during the crisis era. The survey involved 156 reserves managing Central Banks from Americas, Europe, Africa, Asia and Oceania continents and adopted a cross-sectional approach in which a survey was sent to member countries for them to fill out. Out of 156 countries surveyed, 67 responded which is a response rates of about 43 percent. The main findings from the survey indicate that, 70 percent of reserve managers changed their asset allocation. Specifically, about 50 percent of all CBs pulled back from their commercial bank deposits and 35 percent of all respondents reduced their exposure to unguaranteed bonds. Respondents who were considering adjusting the currency composition of their reserves were about 50 percent. All the same, respondents indicated a high interest in commodity currencies such as AUD and CAD. Middle and other higher income countries (countries classified as having reserves over $3,975 million) were considering investing in Renminbi (RMB).

Other scholars (e.g. Lee, 2011) commented that, the GFC in 2008 caused investors to question what went wrong with many of their portfolios, which were believed to be diversified. In addition, Pfleiderer and Marsh (2013) found that, a big question for most investors was what tactical adjustment they should make to their portfolio holdings given the large losses in wealth they had suffered and the extreme market conditions they faced.

In lieu of this, Central Banks restrict the eligible investment universe to highly liquid government bonds and instruments issued by international institutions, government sponsored institutions and supranational and then derive the strategic asset allocation for the whole portfolio through an optimization exercise (Cardon and Coche, 2004). However, Fisher and Lie (2004) provides an alternative SAA framework for reserves that considers various assets more than what is suggested by Cardon and Coche (2004) such as non-government bonds, equities

[1] Strategic asset allocation is the core of an investment plan. It seeks to maximize the benefits of diversification by arranging asset classes as efficiently as possible, often through the use of mean variance-based optimization (Reilly and Ebsworth, 2013).

and currency and which still provide assurance of sufficient liquidity for trade and intervention requirements. Further, Fisher and Lie (2004) contended that the typical asset allocation process by CBs is over constrained, leading to portfolio inefficiency.

To overcome this concern, they came up with an alternative SAA framework where the investment universe was broadened to include non-government bonds such as MBS, ABS and corporate bonds. While currency and country allocation in the typical SAA are treated identically, in an alternative SAA frame work, currency and country allocation can differ. Fisher and Lie (2004) relaxed also the duration and credit constraints. In their demonstrated framework, the source of efficiency gains comes from exploiting the correlation between; currency and bond returns, full maturity yield curves across countries and non-government securities.

Borio et al. (2008) goes as far as claiming that there has been a growing tendency to separate the reserve portfolio into tranches with different objectives. They also concluded that, around two thirds of the Central Banks had established two (or more) separate tranches.

On the other hand, Bernad (2009) identified the challenges facing institutional investors and came out with the observations of new trends in the investor's asset allocation behavior. According to Bernad (2009) the financial crisis underlined the difficulty of predicting risk and returns had provoked investors' interest in new approaches to asset allocation such as pure risk based strategies and allocation by risk factors. Furthermore, the study revealed that low level of yields on fixed income markets which are the bulk of Central Banks' portfolios increasingly leads them to consider diversification towards new currencies and asset classes, as well as more actively managing their asset allocation.

Consequently, Bernad (2009) recommended to the Central Banks, currencies that benefit from long term appreciation potential, RMB in particular as it is not over valued against other major currencies and it expected to benefit from increased internationalization. However, liquidity and market depth for RMB was cited as a challenge.
Set in this context, this paper explores how Central Banks arrived at their asset allocation in the context of East Africa region particularly on whether and how priorities of CBs reserves management objectives were adjusted. Thus it is hypothesized in this study as follows:

- $\boldsymbol{H_1}$: *The extent to which priorities of East African Central Banks' objectives changed is related to the Global Financial Crisis.*
- $\boldsymbol{H_{1a}}$: *The extent to which priorities of East African Central Banks' objectives changed is related to the liquidity problems.*
- $\boldsymbol{H_{1b}}$: *The extent to which priorities of East African Central Banks' objectives changed is related to the low interest rate environment.*
- $\boldsymbol{H_{1c}}$: *The extent to which priorities of East African Central Banks' objectives changed is related to the level of reserves of the Central Banks.*

2.3: Analytical framework & research model

The effects of global financial crisis on developing countries, East Africa Community (EAC) in particular, are forecasted to be comparable to those on developed countries (Lunogelo, mbilinyi and Hangi, 2009). Global financial crisis affected East African countries through three primary channels. First, as growth in trading partners slowed, EAC economies suffered from a decline in external demand for their good and services. Second, domestic demand growth were dampened due to reduced income and low prices of commodities, Finally, reduction in capital flow including Foreign Direct Investments (FDIs) constrained and dampened growth prospects (see for example; IMF, 2009).

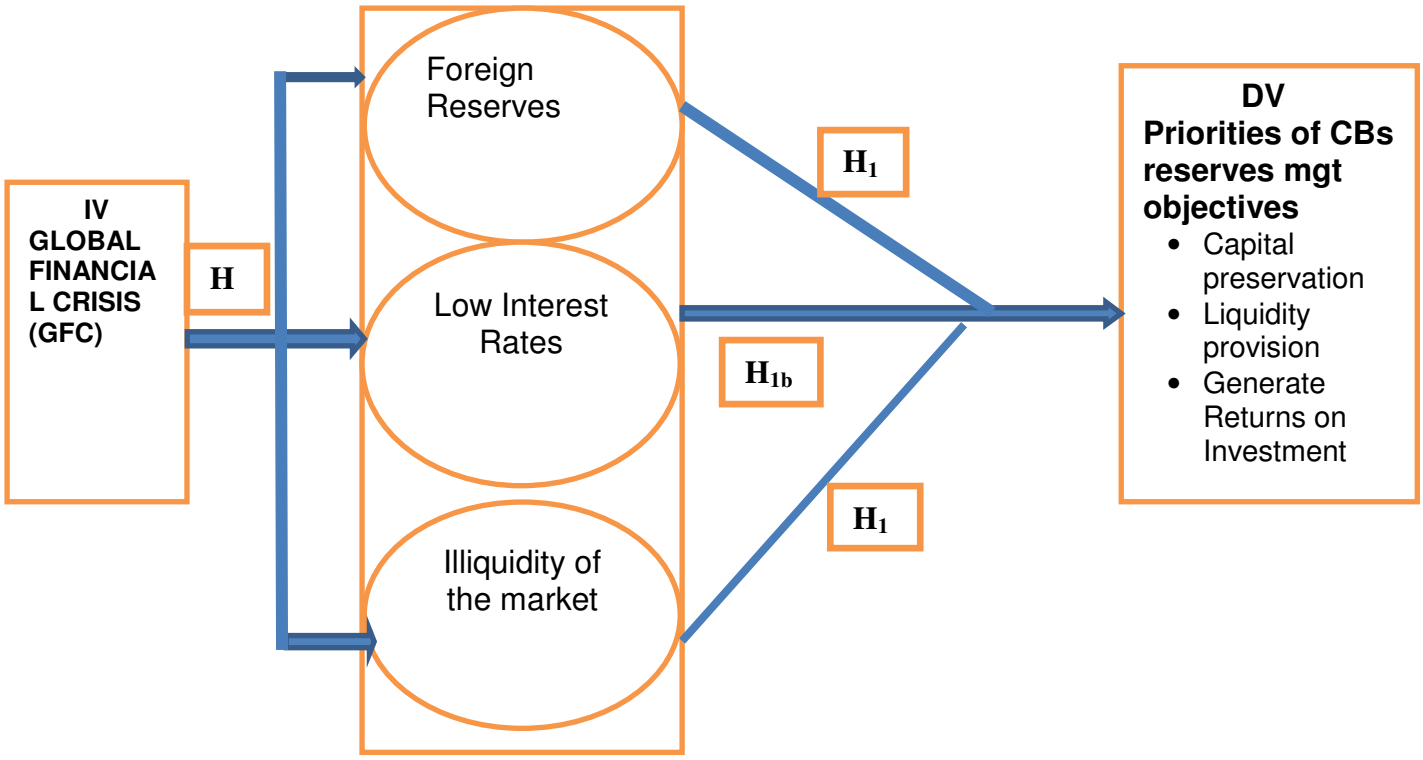
After a careful consideration on the study's objective and critical review of the existing literature, three variables of GFC and three contents (indicators) which represent the priorities of CBs reserves management objectives and which are significant from CBs perspective were observed. This means that three hypotheses were tested in this framework to get to know more about the impact of illiquidity of the market (H_{1a}), low interest rates (H_{1b}), and level of foreign exchange reserves (H_{1c}) on the priorities of CBs reserves management objectives.

Variables are selected from the available literature and theoretical lens of the researcher(s) and have been taken into consideration for building a framework and getting up the research and analyze the results. Notwithstanding,

the conceptual model (see figure 1) assumes that GFC has a direct link with the priorities of CBs reserves management objectives.

The model below highlights on the constructs and hypothesized relationship in the study.

Figure 1: A theoretical model for the effects of GFC on the CBs reserves management objectives.



Source: Authors' theoretical & conceptual lens

3.0 Methodology and Designs

This research involved a combination of both qualitative and quantitative research methods for a triangulation. An exploratory design through both experience and literature surveys were adopted for the qualitative phase of the study, which was instrumental in the design of the data collection instruments used in the quantitative stage. In addition, the survey instrument utilized for the study reflected the framework depicted in Figure 1. Based on the developed conceptual model, as well as the semi-structured telephone interviews with managers in the Directorate of Financial markets; a survey instrument was developed specifically for collecting primary data. This way, a semi- structured questionnaire was finally designed and e-mailed to staff responsible for financial market(s) functions. Here again, it is worth noting that, the Bank of Tanzania (BOT) was used as a sampling frame to obtain the names of the relevant directorates or departments which deals with foreign exchange reserves management in each country, and from each cluster (directorate); simple random sampling technique was utilized to select respondent(s) who participated in the study. The contact details for each head of department/directorate were also utilized. Within this context, all the addresses from the mailing lists (as per BOT database) were valid because none was returned as undeliverable. The great strength of survey as the primary data collecting approach is its versatility (Blumberg, Cooper, and Schindeler, 2011). Therefore,

questionnaires were mailed to each Directorate of Financial Markets, particularly in the department which deals with foreign exchange reserves management for each East African CB and the response rate was 100 percent (see also Table 1).

On the contrary, secondary data was drawn from existing literature on the accepted search engines and sites such as Google Scholars, Emerald, EBSCO, and IMF Country reports. Likewise, items used in the measurement of CBs reserves management objectives i.e. safety in terms of capital preservation, provision of liquidity, and generation of reasonable returns were adapted from IMF (2009) as well as Cardon and Coche (2004).

The research also involved a pilot study to pre-test the questionnaire and due to geographical proximity and ease of personal contact, a convenience sampling method was used, where in, BOT was selected for the pilot survey. Besides, a pre-test of the instrument was conducted to ensure clarity and validity of the survey instrument. Some minor changes were made to produce a final version. This conforms to Zikmund (2000) who insists that carrying out a pilot survey helps to provide some conceptual clarification to the research design and can detect problems in the questionnaire constructions.

Further, the concerns of external validity was addressed through contacting the respondents via telephone calls (those outside Tanzania) and through physical visits to BOT staff so as to verify if they personally completed the survey tool and in all cases, they personally acknowledged to have completed the survey form. In connection to this, the use of the quantitative techniques in the analysis and hypothesis testing makes replication perhaps easier to execute since it does not involve any situations of interpretations by its subjects and hence consistent results was taken into account as a measurement of reliability.

Likewise, various ethical issues were taken into consideration during the survey. Specifically, issues like confidentiality, transparency, selection of the respondents scientifically; protection of anonymity, and specifying or acknowledging the limitations that cropped in during the study formed the ethical guiding principles for the study.

Importantly, the descriptive and quantitative tools of analysis were applied to the responses and findings from both secondary and primary sources.

Consequently, an analysis of the relationship between GFC and priorities of CBs reserves management objectives through Chi-square and cross tabulation tests were performed using the Statistical Package for Social Scientists (SPSS:21).

3.1 The research philosophy

In this study, both the positivist (objectivist) and subjectivism perspectives were adopted because the effects Of GFC in the East African region is first of all an under researched area. Thus, the scientific search for generalizable, universally accepted theories and principles derived from a positivist approach in the social science were pursued and tested in the context of Central Banks decisions with respect to GFC. Besides, the main features of this study are that data have been gathered through surveys and then from this data the research questions and hypothesis are tested and answered respectively. In order to perform these tasks the use of previous theories was proved important. These theories assisted to construct the survey questions and also to interpret the answers received from the sample just as described earlier in the previous section. This mirrors the epistemological position of positivism. Bryman & Bell (2011, p.15) defines epistemology as “the question of what is regarded as acceptable knowledge in a discipline”.

With a positivistic approach, the knowledge in the subject has been only that of previous research in connection with various data analysis that can help explain and interpret the findings. All of the above mentioned procedures were made in a complete objective manner. Subjective actions did not work out and thus kept the study free of the researcher's own values. Similarly, more of the studies on SAA and Financial crises have been conducted and conclusions drawn from western context, of which their applicability to developing economy such as Tanzania, Kenya, Uganda or Rwanda remains uncertain (Borio et al. 2008; Awasthi & Sharad, 2012). It is for this reason that the study envisaged to adopt a contingency approach taking into consideration the various extraneous factors impinging on Central Banks' operations. The approach is useful in investigating the devastating effects of GFC on Asset Allocations performed by Central Banks. Traditionally, epistemology concerns the study of the nature of knowledge, validity, and limits of inquiry and has been considered to be scientific and pragmatic (see also Saunders et al. 2003) but narratives are regarded as non-scientific and belong to the literary genre only. Thus the specific mixed methods and strategy used was the concurrent nested strategy as suggested by Creswell (2003).

4.0 The empirical setting - East Africa Community

The East African Community is the regional inter-governmental organization grouping the Republics of Burundi, Kenya, Rwanda, Tanzania, and Uganda with its headquarters in Arusha, Tanzania. The Treaty for Establishment of the East African Community was signed on 30 November 1999 and came into force on 7 July 2000 following its ratification by the original three partner states – Kenya, Tanzania and Uganda. The Republics of Rwanda and Burundi acceded to the EAC Treaty on 18 June 2007 and became full Members of the Community with effect from 1 July 2007. The EAC aims at widening and deepening co-operation among the Partner States in political, economic and social fields for their mutual benefit (URT, 2012). The target for the Monetary Union was 2012, leading ultimately to a Political Federation of the East African States. The protocol for the East Africa Monetary Union was finally signed on 30th November 2013 by the five heads of state[1]. Moreover, the Community has a combined population of 125 million; land area of 1.85 million sq. kilometers and a combined GDP of $ 44 billion (See also Appendix 1).

5.0 Results and Analysis

In all five countries of the EAC, the respondents surveyed were classified into two general categories of positions held namely: Managers (60%) and Senior Financial Analysts (40%). This supports the view that officers with experience in the department of foreign exchange reserves were interviewed to provide the relevant information with regard to the subject matter (see also Table 1).

[1] A conference paper on EAC Development strategy (2013) for deepening and accelerating an Integration.

Table 1: Sampled departments and CBs officers selected.

Country	Central Bank	Sampled department	Position of the bank officer(s) selected
Burundi	BRB	Foreign Banking Operations	Manager
Kenya	CBK	Financial Markets	Senior Officer
Rwanda	BNR	Financial Markets	Manager
Tanzania	BOT	Foreign Markets	Senior Financial Analyst
Uganda	BoU	Financial Markets	Portfolio Manager

Source: Field findings, 2015

5.1 Central Banks and their reactions to GFC

In this study the general difficulties encountered by CBs are defined and divided into the following: Levels and liquidity of reserves, increased needs for certain currencies, low interest rates and concerns for specific asset classes. Other scholars have also revealed that Central Banks experienced these difficulties (Pringle and Carver, 2006; Mulder and Morahan, 2013). Each of the above difficulties was analyzed and presented in the following Table below.

Table 2: Difficulties experienced in managing reserves during crisis era

Choice	Total % response	BRB	CBK	BNR	BOT	BoU
Level of reserves	40	■				■
Liquidity of reserves	80	■	■	■	■	
Increased needs for certain Currencies' as part of the currency composition	20				■	
Concerns related to specific asset classes	20				■	
Low interest rates	60		■	■	■	
Did not experience any difficulties	0					

Source: Field findings, 2015

5.1.1 The liquidity of reserves and/or the market

From table 2, it is notable that each Central Bank experienced at least some and or multiple difficulties over the period, which indicates the severity of the crisis. The findings revealed that, 80% of EAC Central Bank experienced difficulties with liquidity of reserves assets. Given the context of the crisis, literature has also confirmed that many assets became increasingly illiquid (see for example; Minsky, 1986).

Hypothesis testing results ***(H_{1a})***

"The extent to which priorities of East African Central Banks' objectives changed is related to the liquidity problems".

A chi-square analysis and procedure was used to test the hypothesis and the liquidity of reserves was entered as an independent variable pertaining to GFC with the priorities of the CBs objectives treated as dependent variables.

Based on the Chi-Square test statistic on the relationship between the liquidity problems and the priorities of the Central Banks' reserves management objectives, the finding indicates that there is significant relationship at 5% significance level (p-value = 0.171) as shown in Table 3. Although the relationship is substantiated, the sample results testify that the EAC Central Banks did not seem to change their priorities of reserves management objectives. Instead, they withdrew their money from foreign commercial banks, possibly because of concerns about the bank's financial condition or because they were worried about the bank runs. This indicates that EAC Central Banks were struggling to protect their capital from loss. Accordingly, Mulder and Morahan (2013) purports that 50 percent of the 156 Central Banks surveyed across the IMF member countries pulled back their commercial banks deposits.

Table 3: The liquidity of reserves and priorities of Central Banks Objectives

	Value	Df.	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.875[a]	1	.171
Continuity Correction[b]	.052	1	.819
Likelihood Ratio	2.231	1	.135
Fisher's Exact Test			
Linear-by-Linear Association	1.500	1	.221

5.1.2 Low interest rate Versus Returns on Investments

Meanwhile, the sample findings in table 2 revealed that, 60% of the respondents were affected by low interest rate environment. Further, the quantitative findings reveal that, only BRB and BOU were not affected by the low rates. However, when reserves managers from the two Central Banks interviewed, they pointed out that, low rates affected their scope of generating returns and hence lower income from foreign investments were realized. Notably, the low interest rate environment was a crucial concern of the difficulties encountered because it significantly dwindled the earnings of EAC Central Bank's over the period. For instance, since the start of the crisis in 2008, yields on highly rated Eurozone Sovereign paper and the US Treasury bill rates declined significantly as depicted in Figure 2a and 2b below:

Hypothesis testing results *(H_{1b})*

"The extent to which priorities of East African Central Banks' objectives changed is related to the low interest rate environment".

Here again, as depicted in table 4 below, a chi-square analysis and procedure was used to test the above hypothesis and when interest rate environment was cross tabulated with priorities of CBs reserves management objectives, the Chi-Square test statistic at 5% significance level (p-value = 0.361) reveals significant relationship between low interest rate challenge during the financial crisis and the change in the priorities of reserves management objectives. In this case, the low interest rate(s) was entered as an independent variable pertaining to GFC with the priorities of the CBs objectives treated as dependent variables.

Figure 2a: Eurozone Benchmark Curve Change

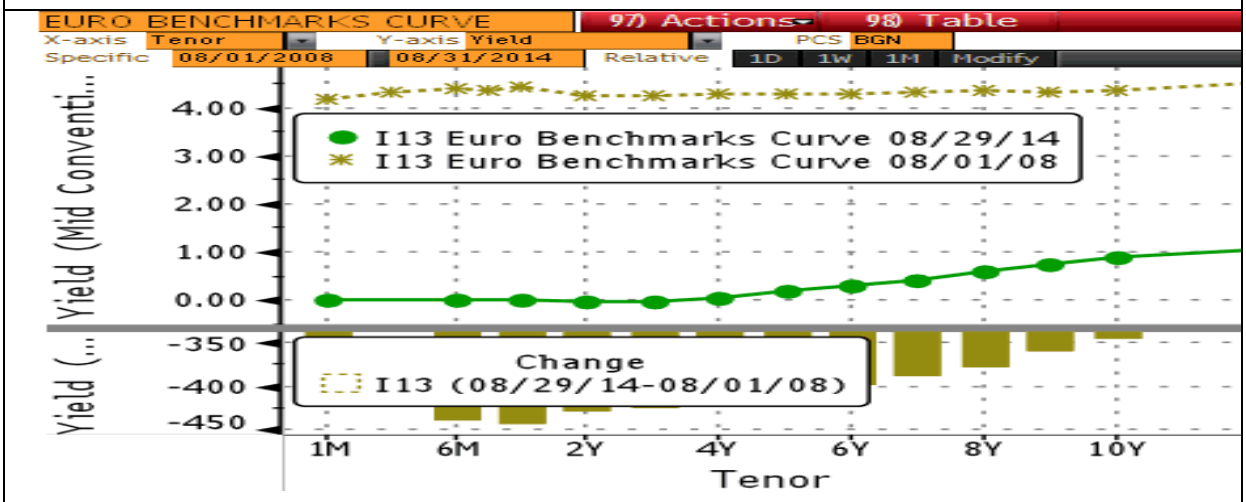
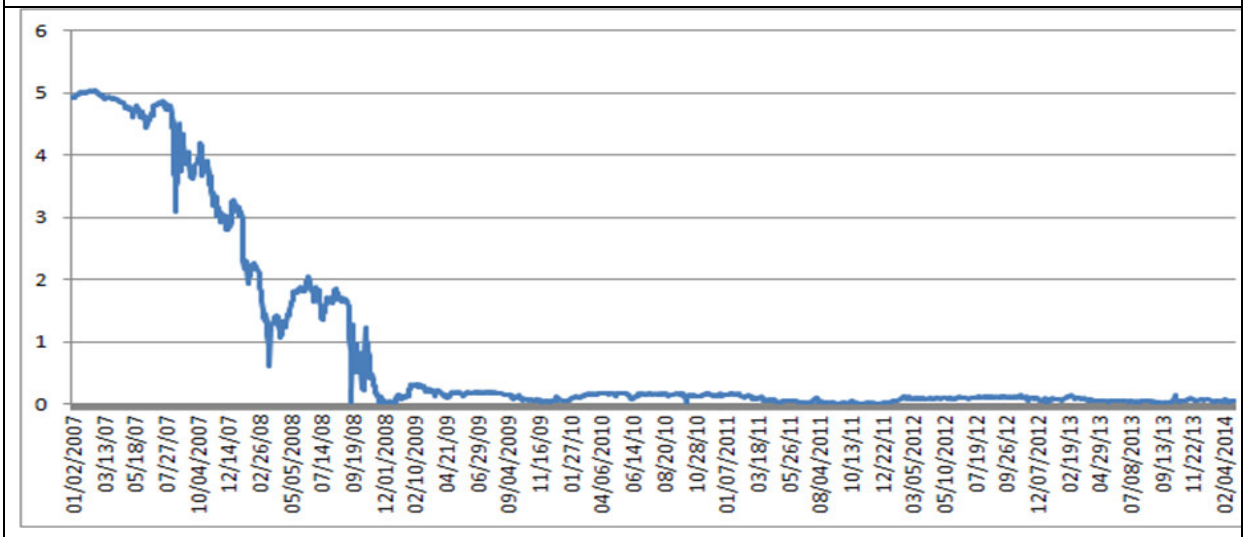


Figure 2b: US three months Treasury bill rates



Source: ***Bloomberg and Resource Center of the U.S Department of the Treasury***

Conversely, there is a continuous indication from the sample findings that low interest rates environment observed during the crisis did not led to the change in the priorities of Central Banks' reserves management objectives, instead, the phenomenon lead to portfolio diversification whereby, EAC Central Banks concentrated their investments in products with a view to preserve capital. For instance, one senior financial analyst from BOT, who participated in this study conceded during an interview that "… *BOT invested small part of its reserves in instrument issued by the Government of China and Australia*". On the other hand, the result from an interview with the staff from the Bank of Uganda spells out that the Bank searched new counterparties with good credit ratings in other regions apart from the G7[1] with a view that it would help to address the shrinking

[1] G7 are the major advanced economies as reported by the International Monetary Fund: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States

investment room. The respondents added also that the BOU reserves (whether internally or externally managed) were invested in instruments, which have remained largely unaffected by the crisis.

Likewise, this study deduced that CBK diversified their reserves and invested only on short-term deposits, US-issued Government securities, and in high quality private supra-national securities. Consequently the Bank of Burundi decided to concentrate only with deposits with Central Banks and the B.I.S while their neighbours, BNR authorised changes of the benchmark for one of their external fund managers from 0 – 3 to 1 – 3 Year US Treasuries and authorized another fund manager to include in its benchmark the Australian dollar. Also, the respondent(s) disclosed that, despite the changes, the Banks succeeded in preserving the capital and providing liquidity, while earning low returns as compared to the previous period.

Table 4: Low interest rates and priorities of Central Banks objectives

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.833[a]	1	.361
Continuity Correction[b]	.000	1	1.000
Likelihood Ratio	1.185	1	.276
Fisher's Exact Test			
Linear-by-Linear Association	.667	1	.414
N of Valid Cases	5		

Source: Field findings, 2015

5.1.3 The level of reserves and priorities of CBs objectives

It is also worth noting that, the level of foreign reserves was among the variables identified as one of the challenge and the driver to the priorities of CBs reserve management objectives. In this regard, it was framed as a function of specific variables such as capital preservation, liquidity requirements, and required return on investments. Surprisingly, findings in table 2 disclose that BRB and BOU were among the Central Banks which cited the level of reserves as being of concern compared to the rest. Possible explanations for this could be either an indication of the insufficient level of reserves to cover the need for greater liquidity buffers and/or there were sufficient reserves which faced the narrowed investment universe.

Hypothesis testing results *(H_{1c})*

"The extent to which priorities of East African Central Banks' objectives changed is related to the level of foreign reserves of the Central Banks".

An examination of Chi Square statistical tests at the 5% significance level (*p-value = 0.709*) indicates that, the level of reserves during crisis relates to change in priorities of East African CBs reserves management objectives. However, these results do not conform to responses from the interviewed respondents, in which the findings revealed that there were no changes in priorities of reserves management objectives (See also table 5 below).

In lieu of this, one of the respondents from BOU disclosed that, reserves of the CBs fluctuated from October 2008 through mid-2011 largely due to interventions in the interbank foreign exchange market performed to curb

currency volatilities occasioned by the massive capital outflows observed during the period. What is more, this study found out that, the Bank embarked on daily purchases of foreign exchange from the interbank market for reserve build up. The survey with BRB respondents also disclosed that they have had low reserves and were worried in case of the need for liquidity buffer and the Bank was prepared to set up policies for export promotion in order to increase the level of foreign exchange reserves and improve business environment to attract foreign investors. This observation confirms that BRB had insufficient level of reserves to cover the need for greater liquidity buffers and yet did not consider change in the priorities of reserves management objectives.

Table 5: Level of reserves and priorities of Central Banks objectives

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.139[a]	1	.709
Continuity Correction[b]	.000	1	1.000
Likelihood Ratio	.138	1	.710
Fisher's Exact Test			
Linear-by-Linear Association	.111	1	.739
N of Valid Cases	5		

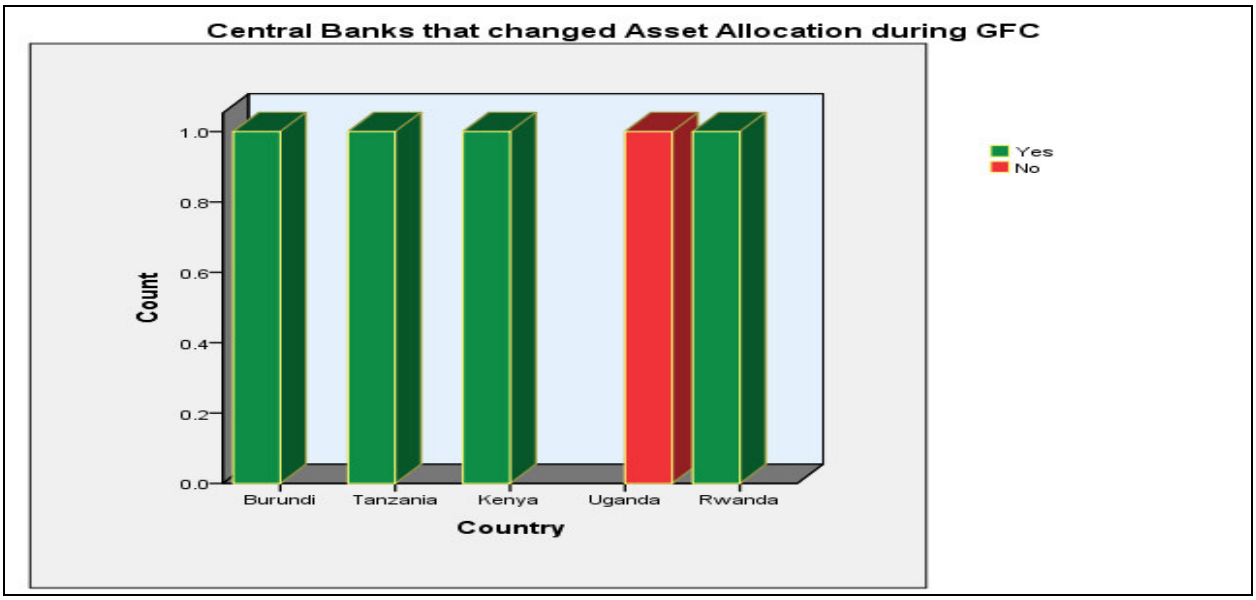
Source: Field findings, 2015

5.2 Other key Central Banks' decisions addressed during the crisis.

As indicated in table 6 below, the Central Banks decisions in responding to crisis were identified as immediate change in asset allocation, strengthening risk management system, use of reserves to provide liquidity and seeking other sources of liquidity. After classifying decisions in the aforementioned categories, the results indicate that, more than half (80%) of the respondents changed their asset allocation whereas strengthening risk management system and seeking other sources of liquidity decision categories both accounted for 20% each. This is to say that, difficulties experienced by East African CBs led them to re think effective management of their reserves.

Table 6: Actions taken by Central Banks to address crisis difficulties

Choice	**Total % response**	**BR**	**KE**	**RW**	**TZ**	**UG**
Immediate changes to asset allocation	80					
Strengthening risk management system	20					
Use of reserves to provide liquidity or for market intervention	0					
Seeking other sources of liquidity	20					



Source: Field findings, 2015

5.2.1 Yields search and priorities of Central Banks objectives

Although CBs were searching for yields and diversification, priorities of investment objectives did not change as highlighted earlier. The experience survey confirmed that, all investments were performed to make sure that capital is preserved, liquidity requirements are met and finally the minimum return is earned. When analyzed in terms of investment horizon, findings in table 8 display that, investment horizon for working capital tranche remained less than a year for all Central Banks. However, the investment horizon for liquidity tranche varies. Whereas the investment horizon for BRB is the same for the two tranches due to low level of reserves holdings, the investment horizon for Uganda is on the other side longer than other Central Banks and these are mandated to external fund managers. Generally, none of the Central Banks is investing longer than 5 years. This also goes in hand with IMF (2005a) that, a horizontal separation of reserves is created through the creation of liquidity and investment tranches to give focused attention on liquidity and return objectives.

In summary, although the statistical tests support the hypotheses that there is relationship between GFC and change in the priorities of reserves management objectives, but findings from the sample results does not support this conclusion.

Table 7: Central Banks investment horizon for various tranches

CB	**Working capital**	**Liquidity**	**Investment**
	Less than 1 year	1 to 3 years	2 to 5 years
BRB			
CBK			
BNR			
BOT			
BoU			

Source: Field findings, 2015

6.0 Conclusion and Recommendations

The study investigated the effects of the global financial crisis of 2008 on East Africa Central Bank's asset allocation. Specifically the study evaluated the extent to which priorities of CB's objectives (safety, liquidity and return) changed during the financial crisis. Moreover, the effects of the GFC of 2008 on the priorities of Central Banks' reserve management objectives were identified in all the five Central Banks which constitute to the East Africa Community.

Consequently, the findings and discussions led to the conclusion that, given the effects of the global financial crisis of 2008; all East African Central Banks had chosen to reallocate their financial assets without changing priorities of the key reserves management objectives of preserving capital, providing liquidity and generating reasonable returns. The East Africa Central Banks attempted to limit their risk exposures by: stopping from placing money markets deposits with commercial banks; increasing investment in fixed income; placing all redeemed money markets in major Central Banks like BIS, FED and BDF; and changing the currency composition. These findings are found to be supported by Cardon and Coche (2004) who concluded that "… a general requirement might be that changes in the investment universe should be made in connection with a review of strategic asset allocation".

Furthermore, Central Banks changed their currency composition towards nontraditional reserves currencies such as Australian Dollar, Canadian Dollar and Chinese Renminbi as a way to diversify from developed economies and to enhance returns.

Experiences across EAC Central Banks in dealing with the challenges of the global environment have been quite similar, although some have perhaps been more courageous than others in terms of the asset allocation decisions and avenues in which they have chosen to diversify. Likewise, caution is needed because Central Bank reserve managers are custodians of public funds, and at all times have to be guided by prudent risk management strategies. The global financial market environment has created many new risks and challenges for reserve managers. The literature has confirmed that shortcomings in risk management were among the major factors underlying the crisis. With the increase in the level of reserves and changes in the global economy, there is much higher level of interest and thus scrutiny on how these reserves are managed becomes a paramount. Hence, our findings led us to recommend the following:

1. Improve risk management practices and procedures

   The global financial crisis highlighted the need for improved risk management procedures. According to Hull (2007), risk management is nowadays considered as a key activity for all companies. Many of the disastrous losses[1] of 2008 due to Lehman's bankruptcy filing would have been avoided if good risk management practices were in place. It is worth to re call that, in 2008, Lehman faced an unprecedented loss

[1] According to Bloomberg news, the Dow Jones closed down just over 500 points, several money funds and institutional cash funds had significant exposure to Lehman and fell below $1 per share, following losses on their holdings of Lehman assets and close to 100 hedge funds who used Lehman as their prime broker were also affected.

as a result of having held on to large positions in subprime and other lower-rated mortgage tranches. Likewise, improvements in the risk management practices and procedures should consider the correlations of currencies and a vigilant approach to risks emanating from unseen avenues.

2. Ensure robust portfolio and risk management infrastructure is in place:

   Following unpredictable market conditions and inclusion of some non-traditional assets in investment portfolios for various Central Banks, it means that reserves management has become more complex. This calls upon building capacity to Central Bank reserves managers and investing in sophisticated IT and risk management systems that are able to handle complex transactions for which CBs are engaging in.

3. Diversification of assets

   While it is not possible to predict when global financial markets will return to a higher interest rate environment, some financial analysts expect interest rates to remain at historically low levels for an extended period. Therefore, East Africa Central Banks should weigh the opportunity cost associated with investing in low risk, low yielding strategies against a higher probability of preserving capital to invest in a higher interest rate environment. Meanwhile in a world of deteriorating credit, currencies and non-traditional countries with high credit rating stand out as potential reserve investment alternatives. However, any increase in the range of allowable instruments and markets that includes non-traditional investment areas should be done within the permissible risk parameters and tolerance limits.

6.1 Limitations and areas for future research

Since the study investigated the extent to which global financial crisis affected asset allocation in East Africa CBs, only some selected GFC indicators and priorities of CBs objectives were the focus of the investigation. This suggests that some details of GFC and CBs strategic decisions remains uncertain and thus, future studies may consider examining East African Central Banks' Asset allocation prior and after the GFC of 2008. Likewise, the CBs asset allocation and the change in risk tolerance during the GFC provide an avenue for further research. All the same, size of the sample was limited only to five CBs and hence a big project for the rest of Sub-Saharan Africa is recommended.

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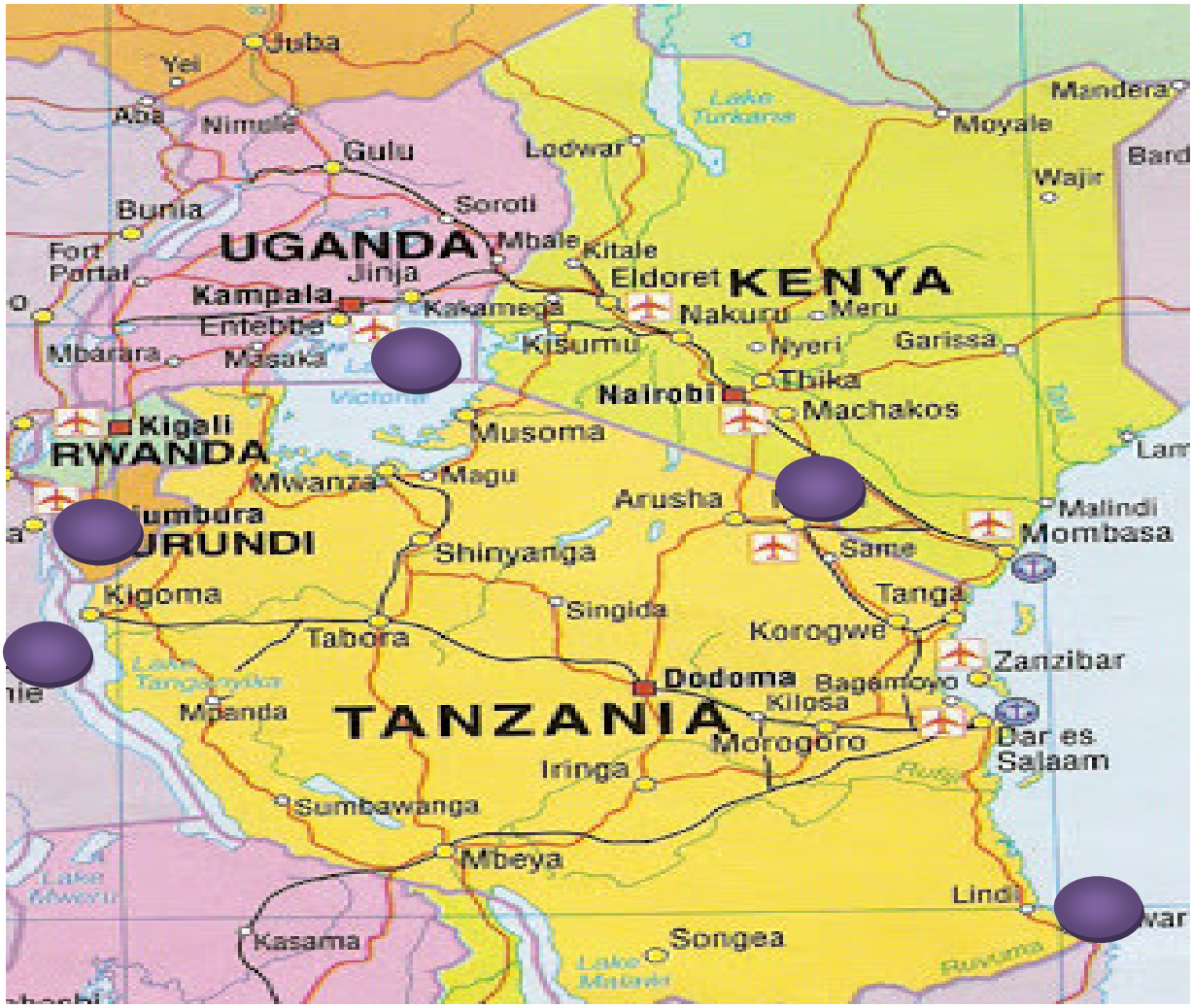
List of abbreviations

ABS	Asset Backed Securities
AUD	Australian Dollar
BDF	Banque de France
BIS	Bank for International Settlements
BNR	Bank Nationale du Rwanda
BOT	Bank of Tanzania
BoU	Bank of Uganda
BR	Burundi
BRB	Banque de La Republic du Burundi
BRICS	Brazil, Russia, India, China and South Africa
CAD	Canadian Dollar
CBK	Central Bank of Kenya
CBs	Central Banks
DV	Dependent Variable
EAC	East African Community
EMCs	Emerging Market Countries
FDIs	Foreign Direct Investments
FED	Federal Reserve Bank
GDP	Gross Domestic Product
GFC	Global Financial Crisis
IMF	International Monetary Fund
IV	Independent variable
KE	Kenya
RMB	Renminbi
MBS	Mortgage Backed Securities
OECD	Organization for Economic Co-operation and Development
SAA	Strategic Assets Allocation
SPSS	Statistical Package for Social Scientists
URT	United Republic of Tanzania
US	United States

Appendix 1: The Map of East Africa



Source: URT, 2009

Key:

The city where Central Bank is located