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MACROECONOMIC EFFECTS OF CAPITAL ACCOUNT LIBERALIZATION: EVIDENCE FROM SUB-SAHARAN AFRICA

By

Tamara Esther Mughogho[1]

Ph.D. In Economics

In the

SCHOOL OF ECONOMIC AND BUSINESS SCIENCES

At the

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Supervisor: Professor Imhotep Paul Alagidede

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[1]Email: tamaramughogho@yahoo.com . Cell Phone: +27764568745

DEDICATION

This is dedicated to my late parents Mrs. Christina Nomathemba Mughogho and Professor Spider Kajera Mughogho.

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I would like to give thanks to God for being with me throughout this arduous process. In addition I would also like to sincerely acknowledge my supervisor Professor IMHOTEP Paul Alagidede, for tirelessly providing guidance on this thesis throughout the study period; Professor Mark Ellyne at the University of Cape Town for his guidance and assistance with data; the African Economic Research Consortium (AERC) for providing me with the funding which has enabled me to pursue my PhD studies; my colleagues and friends from the University of the Witwatersrand and fellow colleagues under the AERC Collaborative PhD Programme for their moral support and encouragement throughout this process; and finally to my dearest family and friends back home for their prayers and support. I could not have done it without the love and kindness you extended to me.

ABSTRACT

This thesis examines the macroeconomic effects of capital account liberalization (CAL) for a panel of Sub-Saharan Africa (SSA) countries from 1996 to 2013. Specifically, the study examines the effects of CAL on capital flows, financial sector development, financial crisis, and exchange rates. For this study, several methodologies are employed and these include System-Generalised Method of Moments (GMM), Least Squares Dummy Variables (LSDV), Fixed Effects (FE), Autoregressive Distributed Lag (ARDL) Models, and Propensity Score Matching (PSM) techniques. The study makes several key findings. Firstly, the study finds that liberalizing capital inflows promotes the inflows of capital into SSA. This is particularly so for foreign direct investment. The study also provides evidence of significant thresholds effects of institutional quality and financial sector development. That is, higher levels of institutional quality and financial sector development help to enhance the effects of CAL on capital flows. Secondly, the study unearths that CAL, implemented on its own, has a negative effect on financial sector development. However, liberalization of capital accounts coupled with substantial trade openness has a positive effect on financial sector development. It is also concluded that liberalization of capital flows reduces the exchange market pressure in SSA. This implies that capital account openness is unlikely to induce a currency crisis for SSA. This result holds even after controlling for sample selection bias. Lastly, the findings of the study suggest that CAL leads to exchange rate appreciation for SSA countries. However, this effect is attenuated with higher levels of financial sector development.

The study has made significant contributions to the body of knowledge in several key ways. Firstly, the study provides regional evidence of macroeconomic effects CAL in SSA where extant studies for SSA have mostly been single country studies which focused on examining effects on economic growth. In addition, the study makes methodological contributions by employing sample splitting techniques, to examine the presence of threshold effects, and examining potential non-linear dynamics in the effects of CAL. Lastly, the study employs a new measure of CAL which, not only builds upon past measures and improves on them, but also disaggregates CAL based on several criteria such as asset type, the direction of liberalization and whether liberalization is on residents or non-residents.

Keywords*: Capital account liberalization, financial sector development, capital flows, financial crisis, currency crisis, exchange rate appreciation.*

PUBLICATIONS AND RESEARCH OUTPUT

Prior to the submission of this thesis, portions of it have either been presented at various conferences or have been submitted to peer-reviewed journals and working paper series and are awaiting/undergoing review. Details of the research output are outlined as follows;

Conference presentations

December, 2017	African Economic Research Consortium (AERC) Biannual Research Workshop, Arusha, Tanzania. *The capital account liberalization and financial sector development nexus: Evidence from Sub-Saharan Africa*
August, 2018	Africa Review of Economics and Finance Conference, WITS Business School, Johannesburg, South Africa. *The capital account liberalization and financial sector development nexus: Evidence from Sub-Saharan Africa*
September, 2018	School of Economics and Business Science Postgraduate Conference, Johannesburg, South Africa. *Capital account liberalization and capital flows to sub-Saharan Africa: A panel threshold approach*

Journal submissions

Journal /Working Paper Name	**Article**	**Status**
International Economics	*The capital account liberalization and financial sector development nexus: Evidence from Sub-Saharan Africa*	Submitted initial corrections
Economic Research Southern Africa	*Capital account liberalization and capital flows to Sub-Saharan Africa: A panel threshold approach*	Accepted with minor corrections
African Review of Economics and Finance	*Capital account liberalization and exchange rates and the current account balance in sub-Saharan Africa*	Forthcoming

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DECLARATION REGARDING PLAGIARISM

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms & Abbreviation	Meaning
CAL	Capital Account Liberalization
CBI	Cross-Border Initiative for Eastern and Southern Africa
CFA	Communaute Financiere d'Afrique
CPI	Consumer Price Index
CEMAC	Central African Economic and Monetary Authority
EMP	Exchange Market Pressure
FE	Fixed Effects
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IMF	International Monetary Fund
LSDV	Least Squares Dummy Variable
RE	Random Effects
SADC	Southern Africa Development Community
SSA	Sub-Saharan Africa
SAPs	Structural Adjustment Programmes
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
WAEMU	West African Economic and Monetary Authority
WB	World Bank
WDI	World Development Indicators
WGI	World Governance Indicators

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CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

With the collapse of the Gold Standard, after the Great Depression, capital flows were viewed as destabilizing and countries were encouraged to maintain controls on capital[2]. This was because pro-cyclical capital flows were believed to be the sources of foreign exchange disturbances that were experienced in the 1920's and 1930's (Ocampo, 2015). However, in the 1970's countries like the USA began to pursue more liberal capital account regimes. This followed the fall of the Bretton-Woods system which necessitated a shift to more flexible exchange rate regimes (Bordo, 1993). Soon after, other developed countries, following the path led by the USA, began to liberalize their capital accounts. As a result, with many advanced economies liberalizing, pressure mounted on developing countries to open up to international capital flows as well. With countries pursuing more liberal capital account regimes, global capital flows began to increase in the 1980's and 1990's (Eichengreen, *et al* 1998; Fuceri & Loungani, 2018; IMF, 2012a; IMF, 2012b). For instance, Lee and Jayadev (2005) noted that, between 1973 and 1997, inflows of capital to less developed countries rose from U$10 billion to US$ 300 billion respectively. Fischer (1998) also highlighted that net inflows of capital to developing countries increased to more than US$150 billion between 1990 and 1995. The increase in capital flows was not only due to greater financial integration but also due to a combination of economic reforms.

Throughout the late 1980's and 1990's, there was a steady increase in the popularity of capital account liberalization (CAL) as a policy. This all changed in the mid-1990's after several crises were experienced in East Asia, Russia and Latin America (Stiglitz, 2000; Eichengreen, 2001; Prasad & Rajan, 2008). In this regard, the appropriateness of fully convertible capital accounts began to be questioned because economists associated these crises with overly rapid liberalization and poor sequencing of reforms.

[2] These include price based measures, volume based measures and administrative controls. Price based measures reflect differences between assets prices and a distortion in the prices of assets reflects the presence of capital controls. Flow measures on the other hand include gross capital inflows and outflows measured relative to gross domestic product whilst stock measures include foreign direct investment inflows and outflows.

The affected countries experienced exchange rate volatility and massive capital outflows which led to some countries re-imposing capital controls. This also prompted the IMF to loosen its stance on CAL as it began to realize that the elimination of controls of capital may not be appropriate for all countries. Hence, the IMF began to advocate for liberalization conducted in a proper sequenced manner (Licchetta, 2006; Gochoco-Bautista & Sotocinal, 2014; IEO, 2015). The IMF even started to advocate the usage of capital flow management measures (CFM's), when necessary, to protect countries from volatile capital inflows and prevent a crisis (Park & Takagi, 2012; IMF, 2012a; IMF, 2012b). Recently, however, there has been a renewed interest in CAL under the new financial architecture which emphasizes enhanced regulation and supervision. As such, from the late 1980's to the mid-1990s, many Sub-Saharan African (SSA) countries began to pursue CAL on a larger scale. This was often part of a larger series of reforms executed under the International Monetary Fund (IMF) and World Bank (WB) Structural Adjustment Programmes (SAP's) and the Washington Consensus.

1.2 Macroeconomic effects of capital account liberalization

Capital Account Liberalization (CAL) involves removing or relaxing restrictions on capital movements (Henry, 2006; Eichengreen *et al*, 1998). This enables capital to move freely to and from countries. The perceived effects of CAL remain a contentious issue both from a theoretical perspective and an empirical standpoint (Lee & Jayadev, 2005; Aoki *et al*, 2010; Chinn & Ito, 2008). Advocates for CAL cite the efficiency-enhancing effects of CAL (Cooper, 1998; Henry, 2006; Licchetta, 2006; Egbuna *et al*, 2013; Ayinde & Bankole, 2015: Chea, 2011). They base their arguments on the allocative efficiency view which stems from the neoclassical growth model developed by Solow (1956). This model posits that an international movement of capital promotes efficiency in resource allocation when capital moves from countries with abundant supplies of capital (where there are low capital returns) to developing countries with scarce capital supply (where there are high returns to capital) (Solow, 1956). This leads to a decrease in the price of capital in developing countries and leads to a short-term increase in investment which brings about economic growth (Henry, 2006). Proponents for CAL cite the growth-enhancing effects of CAL which are either direct, through increased savings and technology transfers, or indirect as a result of specialization due to increased risk management (Gochoco-Bautista & Sotocinal, 2014; Nyangoro, 2017).

CAL is also perceived as having other 'collateral benefits' which are often touted, including enhanced consumption and output smoothing.

This occurs by allowing residents and governments more opportunities to borrow from abroad and on more favorable terms (Fischer, 1998). Furthermore, Fuceri and Loungani (2018) argue that this increased consumption smoothing can lower income inequality.

Increased capital flows are also believed to generate competition in domestic financial markets and hence foster efficiency in the financial sectors (Prasad & Rajan, 2008; Rajan & Zingales, 2003; Eichengreen, 2001; Klein & Olivei, 1999). How this works is that an increase in foreign competition reduces domestic incumbent firms' ability to lobby government for financially repressive policies which dampen financial sector development. Furthermore, because global capital markets are competitive, CAL can induce discipline in macroeconomic policymaking (Stiglitz, 2000; Eichengreen, 2001; Dornbusch, 1998; Prasad & Rajan, 2008; Gibson *et al*, 2006). This is because policymakers are motivated to maintain low fiscal deficits and inflation in order to attract foreign investors. Lastly, Fischer (1998) also argues that CAL facilitates trade by offering avenues through which countries can finance their trade.

Such arguments for CAL and its associated capital flows are compelling and based on the belief that foreign capital brings about economic growth, job opportunities, technological transfers and increased access to markets. However, problems arise if the capital inflows are volatile in nature as this can undermine financial stability (Singh, 2003; Edison *et al*, 2002; Ocampo, 2015). Where capital flows are prone to reversals and sudden stops, financial instability can ensue. Such risks are exacerbated in countries with poor macroeconomic fundamentals, underdeveloped financial systems and poor institutional quality (Ndikumana, 2003). Financial instability is detrimental in its own right. However, Stiglitz (2000) states that financial instability can actually undermine the growth effects of CAL. It has also been argued that, instead of reducing consumption volatility, CAL can actually increase the volatility. This is especially true in the event of adverse shocks (Stiglitz, 2004). Adding on to this, CAL can hinder policymakers' ability to undertake independent monetary policy (Gochoco-Bautista & Sotocinal, 2014; Gibson *et al*, 2006). This is because CAL can inhibit a government's ability to lower interest rates. In Mundell's (1963) famous trilemma, it is posited that a country cannot be open to capital flows, preserve a fixed exchange rates regime and implement an autonomous monetary policy at the same time. By dampening a government's policy-making ability, CAL can therefore reduce a government's ability to respond to negative economic shocks (Stiglitz, 2004).

This has been seen in countries like Tanzania, Uganda, and Zambia where inflows of portfolio equity affected the conduct of monetary and fiscal policy (IMF, 2008). Regarding external competitiveness, antagonists of CAL stipulate that open capital accounts can erode a country's external competitiveness. This can occur where capital inflows culminate in Dutch Disease effects and lead to an appreciation of exchange rates. In addition, Cooper (1998) argued that free capital mobility can be an incentive for investors to escape domestic taxes and send capital to countries where taxes are lower. Such scenarios are made possible where different countries have different taxation schemes.

With such a myriad of possible effects, both positive and negative, countries have often debated whether to abolish capital controls or not. These include quantitative capital controls which are restrictions and/or limits on capital flows for minimum stay periods. Price-based measures, on the other hand, include requirements on reserves on capital flows or taxation of capital flows (Ocampo, 2015). Eichengreen (2001) suggested that countries who maintain capital controls may signal to investors that the country is unwilling to commit to stable monetary and fiscal policy. Furthermore, with capital controls, investors may invent ways to circumvent the controls which include under-invoicing and over-invoicing (Massa, 2014). Furthermore, capital controls can also promote rent-seeking behavior (IMF, 2012b). Evidently, capital controls can be distortionary. Dornbusch (1998) further argued that protectionism wastes resources and that it is important to liberalize both trade and capital accounts immediately. Most countries, however, implemented capital controls in a bid to curb volatile capital flows. During the East Asian crisis, it was observed that India and China were spared from the crisis despite being in close proximity to affected countries. This was attributed to them having capital controls in place. Furthermore, some countries in East Asia and Latin America countries still experienced capital flight, in the 1980s and 1990s, despite imposing some controls (Prasad & Rajan, 2008; Glick *et al*, 2006). Such observations only serve to enhance the misconception of the exact effects and role of CAL in an economy.

It is apparent that the potential effects of CAL are mixed, remain unclear and country experiences have been greatly varied. Therefore, while theory and empirical studies agree on the efficiency-enhancing effects of trade liberalization the argument for liberalizing capital flows is not so clear-cut (Singh, 2003). Proponents for CAL have relied on the same efficiency enhancement argument used for trade liberalization.

They ignore the fact that CAL occurs in a different environment since capital markets are often characterized by information asymmetry and its associated moral hazard and adverse selection which can lead to inefficient outcomes (Stiglitz, 2000; Stiglitz, 2004; Cooper, 1998; Gochoco-Bautista & Sotocinal, 2014; Rodrik, 1998). This is unlike the goods market, where such issues are less prevalent and almost non-existent. Efficacy of CAL is hence undermined by the fact that how prices are determined in asset markets may be controlled by speculative traders (Singh, 2003).

1.3 Motivation of the study

The complex nature of CAL warrants more research. To quote Eichengreen (2001, P. 341) "*CAL remains one of the most controversial and misunderstood policies today".* This is because, unlike trade liberalization, which has been pursued as far back as the 1940s, CAL only gained prominence in the 1970's (in developed countries) and 1980's and 1990's (in developing countries)(Gylfason, 2011). Therefore, while theory and empirical evidence concur on the efficiency-enhancing effects of trade liberalization, economists are still divided on the costs and benefits of CAL (Aoki *et al*, 2009; IMF 2012a).

CAL is a two-edged sword. On one hand, it can promote growth and at the same time, it can potentially lead to a financial crisis which can undermine said growth (Bicaba *et al*, 2015). Early studies focused on unearthing effects of CAL on growth, often with mixed findings. While some studies found growth-enhancing effects of CAL (Quinn, 1997; Quinn & Toyoda, 2008; Henry, 2006), others have failed to find robust evidence of this (Rodrik, 1998; Eichengreen, 2001; Grilli & Milessi-Ferretti, 1995). In some cases, effects were found to be asymmetrical with Klein and Olivei (1999) finding significant growth effects in industrialized countries only while Edison *et al* (2002) found significant effects only in East Asian countries and none for other regions including industrialized countries. The lack of consensus thus rendered the debate on CAL still pertinent.

The situation is compounded in SSA where little research has been done (Ellyne & Chater, 2013). The few studies conducted in SSA have focused mostly on the relationship between CAL and economic growth (Khumalo & Kapingura, 2014; Egbuna *et al*, 2013).
Thus there is little research on the effects of CAL on capital flows, financial sector development, financial crisis, and exchange rates.

This is despite the fact that CAL affects these macroeconomic variables which in turn have a direct bearing on economic growth and are potential ways through which CAL can affect economic growth. Therefore, examining the macroeconomic effects of CAL on such variables, for SSA, remains an important academic endeavor whose vitality cannot be emphasized enough. There are several reasons why this is so.

Firstly, evidence on whether CAL promotes capital flows to SSA remains unclear (Insaidoo & Biekpe, 2013). This uncertainty is compounded by observations from Lucas' famous paradox, where it was observed that capital was observed not to flow to developing countries as suggested by theory (Lucas, 1990). The situation on the ground is even more complex. While Kasekende (2000) pointed out that capital inflows to Uganda had increased after liberalizing, a report by the IMF (2008) showed that capital inflows in Uganda only picked up in 2004, 7 years after initial liberalization in 1997. South Africa, on the other hand, experienced immense inflows of capital after becoming re-integrated with global capital markets. This, however, coincided with the collapse of the apartheid regimes and the democratic elections in 1994. Hence, it is uncertain if reintegration into the capital markets alone is what prompted the increase in capital flows or rather the removal of sanctions which also contributed to making South Africa an attractive investment destination[3]. This brings to the fore the importance of CAL vis-à-vis country-specific characteristics in attracting capital inflows. Wang and Jahan (2016) argued that other issues, apart from capital controls, could influence capital flows. Furthermore, countries like China were able to draw capital flows despite maintaining capital controls (Stiglitz, 2000). The few studies which have sought to examine the effects of CAL on capital flows for SSA countries have found that CAL does not increase capital flows (Ayinde & Bankole, 2015). However, this was for Nigeria only, and it was argued that poor institutions in Nigeria hindered the country from attaining its FDI potential. Hence, evidence for SSA as a whole remains wanting and examining the dynamics of the CAL-capital flow nexus constitutes an important academic research venture. This is vital given that capital inflows could bridge the savings and investment gap and promote growth in SSA (Kasekende, Kitabire & Martin, 1996).

[3]This was after the end of Apartheid and the 1994 elections which ushered in a new era of democracy.

Secondly, examining effects of CAL on financial sector development in SSA is imperative given that theory suggests that full capital convertibility can promote financial sector development (Rajan & Zingales, 2003). A well-developed financial sector is not only vital in its own right but it can also promote much needed economic growth in SSA. To quote Ibrahim and Alagidede (2016, P.2) "*there are more avenues for financial development which can yield 1.5 percent additional growth for SSA*". By interrogating this conjecture further, this study aims to enlarge the knowledge on the role of CAL in financial sector development.

Thirdly, during the Global Financial Crisis in 2008-2009, most SSA countries' were spared from the contagion effects of the crisis. Even more integrated financial systems like South Africa were spared from the effects and this was largely attributed to the good regulation and supervisory systems in place (Otchere, Senbet & Simbanegavi, 2016). Hence it remains to be examined if enhanced financial integration can expose SSA to greater financial instability. The East Asian Crisis was often associated with rapid CAL. Whether CAL *actually* led to the crises is unclear. This is because some countries that had capital controls in place still experienced a financial crisis. In some cases, it has actually been found that imposition of controls was positively associated with currency crisis (Henry, 2006; Glick, *et al* 2006). Thus it is imperative to examine if CAL can result in a financial crisis in SSA and this is vital given that crisis can undermine the growth-enhancing effects of CAL in SSA. To date, there is almost no evidence of this in SSA. Kasekende (2000) stated that Uganda did not experience crisis after it liberalized and was spared from the contagion effects of the East Asian and Latin American crisis in the mid-1990's. The same, however, cannot be said for other SSA countries since little research has been done on the matter.

Lastly, economic theory suggests that inflows of capital, which may follow liberalization, can culminate in real exchange rate appreciation. This can dampen external competitiveness of which evidence of this for SSA is almost non-existent. It is thus, an essential academic enterprise to explore the exact effects of CAL on exchange rates in SSA. This is worthwhile given that, appreciation of exchange rates and further erosion of external competitiveness can worsen current account balances. This is worrisome given that SSA current account balances are already in a dire state and above the maximum sustainable amount of 5 percent (Moussa, 2016). Further deterioration of current account balances would, not only increase Africa's debt burden but could also render the region vulnerable to crises. Research on the effects of CAL on exchange rates is almost non-existent for SSA.

Furthermore, little is known if certain country conditions can help in reducing this effect. Saborowski (2011) stated that higher levels of financial sector development can attenuate the Dutch Disease effects of increased capital flows. This remains to be proven in the SSA context and can offer meaningful policy implications.

In summary, there is room for more research to determine the effects of CAL in SSA. This is imperative given that SSA remains relatively underdeveloped with relatively poor macroeconomic fundamentals. Hence, there is need to go beyond examining effects of CAL on economic growth and try and unearth all possible effects of CAL which can have a direct bearing on the macroeconomic performance. With this in view, this study is aimed at assessing the macroeconomic effects of CAL in Sub-Saharan Africa for the period 1996 to 2013. The sample period is imperative given that a bulk of the liberalization in SSA occurred in the mid-1990s and early 2000's (Ndikumana, 2003; Murinde, 2009; IMF, 2008). The controls which currently remain in some SSA countries, however, are mostly just bureaucratic or administrative controls (Massa, 2014). The Wang-Jahan index for CAL used in this study also goes up to 2013. The Wang-Jahan index is a de jure measure which is calculated based on information provided in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. More on this is outlined in Chapter Three. This measure is selected based on the fact that it makes several methodological improvements to previous measures of CAL used in other studies and builds upon those measures. The measure will thus provide a more meaningful analysis of the effects of CAL. The study covers Francophone (Senegal, Togo, Cote D'Ivoire, Burkina Faso), and Anglophone countries in all regions of SSA and spans both resource-rich (Angola, Nigeria, and Botswana) and resource-poor countries (Tanzania, Malawi, and Uganda)[4]. The data used in this study is obtained from various sources including the World Bank Development Indicators, the World Governance Indicators, and IMF databases.

1.4 Problem statement

This problem statement is carved around four areas where gaps have been identified and these are *CAL and financial sector development (FSD)*; *CAL and capital flows*; *CAL and exchange rate*; *CAL and financial crises*. This thesis will make a modest contribution to the growing literature by investigating threshold effects and possible non-linear effects of CAL in SSA.

[4]The full list of countries is available in the appendices

Capital Flows: Capital inflows to SSA remain relatively low with limited resources to fund private and public investments (Kunu, 2015; Ndikumana, 2003; UNECA, 2006; UNCTAD, 2000). According to the neoclassical theory, SSA should experience increased capital flows, as a result of CAL, since the region is capital scarce and labor-rich (Henry, 2006; Kose *et al*, 2011). Whether CAL has actually increased capital flows to SSA remains unanswered. The few studies done in SSA have done little to resolve the debate often providing mixed findings (Ayinde & Bankole, 2015; Kasekende, 2000). Furthermore, Assibey and Adu (2016) showed that capital inflows to SSA are uneven with some countries receiving more capital than others. This necessitates examining the effect of CAL on capital flows taking into consideration possible threshold effects. To the best of my knowledge, there are no studies which have examined threshold effects in the CAL-capital flow nexus for SSA.

Financial Sector Development: SSA's financial sector is relatively underdeveloped and characterized by a limited range of financial products and insufficient credit allocation (David, Mlachila & Moheeput, 2014: Ndikumana, 2003). Advocates for CAL state that it can promote financial sector development by fostering competition (Klein & Olivei, 1999; Eichengreen, 2007). Evidence of this, however, has not been fully examined for SSA. The limited studies that have been done have provided mixed findings for different regions in SSA (Mahawiya, 2015). This could be indicative of possible non-linear dynamics in the relationship between CAL and FSD which are yet to be fully examined.

Financial crisis: SSA's economic performance has historically been dismal relative to other parts of the world. Furthermore, the region has rampant poverty levels where poverty rates have actually been increasing (Olinto *et al*, 2013; World Bank, 2016). The possibility of experiencing a financial crisis can, therefore, have severe economic and welfare ramifications in SSA. Whether CAL can potentially lead to a financial crisis is yet to be clearly examined for SSA. The East Asian and Mexican crises in the 1990s were linked with rapid CAL (Shen & Yang, 2015: Eichengreen *et al*, 1998). However, it is still debated if the crises were due to CAL (Eichengreen, 2007). This is an important issue given that a financial crisis can not only worsen the financial sector but it can also undermine the growth effects of CAL (Stiglitz, 2000). There is scant research in SSA linking CAL and financial crisis and overall research done in other parts have done little to point towards the desired sequencing of CAL to reduce crisis (Prasad & Rajan, 2008).

Exchange rates: SSA currently runs on very high current account deficits above the 5 percent sustainable amount (Moussa, 2016; IMF, 2017a; Osakwe & Verik, 2007). This is problematic in the sense that unsustainable current account deficits can increase the debt burden. It is, therefore, worrisome to note that CAL can result in exchange rate appreciation, loss of domestic competitiveness and subsequent worsening of the current account balance of a country (He *et al*., 2012; Combes, 2012). Evidence of the effects of CAL on exchange rates in SSA is severely lacking since most studies that have been done have been conducted for emerging countries (He *et al*, 2012). Furthermore, in some cases, high levels of financial sector development have been found to attenuate the appreciation effect of CAL (Saborowski, 2011). Again, there is no evidence which points to this in SSA.

1.5 Objectives of the study

Whether or not CAL will have positive or negative effects in SSA is an issue of empirical importance. The overall objective of this thesis, therefore, is to assess the macroeconomic effects of capital account liberalization in SSA. The specific objectives are to:

- Evaluate the relationship between CAL and capital flows;
- Investigate the effects of CAL on financial sector development;
- Interrogate the effects of CAL on financial sector stability; and
- Examine the effects of CAL on exchange rates.

1.6 Justification and significance of the study

Previous studies on CAL have failed to bring about conclusive evidence on its effects. This is because research in the area often suffers from several shortcomings. The first has to do with a measure for CAL. This has been a contentious issue as studies have relied on a wide array of measures. Measures that proxy CAL as capital inflows and outflows as a share of GDP disregard the fact that capital flows are influenced by other macroeconomic policies and factors and not just liberalization of capital accounts. Furthermore, such measures don't give an indication of the intensity of capital account restrictions. Other studies use categorical variables which take on values of one for when a country is liberalized and zero otherwise. This can be misleading since countries rarely move from completely closed capital account regimes to fully open ones instantaneously. Again these types of measures do not give an indication of the intensity of capital controls. Other commonly used measures such as the Schindler (2009) and Chinn-Ito (2008) index capture intensity of capital controls.

However, the Schindler (2009) index does not cover most of the SSA countries. The Wang-Jahan measure used in this study, therefore, builds on this measure and captures the broad country coverage of the commonly used Chinn-Ito index.

The Wang-Jahan measure offers several advantages over the Chinn-Ito index. Firstly, it disaggregates all 12 components of CAL under the IMF Annual Report on Exchange Agreements and Exchange Restrictions (AREAER). This provides an all-encompassing way of understanding the exact effects of CAL. Secondly, the measure also disaggregates liberalization of capital accounts based on asset type, the direction of capital flows and whether or not liberalization is on residents or non-residents. The advantage of this is that it enables us to examine the direct effect of liberalization of a specific asset such as foreign direct investment or portfolio flows on that particular asset. According to Henry (2006), studies that rely on indices showing overall liberalization may obtain insignificant findings merely because such indices may not have a direct effect on the intended variable. Hence specifically examining the effects of FDI inflow liberalization on FDI inflows may offer more meaningful results. Thus, the use of the Wang-Jahan index allows the analysis of various aspects of CAL whilst capturing the intensity of capital account restrictions as well. Furthermore, a comparative inspection of the Chinn-Ito and Wang-Jahan indices for each country over the time period shows that the Wang-Jahan index offers more variability over the years compared to the former. In other words, the Chinn-Ito index reflects very little variability in CAL compared to the Wang-Jahan index. Therefore, the Wang-Jahan index offers an opportunity for richer analysis and fully captures the differences in the rate of liberalization for different countries. It is, thus, able to capture the gradual manner in which different countries move from closed capital accounts to fully liberalized ones.

Furthermore, there is a growing body of economists who agree that CAL benefits countries that exhibit certain characteristics including, good institutions, sound macroeconomic fundamentals, and well-developed financial sectors. This study, thus, makes a methodological contribution to the growing body of literature which examines non-linear effects in the relationship between CAL and financial sector development. This is done by including an interactive term for threshold variables and also including polynomial terms in the interactive variables. The inclusion of polynomial terms helps to assess whether there is a turning point in the effect of a certain variable. It has been suggested that, for CAL to promote financial sector development, there is a need to have proper institutional frameworks in place.

However, Klein and Olivei (2005) found that intermediate levels of institutional development are the ones which affect the correlation between CAL and economic performance thus indicating possible non-linearity. This justifies the inclusion of polynomial terms to assess this dynamic for SSA. The couple of studies that have been done for SSA have not adopted this approach which can provide new and interesting insights into the CAL-financial sector development nexus. Furthermore, unlike studies which rely on credit to the private sector to measure financial sector development or liquid liabilities, this paper uses the Financial Development Index[5] developed by Svirydzenka (2016). The major advantage of this measure is that it is broader and captures the multi-faceted nature of financial systems. This measure captures aspects relating to the development of financial markets and that of financial institutions. Furthermore, this measure is a composite index made up of sub-indices capturing financial sector efficiency, access, and depth. Hence, apart from covering all aspects of financial sector development, the measure also allows in-depth analysis of the effects of CAL on these sub-components.

This study will also make a contribution to knowledge by employing sample splitting and threshold regression methodology to examine threshold effects in the relationship between CAL and capital flows. This is motivated by the suggestion that capital flows to SSA are asymmetric hence indicating heterogeneity in the countries (Assibey & Adu, 2016). This thesis employs sample splitting techniques and threshold regression following the suggestions by Kose *et al* (2012). This will enable a comprehensive analysis of threshold effects which will shed light on asymmetries in capital flows to SSA. Furthermore, as mentioned before, unlike other studies which rely on the Chinn-Ito measure of CAL, this study will use Wang-Jahan Index. Hence we will be able to examine whether specific liberalization of FDI inflows will affect FDI inflows, unlike other studies which base their results on overall liberalization indices. Overall indices may fail to offer meaningful results since they capture other aspects which may not be directly linked to a certain capital asset flow.

This study will also contribute to the literature on the effects of CAL on exchange rates. To the best of my knowledge, there are no studies that have been done on this in SSA.

[5]This measure is available on the IMF databases

This study also innovates on existing studies done in other parts of the world by recognizing the potential importance of financial sector development in examining the relationship between CAL and exchange rates as suggested by Saborowski (2011). This is because it has been suggested that well-developed financial systems are able to attenuate the appreciation effects of CAL. This study will, thus, help uncover new knowledge on the possible Dutch disease effects of CAL and capital flows for SSA which will add on to academic knowledge and also inform policymaking across the sub-region. Furthermore, the study goes a step further and examines the direct effects of CAL on current account deficits in a bid to examine whether CAL will directly affect the current account balance. This has not been done before to the best of my knowledge.

Lastly, effects on CAL on financial/currency crisis have not been examined in SSA. This study seeks to verify that. The study contributes to knowledge by developing an Exchange Market Pressure (EMP) index for SSA countries which measures currency crisis. The study shall employ propensity score matching techniques to control for sample selection bias, which has been found to be prevalent in the relationship between CAL and crisis in other parts of the world. This is because it has been suggested that countries who have higher economic growth, well developed financial sectors and are more open to trade are more likely to pursue open capital accounts. Because of their sound economic characteristics, such countries have a lower chance of experiencing a financial crisis. Hence, owing to the fact that random selection may not be possible in such instances, there is a need to control for sample selection bias. By doing so, this study will help shed more light on the effect of CAL on financial crisis in SSA.

Aside from the fact that there has been no research on macroeconomic effects of CAL at a panel level, the justification for conducting the study for SSA stems from the fact that theory predicts different effects of CAL for different regions based on capital availability. For instance, by opening capital accounts, SSA, being capital scarce, should experience increased capital flows, unlike developed, capital abundant countries that should experience capital outflows. Hence, it is important to assess whether or not CAL will have the desired effects postulated by theory and it is flawed to draw any implications for SSA based on studies done in developed countries where the effects of CAL are expected to differ. Furthermore, it is has been suggested that panel studies on CAL which combine both developing countries and developed countries may provide results that are not meaningful.

This is because the opposing effects of CAL in developed and developing countries may lead to insignificant findings (Henry, 2006). Furthermore, such studies may not obtain meaningful results because developed countries started to liberalize in the late 1970's whilst most developing countries began to liberalize prominently in the mid-1990's. As such, Henry (2006) argued that studies, like Rodrick's (1998), obtained insignificant findings merely based on sample choice because the study only went up to 1989. For more meaningful results, the study should have extended up to the 1990's when most developing countries began to pursue liberalization. Hence, this thesis essentially tests whether or not the predictions of CAL theory hold for SSA.

This study comes at an opportune time when most countries in SSA have committed towards full liberalization of their capital accounts in line with regional integration agenda and the move towards the establishment of common monetary unions (Nyanzi, 2010). As such, there are many agreements to liberalize capital flows under the Southern Africa Development Community (SADC), the Cross-Border Initiative in Eastern and Southern Africa (CBI) and in other regional blocks like West African Economic and Monetary Union (WAEMU) and Central African Economic and Monetary Community (CEMAC) (Bicaba, Brixiova & Ncube, 2015; Ndikumana, 2003; Smith *et al*, 2004). By unearthing the effects of CAL, this study will, therefore, provide knowledge-based policy guidance to policymakers in the SSA region.

1.7 Organization of the thesis

The remainder of this thesis is organized in the following way. Chapter Two offers a background of the reforms on the capital accounts that have been undertaken in various SSA countries. The chapter also provides an overview of the prevalence of capital controls in SSA as well as providing a summary of the trends in capital flows in the region.

Chapter Three examines whether or not CAL leads to an increase in capital flows in SSA. The chapter seeks several questions: Does liberalizing capital accounts promote capital inflows to SSA? Are capital flows likely to be higher in countries with higher threshold levels of financial sector development? This is done by employing sample splitting and threshold effects methods in a bid to answer these questions.

The second essay of the thesis is presented in Chapter Four. It investigates the effect of CAL on financial sector development using System-GMM estimators. This chapter seeks to answer the question of whether CAL promotes financial sector development in SSA.

The chapter also seeks to examine the non-linear effects of institutional quality in the CAL-financial sector development nexus.

Chapter Five examines whether or not CAL can potentially lead to a currency crisis in SSA. This is done by employing Fixed Effects, Least Squares Dummy Variables, and System-GMM estimators to examine this as well as employing propensity score matching techniques to correct for sample selection bias.

Chapter Six is aimed at analyzing the Dutch Disease effects of CAL. That is, the chapter examines whether CAL will result in exchange rate appreciation in SSA. The chapter goes further and examines this conjecture for South Africa and Nigeria in addition to analyzing the overall effects for SSA. The chapter also seeks to assess the direct effect of CAL on current account balances in SSA.

Chapter Seven concludes the thesis by giving an overview of the results of the thesis and provides policy recommendations which are drawn from these results and findings.

CHAPTER TWO

BACKGROUND OF CAPITAL ACCOUNT LIBERALIZATION AND ECONOMIC PERFORMANCE IN SSA

2.1 Capital account liberalization in Sub-Saharan Africa

Many SSA countries began to liberalize their capital accounts under the auspices of broader economic reforms which began in the 1980's and gained momentum in the 1990's. These fell under the IMF/World Bank-supported Structural Adjustment Programmes (SAP's). Hence CAL has been part of overall macroeconomic reforms in most countries except for countries like Cameroon and Senegal (IMF, 2008). Early reformers included Nigeria who began to implement reforms on the capital account as early on as the 1980s (Murinde, 2009). Kenya also began to liberalize in the 1980s when faced with an impending economic crisis. Following this, Ndikumana (2003) noted that liberalization only increased the country's vulnerability to capital flight and did nothing to ease the economic crisis. For the rest of SSA, they began to liberalize in the 1990's and this was often kick-started by eliminating or relaxing restrictions on long-term capital flows, such as FDI, while maintaining controls on short-term capital flows. For instance, Tanzania removed restrictions on FDI inflows in the mid-1990s and maintained controls on portfolio flows (IMF, 2008).

Specific reforms often involved removing or relaxing restrictions on foreigners to participate in FDI and allowing foreigners to repatriate dividends and to purchase government bonds and securities. According to Bicaba, Brixiova & Ncube (2015) countries like Mauritius and Zambia liberalized at the beginning of the 1990s, while others like Angola maintained strict restrictions during the period 1995 to 2005. In some cases, political events spurred CAL. This was observed in South Africa where, after the 1994 elections, they abolished capital controls and reintegrated into global financial markets (Ndikumana, 2003; Insaidoo and Biekepe, 2013). Prior to that, during the apartheid regime, the country had faced economic sanctions and was closed off to the rest of the world. Table 2.1 highlights some of the major reforms that were implemented in various SSA countries.

Table 2.1: Capital Account Reforms in SSA

Country	Reform
Uganda (1997)	One step liberalization
Zambia (1990-1995)	**1993-1994:** Removal of restrictions on transactions in the capital account
	1995: Foreign currency bank deposits accepted
Ghana (1995-2006)	**The 1990s:** Opening up to portfolio flows and FDI
	2006: Foreigners permitted to purchase long-term government securities.
Nigeria (1985-2006)	**The mid-1980's:** Foreign exchange market reforms
	1995 onwards: Nationals allowed to hold securities abroad
	Reduction in the requirement that Nigerians hold majority ownership of foreign firms
	Convertibility of dividends and profits
Cameroon (2000 to date)	Foreign exchange guidelines synchronized and restrictions on flows of capital relaxed countries in the CEMAC region
Tanzania (1990)	**1997:** Liberalization of FDI
Senegal (1999)	**1999:** Removal of restrictions on FDI inflows and on residents borrowing from abroad
Kenya	**1991:** Introduction of foreign exchange bearer certificates
	1995: Shilling became fully convertible
	1994: Some companies allowed to hold foreign currency denominated accounts
Malawi	**1995:** Removal of restrictions on foreigners to repatriate investment proceeds
South Africa	**1994:** Non-residents allowed to purchase bonds, shares
	Quantitative restrictions removed
	Investment abroad allowed

Source: Murinde, 2009; Ndikumana, 2003; IMF, 2008. Note: CEMAC refers to Central African Economic and Monetary Authority

Capital account liberalization in SSA has also occurred under the framework of regional economic agenda. Examples include the Southern Africa Development Community (SADC) Finance and Investment Protocol (FIP) where countries agreed to liberalize capital accounts by 2018 (Smith *et al*, 2014).

Furthermore, member countries of the West African Economic and Monetary Union (WAEMU) removed controls on FDI within the region (Bicaba, Brixiova & Ncube, 2015). The same can be said for the Cross-Border Initiative in Eastern and Southern Africa (CBI) (Ndikumana, 2003). In the Communauté financière d'Afrique (CFA) zone there is free capital mobility between the member countries and France. Exchange rate regulations were also harmonized and all controls were lifted within the Central Africa Economic and Monetary Authority (CEMAC) zone and controls were maintained for countries, not within the block. According to Gibson *et al* (2006), regional coordination of CAL results in greater mobility of capital when many countries in a region liberalize.

Table 2.2 shows the prevalence of capital controls in selected SSA countries. To date, a few restrictions remain in countries like Cameroon who only liberalized within the CEMAC region (Murinde, 2009). The same can be said for Senegal who retains capital controls for Non-WAEMU countries. Countries that are fully liberalized include Uganda, Seychelles, Mauritius, and Zambia, with Uganda adopting a big-bang one-step approach to liberalization (Murinde, 2009). Other countries have adopted a more gradualist approach. These included countries like Zambia (1990 to 1995), Nigeria (1985-2006) and Cameroon (2000 to date). Sequencing has also varied among countries with Ghana opting for good sequencing where they pursued economic stabilization first and accompanied CAL with institutional development reforms (IMF, 2008; Wang & Jahan, 2016). Uganda, on the other hand, liberalized with a prevailing shallow financial sector and limited regulatory capacity (Wang & Jahan, 2016). Recently, countries like Nigeria re-imposed some restrictions to curb capital flight and reduce pressure on the Naira. For instance, they imposed restrictions regarding purchasing foreign currency in local markets for investments in foreign securities (IMF, 2016). Likewise, in 2008-2009, Zambia and Tanzania tightened capital controls to discourage speculative controls (Massa, 2014). This was the period during which the global financial crisis occurred. The controls which currently remain in most of SSA, however, are mostly just bureaucratic or administrative controls (Massa, 2014).

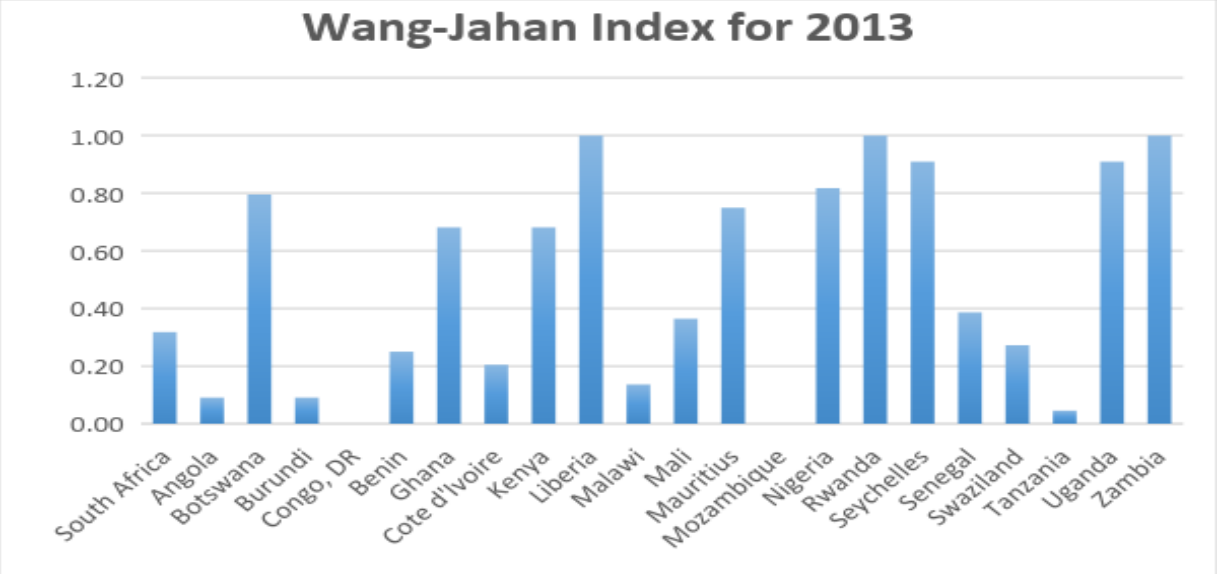
Table 2.2: Prevalence of capital controls in SSA

Country	FDI and portfolio equity inflows	
	Inflows	**Outflows**
Botswana, Seychelles, Nigeria, Uganda and Zambia	Shares: Restrictions present FDI: Absence of restrictions	Shares: Absence of restrictions FDI: Absence of restrictions
Cameroon	Shares: Restrictions on foreign securities larger than CFA Franc 10 million FDI: No restrictions on FDI less than CFA Franc 100 million	Shares: Restrictions present FDI: No restrictions on FDI less than CFA Franc 100 million
Ghana	Shares: No restrictions FDI: Restrictions	Shares: Limits for non-residents to trade in shares FDI: No limits
Mauritius	Shares: Restrictions on shares that are not registered in the stock market FDI: Restrictions on FDI in the sugar sector	Shares: No restrictions FDI: No restrictions
Mozambique	Shares: Restrictions present FDI: Restrictions present	FDI: No restrictions Shares: Restrictions present
South Africa	Shares: Restrictions for non-residents FDI: No restrictions	Shares: Limits for foreigners from certain countries
Tanzania	Shares: Foreigners allowed to buy 60% of total securities by an issuer FDI: No restrictions	Shares: Restrictions for non-residents from certain countries

Source: IMF (2008); Murinde (2009)

Figure 2.1 shows the extent of capital account liberalization in SSA based on the Wang-Jahan capital account index[6]. Countries with sufficiently open capital accounts register a value of one and these include Uganda, Liberia, and Rwanda while countries like Angola, Mozambique, Burundi, Tanzania and the Democratic Republic of Congo, remain relatively closed. Kenya and Nigeria are modestly open and Ghana was closed until it passed its Foreign Exchange Act in the year 2005 (Wang & Jahan, 2016). By 2010 Rwanda had completely opened up its capital account (Wang & Jahan, 2016).

Figure 2.1: Capital Account Openness Index for SSA Countries



Source: IMF capital account openness database

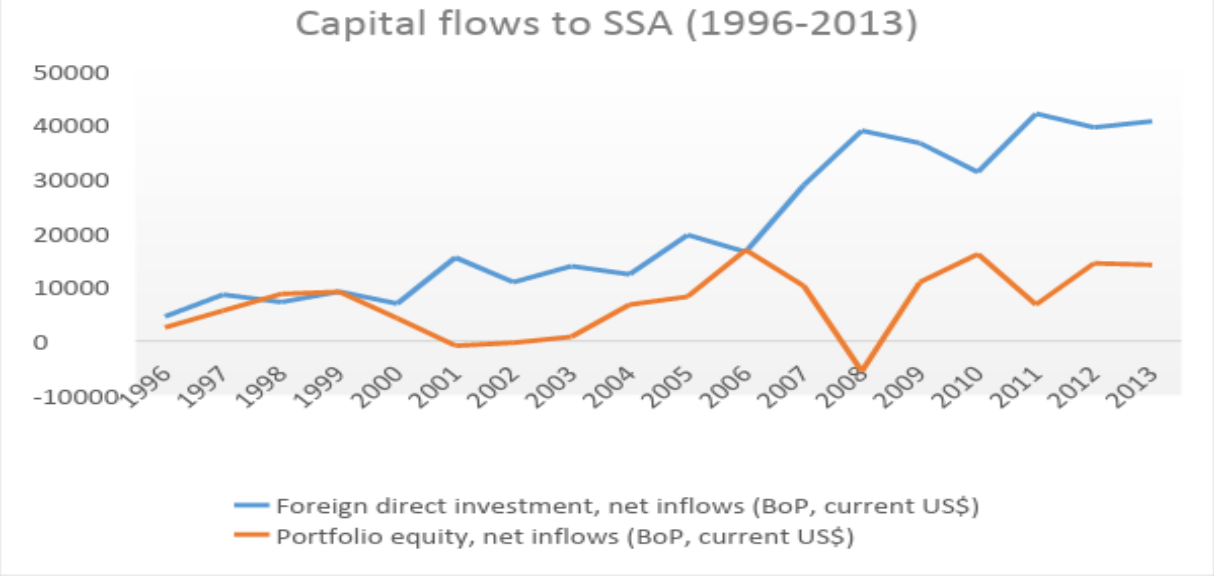
2.2 Trends in capital flows to Sub-Saharan Africa

With the increase in worldwide inflows of capital in the 1980's and 1990's, SSA also experienced increased capital inflows. Prior to the 1990's, capital flows averaged less than 1 percent of GDP. However in the 1990's capital flows began to increase (Nyangoro, 2017). This was due to economic reforms that were implemented which led to an improvement in the business climate and improved macroeconomic conditions. Further to this, an increase in economic deregulation and policies which enhanced financial integration led to a rise in capital inflows. During the period 1998 to 2002, net inflows of private capital rose from US$ 6.8 billion to US$ 17 billion (UNECA, 2006).

[6]This is available on the IMF database

It was also reported that between 2000 and 2007, capital inflows grew to four times their value from US$11 billion in 2000 to US$53 billion in 2007(IMF, 2008; Murinde, 2009; Bicaba, Brixiova & Ncube, 2015). The ratio of capital inflows to GNI averaged at 4.9 percent per annum from 2000 to 2007 (IMF, 2009). A 2006 report by the United Nations Economic Commission for Africa (UNECA) further showed that FDI inflows increased from US$ 29 billion in 2010 to US$ 37 billion in the year 2011, US$ 39 billion in the year 2012 and US$ 42 billion in 2013. Apart from FDI and portfolio flows, bond flows have also been on the rise. In a survey by Massa (2014), it was observed that countries like Ghana, Cote D'Ivoire, Nigeria, Zambia, and Tanzania had earned up to US$ 8.1 billion. This was a result of issuing their first sovereign bonds. It is important to note that portfolio inflows took a dip in 2008 and this was when the global financial crisis occurred (Massa, 2014). However, after the global financial crisis, capital flows have been on the rise (Nyangoro, 2017; Alley, 2017). The increase in global capital to SSA has also been attributed to the Multilateral Debt Relief Initiative which had occurred. The trends in capital flows are presented in Figure 2.2.

Figure 2.2: Capital Inflows into SSA in Millions of US$



Source: World Development Indicators

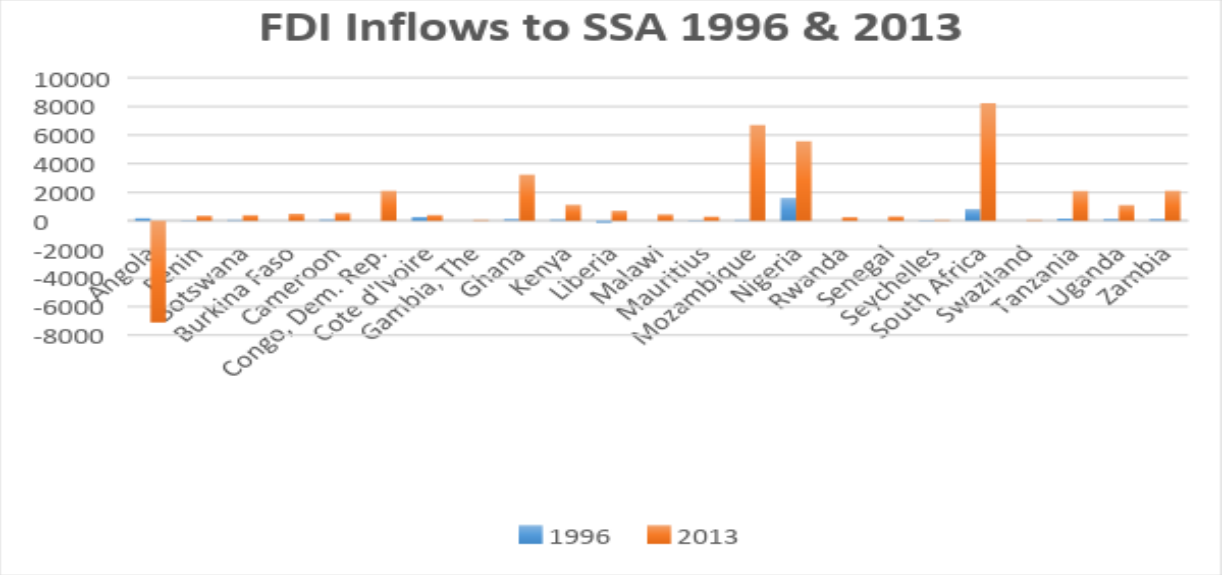
Examining Figure 2.2, it becomes evident that a bulk of capital flows to SSA have been towards FDI, with SSA attracting very minimal portfolio inflows. It is also vital to highlight that, in spite of the increase, overall capital inflows to SSA remain lower compared to other regions.

Ndikumana (2003) pointed out that SSA only receives 4.3 percent of total FDI to developing countries. The factors which hinder FDI in SSA include underdeveloped financial sectors, poor physical infrastructure and high country risk (Ayinde & Bankole, 2015; UNECA, 2006). Evidently, institutions play an important role as it was highlighted that government stability helped to attract investments in Tanzania, Uganda and South Africa (Bhinda, Griffith-Jones & Martin, 1999). Underdeveloped financial sectors have also hindered some African countries from achieving their FDI potential. For instance, countries like Malawi have underdeveloped financial sectors with bank deposits concentrated in a few banks and limited bank lending (Ndikumana, 2003). Cameroon also has an underdeveloped financial sector which led to most of its FDI being limited to the oil sector.

The inflows of capital to SSA have been concentrated in a few economies. IMF (2008) reported that Nigeria and South Africa receive 48 percent of FDI which comes to SSA. With regards to portfolio inflows, the situation is more extreme with South Africa accounting for most of the portfolio inflows. South Africa receives about 88 percent of total portfolio flows into SSA and this can be attributed to its relatively more developed financial sector (IMF, 2008).

Hence, a well-developed financial sector remains vital in attracting portfolio flows (Chea, 2011; Murinde, 2009; IMF, 2008). This is due to the fact that well-developed financial sectors are capable of absorbing and allocating capital flows more effectively (Saborowski, 2011). Recently, other countries whose financial sectors are also relatively developed, have been able to attract a few portfolio inflows as well. These include Nigeria and Botswana. Figures 2.3 and 2.4 show the comparative inflows of FDI and portfolio flows into SSA for 1996 and 2013.

Figure 2.3: FDI inflows to SSA in Millions of US$ (1996 & 2013)

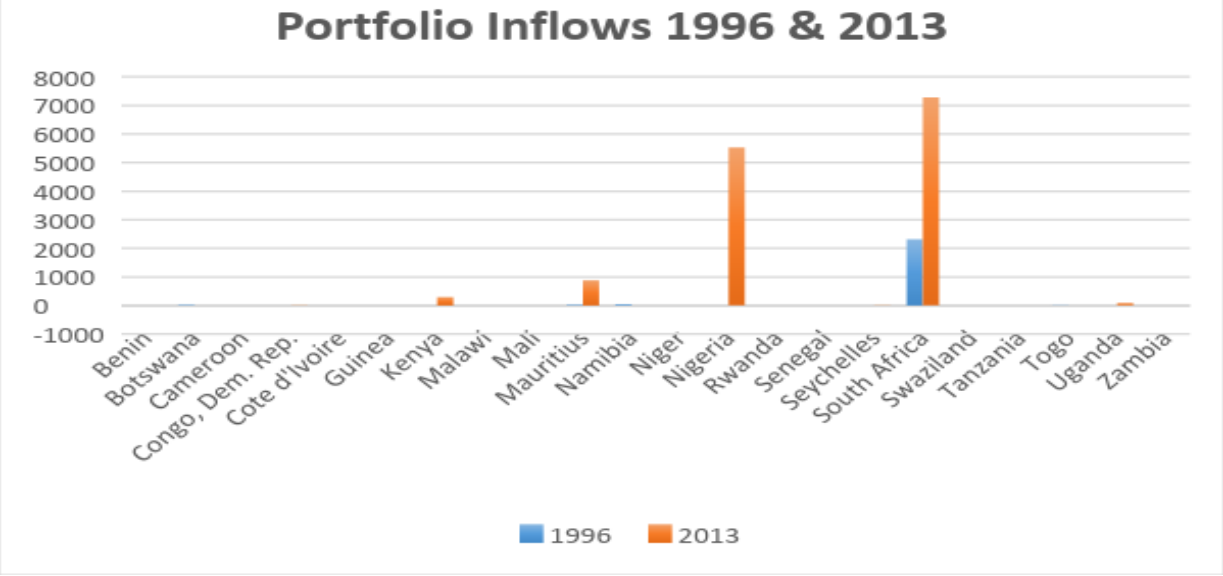


Source: World Development Indicators

In Figure 2.3 it is apparent that, for countries like South Africa, Ghana, Nigeria, and Mozambique, there has been a massive rise in FDI between 1996 and 2013. Countries like Angola on the other hand have experienced a downturn in inflows of FDI.

Apart from Nigeria, Mauritius is the only other SSA country which is close to South Africa in attracting portfolio capital inflows. This is shown in Figure 2.4. The other SSA countries receive very negligible amounts of portfolio inflows.

Figure 2.4: Portfolio inflows to SSA in millions of US$ (1996 & 2013)

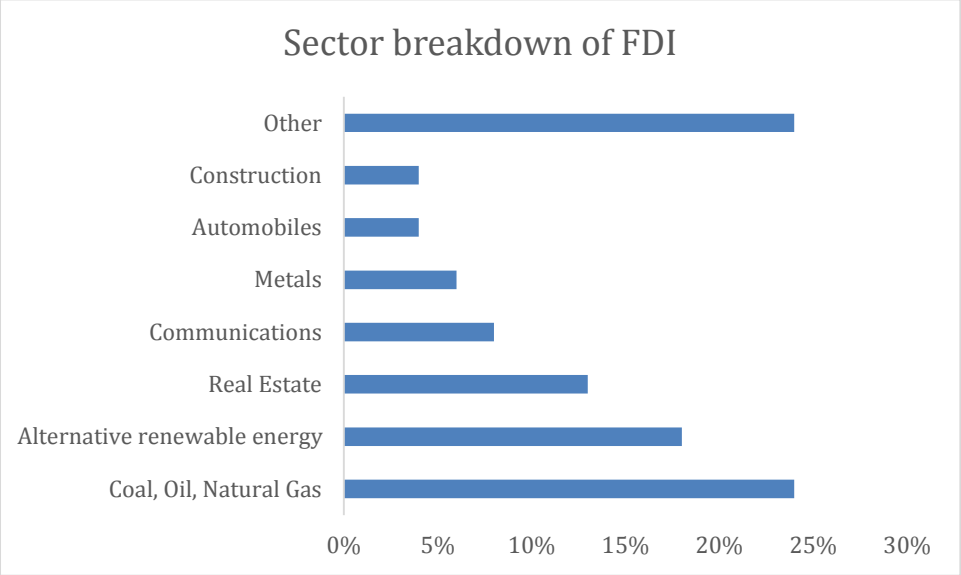


Source: World Development Indicators

With regards to the composition of FDI inflows, most of the inflows to SSA have been to the natural resources sector (Ndikumana, 2003; World Bank, 2014; UNECA, 2006). A substantial amount of FDI has been to resource-rich countries like Nigeria (oil), Democratic Republic of Congo (copper and cobalt), Angola (oil) and Liberia (iron ore) (UNCTAD, 2000; UNCTAD, 2004). The large share of FDI in mining industries, henceforth, limits its effect on employment and economic transformation (UNECA, 2006). Bhinda, Griffith-Jones, and Martin (1999) pointed out that investment in oil in Nigeria and South Africa was dominated by OECD companies. In recent times, most of the investments, in the extractive sector, have been dominated by Chinese firms (Chea, 2011). However, there has been a rise in investment in other sectors such as services and manufacturing. A report by the IMF (2008) showed that, recently, investment has been rising in the financial sector as well with China's Industrial and Commercial Bank of China (ICBC) acquiring a share in Standard Bank in South Africa and the China Development Bank signing a similar deal with Nigeria. In the same vein, Kunu (2015) pointed out that capital flows to Nigeria were no longer being targeted to primary sectors (agriculture and manufacturing) but to service-oriented industries like banks at the expense of the real economy. Furthermore, a report by the United Nations Conference on Trade and Development (UNCTAD) in 2004, highlighted that FDI in services was also increasing with South African FDI in telecommunications overtaking that in mining and extractive industries.

Figure 2.5 shows the sector composition of FDI to the African continent. In 2016, the coal, oil and natural gases sector were the top earners of FDI accounting for US$ 15.7 billion (23%) of FDI. This was followed by the alternative renewable energy sector with US$ 12.2 billion (18%) and real estate US$8.7 billion (13%). Building and construction attract the lowest FDI with US$ 2.5 billion (4%).

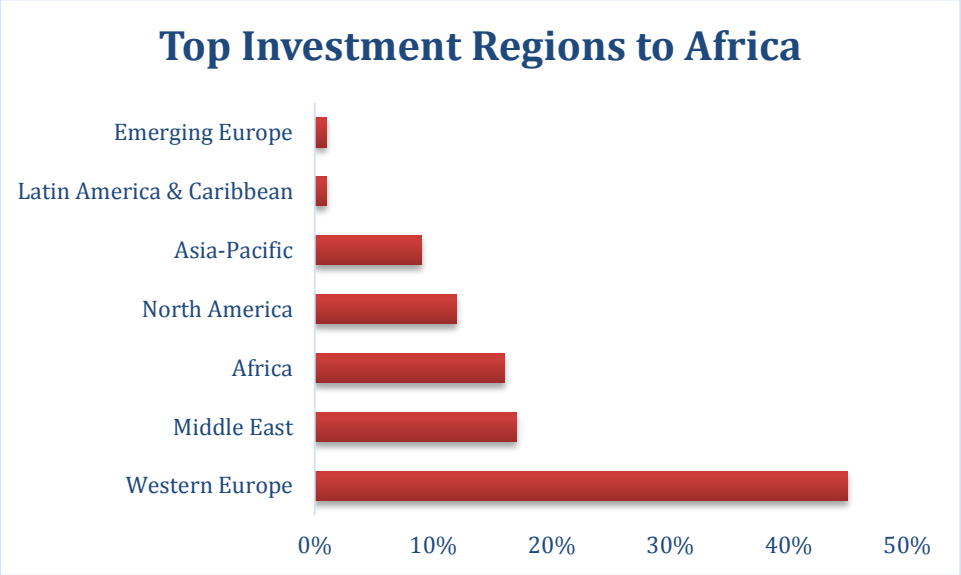
Figure 2.5: Sector Composition of FDI to Africa (2016)



Source: Africa Investment Report 2016

Figure 2.6 shows the top investors to Africa as of 2016. Looking at investor origins, Western Europe is the largest investor to Africa with US$ 30.1 billion (45%) followed by the Middle East with US$ 11 billion (17%) and intra-Africa FDI of US$ 10.7 billion (16%). The lowest contributors of FDI to SSA are Latin America and the Caribbean and emerging countries in Europe with US$ 0.41 billion (1%) and US$ 0.35 billion (1%) respectively. It is noteworthy that Chinese investments in SSA have been increasing steadily. The presence of Chinese firms became apparent after the global financial crisis. FDI flows from China increased from next to nothing in the early 1990's to about 7 % of the total FDI to SSA (Pigato & Tang, 2015).

Figure 2.6: Top Investors in Africa (2016)



Source: Africa Investment Report 2016

2.3 Capital account liberalization and capital flows in SSA

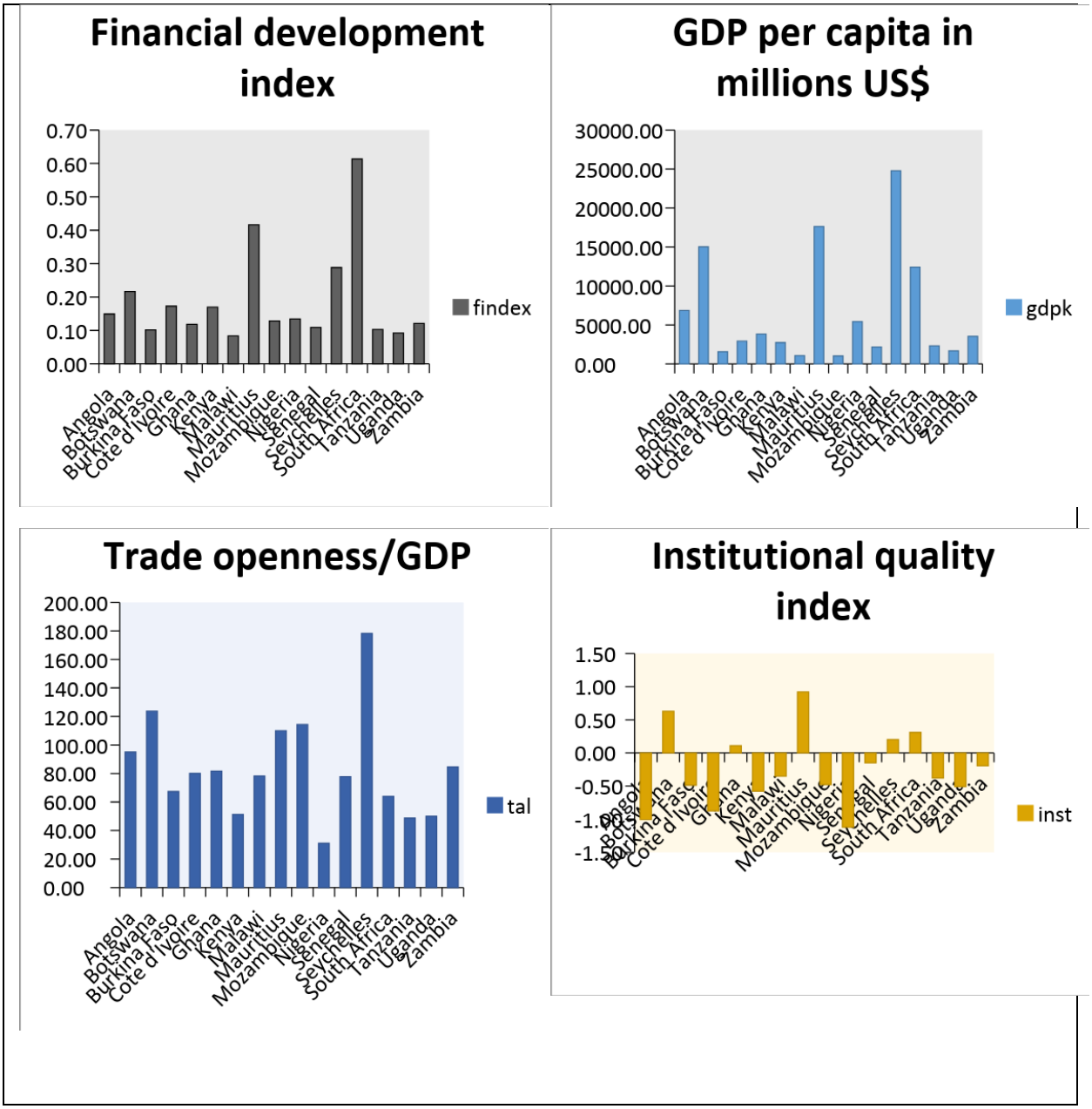
Prior to pursuing liberalization, countries in SSA would implement capital controls in order to reduce capital flow surges and to mitigate the adverse effects of these increases in volatile flows on the economy (Alley, 2017). However, to benefit from the increasing global capital flows in the late 1980's and 1990's most SSA countries began to pursue more liberal regimes. Whether or not CAL has led an increase in capital flows to SSA remains uncertain.

Currently, countries like Uganda and Zambia are fully open and receive a lot of capital flows (IMF, 2009). At the same time, relatively closed countries like Mozambique also receive substantial capital inflows (IMF, 2009). It was further noted that capital flows to countries like Senegal have been low due to retaining capital controls for Non-WAEMU countries (IMF, 2008). In Ghana and Nigeria, portfolio and direct inflows surged due to liberalization (IMF, 2008). In the case of Uganda, Kasekende (2000) highlighted that Uganda has been experiencing increased capital inflows since liberalization. However, a report by the IMF (2008) and an analysis by Wang and Jahan (2016) showed that, since liberalization in 1997, the volume of capital flows in Uganda only picked up in 2004. Hence, capital flows may not always automatically increase as a result of CAL. This could be due to a number of factors including the fact that there is a high probability of the homes bias. According to Gochoco-Bautista and Sotocinal (2014), this occurs where investors have a tendency to invest in equities locally even if capital is mobile internationally.

Hence it is not certain whether or not CAL has led to increased capital flows in SSA. There are a number of factors which affect the efficacy of CAL as a policy. For countries to realize sufficient benefits from CAL, there is a need to attain certain threshold levels of development (Park & Takagi, 2012; Kose *et al*, 2011; IMF 2012a). That is, countries must have a well-developed financial sector, be sufficiently open to trade and have adequate bank supervision. Apart from this, it is also vital that countries have attained domestic financial liberalization fist prior to pursuing financial integration. This is because, as Gibson *et al* (2006) states, if domestic interest rates have not been adjusted to international ones, capital outflows may ensue. A majority of SSA countries are characterized by poorly developed financial sectors, dismal economic performance, and very weak institutions. This becomes apparent in Figure 2.7.

Figure 2.7 shows the levels of financial sector development, Real GDP per capita, institutional quality and trade openness for selected SSA countries. Countries with high levels of GDP per capita, financial sector development include South Africa, Mauritius, and Seychelles. With regards to institutional quality, most of SSA have very low levels of institutional quality ranging in the negative values (World Bank, 2018). Few countries like South Africa and Mauritius have positive levels of institutional quality. Regarding trade openness, Botswana, Seychelles, and Mozambique are some of the most open countries. In this aspect, South Africa is relatively less open to trade.

Figure 2.7: Selected economic indicators for SSA (2016)

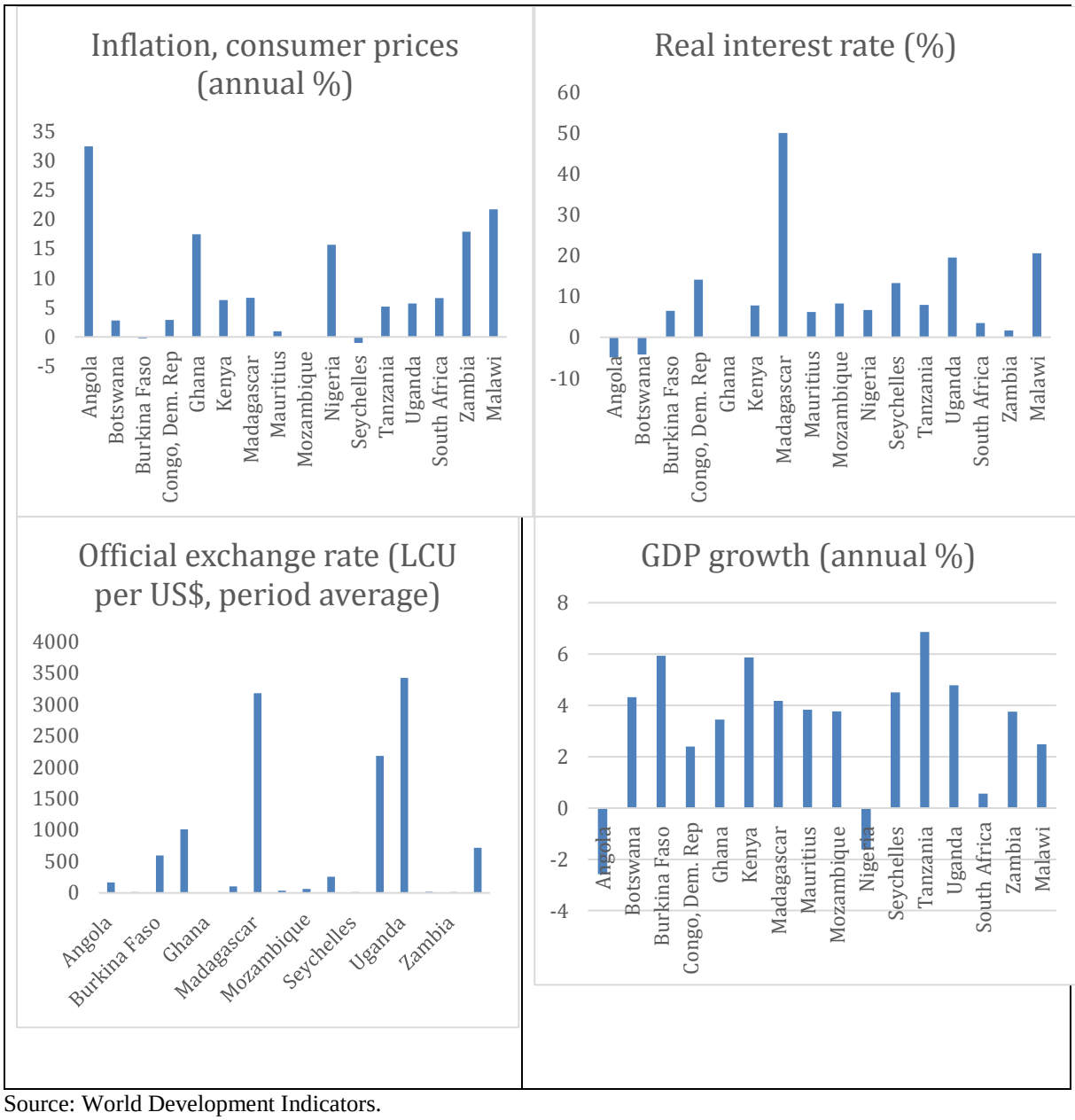


Source: IMF and World Bank Development Indicators

Figure 2.8 shows a brief snapshot of key macroeconomic indicators in selected SSA countries. The first quadrant shows annual inflation for 2016. From this it is apparent that countries like Angola Ghana, Nigeria Malawi and Zambia are observed to have very high levels of inflation. Regarding GDP growth, Tanzania seems to have the highest levels of GDP annual growth with a GDP growth rate of about 7 percent.

Overall GDP growth rates in SSA are below 6 percent with Angola experiencing a negative GDP growth rate in 2016. Most of SSA have interest rates which are below 20 percent except for Madagascar which is an outlier with an interest rate approaching 50 percent.

Figure 2.8: Selected Macroeconomic Indicators for SSA (2016)



Source: World Development Indicators.

2.4 Conclusion

This chapter has offered an overview of the trends in CAL in SSA and the prevalence of capital controls to date. It is evident that the speed and scope of liberalization has been varied across the sub-region. Some countries in SSA opted for overly rapid liberalization whilst others adopted a gradualist approach.

Furthermore, the prevalence of controls on capital ranges across the region. The chapter has also provided a background to the capital flows to SSA as well as providing country experiences with CAL. Lastly, a brief snapshot of the macroeconomic conditions in SSA is presented in order to provide a context for the study.

CHAPTER THREE

CAPITAL ACCOUNT LIBERALIZATION AND CAPITAL FLOWS TO SUB-SAHARAN AFRICA: A PANEL THRESHOLD APPROACH

3.1 Introduction

Whether or not capital account liberalization (CAL) increases capital flows to developing countries has been an issue of great academic debate. On one hand, some studies find positive significant effects on capital flows (Henry, 2006; Noy & Vu, 2007; Sedik & Sun, 2012). Other studies, however, find negative effects of CAL on capital flows (Ayinde & Bankole, 2015; He *et al*, 2012). To add on to this, the Lucas paradox (1990) showed that capital flows to developing countries were not as substantial as predicted by theory. Hence the effects of CAL on capital flows remain heavily questioned. CAL involves removal or easing of restrictions in the capital account of the Balance of Payments (BoP). The capital account captures many capital flows including foreign direct investment (FDI), portfolio flows and bank borrowing. Controls on capital are broad and encompass price-based measures, volume-based measures, and administrative controls.

The collapse of the Bretton Woods system, in the 1970's prompted the move towards liberal capital accounts in developed countries. This culminated in a steady rise in popularity of CAL in other parts of the world including emerging countries and developing countries. However, the popularity of CAL was brought to a halt after the Latin American and East Asian crises experienced in the mid-1990's. These crises were associated with rapid liberalization and, as such, economists began to question CAL as a policy (Eichengreen *et al*, 1999: Lichetta, 2006). The crises were characterized by massive reversals in capital flows which led to some countries re-imposing capital controls. The experiences in Asia and Latin America contributed to the slow pace in liberalization in SSA as countries were wary to liberalize their capital accounts rapidly (Chea, 2011). Recently, however, there has been a revival in the interest in CAL under the New International Financial Architecture which advocates for enhanced regulation and supervision. Furthermore, as SSA began to pursue deeper regional integration, CAL became an issue of policy debate.

Sub-Saharan Africa countries began embarking on policies aimed at fostering enhanced financial integration in the mid-1980s. This was often part of broad reform packages which involved market and economic reforms.

As part of these reforms, countries began to pursue more liberal capital account regimes in the 1980s with CAL taking full force in the mid-1990s. To date countries with fully liberalized capital accounts in SSA include Seychelles, Botswana, Uganda, Mauritius, and Zambia. Countries like Ghana, Nigeria, and South Africa have opted for a gradualist approach (Murinde, 2009).

The motivation to liberalize capital accounts is often drawn from the neoclassical postulations that CAL promotes efficiency in resource allocation. This occurs when CAL results in an increase in inflows of capital into developing countries that are capital scarce from capital rich developed countries thus promoting a temporary increase in investment in the former (Henry, 2006).

In the past couple of years, Sub-Saharan Africa has experienced a surge in capital inflows (Kundu, 2015; Murinde, 2009). The increase in capital flows to SSA was attributed to financial sector reforms and improved investor demand. Chea (2011) also attributed the rise in capital flows to factors like increasing global liquidity, improved economic policies, improved business climate, and increased natural resources. Evidently, determinants of capital inflows go far beyond government policy to remove restrictions on capital flows. Other factors which determine capital flows are grouped into *push* and *pull* factors. *Pull* factors include country-specific conditions which attract capital flows into a country and *push* factors are conditions prevalent in countries where capital is flowing out of.

In as much as capital flows to SSA have been increasing, they remain low compared to other regions in the world (Battachrya *et al,* 1997; Insaidoo & Biekepe, 2013). Such trends point towards a possible Lucas paradox[7] (Lucas, 1990; Alfaro & Kalemli-Ozcam, 2003). Furthermore, this begs the question of whether CAL does indeed promote capital flows into SSA. This is an issue which has not been fully explored and empirical evidence remains wanting. The importance of the matter is underscored by the fact that FDI inflows are a potential means by which CAL can enhance economic growth. Furthermore, increased capital inflows can lead to enhanced financial sector development and consumption smoothing (Lichetta, 2006; Singh, 2003). Lastly, FDI can also result in job creation and generate more taxes for a country.

[7]It was argued that capital was not flowing to developing countries as theory predicted

This chapter, therefore, seeks to examine the effects of CAL on capital flows in SSA from 1996 to 2013[8]. The choice of the period is largely due to the fact that a bulk of liberalization in SSA took place during this time frame. Countries like Ghana, Uganda, Zambia, Malawi, Kenya, and Tanzania mostly liberalized FDI inflows in the mid-1990s (Murinde, 2009; Ndikumana, 2003). To add on to this, the Wang-Jahan CAL index, used in this chapter, ranges between 1996 and 2013.

More pertinently, however, the chapter also seeks to examine whether threshold effects are prevalent in the sample. It is widely agreed that countries must achieve a certain threshold level of development if they are to benefit from CAL (Kose *et al*, 2011; Noy & Vu, 2007). Hence, CAL is viewed as more beneficial to those countries that achieve certain levels of development. Assibey and Adu (2016) and Chea (2011) pointed to some heterogeneity and asymmetry and observed that capital inflows to SSA are not distributed equally with a few countries receiving more inflows than others. A report by Ernst and Young (2017) showed that, in 2016, Kenya, Nigeria, and South Africa attracted 58 percent of the continents total FDI projects. Despite the evidence of heterogeneity, few studies for SSA have brought the issue to the fore. This chapter, therefore, contributes to the growing knowledge of CAL and capital flow literature by using sample splitting and threshold regression methods to examine threshold effects.

Furthermore, the chapter departs from other studies by employing a measure of CAL which disaggregates CAL based on asset type thus giving us a measure for FDI liberalization, portfolio liberalization and so forth. This is important since CAL involves liberalization of many asset types and liberalization can be directed either towards inflows or outflows of capital. Hence the need for a measure which distinguishes these and is able to give a concise effect of particular asset liberalization on the specific assets. Hence, the study also assesses the effects of FDI inflow liberalization on FDI flows and the effect of portfolio equity inflow liberalization on portfolio flows. The Wang-Jahan measure used in this study combines the broad country coverage of the commonly used Chinn-Ito index whilst also capturing the intensity of capital flows.

The remainder of this chapter is organized in the following way. Section two provides a background of CAL and capital flows in SSA.

[8]We examine effects for 13 countries based on availability of data. The methodology employed requires the use of well-balanced panel data hence we drop some observations which do not have all the data readily available.

Section three reviews the literature on CAL and capital flows. Section four and five outlines the methodology used and the results of the study respectively. Section six concludes the chapter.

3.2 Capital account liberalization and capital flow trends in SSA

Table 3.1 summarizes some of the major CAL reforms implemented in SSA over the past couple of years. SSA countries started to pursue CAL in the mid-1980s under the Structural Adjustment Policies (SAP's). However, CAL began to gain major traction in the 1990s. Initial reforms involved removing restrictions on FDI while maintaining controls on short-term flows. Many countries in SSA began to liberalize as part of the regional integration agenda. For instance, countries SADC committed to fully open their capital accounts by 2018 under the SADC Finance and Investment Protocol (FIP) (Smith *et al*, 2014). This is because the region is moving towards a monetary union, as with other regional blocks in SSA, in preparation for a continental common monetary union.

Table 3.1: Summary of major capital account reforms in SSA

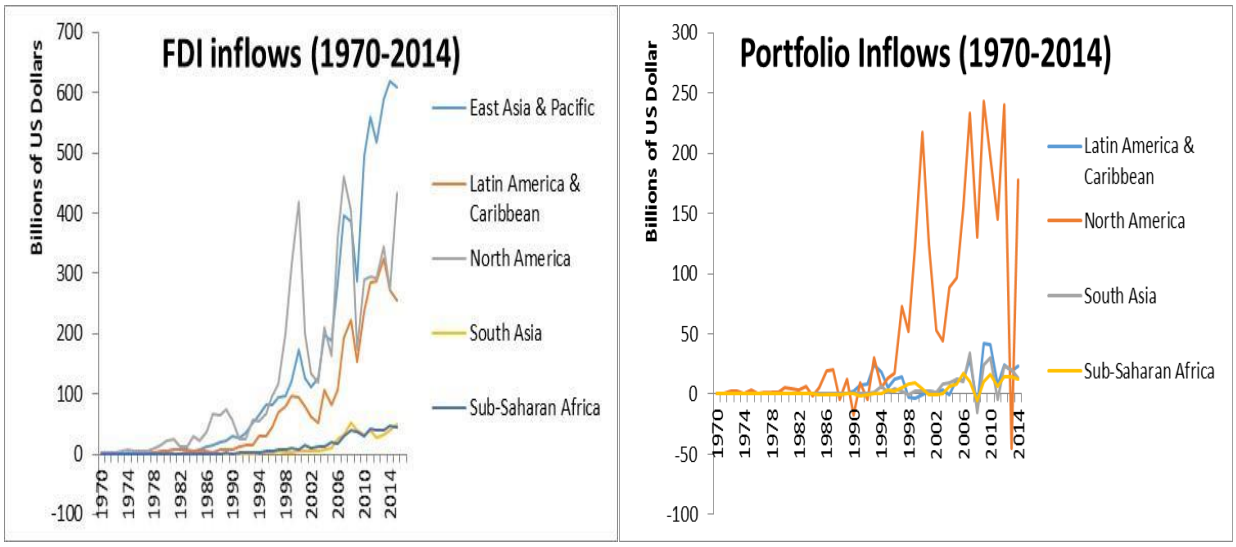
Country	Year	Reform
Tanzania	1997	Full liberalization of foreign direct investment
Kenya	1991	Foreign exchange bearer certificates introduced
Uganda	1997	One step liberalization as part of broader macroeconomic reforms
RSA	1994	Dismantled restrictions forex transactions by residents and non-residents
Malawi	2012	Liberalization of the kwacha
Zambia	1994	All forms of restrictions of capital transactions were removed
Nigeria	1995	Nationals allowed to invest in securities abroad
Ghana	1995	Partial opening up to portfolio inflows and FDI

Source: Murinde (2009); Ndikumana (2003); Kasekende, Kitabire, and Martin (1996)

The major motive for CAL is that it promotes convergence and catch up with developed countries as a result of capital flowing from regions that are capital-rich to capital-poor regions. SSA being a capital-scarce region is thus expected to receive inflows of capital and to be catching up with developed regions.

However, from Figure 3.1 below, it is evident that SSA is lagging behind compared to the rest of the world with regards to FDI and portfolio inflows. The relatively low capital flows to SSA can be attributed to factors such as poor macroeconomic management, high country risk, and exchange rate misalignment (Ndikumana, 2003). The poor macroeconomic environment can reduce the marginal product of capital in developing countries (Chea, 2011). Furthermore, Bhattacharya *et al* (1997) attributed low capital flows to SSA to large structural deficits and erratic monetary policies which contributed to variable inflation and interest rates.

Figure 3.1: Comparative trends in capital flows (1970-2014).



Source: World Development Indicators

The link between CAL and capital flows is an issue which warrants deeper analysis. Countries like Uganda that have liberalized capital accounts have witnessed capital inflows (Kasekende, 2000). However, some countries with relatively closed capital accounts have also been experiencing capital inflows (Murinde, 2009). South Africa experienced a massive inflow of capital after becoming re-integrated with world capital markets (Insaidoo & Biekepe, 2013). However, this coincided with the dramatic political shift in the country which led to the removal of sanctions and made South Africa an attractive investment destination. Hence, it is uncertain if re-integration into world capital markets is what led to increased capital flows or rather the changing political climate.

3.3 Literature review

3.3.1 Theoretical literature

There are several schools of thought which elucidate the effects of CAL on capital flows. The most prominent one is the Allocative Efficiency view which stems from the Neoclassical Growth Model developed by Solow (1956). This view stipulates that CAL facilitates efficient international resource allocation from capital-rich countries (with low returns to capital), to capital-poor countries (with higher capital returns) (Henry, 2006: Shen & Yang, 2015; Lichetta, 2006). The influx of capital inflows to capital-scarce regions then reduces the cost of capital in those regions. As a result, capital-poor countries experience a short-term rise in investment and economic growth. In essence, CAL results in a higher steady-state level of capital in developing countries. At the new steady state path, growth in effective capital falls back to zero and capital stock will grow at its normal rate (Henry, 2006). The Model assumes a Cobb-Douglas production function outlined in equation 3.1 where the national output (Y) is a function of capital (K) and effective labor (AL):

$$Y = f(K, AL) = K^{\alpha}(AL)^{1-\alpha} \tag{3.1}$$

Equation 3.1 shows the production function in a given economy. Capital per unit of effective labour is given as $k = \frac{K}{AL}$ and output per unit of effective labour is given as $y = \frac{Y}{AL}$.

Using this notation and the assumption of homogeneity of the production function we obtain the intensive form of the production function given in equation 3.2 below.

$$y = f(k) = k^{\alpha} \tag{3.2}$$

The model assumes that the economy saves a fraction (s) of total income earned ($y=f(k)$) and that capital depreciates at a rate δ whilst the labour force and output per worker grows at rates n and g respectively. In this regard, the evolution of capital in the model is stipulated by the equation below:

$$\dot{k}(t) = sf(k(t)) - (n + g + \delta)k(t) \tag{3.3}$$

The right-hand side of the equation shows the difference between actual and break even investment (Henry, 2006). In the steady state, the growth of effective capital is zero and the capital stock is increasing at a rate $n+g$ where g is the growth rate of output per worker. The equilibrium for investment is where $f'(k^*) = r + \delta$. The right-hand side is the marginal product of capital which is the sum of interest rates and the depreciation rate.

In this framework, it is assumed that interest rates in developing countries are higher than those in foreign countries ($r>r^*$). Thus with CAL, capital flows into developing countries until the new equilibrium condition for investment is such that $f'(k^*) = r^* + \delta$.

Although this model provides a concise overview of the effects of CAL on inflows of capital, the model is based on several limiting assumptions that nations produce similar products at the same constant returns to scale production and using factors of production that are the same (Alfaro & Kalemli-Ozcam, 2003). In reality, countries do not produce the same goods as some countries may have a comparative advantage in certain goods. Furthermore, countries do not employ the same factors of production as some countries are more capital/labor abundant than others. The model is also limited in its assumption of perfect information when in reality information asymmetries are a well-known characteristic of financial markets. Imperfect information may result in a failure to efficiently allocate resources as stipulated by the model. For instance, Bonizzi (2013) states that international capital markets are faced with information asymmetry which may lead to cases of home bias or herding resulting in low capital inflows to some countries. Thus Eichengreen *et al* (1999) suggested that CAL will only improve resource allocation when accompanied by policies to reduce moral hazard and adverse selection. The Lucas paradox went far ahead to show that, contrary to neoclassical theory, capital was not flowing into those capital-scarce countries as predicted (Lucas, 1990). One explanation for this is that differences in fundamentals in a country affect the structure of production in that country and can hence affect the marginal product of capital (Alfaro & Kalemli-Ozcam, 2003).

Drawing from the limitations of this Model, Mankiw, Romer, and Weil (1992), developed an augmented version of the Neoclassical Model which posits that countries with scarce physical capital but abundant human capital profit from net inflows of foreign capital and that these movements of capital continue until the domestic and foreign interest rates are equalized. This view has been criticized, however, based on the idea that developing countries do not benefit from capital inflows because of underdeveloped capital and money markets (Bonizzi, 2013). Similar to this, the Modified Lucas model (1988) states that countries with scarce physical capital and large quantities of human capital benefit from increased capital flows (Bonizzi, 2013). However, this model departs from the augmented model since it states that this will only occur based on the assumption that only physical capital is mobile (Bonizzi, 2013).

In addition, due to shortcomings of the efficient allocation hypothesis, models like the Dependency Model advocated for capital controls and posited that CAL exacerbates underdevelopment in developing countries since inflows of capital from capital-rich developed countries only serve to benefit advanced countries (Egbuna *et al*, 2013). To counter such arguments, the Neoclassical Counterrevolution Framework, instead, cites that economic development can be attained in an economy with freely operating markets and minimal government intervention.

The Capital Asset Pricing Model (CAPM) has also been used to explain international capital flows (Bonizzi, 2013). This model stipulates that due to securities of different countries being lowly correlated, the efficiency of a portfolio can be enhanced by investing in foreign assets. This is because investing in foreign assets reduces the variance of a portfolio. This implies that worldwide portfolios should converge into an international portfolio asset that is diversified perfectly.

3.3.2 Empirical literature

One of the most prominent studies looking at the effects of CAL on capital flows was conducted by Henry (2006). The study aimed to test the predictions of the Neoclassical Theory and found that, from a sample of 11 emerging countries, CAL led to a 22 percent growth in investment. For developing countries, however, liberalization did not increase investment, growth or reduce the cost of capital. The study used a dummy variable to capture the period in which the country liberalized and this was used to measure short-term effects which are suggested by theory. It is important to note, however, that using a dummy variable for CAL does not give an idea of the intensity of capital restrictions and hence can be a limited way to capture CAL.

Similar to Henry (2006), Noy and Vu (2007) found that CAL positively affects the inflows of FDI when the study controlled for macroeconomic and institutional factors. However, the effect of CAL was found to be moderate. This study employed dynamic panel methods in a study of 62 developing and 21 developed between the periods 1984 and 2000. To measure CAL, the authors generated their own index from the Chinn-Ito KAOPEN index calculated as KAOPN= (Chinnito+2)/4.5. The study, however, fails to explain the rationale for coming up with the new measure and how it improves on the Chinn-Ito index. The study also looks into the effects of institutional quality.

However, their sole focus is on corruption and political stability, leaving out other factors of institutional quality which can affect FDI including the rule of law and regulatory effectiveness.

Sedik and Sun (2012), using a dynamic panel model for 37 emerging market economies, analyzed the experience of emerging countries with liberalized capital flows for a period between 1995-2010. Like Henry (2006) and Noy and Vu (2007), the study found that openness led to increased capital flows. CAL also led to increased equity returns and decreased inflation. The study employed dynamic panel methods and used System-GMM estimators. This study attempts to evaluate the threshold effects on capital flows, however, by using a composite threshold it does not give a clear picture of which threshold variable is more pertinent in promoting increased capital flows.

In a study for 14 Middle Eastern countries, Gammoundi and Cherif (2014) aimed to assess the link between CAL and FDI from 1985 to 2009. They used a dynamic panel model and GMM estimators. The findings from the study were that countries are able to reap benefits from CAL if they met certain threshold levels of financial sector development and institutional quality. For instance, CAL was observed to negatively impact FDI but this was mitigated in countries that had exceeded the threshold level of financial development of 0.62. This study examines threshold effects but uses interactive terms to do so. Departing from this approach, this thesis employs sample splitting methods to examine threshold effects in the hope that they give a more concise picture of the effects of CAL. In this study, they use the number of telephone lines per 1000 people to measure infrastructure quality. For this thesis, a composite measure is developed in order to capture other infrastructure aspects such as electricity.

Asiedu and Lien (2003) conducted a study of 96 developing countries from 1970 to 2000. This paper is one of the few which looks at different aspects of capital account liberalization namely, the capital accounts, the presence of multiple exchange rates, and removal of controls proceeds from exports. They employed fixed effects and found that CAL was beneficial and increased FDI in the sample. The sample, however, is a mix of countries including SSA which only began to liberalize largely in the late 1980s and the early 1990s. Hence, to include such countries in a study which starts in 1970 may be misleading. The study also recognizes possible endogeneity but does not fully address the issue.

He *et al* (2012) examined the effects of capital account liberalization for 25 advanced and emerging economies between 1997 and 2009. They considered effects on inflows and outflows of FDI in addition to examining effects on portfolio inflows and outflows. The study employed GMM estimators and found that CAL facilitates more FDI and outward portfolio transactions. Cal was seen to have a negative effect on portfolio inflows. This study misses an opportunity to examine threshold effects since it combines both emerging and advanced economies. This could have provided a more in-depth view of the effects of CAL.

In a study for Nigeria from 1980 to 2011, Ayinde and Bankole (2015) found that liberalization of the current account in Nigeria did not lead to an increase in FDI. The study employed a Bounds-Testing Approach to determine the effects in the long run and in the short run. To measure CAL, the study employs the Chinn-Ito index. The study cites factors like qualitative governance, price stability, and institutional development which can enhance foreign direct investment in Nigeria.

Most of these studies used have employed the Chinn-Ito index to measure CAL (Ayinde & Bankole, 2015; Noy & Vu, 2007). Although this measure has its advantages, it does not disaggregate liberalization based on asset type. Henry (2006), suggested that disaggregating CAL based on asset type could help bring clarity to the debate on CAL since there are different methods of liberalizing the capital account. This study, therefore, seeks to employ the Wang-Jahan index which, apart from providing an overall index of capital account liberalization, disaggregates liberalization of capital flows according to the specific asset type be it FDI, portfolio or debt flows and whether liberalization is on inward or outward flows of capital. Furthermore, some studies that have sought to examine threshold effects have relied on using a composite threshold (Sedik & Sun, 2012). However, examining individual threshold effects may offer more meaningful results as it will help ascertain which threshold variables are more pertinent in ensuring that CAL has a positive impact on capital flows. To add on to this, there are limited studies examining the effects of CAL on capital flows for SSA. Some of the studies that have been done have combined countries that are developed and developing in their samples. However, there is a need for research which looks into developed countries separately given that they began to liberalize capital accounts at a later stage compared to their counterparts in developed countries (Henry, 2006). This is also imperative given that theory posits different effects of CAL for different regions. A summary of selected previous studies is provided in Table 3.2.

Table 3.2: Summary of selected empirical literature

Author	Scope	Findings
Noy & Vu (2006)	62 developing and 21 developed countries (1984-2000)	CAL positively affects FDI
Sedik & Sun (2012)	37 emerging market countries	Positive effects of CAL on capital flows
Asiedu & Lien (2003)	96 developing countries (1970-2000)	CAL positively affects FDI
He *et al* (2012)	25 Advanced and emerging countries (1997-2009)	A positive relationship between CAL and FDI
Henry (2006)	11 emerging market countries	CAL leads to increased FDI

Source: Author's survey

3.4 Methodology

3.4.1 Theoretical framework

The analytical framework for this chapter draws from the model developed by Fernandez-Arias and Montiel (1996). The model assumes that international capital flows occur through dealings in assets given as S, where s=1…n. It is also assumed that S is comprised of domestic expected returns (D) and a creditworthiness adjustments factor given as C. Domestic expected returns are inversely related to a vector of net capital inflows (CF) while the creditworthiness factor is a negative function of stocks of liabilities of all types S (=S_{-1}+CF). Voluntary capital flows are determined by the arbitrage condition:

$$D(d,CF)C(c,S_{-1}+CF)=W(w,S_{-1}+CF) \qquad (3.4)$$

In equation 3.4 W is the opportunity cost of S-type funds in the world economy. Hence the arbitrage condition implies that domestic expected returns interacted with the credit adjustment factor are equal to the opportunity cost of S-type funds in the world economy.

The shift terms *d, c* and *w* stand for domestic economic conditions, the creditworthiness of a country, and other financial conditions in the creditor country respectively. Equation 3.4 defines *CF* implicitly and shows how *CF* depends on *d, c, w, S-1.* In this regards inflows of capital are deemed to be determined by the various domestic conditions, creditworthiness factors and other financial conditions in creditor countries.

This is shown in equation 3.5 below where capital inflows (*CF*) are a function of *d, c, w,* and $S_{-1.}$

$$CF = CF(d, c, w, S_{-1}) \tag{3.5}$$

This model stipulates that capital flows (CF) are increasing with respect to the domestic economic characteristics (*d*), the creditworthiness of the country (*c*) and decreasing financial conditions in the in creditor country (*w*). Domestic factors captured in *d* include things like improved macroeconomic policy (inflation stabilization), policies which increase the attractiveness of domestic financial markets to investors and policies to increase openness to foreign investors (capital account liberalization) and structural macroeconomic policies which distort intertemporal relative prices (trade liberalization) (Fernandez-Arias & Montiel, 1996). Factors in *c* include things like sustainable debt and shocks to national income while external factors include things like foreign interest rates.

3.4.2 Empirical model specification

Assibey and Adu (2016) showed that capital inflows to SSA are uneven with some countries receiving more capital than others. This is indicative of heterogeneity in the countries.

Kose *et al* (2011) suggested that those nations with well-developed institutions and higher financial sector development attract more FDI inflows. Taking this in mind, the study examines threshold effects by employing sample splitting methods first suggested by Hansen (2000). Following Kose *et al* (2011) the model is specified as follows.

$$CF_{it} = \alpha_i + \beta_1 kal_{it}(q_{it} < \gamma) + \beta_2 kal_{it}(q_{it} \geq \gamma) + \theta X_{it} + \mu_i + \varepsilon_{it} \tag{3.6}$$

Where CF_{it} is a measure of capital inflows for country *i* at time *t*. *kal* is capital account liberalization. X is a vector of other explanatory variables[9]. The choice of other explanatory variables is based on that of Gammoundi and Cherif (2014) and Sedik and Sun (2012). q_{it} captures the threshold variable. γ is the threshold parameter. The sample is divided into two with coefficients, β_1 and β_2 which are the coefficients for the low and high regimes respectively. μ_i are individual effects and ε_{it} are white noise error terms. To estimate this equation, fixed effects estimators are used[10]. Fixed effects are used to control for unobserved heterogeneity in the sample. According to Torres-Reyna (2007), fixed effects also control for all time-invariant differences between observations.

Recognizing the possibility of possible endogeneity the study also examines the effects of CAL on FDI using the one step System-GMM estimator developed by Arellano and Bover (1995). This will help verify robustness of the results. Although some argue that the two-step estimator is more efficient asymptotically, Hwang and Sun (2015) suggest that caution needs to be taken when employing the two-step procedure. They argue that efficiency gains may not be materialized in finite samples and that researchers should employ the two-step estimator only if the benefits outweigh the costs. Thus, a dynamic panel equation is also specified as follows for the whole sample:

$$\Delta CF_{it} = \alpha_i + \beta_0 \Delta CF_{i,t-1} + \beta_1 \Delta kal_{it} + \theta \Delta X_{it} + \Delta \varepsilon_{it} \tag{3.7}$$

3.4.3 Data and descriptive statistics

Measures of Capital Flows

The study samples 13 countries in SSA annually from 1996 and 2013 based on the availability of data. The countries sampled are a representative mix of countries in West, East and Southern Africa. These countries also undertook most of their liberalization reforms in the period sampled (Murinde, 2009; Ndikumana, 2003). The choice of 13 countries is because the sample splitting methodology employed required the data to be heavily balanced with no missing values at all so the countries selected are those countries with data available for all variables. The countries sampled are outlined in Appendix A. The dependent variable is *CF* which is a measure of capital inflows to SSA.

[9]These include: real interest rates, real exchange rates, trade openness, inflation, infrastructure quality, inflation, gdp and debt

[10]The *xthreg* command in Stata 14 estimates the threshold regression using fixed effects estimators

The main capital flows to be considered in this study are FDI inflows as a share of GDP. This is because SSA receives more FDI compared to portfolio inflows. Only a few countries like South Africa receive large inflows of portfolio flows.

As such, data on portfolio inflows is very scant for SSA. The effects of CAL on portfolio inflows are only examined as a robustness check. The data for these variables are obtained from the World Development Indicators.

Measures of Capital Account Liberalization

For the purposes of this study, the Wang-Jahan Index for CAL is employed. The index is derived by using a binary coding of 0 for restricted and 1 for fully open. This criterion is applied in all 12 sub-components of the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) database. The index is thus an aggregate index of various components of capital account liberalization which include equity liberalization, bond liberalization, money market liberalization, derivative liberalization and direct investment to name a few. It is constructed for 164 countries over the period 1996 to 2013. The advantage of this measure is that it builds upon the Chinn-Ito index by increasing the coverage for developing countries. Currently the Chinn-Ito index is limited in its coverage for developing country. Another major improvement on the Chinn-Ito index is that the Wang-Jahan index disaggregates CAL based on various types of capital flows and also based on the direction of capital flows (inflows versus outflows) in this regard, the index allows for more in-depth analysis into the workings of CAL. Employing this measure will help provide a clearer picture of the effects of CAL on capital inflows to SSA. This is because composite measures may capture many different aspects of liberalization of capital flows which do not have a direct bearing on certain capital inflows. The Wang-Jahan index also captures the intensity of capital restrictions which is vital for the analysis of effects of CAL. Furthermore, the measure builds up on other indices such as the Schindler (2009) index which only disaggregates some of the sub-components of the AREAER database. The index also provides more variation over the years compared to the Chinn-Ito which has very little variability in its values. Hence, the Wang-Jahan index captures gradual adjustment in the capital account.

Other Explanatory Variables (X):

Infrastructure Quality:

Well-developed infrastructure helps to attract capital inflows into the country. Hence a positive relationship is expected between infrastructure quality and FDI. Gammoundi and Cherif (2014) used telephone subscriptions per 1000 people to estimate infrastructure quality.

Recognizing the importance of other infrastructure aspects, this study employs a composite index which includes telecommunications, electricity, and sanitation. Composite measures of infrastructure quality are seen to reduce measurement errors associated with using only one index (Chakamera & Alagidede, 2017). Following Calderon (2009), to derive the infrastructure quality index, the study employs principal components analysis (PCA) to obtain weights which are then multiplied to the respective indicators. Principal components Analysis involves deriving a linear combination of variables that are weighted. The weights are the eigenvectors derived from the principal components analysis and the variables are in logs. The advantage of using PCA is that it reduces noise in data by selecting maximum variations and leaving out minor variations as well as allowing for data variation with only the most relevant information retained (Chakamera & Alagidede, 2017). By doing so PCA will help identify the principal components which provide a greater explanation of infrastructure. The infrastructure quality index is calculated as follows:

$$IQ = 0.4661 * \ln ele + 0.42745 \ln mobil + 0.5524 \ln tele + 0.5429 \ln sani$$

ele is access to electricity as a percentage of the rural population, *mobil* is mobile cellular subscriptions per 100 people, *tele* is fixed telephone subscriptions per 100 people and *sani* is improved sanitation facilities as a percentage of the population with access. Data on these is available on the World Development Indicators.

Real exchange rates:

Investors often take into account the movement in exchange rates when making investment decisions. Lily *et al* (2014) argued that the effects of an appreciation in exchange rates on the FDI inflows can be in two directions depending on the objective of the FDI. The relationship between exchange rates and FDI inflows is positive if FDI is aimed at benefitting domestic markets, but the relationship becomes negative if the objective of FDI is for re-exports or cost reduction. Hence the sign for this variable could be either positive or negative.

Trade Openness:

Countries that are sufficiently open to trade flows are believed to attract more FDI. This is because many investors view countries with trade restrictions as potentially risky (Chea, 2011). Fernandez & Arias (1996) also emphasized that trade liberalization was vital in attracting FDI because it involves removing economic distortions in the form of trade regulation which would hinder inflows of capital. Hence, the more open a country is, the more capital inflows it is expected to earn and thus trade openness is expected to positively influence FDI. The measure for trade openness is given as exports and imports as a share of GDP.

Inflation:

This variable is included to proxy macroeconomic stability. In essence, inflation is an indicator of the quality of monetary policy and investors are more likely to be drawn to countries with stable macroeconomic environments. In Fernandez and Arias (1996), inflation is included as one of the domestic factors which determine the inflows of capital into a country. Countries with high inflation are expected to be less attractive FDI destinations and hence a negative effect of inflation on FDI is expected.

***Real interest rates*:**

Lower interest rates reflect a lower cost of borrowing money and can thus lead to an increase in capital flows. In this regards, an inverse relationship with FDI inflows is thus expected.

GDP per capita and ***external debt as a share of GNI*** will be included in the extended model in the robustness checks. These are included based on the stipulations by Fernandez-Arias and Montiel (1996) that domestic economic factors (*GDP*) and country creditworthiness (*debt*) are other determinants of FDI. Increased GDP brings about increased investment opportunities and is hence expected to positively influence capital inflows. On the other hand external debt is an indicator of poor macroeconomic policies particularly fiscal policies and is expected to reduce FDI.

Threshold variables

For the threshold variables, institutional quality is measured as a composite of the six World Governance Indicators (WGI). These are Voice and Accountability, Government Effectiveness, Regulatory Quality, Political Stability and Absence of Violence, Rule of Law, Control of Corruption. For financial sector development, the study employs net credit to the private sector as a share of GDP growth.

Descriptive Statistics

Table 3.3 below outlines the descriptive statistics of the data. The sample indicates that financial sector development ranges between 2.01 and 60. This shows that the sample is diverse in terms of levels of financial sector development. This diversity gives an incentive to examine, whether indeed threshold effects are present and significant and whether countries with more developed financial sectors attract more capital inflows. Maximum institutional quality is 0.867 while the minimum is -1.665. Again there is evidence of variability in SSA institutional quality. It is important to note that only a few countries like South Africa and Botswana and Mauritius have positive levels of institutional quality. Most SSA countries have very low negative values for institutional quality. The measure for CAL ranges between 0 and 1 standing for countries that are fully restricted and those that are fully liberalized respectively.

Table 3.3: Descriptive statistics

Variable	**Mean**	**Std. Dev**	**Min**	**Max**
Foreign Direct Investment	4.411	6.91	-5.977	54
CAL	0.564	0.339	0	1
Institutional Quality	-0.331	0.64	-1.665	0.867
Financial Sector Development	28.41	35.47	2.01	160

Source: Stata output

3.5 Results and discussions

3.5.1 Preliminary analysis of the effects of CAL on FDI using Fixed Effects

Findings from the fixed effects regression analysis are presented first in Table 3.4. The study starts by examining, the effects of overall capital account liberalization on FDI.

From this, it is found that CAL has insignificant effects on FDI. This finding echoes that of Henry (2006), who found that CAL has insignificant effects on investment for developing countries. However, after employing the disaggregated measure for FDI liberalization, it is observed that FDI liberalization has a positive effect on FDI inflows. This makes intuitive sense and implies that specific capital inflows are responsive to deliberate government policy to liberalize them. This result contradicts findings by Ayinde & Bankole (2015) for Nigeria where it was shown that capital account liberalization does not drive FDI in Nigeria.

Their finding could simply be due to the fact that they employ the Chinn-Ito index which does not disaggregate liberalization based on asset type. In other words, CAL as a policy is broad, hence we are more likely to observe significant effects on capital flows by looking at effects of specific asset liberalization. Trends in other countries in SSA have been varied.

For instance, it was observed that South Africa experienced a surge in capital inflows after being reintegrated into the international capital markets after the collapse of apartheid and the 1994 elections (Cross, 2003). Further to this, a report by the IMF (2008) showed that, after CAL, capital inflows to Nigeria increased. In Tanzania FDI inflows increased from 1 % to 2% of total GDP between 1995 and 1997 after liberalizing FDI. Hence, it is evident that opening up of capital flows can lead to an increase in the inflows. For Uganda however, since initiating liberalization in 1997, capital flows only picked up in 2004.

Table 3.4: Effects of capital account liberalization on FDI

FDI	**Overall Liberalization**	**Liberalization of FDI**
CAL	2.03 (3.22)	4.57 (1.85)**
Real Interest Rates	-0.08 (0.03)**	-0.073 (0.032)**
Real Exchange Rates	-0.002 (0.003)	-0.003 (0.003)
Inflation	-0.004 (0.002)**	-0.003 (0.002)*
Institutional Quality	0.114 (0.309)	0.27 (0.308)
Trade openness	0.156 (0.021)***	0.154 (0.02)***
Constant	-9.33 (2.71)***	-11.61 (2.58)***
Number of observations	234	234
Number of groups	13	13
Adjusted R^2	0.2	0.3
Overall F-statistic	F (6,215)=12	F (8,213)

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1

Looking at other independent variables in the regression as presented in Table 3.3, it is observed that an increase in real interest rates reduces FDI. This is in line with *a priori* expectations since, in standard macroeconomic theory, high-interest rates increase the cost of borrowing which can deter investment. Real exchange rates, on the other hand are, found to be insignificantly related to FDI. This corroborates the findings by Ogun, Egwaikhide and Ogunleye (2012) who showed that real exchange rates had insignificant effects on FDI in most countries and only had significant effects at a lag in a few countries like Botswana and Nigeria. These effects were found to be larger in countries that had floating exchange rates vis-a-vis currency pegs.

Regarding trade openness, this is also seen to significantly increase FDI inflows into SSA. This is because many investors view countries with trade restrictions as potentially risky (Chea, 2011). Hence countries that are more open to trade are more likely to attract foreign investors. Studies have even gone to show that, in SSA, trade, and FDI should be regarded as complements rather than substitutes (Duval & Utoktham, 2014; Asiedu, 2002). This is because trade openness can be beneficial for multinational enterprises (MNE's). This is especially true where goods are produced domestically and sold in foreign markets (Martens, 2008). A report by Ernst and Young (2016) highlighted that China is the highest contributor of FDI in SSA and, not surprisingly, China happens to be Africa's largest trade partner thus confirming that FDI and trade are complements.

Turning to macroeconomic fundamentals, inflation is seen to reduce FDI and this is consistent with expectations. High inflation is more likely to portray poor macroeconomic conditions and make a country less attractive to potential investors. With regards to infrastructure quality, it is found that this has an insignificant influence on FDI in SSA. Amusa, Monkam, and Viegi (2016), in their study, found a negative significant effect of infrastructure on FDI when they used the number of telephone subscriptions as a proxy. In this case, the insignificant effect could simply mean, this proxy does not affect FDI much in SSA. Aspects of transport infrastructure are likely to be more relevant to FDI. In this regard, Seetanah and Khadaroo (2007) showed that the availability of transport infrastructure contributes to the attractiveness of SSA as an FDI destination.

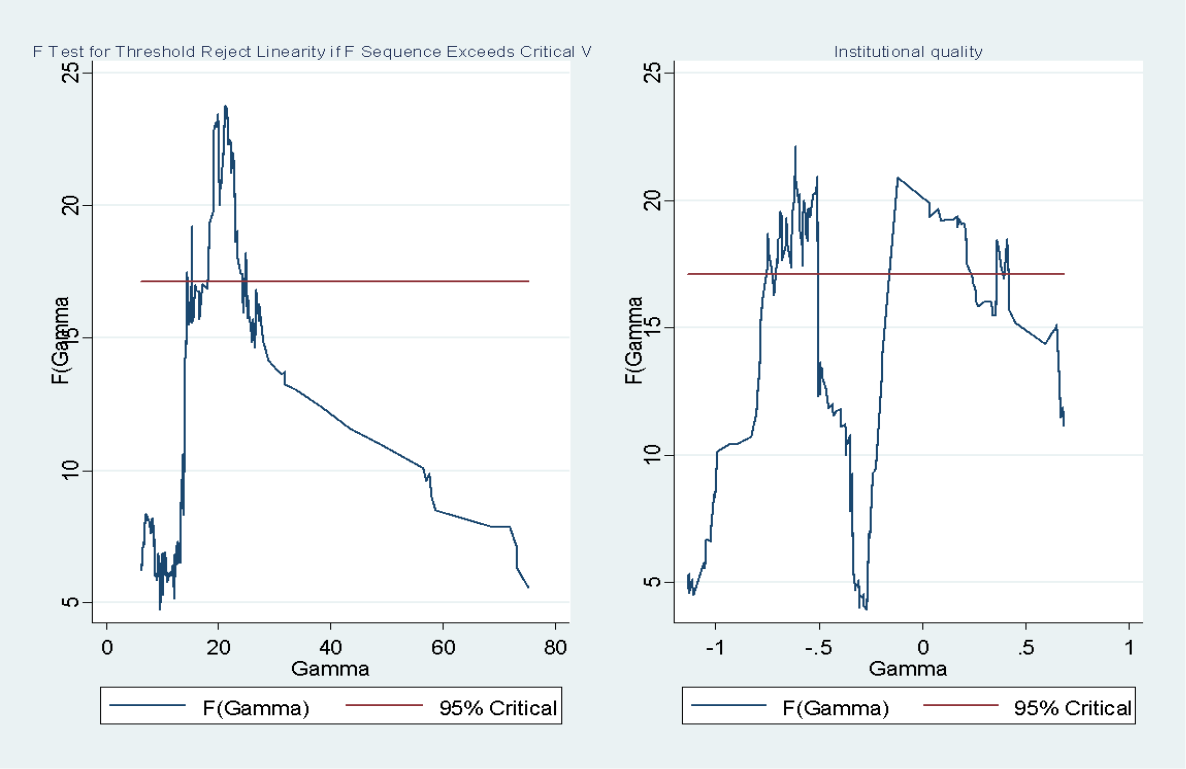
3.5.2 Examining the threshold effects in the relationship between CAL and FDI

Results of Hansen's Threshold Test

The analysis of thresholds kicks off by performing Hansen's (2000) test for threshold effects in order to examine if there are any threshold effects present. This is a Heteroscedasticity-consistent Lagrange-Multiplier (LM) test for thresholds. Findings of this are presented in figure 3.2. The null hypothesis for this test is that there are no threshold effects. Since thresholds are not identified under the null hypothesis, P-Values for this test are computed by bootstrap analogues which produce asymptotically correct P-values. Accepting the null hypothesis implies that there is a need to specify the model in linear form. The threshold tests are conducted for two potential threshold variables, namely financial sector development and institutional quality.

The bootstrap dependent variable follows the distribution $N(0, e_i^2)$ where e_i^2 is the OLS residual from the estimated threshold model. Examining the results of the test, the study fails to reject the null of no threshold effects. This implies that there are possible threshold effects in the CAL-Capital flow nexus for SSA. The graphical representations of the test for threshold effects are presented in Figure 3.2. The vertical line presents the critical value at the 95 percent significance level.

Figure 3.2: F-test for threshold linearity



Source: Stata output

Results of the threshold regression

The results from the sample splitting and threshold regression are presented in Table 3.4. Based on the findings of significant threshold effects, the study examines the effects of CAL on FDI using a non-linear threshold regression. Results of this are presented in Table 3.4. First of all, a single threshold model is estimated with institutional quality as a threshold variable. From this, the study obtains a threshold estimate of 0.2092 at a 95 percent confidence interval (0.1885, 0.2270). The study also obtains a large F statistic of F (8,213) =13.32 which further justifies the specification of a non-linear model with threshold effects.

The signs and significance for most of the coefficients are similar to those in the preceding analysis. That is, FDI liberalization is seen to increase inflows of FDI. The only difference, in this case, is that infrastructure quality is seen to have a positive significant effect on FDI compared to the preceding case where the effect was insignificant. Furthermore, when institutional quality is added as an extra independent variable and it is observed that it has a negative effect on foreign direct investment. This finding could be due to the fact that, most of the levels of institutional quality in sub-Saharan Africa are very low and in the negative values. Out of the sample of 13 countries, only 4 have positive levels of institutional quality. These are Seychelles, Botswana, Mauritius, and South Africa. Murinde (2009) pointed out that for institutional quality to have significant effects it has to achieve a certain threshold level for its impact to be felt.

The analysis of the threshold effects confirms that higher levels of institutional quality enhance the effect of CAL on FDI. That is, CAL leads to an increase in capital flows when institutions are well-developed. Hence, while institutional quality may not have a direct effect on FDI, it enhances the effect of CAL on FDI. In the two sub-samples, it is unearthed that the regime with institutional quality above the threshold experiences larger increases in FDI after CAL. Therefore, those countries in the low institutional quality regime are less likely to benefit from CAL. The importance of institutions to capital flows has been underscored by other researchers. For Nigeria, it was emphasized that despite receiving large FDI flows, poor institutions impeded Nigeria's FDI potential (Akpo & Hassan, 2015; Ayinde & Bankole, 2015). The importance of institutions was also observed in South Africa where they experienced massive capital outflows during apartheid (Cross, 2003). This was a period characterized by the poor application of the rule of law and political instability.

The study also examines the threshold effects of financial sector development. From this, a threshold estimate of 3.78 is obtained with a 95 percent confidence interval (3.36, 4.12). The finding shows a statistically significant F-statistic of F (8, 213) =12.55 which justifies the non-linear specification of the model. Examining the results of this regression shows us that, at low financial sector development regimes, financial sector development has an enhancing effect on CAL. The situation on the ground shows that countries like South Africa, Nigeria, and Kenya are among the highest earners of FDI in SSA (Loots & Kabudi, 2012; Ernst & Young, 2017; Murinde, 2009). These are countries who have relatively more developed financial sectors compared to other SSA countries.

However, in this case, unlike the case of institutions, only low levels of financial sector development have a meaningful effect on enhancing the CAL-FDI link. Hence, beyond a threshold, financial sector development ceases to play a significant role. Hence, it can be concluded that institutional quality is more vital if a country is to benefit from CAL than financial sector development because it has a significant effect at all levels of institutional quality. Table 3.5 outlines the various coefficients with standard errors in parenthesis.

Table 3.5: Threshold regression for FDI

	Institutional Quality Regression	**Financial Sector Development Regression**
FDI	**Coeff. (Std. Err)**	**Coeff. (Std. Err)**
CAL< threshold	3.19 (1.86)*	21.16 (4.69)***
CAL> threshold	13.87 (2.79)***	2.94 (1.87)
Real Interest Rate	-0.07 (0.03)**	-0.05 (0.032)
Real Exchange Rate	-0.003 (0.003)	-0.002 (-0.003)
Inflation	-0.0033 (0.002)**	-0.002 (0.002)
Infrastructure Quality	0.66 (0.33)**	0.311 (0.35)
Trade openness	0.184 (0.022)***	0.141 (0.02)***
Institutional Quality	-5.41 (2.51)**	0.05 (0.05)
Constant	-19.08 (3.12)***	-11.77 (2.6)***
Number of Observations	234	234
Number of Groups	13	13
Adjusted R^2	0.14	0.14
F-Statistic	F (8,213)=13.32	F (8,213)=12.55

Source: Stata output.
***P<0.01, ** P<0.05,* P<0.1

Effects of CAL on FDI using System-GMM

In the initial specification of the model, problems may arise in the sense that independent variables may be endogenous due to possible simultaneity. Hence to correct for any possible endogeneity and to verify the robustness of the System-GMM estimation techniques are employed. To do so, a dynamic panel model is specified since lagged values of FDI are likely to influence present FDI. That is, countries that have attracted large FDI in previous years are expected to continue attracting large amounts of FDI. The results of which are presented in Table 3.6. Following Sedik and Sun (2012), all right-hand variables are treated as endogenous.

Use of System-GMM also helps us to ascertain the short-term effects of CAL. This is because by including the lagged dependent variable, coefficients from GMM represent short-run effects (Sedik & Sun, 2015). These short-term effects of CAL are of particular interest given that, the neoclassical theory postulates that liberalization will lead to a temporary increase in investment. Hence Henry (2006) posited that previous studies which examined the effects of CAL on investment focused on long-run effects while theory only points to short-term effects. Looking at the results of the System-GMM estimators in Table 3.6, again it is observed that liberalization of foreign direct investment inflows has a positive and significant effect on foreign direct inflows in SSA. Trade openness maintains its positive influence on FDI inflows.

Regarding interest rates and inflation, they maintain the same signs as in the previous analysis. The only difference is that their effects are not significant. To examine whether the System-GMM specification is well specified, the Arellano-Bond tests for first and second order autocorrelation are examined as well as the Sargan test statistic for over-identification. The findings suggest the presence of first-order autocorrelation and reject the evidence of second-order autocorrelation. This justifies the inclusion of the lagged dependent variable as an extra regressor and verifies that the specification is appropriate. The analysis also provides a Sargan test statistic of P>Chi =0.075 which shows that the model is not weakened by many instruments and thus validates the specification.

Table 3.6: Results from System-GMM effect of CAL on FDI

FDI	**Coeff.**	**Std.Err.**
FDI_{t-1}	-0.539***	0.088
CAL	29.05***	8.17
Trade Openness	0.202**	0.083
Real Exchange Rate	-0.003	0.006
Real Interest Rate	-0.016	0.079
Infrastructure Quality	2.064***	0.774
Inflation	0.009	0.034
AR (1)	0.001	
AR (2)	0.951	
Sargan OIR	0.075	
DST for instruments		
GMM Instruments for levels:		
Excluding group	0.138	
Dif (null H=exogenous)	0.00	
Iv (eq (level)):		
Excluding group	0.002	
Dif (null H=exogenous)	0.46	
Instruments	55	
Observations	221	

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1. FDI_{t-1} is the lag of FDI. DST: Difference in Sargan Test for Exogeneity of Instruments. Dif: Difference. OIR: Over identifying restrictions test. AR (1) and AR (2) Test statistics for first and second-order autocorrelation.

Robustness Checks

To examine the robustness of the results, the fixed effects analysis is expanded to include additional regressors. Findings of this are presented in Appendix B. The additional regressors include external debt as a share of GDP and GDP per capita as extra regressors in the standard fixed effects model. These variables are included based on the stipulations by Fernandez-Arias and Montiel (1996) that domestic economic factors (*GDP*) and country creditworthiness (*debt*) are other determinants of FDI.

The results obtained from this are the same as in previous estimations. The inclusion of these additional regressors does not change the significance and signs of the variables. However, GDP per capita and external debt are found to be insignificant determinants of FDI.

An alternative specification of the model is estimated whereby the infrastructure quality index that was developed is replaced with a measure of transport infrastructure[11]. From this analysis, it is found that this measure of transport infrastructure does not have a significant influence on FDI just as the previous measure that was constructed. This seems to suggest that, regardless of the measure used, infrastructure development plays a positive, albeit, insignificant role in attracting FDI in SSA.

It is also examined whether portfolio equity liberalization leads to an increase in portfolio equity inflows using the fixed effects regression. Currently, portfolio inflows to SSA are very minimal. The few countries who receive large amounts of portfolio inflows are countries like South Africa and Kenya who have well developed financial sectors. From this analysis, it is observed that the major significant determinant of portfolio inflows into SSA is the level of financial sector development. This could be because countries whose financial sectors are more developed are believed to be more equipped to allocate capital efficiently in the economy and have adequate demand for portfolio assets. Murinde (2009) pointed out that, apart from South Africa who has a more developed financial sector, other countries with well-developed financial sectors like Kenya, Ghana, Nigeria, and Botswana have also managed to attract a few portfolio inflows. The other independent variables also do not have significant effects on portfolio flows. This could be because factors that affect FDI and portfolio inflows are likely to be different. Chea (2011) suggested that factors like trade openness which positively influence FDI to play a minimalistic role in attracting portfolio inflows. Portfolio equity liberalization, hence, does not meaningfully enhance, inflows of portfolio equity as these are largely determined by levels of financial sector development.

Lastly, the robustness of the fixed effects estimations are also examined using the Chinn-Ito index to measure CAL. When this index is employed, it is evident that liberalization has got a positive and significant effect on FDI. This finding corroborates the finding from the first part of the analysis.

[11]Transport services as a share of exports and imports are used with the data obtained from the World Development Indicators

With regards to the other variables, it is also found that the signs of the coefficients are the same as well as the level of significance of the variables[12]. This would seem to suggest that the use of either measure is appropriate in examining effects of CAL. However, this does not undermine the need to examine the effects of CAL using measures that are more direct as the findings have a more meaningful connotation. Furthermore, the Wang-Jahan index provides more knowledge on the effects of specific asset liberalization on the specific asset inflows and hence is more informative. Findings are presented in Appendix B.

3.6 Conclusions and policy recommendations

Whether or not capital account liberalization promotes capital flows has been an issue of great debate. This chapter sought to examine if CAL promotes capital flows into SSA. From the findings, it was observed that an increase in FDI inflow liberalization led to a rise in FDI in SSA. This is so regardless of whether fixed effects estimators or System-GMM are employed.

The study also sought to examine if there are any threshold effects in the relationship between CAL and capital flows. The study was able to obtain evidence of significant threshold effects. It was found that institutional quality helps to enhance the effects of CAL on the capital flows in SSA. That is, countries with sufficiently developed institutions are able to attain greater benefits of CAL on FDI inflows. This effect increases as the level of institutional quality increases. The study also unearthed that financial sector development helps to enhance the effects of CAL on capital flows. However, the effect of financial sector development was found to be meaningful only at low levels of financial sector development. Hence, unlike the case of institutions, financial sector development is only beneficial up to a certain point. Beyond a specific point, the influence of financial sector development ceases to be meaningful. In summary, the study has established the existence of significant thresholds which influence the CAL-capital flow nexus.

Based on the empirical findings of the study, it can be recommended that countries pursuing CAL improve their institutions in order to attain enhanced benefits from CAL. There is a need for improved governance and accountability, enhanced political stability and strengthened rule of law. SSA countries could also stand to benefit from an improved regulatory environment.

[12]The results are presented in the appendices

The study also observed that increased trade openness helps to attract FDI into SSA. Hence, if countries are to attract more capital inflows, there is need to ensure sufficiently open trade accounts.

There is also a need for SSA countries to pursue sound macroeconomic policies which foster inflation levels that are low enough to attract FDI. This is because high levels of inflation were found to deter FDI inflows to SSA.

CHAPTER FOUR

THE CAPITAL ACCOUNT LIBERALIZATION AND FINANCIAL SECTOR DEVELOPMENT NEXUS: EVIDENCE FROM SUB-SAHARAN AFRICA

4.1 Introduction

The collapse of the Bretton Woods system, in the 1970s, saw many countries move towards capital account liberalization (CAL). Starting with the United States of America, many developed countries began to remove restrictions on capital flows to allow free movement of capital and, thereafter, many developing countries began to follow suit. However, after the crises in Mexico, Russia, and South East Asia in the mid-1990s, there was a decline in the support for CAL (Licchetta, 2006). This is because most of these crises were viewed to be a result of rapid liberalization of capital accounts or coupling CAL with fixed exchange rate regimes. As such there was a switch in the IMF's stance to advocate for liberalization on condition that it is done in a well-sequenced manner and with the appropriate prerequisites in place. This further raised the debate on how CAL could influence financial sectors and gave rise to a slew of research which sought to assess the exact effect of CAL.

In Sub-Saharan Africa (SSA), CAL only gained prominence in the late 1980's under the auspices of the IMF/ World Bank recommended Structural Adjustment Programs (SAPs). These programs encouraged countries to pursue more market-oriented policies and move away from excessive government intervention. As such, many countries began to privatize state-owned enterprises and liberalize their financial and trade sectors. The liberalization of trade in goods and services was motivated by the belief that it improves efficiency in resource allocation. In the same vein, countries began to pursue free movement of assets based on the same arguments (Henry, 2006). However, liberalization of capital accounts in SSA has been done at a slower pace, unlike trade liberalization, due to perceived negative consequences of rapid liberalization of capital accounts.

To date, while Zambia, Seychelles, Botswana, Mauritius, and Uganda have fully liberalized capital accounts, countries like South Africa, Nigeria, and Tanzania have opted for a more gradualist approach. For most of these countries, CAL began with countries removing controls on capital inflows such as FDI while controls on capital outflows were maintained.

Between 1982 and 1992, South Africa lifted and reinstated certain restrictions on its capital flows (Bircaba, Brixiova & Ncube, 2015). Furthermore, Nigeria began to liberalize in 1980 reaching full liberalization of foreign exchange controls in 1998. However, after experiencing capital flight, the country moved back to somewhat tighter controls.

The major motivation for liberalization of capital accounts stems from the Efficient Allocation Hypothesis, under the neoclassical growth model which stipulates that CAL promotes efficiency in resource allocation and can foster increased economic growth and investment (Henry, 2006). Another benefit of CAL is that it can promote financial sector development. This can occur through the adoption of best practices of financial supervision which can improve corporate governance and foster enhanced risk diversification as a result of sharing risk with foreign markets (Garcia, 2012). To add on to this, the Interest Group Theory (IGT) posits that, an open capital account, coupled with an open trade account, promotes financial sector development by reducing the influence of domestic incumbent firms who lobby for financial repression (Rajan & Zingales, 2003). The proposed effects of CAL on financial sector development have catapulted research interest and this has been garnered by the fact that financial sector development promotes economic growth (Ndikumana, 2001; Kuada, 2016; Baltagi, Demetriades & Law, 2007; Klein & Olivei, 2001). Evidently, enhanced financial sector development is a potential channel through which CAL can promote economic growth.

Despite theoretical links between CAL and financial sector development, empirical research has done little to resolve the debate on the CAL-financial sector development nexus. Some studies that have been done have confirmed the positive link between CAL and financial sector development (Klein & Olivei, 1999; Chinn & Ito, 2002). However, this evidence is only robust for developed countries and evidence for developing countries remains scant. The little research done in SSA has provided mixed evidence (Mahawiya, 2015; David, Mlachila & Moheeput, 2014). The variation in findings on effects of CAL has led researchers to suggest that country-specific characteristics, like institutional quality, play a big role in determining whether CAL will have perceived benefits on a country (Kose *et al*, 2013; Trabelsi & Cherif, 2016; Chinn & Ito, 2007). Some researchers have gone further to suggest that only intermediate levels of institutional quality are vital for a country to receive benefits from CAL suggesting possible non-linear effects (Klein & Olivei, 2001).

If a good understanding of the effects of CAL on financial sector development, with ramifications for economic growth, is to be established, then issues of nonlinearity/asymmetries, the proper role of institutions and their spillover effects require rigorous examination.

This chapter, therefore, seeks to examine the effects of CAL on financial sector development in 22 SSA countries from 1996 to 2013[13]. The choice of countries sampled is largely based on the availability of data on all variables in the empirical model. The time frame for this study is based on the measure of CAL which ranges from 1996 to 2013. In addition to examining the effects of capital account liberalization on overall financial sector development, the study shall also look at its effects on financial market development as well as financial institution development. In the robustness checks, the study even goes further by examining the effects of CAL on financial sector efficiency. The rationale for this is based on the postulations of the Interest Group Theory that CAL will enhance competition which leads to enhanced financial sector efficiency. The index of financial sector development this study adopts, provides a measure of this, thus making this analysis possible.

This chapter departs from other studies by (i) examining non-linear effects of institutional quality by including quadratic terms in the analysis; (ii) investigating the CAL-FSD nexus using a broader index of FSD with many sub-indices which offer avenues for a multitude of analyses and (iii) employing a new index of capital account liberalization which disaggregates CAL based on asset type while capturing the intensity of capital controls. For this study, the System-GMM estimation technique is employed to control for any possible endogeneity.

The rest of the chapter is structured as follows. Section 4.2 provides a brief overview of financial sector development in SSA. A review of the literature is provided in Section 4.3. Sections 4.4 and 4.5 outline the methodology results of the chapter respectively.

4.2 Financial sector development in Sub-Saharan Africa

Financial sector development involves improving financial service provision and improving access and efficiency in financial systems. A well-developed financial sector is important for the economy in that it facilitates mobilization of savings which can promote economic growth.

[13] The list of countries sampled is included in the appendices.

It can also enhance the creation of products and services to facilitate payments and reduce volatility in an economy by providing instruments which smooth consumption and investment (Mlachila *et al*, 2016). Moreover, Kuada (2016) highlights that a properly developed financial system also reduces the cost of gathering and processing the information on investment opportunities and reduces problems of asymmetric information. With such benefits of a well-developed financial sector, it is worrisome to note that, currently, financial markets in SSA remain underdeveloped and characterized by a limited range of financial products, insufficient credit allocation and underdeveloped stock markets (David, Mlachila & Moheeput, 2014: Ndikumana, 2001).

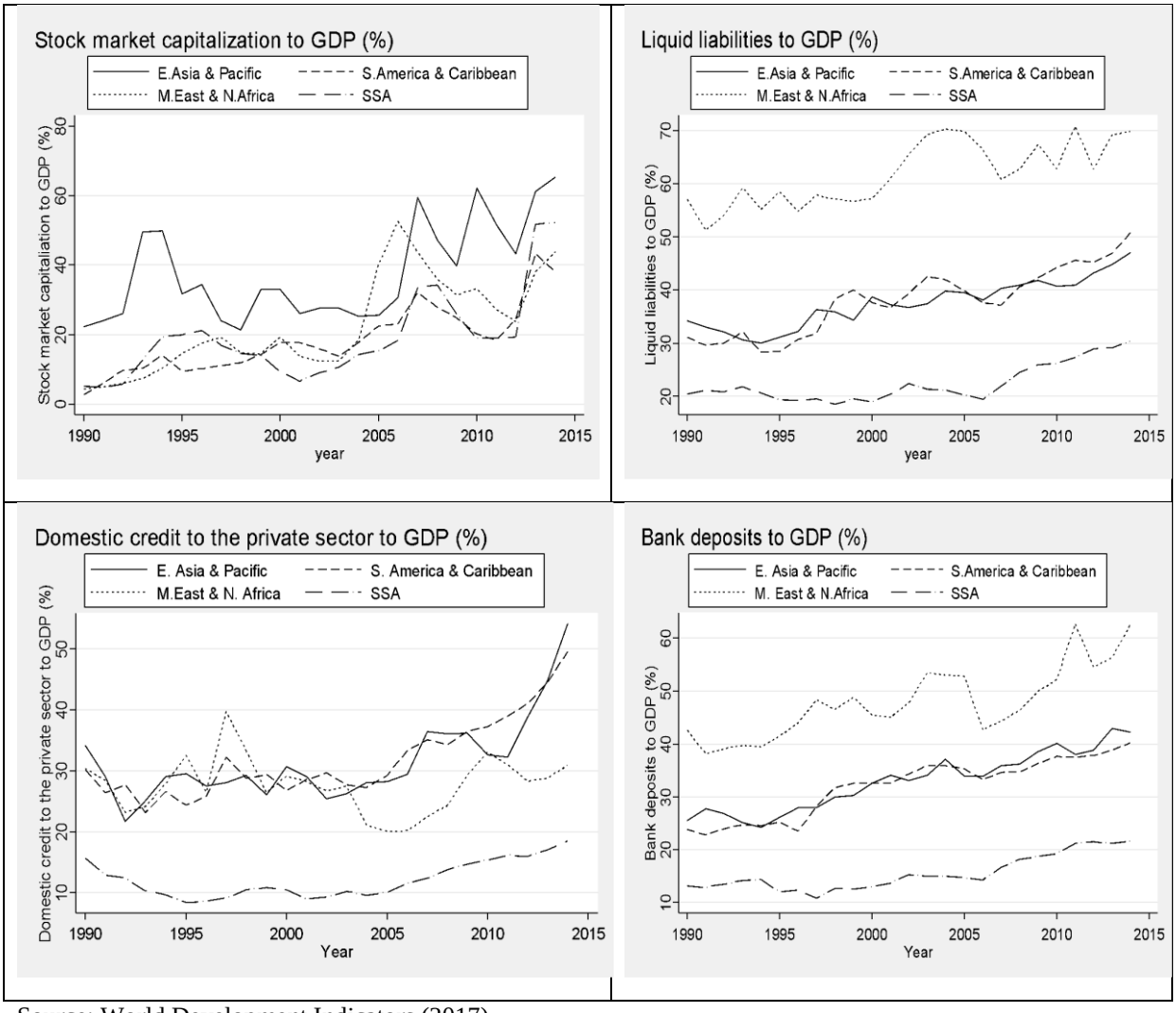
After experiencing a dismal economic performance, many SSA countries began to undertake reforms implemented under the IMF/World Bank Structural Adjustment Programs in the mid-1980s. This involved implementing several reforms aimed at reforming the financial sector of SSA. Reforms included: interest rate liberalization; elimination of limits on credit and preferential interest rates; and privatization of state-owned banks (Gakunu, 2007). As a result, many SSA countries experienced improved performance in their financial sectors (Otchere, Senbet & Simbanegavi, 2017). This was exhibited in the form of an increased number of banks and financial institutions and increased competition (Gakunu, 2007). There was also an increase in private sector credit to GDP from 10 percent in 1994 to 21 percent in 2014 and a rapid expansion in Pan African Banks which have filled gaps left by international banks (Mlachila *et al*, 2016). The region has also experienced a rapid increase in mobile payment systems such as M-Pesa, M-Shwari and Airtel money which has led to increased access to financial markets.

Despite this progress, SSA still lags behind in terms of financial sector development compared to other regions (Ibrahim & Alagidede, 2016; Otchere, Senbet & Simbanegavi, 2017). Firstly, the net credit to the private sector remains half the size of that in the Middle East, East Asia, Latin America and the Caribbean (Mlachila *et al*, 2016). Stock market capitalization only grew to $294 billion in 2004 from $143 billion in 1990 compared to East Asia where stock market capitalization grew from $87 billion in 1990 to $1 trillion by 2004 (Ajakaiye, 2005). On the other hand, the number of companies listed in stock markets actually declined from 1000 in 1994 to 900 in 2004 while those in East Asia grew from 774 to 3582 in the same period (Ajakaiye, 2005).

To add on to this, financial deepening remains low as the ratio of broad money to GDP for SSA is about 25 percent lower than the developing country average (Gakunu, 2007). Lastly, despite the rise in mobile payments systems, financial inclusion remains low with limited access to those in hard to reach areas (Mlachila *et al*, 2016)

Figure 4.1 highlights some of the major indicators of financial sector development including stock market capitalization, liquid liabilities to GDP and credit to the private sector. From the graph, it is evident that SSA is lagging behind compared to other parts of the world such as East Asia and the Middle East with regards to these financial sector indicators.

Figure 4.1: Financial Sector Development Indicators (1990-2015)

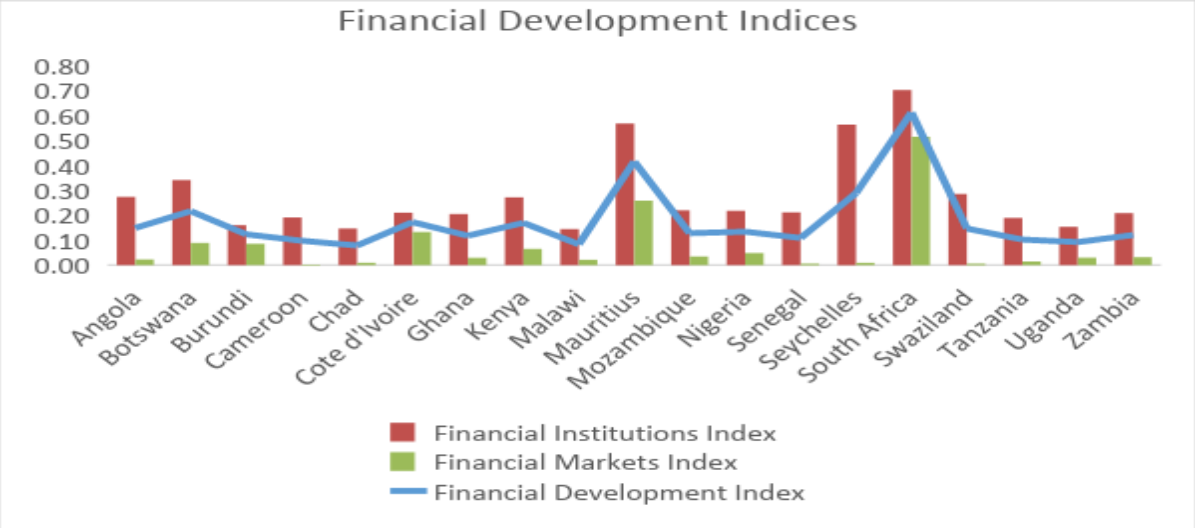


Source: World Development Indicators (2017)

Figure 4.2 shows the unevenness in the levels of financial sector development within SSA as shown by the Svirydzenka (2016) index of financial development. The Sviirydzenka (2016) index is an aggregate index calculated from 9 sub-indices which show how financial institutions and financial markets are developed in terms of depth, efficiency and access. It also captures the multifaceted and multidimensional nature of financial systems which includes the increasingly larger role played by non-bank financial institutions.

The stark contrast is seen with countries like South Africa, Mauritius and Seychelles having very high levels of financial development, while countries like Burundi and Chad are at the lower end of the spectrum. The graph also shows that, for countries like Seychelles, financial institutions are more developed relative to financial markets. This is a trend which can be seen in most of SSA.

Figure 4.2: Svirydzenka financial development index for 2016



Source: IMF (2017)

4.3. Literature review

4.3.1 Theoretical literature

With the increasing popularity of CAL, many theories have been posited to explain the link between CAL and financial sector development. The most direct method by which CAL fosters financial sector development is through increased market size and demand for financial services. This occurs due to the fact that CAL allows agents greater opportunities for borrowing and lending across countries and unearths new sources of finance.

In addition, capital account openness may raise liquidity and lower the cost of capital and this can enhance financial development (David, Mlachila & Moheeput, 2014).

CAL also fosters financial sector development by ensuring increased competition when foreign firms are allowed to operate in domestic markets (Ellyne & Chater, 2013). This is the basic premise of the Interest Group Theory developed by Rajan and Zingales (2003). The theory postulates that CAL results in an influx of foreign firms who reduce the influence of incumbent domestic firms termed 'interest groups'. In a closed economy, these interest groups, lobby for financial repression and block new entrants thus hindering financial development (Bircan, Hauner & Prati, 2012; Rajan & Zingales, 2013). By opening capital accounts, new foreign firms can encourage banks to push for improved disclosure standards and contract enforcement because they don't have domestic personal connections unlike domestic firms (Rajan & Zingales, 2013). Apart from this, Law (2009) also suggests that greater openness creates opportunities to realize new profits and this outweighs the negative effects of enhanced foreign competition.

The Interest Group Theory emphasizes that *both* the trade and capital accounts be liberalized for enhanced financial sector development. This is because opening up of the trade account, alone, leaves room for incumbents to petition the government to subsidize them even in the face of competition from foreign firms instead of them enhancing their operations (Rajan & Zingales, 2013). Opening the capital account thus reduces the government's part in channeling credit to domestic firms. Likewise, opening up capital accounts requires open trade accounts to increase product market competition and give firms an incentive to access finance. For this theory to hold there is a need for an influx of foreign firms otherwise the efficiency gains will not be realized. However, it is important to note that inflows of foreign firms are not automatic and are dependent on many factors including, the macroeconomic conditions in the country as well as the political and institutional framework in place. Furthermore, the postulations of this theory may be undermined where there is rampant government ownership of financial institutions. In this case there may be no incentive to enhance efficiency in operations even in the face of increasing foreign competition. This is because most government-owned enterprises are not really focused on profit maximization.

Apart from the Interest Group Theory, increased capital flows also help introduce international standards and encourage the development of new financial products (Klein & Olivei, 2005; Eichengreen, 2007). This is because foreign capital often comes packaged with technological and organizational know-how. Thus, increased foreign borrowing and lending contribute to the development of a country's financial system since countries basically import a financial system through capital flows (Klein & Olivei, 1999). Furthermore, CAL promotes financial sector development by reducing international transaction costs (Garcia, 2012).

It is important to note that, though CAL fosters financial sector development, countries with higher levels of financial sector development are in turn also believed to allocate capital more effectively and thus attract more capital inflows.

4.3.2 Empirical literature

Many studies have sought to explain the link between CAL and financial sector development. A majority of which have focused on developed countries. These studies often rely on variables like liquid liabilities and credit to the private sector to proxy the level of development of the financial sector while measures of CAL are based on the IMF Annual Report on Exchange Agreements and Exchange Restrictions (AREAER) (Klein & Olivei, 1999: Chinn & Ito, 2002; Law & Habibullah, 2009). Findings from these studies often point to a positive relationship between CAL and financial sector development which is robust only for developed countries while the little evidence from developing countries has been mixed.

In a study for developed and developing countries, Klein and Olivei (1999) examined the effects of CAL on the financial sector between 1986 and 1995. They used liquid liabilities and claims on the non-financial private sector to GDP to measure financial sector development. They found that there was a significant effect of CAL on financial sector development in developed countries and no significant effects in developing countries. To measure CAL, they employed a SHARE index which showed the number of years, during the time period, when the country had free movement of capital. It is important to note, however, that this measure does not capture the intensity of capital flow restrictions which can provide richer knowledge on effects of CAL. It merely captures liberalization as the period in which countries had open capital accounts leaving out aspects of the intensity of capital controls.

Using panel data from emerging and advanced countries, between 1996 and 2007, Chinn and Ito (2002) found that CAL, coupled with institutional and macroeconomic factors, accounts for a large proportion of financial sector development movements. They employed the Chinn-Ito index to measure CAL and credit to the private sector, liquid liabilities and a number of stock exchange indices to measure financial sector development. The study found that the link between CAL and financial development was more pronounced in countries with higher legal and institutional development.

In a study for 34 SSA countries, David, Mlachila, and Moheeput (2014) found evidence of no relationship between trade and CAL and financial sector development after controlling for factors like GDP per capita and inflation. They came up with a composite measure for financial sector development which included liquid liabilities and private sector credit. Like many aforementioned studies, this chapter also employs the Chinn-Ito index as a measure of CAL.

In another study for SSA, Mahawiya (2015) using data from 1980 to 2011, assessed whether simultaneously liberalizing the capital and trade accounts would foster financial sector development. The study employed a dynamic panel approach and found that simultaneous liberalization of capital accounts and trade openness resulted in the enhanced financial development for the SADC region. However, the study did not find a strong link for ECOWAS which is in line with findings by Mlachila, David and Moheeput (2014) who found no significant effect for SSA. Financial openness alone was seen to be detrimental to financial development in SADC.

Trabelsi and Cherif (2016) employed cross-sectional GMM for 90 countries between 1975 and 2009. Like most studies on CAL, this study used the Chinn-Ito index as an indicator for CAL. With regards to financial sector development, the study used a ratio of credit allocated to the private sector as well as broad money as a ratio of GDP. The study found that, in middle-income countries, financial integration doesn't promote the development of the financial sector. However, CAL was seen to promote financial sector development only if a set of prerequisites, such as a well-developed private sector and institutions, were already in place.

Baltagi, Demetriades, and Law (2007) examined the effects of CAL on the financial sector for 42 developing countries between 1980 and 2003.

Using GMM techniques their findings showed that, simultaneous liberalization of trade and capital accounts promoted financial sector development. The study also found that the effects of trade (capital account) openness where higher if the capital (trade) account was relatively less open. Trade openness was found to have larger effects on financial sector development.

Table 4.1 summarizes the findings from the major studies that have been discussed in this section.

Table 4.1: Summary of literature on the relationship between CAL and financial sector development

Author	Scope	Measures of CAL	Results
Chinn & Ito (2002)	Emerging and Advanced countries (1996-2007)	KAOPEN Index	CAL positively related to private credit and stock market value added
Klein & Olivei (1999)	Developed and developing countries	KALIB index	No effect of CAL on FSD in developing countries
David, Mlachila & Moheeput (2014)	SSA (1970-2009)	KAOPEN index	No link between openness and FSD
Mahawiya (2015)	SADC and ECOWAS (1980-2011)	KAOPEN Index	CAL detrimental to FSD in SADC, no effect in ECOWAS
Trabelsi & Cherif (2010)	High and Middle-income countries (1975-2009)	KAOPEN index	No effect on middle-income countries

Source: Author's survey

There are a few major limitations that can be highlighted in previous studies. One concern is that some studies like Chinn and Ito (2002) and Klein and Olivei (1999) combine developing and developed countries and do not consider the timing factor given that developed countries began to liberalize much earlier than developing countries. As such, Henry (2006) emphasized the need for separate research for developed and developing countries. This can help offer more significant findings. On the same note, since developing countries are expected to experience a capital inflow whilst developed countries are expected to experience outflows, including both regions in a study can have opposing effects which may cancel out and provide insignificant findings.

Another common limitation exhibited in the literature is that most studies rely on a singular measure of financial sector development ignoring the multifaceted nature of financial systems. This chapter employs a new measure which captures all elements of financial sector development including institutions and markets and captures their efficiency, access, and depth.

Lastly, Klein and Olivei (2001) hinted towards possible non-linear effects of institutional quality which can have implications for the effects of CAL. They suggested that only intermediate levels of institutions are beneficial in enhancing the CAL-financial sector development nexus. This can be examined either by sample splitting techniques or including polynomials in the regression. This study adopts the latter approach and thus departs from other studies by Mahawiya (2015) and David, Mlachila, and Moheeput (2014) who have not examined this conjecture.

4.4 Methodology

4.4.1 Theoretical framework

The seminal works of McKinnon (1973) and Shaw (1973) posit a positive connection between financial sector development and interest rates and GDP. Complementarities between money and capital are reasons for the positive relationship between financial sector development and output while increases in interest rates increase financial sector development through increased savings (Law & Habibullah, 2009). With regards to CAL, the Interest Group Theory emphasizes that opening up of capital and trade accounts promote financial sector development by reducing the influence of interest groups (Rajan & Zingales, 2003). Thus, there is a positive expected link between financial sector development and capital account liberalization. This chapter, therefore, incorporates variables for capital account liberalization and trade openness as well as an interactive term of the two variables into the basic model for financial sector development as done by Bircan, Hauner, and Prati (2012). It has also been posited that countries with higher threshold levels of institutional quality are better able to reap the benefits of CAL (Kose *et al*, 2011). Thus, the model also includes interactive terms for capital account liberalization and institutional quality and its squared value to capture this. The general model is expressed as follows:

$$FSD = f(rir, gdp, cal, tal, cal*tal, X) \quad (4.1)$$

FSD is financial sector development; *rir* and *gdp* are the real interest rates and real gdp per capita as suggested by the Mackinnon Shaw seminal works. In accordance with the interest group theory, *cal* and *tal* are capital account and trade openness respectively and *cal*tal* is an interactive term for trade and capital account openness which tests the Rajan-Zingales IGT. *X* is a vector of other explanatory variables which have been deemed to influence financial sector development. These include institutional quality and inflation.

4.4.2 Empirical model specification

Along the lines of Law and Habibullah (2009); Mahawiya (2015), the analysis begins with the specification of a static level-log panel model in the form:

$$findex_{it} = \alpha_i + \beta_1 kal_{it} + \beta_2 ltal_{it} + \beta_3 lktal_{it} + \beta_4 lrgdpk_{it} + \beta_5 kins_{it} + \beta_6 kins_{it}^2 + \beta_7 rir_{it} + \beta_8 l\inf l_{it} + \beta_9 lfdi_{it} + \varepsilon_{it} \quad (4.2)$$

The subscripts "*i*" and "*t*" denote country and time respectively and *i*=1, 2…N and *t*=1, 2…T.

ε_{it} is a white noise error term where: $E(\varepsilon_{it})=0$, $E(\varepsilon_{it}\varepsilon_{js})=\delta_{\varepsilon}^{2}$ if *j*=*i* and *s*=*t* and zero otherwise. *findex* is the measure of financial sector development; *kal* is capital account liberalization; *ltal* is the log of trade openness; *lktal* is the log of the interactive term between capital account liberalization and trade openness; *lrgdpk* is the log of real GDP per capita; *rir* is real interest rate; *linfl* is the log of inflation; *kins* and *kins2* stand for the interactive term between CAL and institutional quality and its quadratic form respectively; and *lfdi* is the log foreign direct investment.

Taking into consideration that the data is dynamic, the study employs a dynamic model which is expressed below. This includes a lagged dependent variable to help capture the past history of the dependent variable as well as possible omitted variables (Mahawiya, 2015).

$$findex_{it} = \alpha_i + \beta_0 findex_{it-1} + \beta_1 kal_{it} + \beta_2 ltal_{it} + \beta_3 lktal_{it} + \beta_4 lrgdpk_{it} + \beta_5 kins_{it} + \beta_6 kins_{it}^2 + \beta_7 rir_{it} + \beta_8 l\inf l_{it} + \beta_9 lfdi_{it} + \varepsilon_{it} \quad (4.3)$$

4.4.3 Estimation methods

In standard panel data analysis, the basic estimation methods include fixed effects and random effects. These are able to capture heterogeneity that is prevalent in panel data.

However, in cases where T is small and N is large such estimators are prone to Nickell Bias (Baum, 2013). In this regard, a solution involves taking the first difference. This can be shown in the equation below:

$$\Delta findex_{it} = \alpha_i + \beta_0 \Delta findex_{it-1} + \beta_1 \Delta kal_{it} + \beta_2 \Delta ltal_{it} + \beta_3 \Delta lktal_{it} + \beta_4 \Delta lrgdpk_{it} + \beta_5 \Delta kins_{it} + \beta_6 \Delta kins_{it}^2 + \beta_7 \Delta rir_{it} + \beta_8 \Delta l\inf l_{it} + \beta_9 \Delta lfdi_{it} + \varepsilon_{it} \quad (4.4)$$

This creates a problem of its own since it results in a correlation between lagged dependent variables and disturbances.

To solve for this endogeneity, several techniques are suggested which include instrumental variables and generalized method of moments. In this study, System-GMM are employed because their coefficients capture short-run effects which are of particular importance in CAL literature. Furthermore, Law and Habibullah (2009) also suggested using GMM to study financial sector development because they posited that financial sector development is persistent. Indeed we find that financial sector development is persistent as shown by the large correlation with its lagged value of 0.98. This is above the threshold of 0.8. The System-GMM estimator works well in cases where N is large and T is small, right-hand variables are not strictly exogenous and there is heteroscedasticity and autocorrelation between individual units but not across (Baum, 2013). GMM estimators are also consistent, asymptotically normal and efficient out of all estimators that only employ information in the moment's condition. The study employs System-GMM in lieu of Difference-GMM because with Difference-GMM, lagged variables are poor instruments for first difference variables. Furthermore, the Difference-GMM magnifies gaps in unbalanced panels. Hence, Arellano and Bover (1995) suggested using the System-GMM estimator which provides more efficient results[14]. This basically includes both levels and differenced terms and provides more efficient estimates. The one-step estimator is employed because Hwang and Sun (2015) argued that efficiency gains of the two-step estimator may not be materialized in finite samples and that researchers should employ the two-step estimator only if the benefits outweigh the costs.

In order to verify if the model is well specified, findings from the Sargan test for overidentifying restrictions will be examined as well as the Arellano-Bond Test for first and second-order autocorrelation.

[14]This is implemented using the xtabond2 command in STATA13

4.4.4 Data

To study the effects of CAL on financial sector development the study uses panel data from a sample of 22 Sub-Saharan Africa countries from 1996 to 2013[15]. The choice of the period is largely based on data availability since the capital account index goes up to 2013. The selection of the 22 countries is determined by the availability of data for all variables in the model.

Measures of financial sector development

The measure used to capture financial sector development is the Financial Development Index developed by Svirydzenka (2016). This measure covers 183 countries for the time period between 1980 and 2013. The aggregate index is created from 9 sub-indices which show how financial institutions and financial markets are developed in terms of depth, access and efficiency. This measure overcomes the shortfalls of using a single indicator. The methodology involved in calculating the index involved, (i) normalization of variables (ii) aggregation of normalized variables into sub-indices (iii) aggregation of sub-indices into a final index. For this measure, data from World Bank FinStats, IMF Financial Access Survey and BIS Debt Securities Database were employed. In essence the index is an aggregation of 20 commonly used indices including private sector credit to GDP, bank branches per 100,000 people, stock market capitalization to GDP, and the stock market turnover ratio to mention a few. This measure is available on the IMF database. This study, hence, departs from other studies that rely on using the ratio of private credit to GDP or liquid liabilities to proxy for financial sector development.

The advantage of this measure is that it captures how financial sectors have evolved with larger roles being played by non-bank financial institutions given that modern financial systems are now multi-faceted. This measure also captures the fact that financial markets have developed in ways which allow individuals and firms to diversify savings and it also captures access and efficiency of markets and institutions (Svirydzenka, 2016). The index combines measures of financial institutions such as banks and those of financial markets like stock markets. This highlights the fact that financial services are provided by varied institutions (Mlachila *et al*, 2016).

[15]The list of these countries is included in the appendixes.

Measures of capital account liberalization

One contentious issue with studies on CAL has to do with finding an appropriate measure. CAL can be measured using *de facto* measures such as the net capital flows as a share of GDP. However, these measures do not capture the policy aspirations of the government. As such most studies prefer to employ *de jure* measures. Most *de jure* measures of CAL are derived from IMF data published in the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

The Wang-Jahan Index (2016) shall be employed as a measure of capital account liberalization. This index builds on Schindler's index (2009), which disaggregates all the 12 sub-categories in the AREAER, by expanding the sample and time span. It also captures the broad country coverage of the commonly used Chinn-Ito Index. Another advantage of this measure is that it disaggregates CAL based on asset types as well as residency. This index is developed by using the coding of 0 to reflect closed capital accounts and 1 to reflect fully liberalized capital accounts for each of the 12 categories of the capital account restrictions.

By using this measure, the analysis used in this chapter departs from other studies in SSA that have relied on the Chinn-Ito Index (Mahayiwa, 2015; David, Mlachila & Moheeput, 2015). The Chinn-Ito index is developed from four dummy variables which reflect codes of international capital flow restrictions. It is comprised of four binary series which measure: the presence of multiple exchange rates; controls on current and capital accounts; and requirements on surrendering proceeds from exports. While the Chinn-Ito index has its advantages, it does not disaggregate all 12 components of the AREAER and does not provide data on the restrictions on a specific type of capital flow. Furthermore, the Chinn-Ito provides very little variability in CAL over the period. Hence the gradual nature in which CAL occurs and intensity of restrictions on capital flows may not be fully captured.

Other independent variables

CPI inflation (*infl*) is used to proxy macroeconomic stability which can influence financial sector development (Kose *et al*, 2011). High inflation is viewed as having a negative impact on banking sectors and financial market development and it disturbs the capability of financial institutions to effectively allocate and distribute financial resources. Hence, inflation is expected to be negatively related to financial sector development (Ayadi *et al*, 2013).

Trade openness (*tal*) is given as exports plus imports over GDP. Higher levels of trade may be associated with higher financial sector development (Trabesli & Cherif, 2016). This variable is therefore anticipated to be positively related to financial development. The interactive term *ktal* is included based on the interest group theory which posits that simultaneous liberalization of trade and capital flows will promote financial sector development (Mahawiya, 2015).

To capture the effects of institutional quality, an interactive term for CAL and institutional quality (*kins*) is included. The importance of institutions has been a recurring issue in most studies on CAL. It has been suggested that the benefits of CAL are better realized in countries with higher levels of institutional quality. Ayadi *et al* (2013) suggested that legal institutions and democratic governance are vital in fostering financial sector development. These are thus expected to positively affect financial development. Furthermore, David, Mlachila, and Moheeput (2014) suggest that poor governance and political instability are some of the factors that explain differences in financial sector development in SSA. To add on to this, Kose *et al* (2011) found that countries with lower corruption and bureaucracy and higher corporate governance can enhance the indirect benefits of FDI. Kose *et al* (2011) thus use an average of the WGI to capture institutional quality. This approach is adopted in this study and a composite institutional quality index is developed which is the average of the six indicators in the World Governance Indicators (WGI) database. These include Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption.

The advantage of using this composite measure is that it is broad and captures a wide array of institutional quality indicators. A major departure from other studies involves the inclusion of an interactive term for CAL and the quadratic value of institutional quality ($kins^2$) to capture possible nonlinear relationships. This enables us to determine if, after a certain point, threshold variables are either more or less significant in enhancing the effect of CAL (Kose *et al*, 2011). Klein and Olivei (2001) suggested that only intermediate levels of institutional quality could have a positive influence on whether a country will benefit from CAL thus suggesting possible non-linear effects and a turning point. Hence, by adopting this approach, this study seeks to examine if it is only intermediate levels of institutional quality which boost financial sector development.

rgdpk is real GDP per capita and *rir* is the real interest rate and these are included based on the postulations of McKinnon (1978) and Shaw (1978).

These are expected to positively influence financial sector development. Real GDP per capita is also used to capture the level of economic development and institutional quality. Economic development is believed to enhance financial sector development via increased demand for financial products.

Foreign direct investment (*fdi*) is included in the regression based on the fact that capital account liberalization is supposed to increase capital flows and these are believed to promote financial sector development since foreign capital flows may come packaged with guidelines and standards which may foster financial sector development. The expected sign on this is positive. Table 4.2 summarizes the key variables used in this study.

Table 4.2: Summary of key variables used CAL and FSD

Variable	Frequency	Definition	Source
Findex	Annual	Financial development index	IMF
Kal	Annual	Capital Account Liberalization	IMF
Rgdpk	Annual	Real GDP per capita	World Bank
Rir	Annual	Real Interest Rate	World Bank
Infl	Annual	Inflation	World Bank
Tal	Annual	Trade Openness	World Bank
Fdi	Annual	Foreign Direct Investment	World Bank
Inst	Annual	Index of institutional quality	Authors calculation

Source: Authors Compilation. Note: findex: financial development index, kal: CAL, rgdpk: real GDP per capita, rir: real interest rate, infl: inflation, tal: trade openness, fdi: foreign direct investment, inst: institutional quality

Descriptive statistics and correlations

Table 4.3 summarizes the descriptive statistics for the variables used in this study. The *kal* index lies between 0 and 1 for countries that are very closed to those that are very open respectively. In the sample selected, the maximum GDP per capita observed over the period is US$24, 791 whilst the minimum GDP per capita is US$261. Maximum inflation observed in the sample in the time period is 340 percent whilst the minimum ever observed is 1 percent.

Table 4.3: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Financial sector development	396	0.14	0.11	0.01	0.64
CAL	396	0.45	0.34	0	1
Trade openness	396	81.9	49	25	321
Inflation	372	169	99	1	340
GDP per capita	378	4406	5066	261	24,791
Institutional Quality	396	-0.51	0.65	-2.22	0.86
Real Interest Rate	332	169	99	1	340

Source: Stata output

Table 4.4 shows the correlation matrix for the sample. A preliminary analysis shows that capital account liberalization is positively correlated with financial sector development. Inflation, real interest rates, and foreign direct investment show a negative relationship with the financial sector development index. There is need to have a comprehensive in-depth analysis, however, since these preliminary analyses may not give a full picture.

Table 4.4: Correlation matrix

	findex	***CAL***	***tal***	***infl***	***gdp***	***inst***	***rir***	***fdi***
Findex	1.0000							
CAL	0.1760	1.0000						
Tal	0.2382	0.1912	1.0000					
Infl	-0.0712	0.0309	0.1714	1.0000				
Gdp	0.6950	0.3364	0.4416	0.0438	1.0000			
Inst	0.6100	0.3483	0.1634	-0.1964	0.6273	1.0000		
Rir	-0.0905	0.0564	-0.2110	-0.3409	-0.2051	0.0421	1.0000	
Fdi	-0.0219	0.1542	0.3757	0.1037	-0.1011	-0.1018	-0.1441	1.000

Source: Stata output. Note: findex is financial sector development; tal is trade openness; infl is the inflation; gdp is GDP; inst is institutional quality; rir is real interest rates; fdi is foreign direct investment.

4.5 Results and discussions

4.5.1 Effects of CAL on financial sector development

The analysis starts off by estimating the relationship between CAL and financial sector development using System-GMM one-step estimators.

Table 4.5 presents results on the estimation of the System-GMM. The results show that CAL has a negative significant effect on financial sector development in SSA. That is, a percentage increase in capital account liberalization is seen to reduce financial sector development by 0.71 percent. There are several possible reasons why this could be the case.

Firstly, this could be a result of distortions/imperfections in financial markets in SSA which make it difficult for countries to obtain benefits from CAL. These distortions include things like interest and credit controls and barriers to entry (David, Mlachila & Moheeput, 2014). For a long period of time, countries like Malawi, Tanzania, Swaziland, and Zambia have had interest rate ceilings or banking fee limits determined by Government (SARB, 2014). These could prevent countries from realizing the benefits of CAL on the financial sector.

Secondly, the results could imply that CAL leads to an influx of volatile capital flows which are prone to reversals and can thus potentially destabilize financial sectors in SSA. In 2007, SSA had experienced a six-fold increase in capital flows from the year 2000. However, with the onset of the financial crises, capital flows to some countries declined. Countries like South Africa even experienced reversals in capital flows (Chea, 2011). Ndikumana (2003) further highlighted that, for Kenya, CAL increased susceptibility to, and offered legitimate channels for capital flight. Such phenomena can have detrimental effects on the financial sector especially if there are weak macroeconomic fundamentals and poor regulatory frameworks in place. In such cases, CAL could lead to excessive risk-taking and may make a nation more vulnerable to shocks and bubbles which all undermine financial sector development (David, Mlachila & Moheeput, 2014). In addition, Bicaba, Brixova, and Ncube (2011) highlighted that since most SSA is becoming more integrated, the frontier economies will likely become more vulnerable to global financial shocks. Therefore, while theory suggests that CAL can promote financial sector development, if not sequenced properly and with a lack of appropriate regulation in place CAL can have detrimental impacts on the financial sector.

Lastly, for most SSA countries, the financial sector has largely been made up of banks and most of these have been state-owned. For instance, Botswana, Malawi, Tanzania, Uganda, and Swaziland are some countries who had or have state-owned banks (SARB, 2014; ABC Capital Bank, 2017). The same can be said for Seychelles which has 6 banks, 4 of which are foreign owned and 2 are government owned (Temesgen & Alcinder, 2017).

Therefore, while the IGT suggests that CAL can reduce the opportunity for domestic firms to lobby the government for financially repressive policies, this channel of transmission is undermined when the government owns the financial institutions themselves or is a large shareholder. In this regard, the government-owned financial intermediaries have no incentive to enhance efficiency even in the face of increasing foreign competition because most state-owned enterprises are not profit oriented and are inefficient in their operations. For instance, in Nigeria, prior to reforms, the government had a predominant role in financial systems resulting in them being segmented and underdeveloped (Nathanael, 2014). However, in countries like Botswana, Jefferis and Tacheba (2010) highlighted that liberalization of exchange controls helped banks by permitting them to open foreign currency accounts and provide loans denominated in foreign currency. The removal of exchange controls in 1999 also allowed residents to open bank accounts outside the country leading to an increase in offshore assets and exposed local banks to more competition (Jefferis & Tacheba, 2010). Moreover, abolishing all controls on capital and current transactions led to an increase in bond listings which attracted participation by both residents and non-residents. Liberia, which has a history of having no capital controls, has a relatively higher private credit to GDP ratio higher than the ECOWAS average (IMF, 2016).

However, years of civil strife have negatively affected the economy and weakened the financial sector (Liberia State Department, 2017). Furthermore, IMF (2016) reported that foreign concession companies in Liberia rely on offshore foreign banks for main financial transactions while domestic banks are used for smaller transactions. This could mean that there is some capital flight that is occurring as a result of having fully liberalized capital accounts and this can undermine financial sector development.

Table 4.5: Summary of System-GMM empirical results

Variable	Financial Sector Development	Financial Institution Development	Financial Market Development
	Coeff. (Std Err)	**Coeff. (Std Err)**	**Coeff. (Std Err)**
findex_1	0.94 (0.72)	1.92 (0.49)***	1.01 (1.85)
CAL	-0.71 (0.24)**	-0.23 (0.22)	-1.06 (0.62)*
Trade Openness	-0.63 (0.16)***	-0.33(0.155)**	-0.04 (0.4)
*CAL*Trade Openness*	0.172(0.05)***	0.065 (0.047)	0.25 (0.137)*
Inflation	-0.065 (0.02)***	-0.06 (0.02)***	0.007(0.005)
GDP per capita	0.45 (0.09)*	0.27 (0.27)	-1.07(0.6)*
*CAL*Institutions*	-0.11 (0.08)*	-0.1 (0.08)	0.23 (0.18)
CAL Institutions*^{2}	-0.12().05)**	-0.12(0.05)***	0.09 (0.11)
Real Interest Rates	0.0005 (0.0001)**	0.0004 (0.0001)***	0.0004 (0.0003)
FDI	0.11 (0.02)***	0.097 (0.0212)***	0.23 (0.05)***
AR (1)	0.000	0.000	0.000
AR (2)	**0.631**	**0.999**	**0.091**
Sargan OIR	**0.664**	**0.466**	**0.146**
DST for instruments			
GMM Instruments for levels:			
Excluding group	**0.730**	**0.650**	**0.259**
Dif(null H=exogenous)	**0.233**	**0.70**	**0.060**
Iv (eq (level)):			
Excluding group	**0.790**	**0.510**	**0.138**
Dif(null H=exogenous)	**0.086**	**0.158**	**0.392**
Instruments	55	55	55
Countries	21	21	21
Observations	321	321	321

Note: ***p<0.01; **p<0.05; *p<0.1 .*findex*$_{t-1}$ is the lagged values of the respective financial sector development measures used. DST: Difference in Sargan Test for Exogeneity of Instruments. Dif: Difference. OIR: Over identifying restrictions test. AR (1) and AR (2) Test statistics for first and second-order autocorrelation. The significance of the bold terms reflects (a) Failure to reject the null of no autocorrelation b) validity of instruments in the Sargan OIR test.

4.5.2 Effects of trade openness on financial sector development

Findings from the study, presented in Table 4.5, suggest that trade openness has a negative significant effect on financial sector development. A percentage increase in trade openness reduces financial sector development by 0.63 percent[16]. The could be due to the fact that just opening up to trade alone leaves room for domestic incumbent firms to lobby governments to subsidize them and for them to lobby for financially repressive policies as suggested by the IGT (Rajan & Zingales, 2003). This makes intuitive sense because opening up the trade account while maintaining a closed capital account, gives domestic firms no incentive to improve their operations since they do not face competition from foreign firms. Another explanation for this finding is that the opening up of trade in SSA could worsen the current account deficits. This is because most SSA countries import more than they export and currently operate under current account deficits (Moussa, 2016). Opening up to trade could worsen this and if current account deficits become unsustainable it becomes difficult to obtain the necessary financing and can destabilize payment systems. Hence if a country is unable to sustain its deficit this can have detrimental impacts on the financial sector.

However, after observing the coefficient of the interactive term for capital account openness and trade openness the study finds a positive significant relationship between this variable and the financial sector development index. A percentage increase in the interactive term for CAL and trade openness increases financial sector development by 0.172 percentage points. This finding is in sync with the postulations of the Interest Group Theory which posits that individually, capital account liberalization and trade openness cannot promote financial sector development and that combined opening of capital and current accounts are what promotes financial sector development (Rajan & Zingales, 2003). This could imply that increased trade gives domestic financial firms the much-needed incentive to enhance their operations and source financing from abroad.

The implication of this is that, for SSA countries to benefit from CAL there is a need for sufficient levels of trade openness to foster financial sector development. Trade openness is vital for countries implementing CAL because more open economies are able to withstand the negative effects of sudden stops since they are able to meet external obligations since they obtain revenues in foreign currency from export earnings (Prasad & Rajan, 2008).

[16]These figures are rounded off from the tables

Hence, such economies are less likely to default compared to economies that are more closed to trade. Cooper (1998) also posited that liberalizing capital accounts with trade distortions can lead to misallocation of resources and the worsening of economic conditions. In this case, if capital flows to labor-intensive countries that protect capital-intensive industries this can lead to reduced GDP in the country which can have negative ramifications on financial sector development. Hence, this could explain why the interactive term for CAL and trade openness has a positive effect on financial sector development.

4.5.3 Effects of other control variables on financial sector development

As suggested by theory, inflation has a negative effect on financial sector development. A percentage increase in inflation reduces financial sector development by 0.064 percent. This is because when inflation is high financial institutions lend out lower amounts and end up allocating inefficiently since asset return volatility increases (Gries & Meierrieks, 2010).

In line with the postulations of Mckinnon (1973) and Shaw (1973), GDP per capita has a positive significant influence on financial sector development from the System-GMM results. This is so because GDP per capita is used to represent the level of development in the economy and hence increased GDP per capita leads to increased demand for financial products thus promoting financial sector development. Real interest rates are also positively linked with financial sector development as per the seminal works of McKinnon and Shaw (1973).

With regards to FDI, the study finds that a percentage increase in foreign direct investment leads to increased financial sector development by 0.1 percent.

This suggests that increased capital flows help introduce international standards and encourage the development of new financial products as highlighted by Klein and Olivei (2005) and Eichengreen (2007). This can foster enhanced financial development. The study also sought to establish whether or not institutional quality enhances the link between CAL and financial sector development.

From the findings in Table 4.5, it is evident that institutional quality does not mitigate the negative effect on capital account liberalization in the financial sector in SSA. It is observed that the coefficient for the interactive term between CAL and institutional quality still holds a negative sign. This could be due to the fact that overall levels of institutional quality in SSA are very low and hence institutional quality has a smaller impact on financial sector development in SSA (David, Mlachila & Moheeput, 2014).

Prasad and Rajan (2008) emphasized that when institutions are very low, foreign investors have very little influence to warrant improved governance. Only at minimum threshold levels of institutions can foreign firms advocate for better governance. In SSA, institutional quality is very low, in the sample, only four countries namely South Africa, Mauritius, Seychelles, and South Africa record positive levels of institutional quality. The other countries in SSA all have negative levels of institutional quality.

Furthermore, the lack of significant results could be due to the fact that there could be other forms of institutional quality which could be more beneficial for SSA such as company rights or bank supervision. Other studies which have been done like Gries and Meierrieks (2010) also found that some institutional quality variables like corruption and bureaucracy were found to not be strongly linked to financial sector development. It is also found that the interactive term for CAL and a squared value of institutional quality does not mitigate the effects of CAL on financial sector development and the study hence finds no evidence of threshold effects of institutions.

4.5.4 Effects of CAL on financial institutions development and financial market development

The study also examines the effects of capital account liberalization on the financial institution's development index and financial market development index that are calculated by Svirydzenka (2016). The findings of which are also presented in Table 4.5.

The results of the study show that CAL has a negative effect on financial institution development. However, this effect is not statistically significant from zero. This would imply that CAL does not have a significant influence on financial institutions. With regards to financial market development the study finds that CAL has a negative significant effect on financial market development. Hence, it can be concluded that between markets and institutions, CAL is most likely to have an impact on the markets aspect of the financial sector.

4.5.7 Robustness checks

Several robustness checks are performed to verify the robustness of the results. The findings are presented in Appendix C. The first check involves employing the Chinn-Ito index as a measure for capital account liberalization as an alternate measure of liberalization. When this index is employed, it is again observed that CAL alone is detrimental to financial sector development. Just like the previous analysis, it is also observed that trade openness combined with CAL has a positive significant effect on financial sector development.

The study also examines the effects of FDI liberalization on financial sector development. The Wang-Jahan index for CAL disaggregates liberalization based on asset type. Just like when the overall CAL index is used, FDI liberalization also has a negative effect on financial sector development. The study then analyzes the effects of CAL on financial efficiency which is a component of the Svirydzenka (2016) index. This relationship is examined because the Interest Group Theory posits that CAL will enhance financial sector efficiency. In this case, a positive effect is obtained which is consistent with assumption that CAL enhances financial sector efficiency. However, the effect is statistically insignificant. This would seem to suggest that, although CAL improves financial sector efficiency, its overall effects on financial sector development, such as financial depth, are negative and this could be due to the fact that the other components of financial sector development are negatively affected by CAL.

4. 6 Conclusions and policy recommendations

This chapter was aimed at examining the effects of capital account liberalization on financial sector development in Sub-Saharan Africa. The results of the study show that, if implemented in isolation, CAL can have a negative effect on the financial sector in SSA. Therefore, while theory suggests that CAL can promote financial sector development by increasing market size and demand for financial services, liberalization can also have negative effects on the financial sector. This could be due to the fact that there are credit controls in SSA markets which could make it difficult to realize the benefits of CAL. Furthermore, many banks in SSA have historically been state-owned and these may not enhance efficiency in their operations due to an influx of foreign banks. Hence, based on these findings, it would be advisable for countries to privatize as many banks as possible in order to ensure that efficiency gains from CAL can be obtained. Furthermore, there is a need to examine further the potential of capital flows to destabilize financial sectors in SSA.

The findings of the study also show that CAL, if coupled with substantial levels of trade openness positively affects the financial sector in SSA. This finding supports the Interest Group Theory which postulates that simultaneous liberalization of capital and trade accounts is beneficial for financial sectors. This underscores the need for countries pursuing CAL to be significantly open to trade. There is a need for SSA countries to remove barriers to trade as increased trade can provide incentives to seek foreign financing.

With regards to institutions, the study finds that institutions play a little role in mitigating the negative influence of CAL on the financial sectors. This could be because the overall levels of institutional quality are very low in SSA. For institutions to assert a positive effect on the CAL-financial sector development nexus there is a need for institutions to be adequately developed. Hence, SSA could benefit from fostering increased institutional development. There is a need for specific policies to be put in place which will foster enhanced governance, accountability, rule of law and so forth.

In summary, it can be concluded that CAL, if not implemented well, can have negative effects on the financial sector in SSA. It is imperative, therefore, for SSA governments to ensure that they are sufficiently open to trade before they liberalize their capital accounts. It can also be concluded, that, though important, institutions play a less significant role in maximizing benefits from CAL compared to levels of trade openness.

CHAPTER FIVE

CAPITAL ACCOUNT LIBERALIZATION, FINANCIAL CRISIS AND SAMPLE SELECTION BIAS IN SUB-SAHARAN AFRICA

5.1 Introduction

As part of a wide reform package that was the Structural Adjustment Programmes (SAPs), many countries in Sub-Saharan Africa (SSA) began to pursue policies that were more outward-oriented and emphasized the role of markets over government intervention in the mid-1980's. This culminated in many countries privatizing state-owned enterprises (SOE's), liberalizing financial sectors and liberalizing trade in goods and services. As part of these broad reform packages, countries in SSA also began to pursue capital account liberalization (CAL) in a bid to attract capital flows. The motivation to liberalize was often based on the premise that opening up capital accounts would boost investment and economic growth whilst promoting catch up with developed countries (Henry, 2006). Furthermore, most SSA countries are committed towards CAL in a bid to enhance financial integration. For instance, under the SADC Finance and Investment Protocol (FIP), SADC countries signed agreements to liberalize capital accounts by 2018 in preparation for a SADC monetary union (Smith *et al*, 2014).

While SSA countries only began to pursue CAL in the mid-1980's, their counterparts in developed countries began liberalizing capital accounts as early as the 1970's soon after the collapse of the Bretton-Woods System (Bordo, 1993). The trend began in the USA with many developed countries quickly following suit. However, the support for CAL waned after a wave of financial crises were experienced in the mid-1990's in Mexico (1994-1995) and Asia (1997-1998) (Glick *et al*, 2006). These crises were often attributed to premature or rapid capital account liberalization without appropriate regulatory measures in place thus prompting some countries to re-impose capital controls. The case against CAL was further reinforced by the fact that countries like China and India that were in close proximity to the Asian countries which suffered a crisis, were spared from contagion effects as a result of being more closed (Laurenceson & Tang, 2005; Stiglitz, 2000; Singh, 2003). The experiences in Asia and Latin America, thus, prompted the IMF to switch gears and advocate for gradual liberalization with emphasis on appropriate sequencing (Licchetta, 2006). However, under the New International Finance Architecture, there has been a resurgence in CAL as a policy and most countries in SSA are moving towards more open capital accounts.

Proponents of CAL often base their arguments on the efficiency hypothesis of the neoclassical theory. This stipulates that opening up of capital accounts improves resource allocation by allowing capital to move to capital-scarce regions from capital-abundant countries. By doing so it promotes investment and growth in developing countries (Henry, 2006). This is the same argument that is used in support of trade liberalization. What is often left out, however, is the stark contrast between the trade and financial sectors which may result in different effects. Notably, advocates for CAL overlook the fact that markets for financial services are often characterized by information asymmetries and its related problems which may lead to financial sector instability (Stiglitz, 2000). This is due to the fact that the financial sector is more prone to experiencing market failure which is exhibited in the forms of adverse selection and moral hazard (Laurenceson & Tang, 2005). As such, liberalization of the capital account may actually be detrimental if caution is not taken.

Despite the experiences in Asia and Latin America, whether or not CAL results in crisis remains debatable. Take, for instance, Malaysia who experienced currency crises *after* re-imposing capital controls and El Salvador who faced crises in 1986 and 1990 regardless of the fact that the country had put in place capital controls during that period (Glick *et al*, 2006). In some cases, it has been suggested that lifting capital controls can actually be beneficial in shielding countries from speculative attacks. It is further suggested that capital controls can actually have distortionary effects and can signal government policy ineffectiveness and induce capital flight (Glick *et al*, 2006). Consequently, the question still remains as to whether CAL can lead to a financial crisis.

There has been a surge in research that has sought to examine the relationship between CAL and financial crisis (Shen & Yang, 2015; Akram & Byrne, 2015; Hu *et al*, 2008). Findings, however, have been mixed and remain inconclusive and as such, there is room for more research. More importantly, evidence for SSA is non-existent despite the fact that most SSA countries are pushing towards liberalization and stand to lose the most if they were to experience a financial crisis. Experiencing financial crisis can spell doom for SSA because the region remains grossly underdeveloped with low GDP levels and high poverty levels. It was observed that, during the Asian financial crisis, there was a reduction in employment and wages and a rise in social disturbances and a negative effect on investment and long-term growth (Singh, 2003). Stiglitz (2000) further pointed out that experiencing financial crisis could potentially undermine the growth effects of CAL. Aizenman (2002) corroborated this, showing that currency crises can cost affected countries up to 18 percent of their GDP.

Furthermore, any financial instability would be detrimental for SSA which is characterized by financial sectors that are already underdeveloped relative to those in other parts of the world (Ibrahim & Alagidede, 2016; Otchere, Senbet & Simbanegavi, 2017). This is because, a financial crisis can reduce solvency of banks that have accumulated liabilities denominated in foreign currency from offshore funding and risky foreign investments when a currency crisis occurs (Eichengreen *et al*, 1999). It is imperative to examine these effects for SSA because CAL theory posits that different regions of the world are likely to face different effects of CAL. Hence it is flawed to draw implications from studies done in other parts of the world. Furthermore, during the global financial crisis in 2008-2009, it was observed that most SSA countries were spared from the contagion effects on their financial sectors. This phenomenon necessitates research specific to SSA which can help provide meaningful insight on the matter.

Drawing from the significance of the subject matter and the glaring gaps in research for SSA, this chapter seeks to examine whether or not CAL can lead to a financial/currency crisis in SSA for the period between 1996 and 2013. The sample period is selected based on the fact that most SSA countries implemented CAL reforms in the mid-1990s. To examine the relationship, an Exchange Market Pressure (EMP) index is developed for SSA to proxy financial crisis. By developing an EMP index for SSA, the study makes a methodological contribution to the field and unearths the link between CAL and crisis which has not been examined for SSA.

The study also examines the effect of specific asset liberalization on currency crisis. In particular, the chapter examines whether or not liberalization of FDI or that of portfolio equity flows will lead to a currency crisis. The aim of this is to assess whether different types of capital flows have different effects on currency crisis. This is of particular interest given that inflows of foreign direct investment are long-term and steady whereas portfolio equity flows are more volatile and unstable. By doing so, the study makes a contribution to knowledge by disaggregating liberalization based on asset types and this will provide more insight into the effects of CAL. The study adopts a two-pronged approach where both conventional regression techniques and propensity score matching techniques are employed to control for sample selection bias. For the regression analysis, the study employs Fixed Effects and Least Squares Dummy variables estimators. The study also presents findings from the System-GMM.

The rest of the chapter is structured as flows. Section 2 discusses the literature related to CAL and crisis. Section 3 outlines the methodology and data used in this chapter. Section 4 presents the results of the study for both the regression methods and the propensity score analysis. Section 5 concludes the chapter.

5.2. Literature review

5.2.1 Theoretical literature

A currency crisis can be defined as a condition whereby there is a rapid adjustment in the exchange rates (Sulimierska, 2008: Edwards, 1989). Several models have been developed which explain currency crisis. The first line of models is the *First Generation Models* which were put forward by Krugram (1979) and Salant and Henderson (1978). Here, currency crises are viewed to be a result of excessive monetary expansion to finance large fiscal deficits. This excess domestic credit creation leads to imbalances which can only be offset by exchange rate adjustments to counter changes in central bank reserves. As a result, central banks resort to running down reserves causing economic agents to initiate speculative attacks on the foreign exchange reserves leading to exchange rates collapse (Sulimierska, 2008). It is imperative to note that the predictions of this model were found to be inconsistent with the experience during the 1997 Asian crisis and this led to a weakening of support that fiscal imbalances are responsible for currency crises (Burnside *et al*, 2007). Furthermore, the model assumes that market agents are rational and thus able to launch speculative attacks based on observations of declining foreign exchange reserves. In reality, this may not always hold given that agents may not always form rational expectations and may lack perfect information on the status of government reserves.

The *Second Generation Models*, initiated by Obstfeld (1986), attribute currency crises to speculation which leads to herding behavior. In these models, agents' expectations of exchange rates policy may lead to multiple equilibria and self-fulfilling currency crisis (Sulimierska, 2008). Again, these models are limited in that they assume that agents are able to form rational expectations and have a perfect foresight which affects their actions and in turn affects economic behavior and lead to multiple equilibria. Furthermore, these models are limited in the sense that they assume that economic policies are not predetermined but are, rather, only implemented to react to economic fluctuations.

The *first and second generation models* are similar in that they apply in a fixed exchange rate scenario. Departing from this, the *Third Generation Models* hold for both fixed and flexible exchange rate regimes and are thus more applicable to many countries. In these models, currency crisis is seen to result from microeconomic factors rather than macroeconomic factors as in the aforementioned *first generation models*. To be specific, currency crises are seen to result from aspects of banking system fragility, asymmetric information, and firm balance sheets. In these models, the deterioration of a company's balance sheet may raise the probability of crisis (Sulimierska, 2008). Furthermore, information asymmetry may result in sub-optimal equilibrium being achieved and promote currency crisis. Apart from these 3 groups of models, it has also been suggested that structural weaknesses and inappropriate government intervention can also lead to a currency crisis (Ishii & Habermeier, 2002).

The experiences during the Asian and Latin American crises in the mid-1990s led to a shift in ideology and people began to attribute crises to the rapid liberalization of capital flows rather than macroeconomic fundamentals. This was because there was a wave of sudden stops in capital flows which were faced by emerging markets. These led to crises in Asia (1997-1998), Russia (1998) and Mexico (1994) (Sulimierska, 2008). In Calvo's (1998) *Sudden Stop Model*, the sudden stop phenomenon is one where countries that had previously been receiving large amounts of capital flows suddenly experience a reversal or stop in capital inflows. In this model, sudden-stops bring about currency crisis as a result of stickiness in wages and prices and their links to external financing premiums and via the Fisherian analysis of debt deflations that are brought about by collateral constraints (Sulimierska, 2008). According to Licchetta (2006), *sudden stops* can be detrimental in that they can expose countries to costly liquidity runs. Furthermore, *sudden stops* can reduce creditor confidence and increase demand for immediate loan repayment. This leads to increased interest rates and a scenario where only high-risk investors remain who are indistinguishable from low-risk investors due to information asymmetry. The information asymmetry in financial markets also makes investors prefer to offer short-term loans so that they can leave at any moment (Eichengreen, 2007). Stiglitz (2000), points out that the *sudden stop* phenomenon is exacerbated in cases where there is little economic diversification and poor stabilization. The effectiveness of the *Sudden Stop* model in predicting currency crisis is dependent on the types of capital flows a country receives. As such Fisher (1997) argued that capital movements were mostly appropriate and that currency crisis where rather rational responses to policy errors or foreign shocks.

However, if there is a large inflow of volatile portfolio flows, then the predictions of this model are valid. As such, CAL can be destabilizing if there is inadequate financial regulation of such volatile capital inflows.

5.2.2 Empirical literature

The most commonly used measure of financial crisis in many studies is the exchange market pressure index (EMP) and this captures currency crisis as excess pressure on exchange rates which a monetary authority can accommodate by either running down reserves or raising interest rates. Using this measure, in a study for China, Shen and Yang (2015) found that CAL is harmful to financial stability in the initial year but can actually facilitate financial stability in the long run. They employed a finite distributed lag model and measured CAL as the sum of capital inflows and outflows to GDP. It is important to note that the measure of CAL used in this study is a volume-based measure and thus is limited since it does not take into consideration policy aspirations of government nor does it give an indication of the intensity of capital controls. It also does not capture other dimensions of CAL such as the elimination of multiple exchange rates for instance. Lastly, using capital flows as a measure of CAL is flawed because they may be influenced by other policies, such as monetary and fiscal, and hence may not only reflect changes in capital account policies. Hence, the use of this measure may not give a full picture of the effects of CAL.

Departing from Shen and Young's single country analysis, Glick *et al*, (2006) employed panel matching and propensity score measures for developing countries during the period 1975 to 1997. They also rely on EMP to proxy crisis and find that, even when sample selection bias is controlled for, CAL results in a lower likelihood of currency crisis. For this study, they classified countries as either "liberalized" or "restricted" depending on whether those countries had capital account restrictions at the end of the year. Despite the merits of this study in correcting for sample selection bias, the measure used for CAL is limited in that, again, it does not show intensity to which capital account restrictions are applied and enforced. It merely captures the existence of or lack of capital flows. Furthermore, very few developing countries had liberalized capital accounts in the 1970's hence the sample period beginning from 1975 could be too far off.

In an approach similar to Glick *et al* (2006), Sulimierska (2008) adopted panel propensity score methods to analyze whether or not countries that were liberalized where more vulnerable to crisis.

This was done for a sample of 12 Central and Eastern European (CEE) countries from 1995 to 2005. The results showed a negative relationship between CAL and financial crisis. As in the aforementioned studies, they also use EMP to measure crises. The study diverts from previous studies in that it employed the Chinn-Ito Index and the Glick-Hutchinson Index to measure CAL and both these measures capture the intensity of capital restrictions. The study highlights how the CEE countries began to liberalize in 1989 (after the Berlin wall collapse). However, it is mentioned that the sample countries only faced a lot of speculative currency attacks in the time period sampled. As such, the authors could have provided a back-story of other factors that could have contributed to the rise in speculative attacks between 1995 and 2005 despite opening capital accounts from 1989. This could give a better justification for the time period sampled.

In a study of 19 post-communist countries, Hu *et al* (2008) find that countries with free capital flows have a lower probability of currency crisis. Their study included a sample of nineteen countries from CEE, Baltic States, Commonwealth of Independent States (CIS) countries and the Caucasus for the period between 1995 and 2013. They estimated a panel probit model to examine the effect of CAL. They emphasized the need for appropriate sequencing of CAL as well as proper macroeconomic and political fundamentals that can help prevent speculative attacks. This study, however, only stops at the estimation of probit equations and does not go further by using matching algorithms to establish, in detail, the effects of CAL on crisis as is done in Glick *et al* (2006) or Sulimierska (2008). Hence, the study feels incomplete in that sense and misses an opportunity for further analysis.

Departing from studies which used EMP to measure crises, Sedik and Sun (2012), used a bank capital adequacy ratio to measure financial stability. They conducted a study for 37 emerging market economies from 1995-2010 and estimated a dynamic panel model using Fixed Effects and System-GMM. The study found that liberalization is associated with lower bank capital adequacy ratios and this is indicative of possible threats to financial stability. This study, however, does not take into consideration issues of sample selection bias which seem to be pertinent in studies on CAL and currency crisis.

The review of the literature points to a gap in studies for SSA. Some studies like Glick *et al* (2006) included a handful of SSA countries in their sample, however, Henry (2006) emphasized the need for separate research for different parts of the world.

This is largely due to the fact that different regions of the world have pursued CAL at different times and, hence, lumping different regions together in one study may be misleading considering the time frames. Furthermore, there is a need to examine this relationship for many more countries in SSA in order to gain more insight. In addition, CAL theory points to different effects of CAL on developed and developing countries hence the need for a specific study on SSA. This study, therefore, seeks to examine the case of SSA specifically given the fact that the macroeconomic conditions that prevail in the area are different from those in other parts of the world. Table 5.1 summarizes the key literature relating CAL and financial crisis.

Table 5.1: Summary of the selected empirical literature

Author	Scope	Measure of crisis	Findings
Glick *et al* (2006)	Developing countries (1975-1997)	Exchange market pressure	CAL leads to a lower likelihood of a crisis
Sulimierska (2008)	12 Central & Eastern European countries (1995-2008)	Exchange market pressure	A negative relationship between CAL & currency crisis
Sedik & Sun (2012)	37 emerging market economies (1995-2010)	Bank capital adequacy ratio	CAL associated with a lower likelihood of a crisis
Shen & Yang (2015)	China (1983-2013)	Exchange market pressure	CAL leads to financial instability

Source: Author's survey

5.3 Methodology

5.3.1 Theoretical framework

The theoretical framework for the derivation of the exchange market index is derived from the Model for Exchange Market Pressure Index developed by Girton-Roper (1977) and its modification by Li (2012). The model starts with a basic monetary model as follows:

$$m_t^d = p_t + b_1 y_t - b_2 i_t + v_t \quad (5.1)$$

$$p_t = \alpha_0 + \alpha_1 p_t^* + \alpha_2 e_t \quad (5.2)$$

$$\Delta m_t^s = \Delta d_t + \Delta r_t \quad (5.3)$$

$$\Delta r_t = -\bar{p}_t \Delta e_t \quad (5.4)$$

$$i_t - i_t^* = \lambda_t (E_t e_{t+1} - e_t) \quad (5.5)$$

Equation 5.1 shows money demand at period t where the demand for money (m_t^d) is a function of domestic prices (*p*), income (*y*) interest rates (*i*) and v_t is the stochastic money demand disturbance. Equation 5.2 is the log of the price level in time t expressed as a function of foreign prices (p^*) and exchange rates (*e*). Equation 5.3 shows the change in money base characterised by changes in domestic credit (*d*) and change in reserves (*r*). Changes in reserves are outlined in equation 5.4 which is also the monetary response function where *e* is the log of period t exchange rates. i_t and i^*_t are the logs of domestic and foreign interest rates respectively. λ_t measures capital controls and is equal to 1 with no capital controls and Uncovered Interest Parity holds. If we substitute equation 5.5 and 5.2 into 5.1 we obtain:

$$m_t^d = \alpha_0 + \alpha_1 P_t^* + \alpha_2 e_t + b_1 y_t - b_2[\lambda_t (E_t e_{t+1} - e_t) + i_t] + v_t \quad (5.6)$$

The equilibrium in the money market holds when money demand equals money supply:

$$\Delta m_t^d = \Delta m_t^s \quad (5.7)$$

From equations 5.3, 5.4, 5.6, 5.7 we get

$$\Delta e_t = \frac{-\{\Delta r_t - b_2 \lambda_t (E_t e_{t+1}) - \Delta d_t + \alpha_1 \Delta p_t^* + b_1 \Delta y_t - b_2 \Delta i_t^* + \Delta v_t\}}{\alpha_2 + b_2 \lambda_t}$$

Equation (5.7) can be re-written as:

$$\Delta e_t = \eta \Delta r_t + w_t \quad (5.8)$$

where $W_t = b_2 \lambda_t (E_t e_{t+1}) + \Delta d_t - \alpha_1 \Delta p_t^* - b_1 \Delta y_t + b_2 \Delta i_t^* - \Delta v_t$ and $\eta = -(\alpha_2 + b_2 \lambda_t)^{-1}$ which is the elasticity which converts observed changes in reserves into equivalent exchange rate changes while keeping the money market in equilibrium (Li, 2012). Since exchange market pressure captures surplus currency demand as the exchange rate needed to remove surplus demand where there is no government intervention, EMP is, therefore, given as:

$$EMP_t = \Delta e_t + n \Delta R_t \quad (5.9)$$

Equation 5.9 stipulates that EMP is given as the sum of the change in reserves and exchange rates.

In Girton-Ropers (1977) seminal works, they examined EMP as a function of monetary aggregates and income. Subsequent studies such as Li (2012) have incorporated other variables to account for capital movements. The basic EMP model to be estimated can thus be expressed as follows:

$$EMP = f(X) \tag{5.10}$$

Where EMP is a function of several variables including changes in monetary aggregates, exchange rate overvaluation and capital and trade controls to name a few. The choice of explanatory variables used in this study is largely determined by previous studies that have been done.

5.3.2 Empirical model specification

To examine the effects of capital account liberalization on financial sector stability a static panel model is specified as is done by Akram and Byrne (2015).

$$EMP_{it} = \alpha_i + \beta_1 kal_{it} + \beta_2 X_{it} + \beta_4 (kal*th)_{it} + \varepsilon_{it} \tag{5.11}$$

The subscripts "*i*" and "*t*" stand for country and time respectively with *i*=1…N and *t*=1…T while ε_{it} is a white noise error term. *EMP* is the exchange market pressure index which is our proxy for currency crisis as is employed by Shen and Yang (2015), Glick *et al* (2006) and Akram and Byrne (2015). *kal* is a measure for capital account liberalization and X_{it} is a vector of dependent variables which include money supply, exchange rate overvaluation, inflation, and gross domestic product.

th stands for threshold variable. For this study, the major threshold of interest is trade openness and this is included as an interactive term because it has been suggested that countries that are more open face smaller chances of experiencing crisis (Prasad & Rajan, 2008; Kose *et al*, 2011). This has not been done in other studies and hence offers a methodological contribution to the body of knowledge.

5.3.3 Data

This study examines a panel of 21 SSA countries over a period from 1996 to 2013. The inclusion of countries and the sample size is based on the availability of data on all variables during the sampling period. Data for the study is drawn from the International Monetary Fund database as well as the World Development Indicators on an annual basis. The summary of the variables used is provided in Table 5.2.

***Currency Crisis Measure**:*

A currency crisis is proxied using Exchange Market Pressure (*EMP*) which captures surplus currency demand as the exchange rate needed to clear this surplus demand in lieu of intervention in the foreign exchange market. It models whether or not authorities absorb exchange pressure by drawing on foreign reserves or depreciating their currency (Ziramba, 2007). The EMP is a weighted/un-weighted difference in the exchange rates and reserves. In a crisis, an economy facing depreciation of exchange rates will either seek to offset this change my depleting foreign reserves or increasing interest rates.

The exchange market pressure index is calculated as:

$$EMP_{it} = \lambda_{RER} \frac{\Delta RER}{RER_{t-1}} - \lambda_{RES} \frac{\Delta RES}{RES_{t-1}} \tag{5.12}$$

RER is the real exchange rates and *RES* stands for foreign reserves as a percentage of total external debt. λ are the weights attached to each variable which are given by the inverse in their volatilities:

$$\lambda = \frac{1}{stdev} \tag{5.13}$$

stdev is the standard deviation for each variable. The advantage of weighting is that it reduces the influence of the highly volatile component and assigns equal importance to all components. As a robustness check, the study also estimates the exchange market pressure that is not weighted and uses this for sensitivity analysis.

Capital Account Liberalization measure:

There are several suggested measures of CAL. Most of these measures are based on the IMF data on Annual Report on Exchange Agreements and Exchange Restrictions (AREAER). For this study, the Wang-Jahan (2016) Index of capital account liberalization is employed. This measure builds on Schindler (2009) Index, which disaggregates measures of capital flows, by disaggregating all the 12 sub-categories of the IMF AREAER database. It also captures the broad country coverage of the commonly used Chinn-Ito Index and captures the intensity of capital controls. This index is developed by using the coding of 0 for closed and 1 to reflect liberalized capital accounts for each of the 12 categories of the capital account restrictions.

It is a good measure of overall capital account liberalization and also provides sub-indices to capture liberalization of specific capital flows such as FDI and portfolio flows. The expected sign for this variable is the matter of interest for this chapter.

Other dependent variables (X):

The independent variables included are in line with those included by Akram and Byrne (2015). These include:

Monetary aggregates (M3):

These are given as broad money as a share of GDP. In line with the *first generation models,* the excess money supply can result in speculative attacks based on agents' beliefs on the status of foreign exchange reserves and this can increase exchange market pressure. Hence a positive relationship is expected between this variable and EMP.

Real exchange rates:

This is given as local currency unit to the US dollar. The real exchange rates are expected to be positively related to EMP. The addition of exchange rates is based on the specifications by Akram and Byrne (2015) and Feridun (2009). The rationale of including real exchange rates is because they measure exchange rate overvaluation which can affect the EMP (Filipozzi & Harkmann, 2010). This occurs when short-term investors believe that a central bank has overvalued its exchange rates and that the overvalued exchange rate can't be supported by the bank. The short-term investors can thus impose pressure by converting their domestic currency to foreign currencies at the overvalued exchange rate which they sell later at a higher rate (Central Bank of Nigeria, 2016). This is in line with the *first generation models* where agents are viewed as being able to form expectations on the status of reserves of central banks and as such overvaluation of exchange rates is a good indicator of this and may determine whether agents initiate speculative attacks on the exchange rate.

***Real GDP per capita*:**

This is the real gross domestic product per capita in constant US dollars. This measure is used to proxy macroeconomic development and it has been suggested that sound macroeconomic fundamentals reduce a country's chances of experiencing crisis and hence a negative relationship with EMP is expected *a priori.* A negative sign on the coefficient of this variable would also support the Balassa-Samuelson Hypothesis[17].

[17]Countries with high productivity growth experience high growth in wages. This results in higher exchange rates.

Inflation:

Inflation is expected to be positively related to EMP as sound macroeconomic fundamentals are beneficial to avoid speculative attacks (Akram & Byrne, 2015). Hence an increase in inflation reflects poor macroeconomic fundamentals and is expected to be associated with an increase in the exchange market pressure index.

Table 5.2: Summary of variables used in the study on CAL and crisis

Variable category	Freque	Definition	Source
EMP	Annual	Exchange Market pressure	Own derivation
Kal	Annual	Wang-Jahan Index	IMF
Money Supply (M3)	Annual	Money supply as a share of GDP	WDI
Real Exchange Rate	Annual	Local Currency Unit per US$ period	WDI
Inflation	Annual	Inflation, consumer prices (annual %)	WDI
Real GDP	Annual	GDP per capita in constant 2010 US$	WDI

Source: Authors Compilation

Descriptive statistics and correlation matrix:

Table 5.3 summarizes the descriptive statistics for the sample. In the sample of 21 SSA countries, the average Gross Domestic Product is US$4,357 with the lowest recorded GDP per capita being US$ 261. This is a sharp contrast to the highest recorded GDP per capita of US$17,628. This reflects the diversity in economic development in the countries in the sample.

The average exchange rate in the sample is 259 local currency units to the US dollar with the highest real exchange rate recorded to be 2586 local currency units to the US dollar. The maximum value of liberalization is 1 reflecting those countries that are fully liberalized as opposed to the minimum values of 0 which stands for closed economies. The average EMP is 0.03 with the largest recorded EMP of 1.9.

Table 5.3: Descriptive statistics (exchange market pressure)

Variable	Obs	Mean	Std. Dev.	Min	Max
EMP	270	0.034	0.164	-0.24	1.9
Kal	270	0.54	0.54	0	1
Money supply	270	165	1552	6.19	18347
Real Exchange Rate	270	259	533	0.12	2586
Real GDP per capita	270	4357	4242	261	17628
Inflation	270	130	77	1	265

Source: Stata output. Note: *kal*: capital account liberalization

Table 5.4 outlines the correlation matrix for the variables used in this chapter. Looking at preliminary correlation analysis, there is an observed inverse relationship between CAL and currency crisis. The money supply is seen to be positively correlated with currency crisis as expected and GDP also has a negative expected sign. Official examination, however, is required to determine the exact nature of the relationships.

Table 5.4: Correlation matrix

	EMP	***kal***	***m3***	***rer***	***infl***	***gdpk***
EMP	1.0000					
Kal	0.1760	1.0000				
m3	0.2382	0.1912	1.0000			
Rer	-0.0712	0.0309	0.1714	1.0000		
infl	0.6950	0.3364	0.4416	0.0438	1.0000	
gdpk	0.6100	0.3483	0.1634	-0.1964	0.6273	1.0000

Source: Stata output. Note: m3: money supply, rer: real exchange rate, infl: inflation, gdpk: gdp per capita

5.3.4 Estimation methods

The study employs the Fixed Effects (FE) Estimator as in Akram and Byrne (2015). Fixed effects are used to control for unobserved heterogeneity in the sample. According to Torres-Reyna (2007), fixed effects also control for all time-invariant differences between individuals. A Hausman Specification Test is performed to confirm the validity of fixed effects over random effects[18]. The standard fixed effects model is shown below:

$$y_{it} = \alpha + \beta' X_{it} + \varepsilon_{it} \tag{5.14}$$

$$\varepsilon_{it} = u_i + v_{it} \tag{5.15}$$

For the fixed effects model μ_i stands for individual effects whilst v_{it} is a white noise error term and i=1…N, and t=1…T. The standard equation above, however, does not meet the Gauss-Markov Theorem and therefore OLS results from this can be biased, inconsistent as well as inefficient (Baltagi, 2005). It has also been suggested that FE may underestimate standard errors[19]. The chapter, therefore, also employs the Least Squares Dummy Variable (LSDV) estimator, which is a form of fixed effects which fulfills the Gauss-Markov theorem and provides unbiased consistent and efficient estimators. This will help to verify the robustness of the findings of the fixed effects model. The LSDV model is expressed as follows:

$$y_{it} = \alpha + \beta' X_{it} + u' Z_{u,it} + v_{it} \tag{5.16}$$

Where Z is a dummy variable which takes on the value of 0 when i≠j and 1 when i=j.

Furthermore, it has been suggested that there could be possible endogeneity between CAL and financial crisis. This results from simultaneity, where in some cases countries impose capital controls after they face a crisis. To control for this, findings from the System-GMM one-step estimator developed by Arellano and Bover (1995) are also presented and this will also help to evaluate the robustness of the results stemming from the LSDV estimates[20]. System-GMM estimators are noted for being consistent and efficient out of estimators that only use information in the moment's condition.

[18]This tests the null hypothesis that both random effects and fixed effects are consistent

[19] It has been suggested however, that the xtreg, fe command in Stata corrects for this problem by ensuring the removal of the right number of degrees of freedom in the analysis.

[20]This is performed by using the xtabond2 command in Stata 14.

Although some argue that the two-step estimator is more efficient asymptotically, Hwang and Sun (2015) suggest that caution needs to be taken when employing the two-step procedure. They argue that efficiency gains may not be materialized in finite samples and that researchers should employ the two-step estimator only if the benefits outweigh the costs. Hence this study presents findings from the one-step System-GMM estimators.

5.3.5 Propensity score matching methodology

To control for sample selection bias, the study shall employ propensity score matching techniques. Most studies which are based on observational data are often at risk of facing sample selection bias arising from the fact that sample selection is not random. Even if sample selection is random, bias may still arise if the allocation of treatment to the subject is not (Thavaneswaran & Lix, 2008). Sample selection bias is likely in this study since it has been suggested that countries with more sound macroeconomic conditions and stable political climates and who are more open to trade are more likely to have liberalized capital accounts. These countries also have a lower probability of facing a crisis as a result of having sound economic characteristics (Sulimierska, 2008: Hu *et al*, 2008).

Sample selection bias results in biased outcomes in OLS methods which use a dichotomous indicator of treatment because the error term may be correlated with explanatory variables (Guo, 2011). In this case, it is hard to discern if differences in outcomes between treated and control observations are due to treatment or rather due to other differences between observations. Hence, to solve the problem of sample selection bias, the study employs propensity score matching methods. Propensity score matching is also beneficial in some cases where regression models are misspecified and likely to produce biased estimators. Lastly, PSM methods do not violate any model assumptions since they are non-parametric based whilst standard linear regressions rely on assumptions of functional form.

Propensity score matching methodology, thus, involves matching treatment (liberalized) observation to control (not liberalized) observations that have similar characteristics which determine participation (Thavaneswaran & Lix, 2008). It matches treatment and control units with similar values on propensity scores. In this study, the outcome is currency crisis whereas the treatment group consists of observations (countries) with very open capital accounts and the control group consists of those with relatively closed capital accounts.

Rosenbaum and Rubin (1983) describe propensity scores as the probability of study observations receiving treatment based on observed characteristics. Essentially, propensity scores show the conditional probability of being treated given individual characteristics (X) and are given as P(X) below:

$$P(X) = \Pr = (KAL = 1 | X) \tag{5.17}$$

Apart from the standard PSM estimator, findings from the *nearest neighbor algorithm* are also presented. This method matches treatment observations to non-treatment observations that have the nearest propensity score (Glick *et al*, 2006). Furthermore, the study employs the *regression-adjusted coefficients* which help to correct for any omitted variables which could possibly influence the outcome variable. This, therefore, improves consistency and efficiency.

Defining a dummy variable for Currency Crisis

In this part of the analysis, a currency crisis is defined as a period where there are large changes in EMP. As such a dummy variable *crisis* is developed as follows:

$$crisis_{it} = 1 \text{ if } EMP_{it} > \mu_{emp} + 1.5\delta_{emp} \tag{5.18}$$

In this equation, μ_{emp} is the mean of the EMP index and δ_{emp} is the standard deviation. This approach of defining currency crisis is similar to the one adopted by Glick *et al* (2006).

Defining a dummy variable for CAL

For the benchmark probit analysis, a dummy variable for capital account liberalization (*finop*) is generated which takes a value of 1 for those countries whose Wang-Jahan index value is *sufficiently* close to 1 (>0.7) and 0 otherwise.

In the benchmark probit equation for CAL, several macroeconomic and political variables are included which have been observed to influence CAL (Glick *et al*, 2006; Sulimierska, 2008). These include broad money as a share of GDP; CPI inflation; GDP per capita; trade openness; and political stability. An augmented probit model is also specified which includes historical values for capital account liberalization and currency crisis (EMP).

5.4 Results and discussions

5.4.1 Results from regression analysis

Results from Fixed Effects and Least Squares Dummy Variable Regressions

First of all, findings from standard regression techniques based on Fixed Effects (FE) and Least Squares Dummy Variable (LSDV) estimators are presented in Table 5.5.

A Hausman Test is performed to discern whether or not Random Effects (RE) of FE are a better fit for the data[21]. From this, a P-value of 0.1376 <0.05 is obtained which suggests that a FE model is more appropriate. Thereafter, the study proceeds to estimate a Fixed Effect Regression. The post-estimation diagnostic tests are then performed. For this study's the time sample (t) is 17 so there is no need to worry about cross-sectional correlation or serial correlation since these problems are more likely to manifest where t is very large, for instance, over 20 to 30 years (Torres-Reyna, 2007). Therefore, the study tests for GroupWise Heteroscedasticity using the Modified Wald Test and obtains a p-value of 0.000 and this result is indicative of the presence of heteroscedasticity[22]. Hence, findings that are corrected for heteroscedasticity with robust standard errors are presented. The study also presents the findings from the LSDV estimator which provides more or less similar results to the fixed effects estimators.

The results of the study show that an increase in CAL is linked with a lower exchange market pressure index and this is statistically significant at the 10 percent level of significance. This implies that capital account liberalization is associated with a lower chance of a currency crisis. There are several possible explanations for this.

Glick *et al* (2006) argued a CAL can reduce currency crisis since it promotes increased market liquidity which stimulates economic growth and boosts productivity growth and this can lower the EMP index. Indeed, a study by Khumalo and Kapingura (2014) found that capital account liberalization was associated with increased growth in economic production in South Africa. Furthermore, Alley (2017) showed that risk sharing capital flows to SSA (such as FDI) were indeed beneficial for growth. Therefore, if CAL is leading to economic growth in SSA, this can explain why CAL is associated with a lower EMP.

[21]The results of the Hausman test are presented in Appendix D.

[22]The results of the Modified Wald Test are presented in Appendix D.

In addition, the findings seem to suggest that most capital flows to SSA are mostly appropriate and less volatile such that they do not compromise financial stability. A currency crisis is more likely to occur when there is an influx of volatile capital flows. For SSA very few countries receive portfolio inflows which are the most volatile form of capital and most inflows to SSA are of the stable variety and this could explain the findings. According to the IMF's (2017b) World Economic Outlook, portfolio inflows to SSA averaged at just $15 billion per annum compared to FDI inflows which averaged $36 billion per annum.

FDI is less likely to lead to crisis since it requires a long-term commitment and is less prone to sudden stops. Had SSA been experiencing large amounts of portfolio inflows, the situation could have probably been different.

For Uganda, Kasekende (2000) highlighted that FDI constituted a significant proportion of capital flows and that after Uganda liberalized its capital accounts, they had not experienced volatile capital flows. The reason given for this was that Uganda's financial markets were not that developed to facilitate the development of instruments that could attract portfolio inflows. For South Africa on the other hand, most of its capital flows are short-term portfolio flows (Mohamed, 2006). This could be due to the fact that the level of financial sector development in South Africa is comparatively higher in SSA. Consequently, South Africa experienced a Rand crisis in 2001 which saw portfolio inflows decline by -6.6 percent due to a lot of currency speculation and the Rand depreciated by 26 % between September and December 2001. They also experienced another crisis in 1998 where the Rand plummeted by 28 percent between April and August 1998 (Bhundia & Ricci, 2005). Several other factors were attributed to the 2001 currency crisis. These included an increase in the money supply in September 2001 which may have resulted in overshooting of the exchange rate as per Dornbusch's (1976a) exchange rate model. This seems to be in line with the *first generation currency crisis*. However, reports from the Myburg commission argued that an announcement by the South Africa Reserve Bank in October 2001 that it would tighten exchange controls contributed to sharp depreciation. Looking at the case of Zambia, Muhonga and Soteli (2009) showed that increases in capital flows to Zambia led to an increase in reserves and a *steady* appreciation. This suggests that capital flows are not always detrimental to financial instability. However, due to contagion effects, Ndulo *et al* (2010) noted that during the global financial crisis, portfolio investments in equities and government securities in Zambia were negatively affected. Despite this, Zambia continued to receive substantial inflows of FDI in 2009 albeit at slightly lower levels than in 2008.

All in all, most SSA countries were spared from financial effects of the global financial crisis as a result of not being fully integrated with the international financial markets and due to the fact that they receive fewer short-term capital flows that are volatile.

The findings also seem to validate Fischer's (1997) statement that capital flows are mostly appropriate and would not cause financial crisis. As such macroeconomic fundamentals are expected likely to affect the EMP index (Glick *et al*, 2006).

Indeed, the results of the study show that higher levels of GDP reduce EMP and thus reduce the likelihood of experiencing a financial crisis. Furthermore, increased money supply and inflation both lead to an increase in the exchange market pressure index as expected. However, the effect of the variables is not statistically different from zero and this suggests that CAL remains a major factor in determining EMP in the sample. Interestingly, the interactive term for CAL and trade openness has a positive effect on EMP. However, this is not statistically significant enough to warrant any meaningful inference on the sequencing of CAL.

The overall R-squared value for the model is 0.36. However, statistically significant P-values and large F values are obtained which go to suggest that jointly the variables are good explicators for EMP.

Looking at the results from the System-GMM estimator, the findings seem to echo those presented by the LSDV/FE. CAL is associated with decreased exchange market pressure and this is statistically significant at the 10 percent level of significance. The major difference here is that the interactive term for CAL and trade openness now has a positive significant effect on the financial crisis. This implies that more trade openness has sharp depreciation effects on the exchange rates in SSA and that it increases financial instability in SSA. This makes intuitive sense given that most SSA countries are net importers and hence increased trade openness could be worsening the trade balance and subsequently negatively affecting financial instability. A trade deficit worsens the Balance of Payments and results in depreciation due to excess demand for foreign exchange. Moussa (2016) found that increased trade openness led to current account deficits in most SSA countries. Furthermore, Kassim (2013) showed that imports grew 2 percent faster than exports after trade liberalization and thus worsened the trade balance. Only a few cases, like Kenya, experienced an improved trade balance post-trade liberalization.

To establish the validity of the GMM model results from the Arellano-Bond test for first order [AR (1)] and second order [AR (2)] autocorrelation are observed and from this P-values of Pr >z=0.000 and Pr >z= 0.348 for the AR (1) and AR (2) tests, respectively, are obtained. This justifies the inclusion of the lagged dependent term as a regressor as the first-order autocorrelation is corrected when this term is included. The validity of the GMM model specification is also cemented by examining the Sargan test statistic of 0.604.

This verifies that the model is not over-identified and verifies the appropriateness of the instruments used. The tests for exogeneity which are performed post-estimation confirm that the instruments are indeed exogenous. The results of the findings from FE, LSDV, and System-GMM are summarised in Table 5.5 below.

Table 5.5: Summary of Coefficients

EMP	**Fixed Effects Coeff (SE)**	**LSDV Coeff (SE)**	**System-GMM Coeff (SE)**
Kal	-0.108(0.059)*	-0.108(0.061)*	-0.13*(0.07)
Money supply	0.005(0.005)	0.005(0.005)	0.045(0.04)
Real Exchange Rate	-0.058(0.007)***	-0.058(0.007)***	-0.032(0.02)
Inflation	0.003(0.008)	0.003(0.008)	0.0006(0.022)
GDP per capita	-0.010(0.0412)	-0.102(0.042)	-0.003(0.034)
*CAL*Trade openness*	0.045(0.043)	0.045(0.044)	0.14(0.019)
EMP_{t-1}			0.2(0.067)**
Constant	0.051(0.303)	0.051(0.312)	-
Observations	254	254	254
Groups	15	15	25
Adjusted R^2	0.2	0.35	-
AR (1)			0.000
AR (2)			**0.384**
Sargan OIR			**0.604**
DST for instruments			
GMM Instruments for levels:			
Excluding group			**0.509**
Dif (null H=exogenous)			**0.857**
Iv (eq (level)):			
Excluding group			**0.588**
Dif (null H=exogenous)			**0.433**

Note: ***, **, *: significance levels at 1%, 5% and 10 % respectively. kal: Capital account liberalization. EMP_{t-1} is the lagged values of the Exchange Market Pressure. DST: Difference in Sargan Test for Exogeneity of Instruments. Dif: Difference. OIR: Over identifying restrictions test. AR (1) and AR (2) Test statistics for first and second-order autocorrelation. The significance of the bold terms reflects (a) Failure to reject the null of no autocorrelation b) validity of instruments in the Sargan OIR test.

Effect of Portfolio and Foreign Direct Investment Liberalization

In the analysis of capital account liberalization, it is recognized that capital flows are twofold. First, there are the short-term capital flows (e.g. portfolio equity flows and short-term bank loans) as well as the long-term capital flows (Foreign Direct Investment). The short-term flows are the ones likely to result in a crisis since they are volatile. For instance, during the Asian crises, it was observed that when the regions experienced reversals in bank lending and portfolio flows, FDI inflows did not change.

Decomposing the overall CAL index, it is found that, indeed, portfolio equity liberalization is positively correlated with EMP while FDI liberalization reduces the currency crisis measure. However, the findings from both analyses are not statistically significant from zero. This could imply that there are other components of the Wang-Jahan which contribute significantly to EMP. The Wang-Jahan index is broad and goes even further to provide sub-indices for other aspects such as money market liberalization and debt liberalization. Such aspects of liberalization could have a more significant influence on EMP.

Findings using De Facto Measures of Capital Account Liberalization

De facto measures of capital account liberalization measure CAL as the sum of capital inflows and outflows as a share of GDP. These are volume based measures which capture net flows of capital. Using this measure, it is found that capital account openness ceases to have a significant effect on the exchange market pressure index. This could be because using *de facto* capital flows to proxy CAL does not reflect the intensity of capital controls. Furthermore, such volume based measures do not capture the multi-faceted nature of CAL which includes things like, the presence of multiple exchange rates, unlike their *de jure* counterparts. In addition, volume-based measures say little about the policy influence of government and are affected by many external factors. It is also found that, unlike the previous case where the *de jure* Wang-Jahan measure is used, real GDP per capita has positive effects on exchange market pressure and money supply is seen to significantly affect the exchange market pressure index. Unpacking the various capital flows it is observed that both *de facto* foreign direct investment openness and portfolio investment openness have insignificant effects on exchange market pressure. Changes in real exchange rates are seen to significantly decrease the EMP index while increments in money supply have positive effects on the exchange market pressure index.

Robustness Checks

In order to verify the robustness of the results, a standard LSDV regression is estimated using an un-weighted exchange market pressure index. The findings are presented in Appendix D When the measure is employed it is observed that capital account liberalization has an insignificant effect on exchange market pressure and that GDP has got a positive significant effect on the exchange market pressure index. However, after employing the *de facto* measures of capital account liberalization as a regressor instead of the *de jure* measure used in the preceding analysis, it is unearthed that CAL has a negative significant effect on exchange market pressure and that FDI and portfolio openness do not have a significant impact on the exchange market pressure index.

5.4.2 Results from propensity score matching methods

Descriptive Statistics

Table 5.6 outlines the descriptive statistics for the propensity score matching techniques. For the sample, an analysis of the liberalization dummy that was created shows that 40 percent of the observations are liberalized compared to 60 percent that are not liberalized. That is 40 percent of the sample have a liberalization index greater than 0.7. Countries that are fully liberalized in SSA include the likes of Zambia, Mauritius, Uganda, Seychelles, and Liberia. Other countries like Tanzania, Kenya, and Malawi have adopted a more gradual approach and have not removed all restrictions on capital flows.

The analysis also shows that, between 1996 and 2013, only 6 episodes of currency crisis were experienced out of a total of 270 observations. This represents a 2 percent occurrence of currency crisis over the period. For instance, South Africa is known to have experienced a Rand crisis in 1998 and 2001. From the preliminary analysis, it is observed that the 6 currency crisis episodes all occurred in observations (countries) that were liberalized. Preliminary correlation analysis, however, shows a negative correlation between CAL and currency crisis.

Table 5.6: Descriptive statistics for propensity score methods

Finop	**Frequency**	**Percent**
0	163	60
1	107	40
Total	*270*	*100*
Crisis	**Frequency**	**Percent**
0	264	98
1	6	2
Total	*270*	*100*

	Finop		
crisis	0	1	***Total***
0	157	107	264
1	6	0	6
Total	163	107	270

Source: Stata output. Note: Finop is the financial openness dummy variable.

Comparing the summary statistics in Table 5.7 for the treatment group and the control group, it is evident that observations in the treatment group (countries that are liberalized) have generally higher levels of GDP, are more open to trade and have less government expenditure compared to countries that have more capital controls. These countries are also seen to be more politically stable and have lower inflation levels.

Table 5.7: Summary statistics for the treatment and control group

	Treatment Group		Control group	
	Mean	**Std Dev**	**Mean**	**Std Dev**
GDP per capita	5451	5226	3639	3271
Trade Openness	90	58	74	35
Current Account Balance	137	68	119	66
Government Spending	110	89	124	67
Political Stability	-0.29	1.12	-0.53	0.67
Inflation	131	79	163	77

Source: Stata output.

Preliminary Capital Account Liberalization Probit Equations

Results from the benchmark and augmented probit equations are presented in Table 5.8. A benchmark probit model for CAL is first estimated which includes variables which have been known to influence CAL as incorporated by Glick *et al* (2006) and Sulimierska (2008). These include economic structure variables (trade openness, current account deficits, and government expenditure), political variables (political stability) and macroeconomic variables (GDP, inflation). These are included because it has been suggested that nations with good macroeconomic fundamentals, political stability, that are more open to trade and have lower current account deficits have a higher probability of implementing CAL.

The benchmark probit equation is specified as follows:

$$\Pr(kal=1)=\theta(\beta_0+\beta_1 curr_{t-1}+\beta_2 gov_{t-1}+\beta_3 tal_{t-1}+\beta_4 gdpk_{t-1}+\beta_5 pol_{t-1}+\beta_6 \inf l_{t-1} \qquad (5.19)$$

where *curr* is the ratio of the current account balance to GDP; *gov* is total government expenditure as a proportion of GDP; *tal* is trade openness over GDP; gdpk is GDP per capita; *pol* political stability and *infl* is inflation. The explanatory variables are all lagged to control for simultaneity.

An augmented probit equation is also specified which includes the lagged value of capital account liberalization and lagged values of EMP as extra regressors. These values are included because it has been suggested that previous CAL is more likely to determine future liberalization and that if a country experiences crisis in one year it can lead to the implementation of capital restrictions in the following year. The augmented probit equation is specified as follows:

$$\Pr(kal=1)=\theta(\beta_0+\beta_1 curr+\beta_2 gov_{t-1}+\beta_3 tal_{t-1}+\beta_4 gdpk_{t-1}+\beta_5 pol_{t-1}+\beta_6 \inf l_{t-1} + \beta_7 kal_{t-1}+\beta_7 emp_{t-1} \qquad (5.20)$$

From the benchmark probit equation, it can be seen that countries that have higher levels of GDP per capita; are more open to trade and whose current account balance is larger are more likely to have liberalized capital accounts. This does not mean that factors like having a high level of GDP are automatic determinants of whether a country is liberalized as is seen for cases like South Africa that remain partially closed. These findings merely suggest that countries with those characteristics are more likely to liberalize but this is not always the case. There are countries like Liberia with very low levels of GDP and political instability but with a fully liberalized capital account. It is also noted that countries with higher levels of government expenditure are less likely to be liberalized. Inflation levels and political stability are found not to have economically meaningful effects on capital account liberalization.

When lagged values of capital account liberalization are included in the augmented probit model, the other explanatory variables no longer have a significant effect on capital account liberalization. Previous capital account liberalization is seen to positively influence future capital account liberalization. This makes intuitive sense given that countries would hardly move from a case of full liberalization in on year to a fully closed capital account the next. Furthermore, the results show that an increase in exchange market pressure index is associated with reduced liberalization implying that a currency crisis in one year results in the imposition of capital controls in the next year. However, the importance of *EMP* in exchange market pressure is too insignificant to be economically meaningful.

The findings from the augmented equations suggest that past capital account liberalization is the best determinant of future capital account liberalization and this is cemented by the fact that the Pseudo R^2 for the benchmark equation is a low 0.069 compared to the Pseudo R^2=0.78 in the augmented equation[23].

[23]The results for this estimation are presented in the appendices

Table 5.8: CAL benchmark and augmented probit equations

Dependent Variable: Capital Account Liberalization		
Explanatory variable	**Benchmark Probit**	**Augmented Probit**
GDP per capita$_{t-1}$	0.00008(0.00003)***	0.00003(0.00005)
Trade Openness$_{t-1}$	0.003(0.002)*	-0.0002(0.004)
Current Account Balance$_{t-1}$	0.002(0.0012)*	-0.001(0.002)
Government Spending$_{t-1}$	-0.0032(0.001)**	-0.002(0.002)
Political Stability$_{t-1}$	-0.0062(0.12)	-0.09(0.21)
Inflation$_{t-1}$	-0.0003(0.001)	0.0009(0.0002)
finop$_{t-1}$		3.68(0.34)***
EMP$_{t-1}$		-1.29(2.00)
No of observations	254	254
Pseudo R^2	0.068	0.8

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1. *finop*=capital account liberalization dummy, *EMP*=exchange market pressure index. The subscripts t-1 denote lagged values.

Preliminary Currency Crisis Probit Equations

Table 5.9 Outlines the benchmark and augmented probit equations to examine the effects of other variables on financial crisis apart from CAL. In the benchmark equation, several regressors are included that have been included in other studies (Glick *et al*, 2006; Sulimierska, 2008; Hu *et al*, 2008). These include current account balance to GDP, GDP per capita, changes in domestic money supply, and changes in real exchange rates. Current account surpluses, exchange rate overvaluation and high GDP are expected to be linked to a lower frequency of crises. The currency crisis equation is outlined below:

$$\Pr(crisis = 1) = \phi(\beta_0 + \beta_1 m3res_{t-1} + \beta_2 curr_{t-1} + \beta_3 \Delta m3_{t-1} + \beta_4 \Delta GDP_{t-1} + \beta_5 \Delta rer_{t-1} + \beta_5 kal_{t-1} \quad (5.21)$$

The dependent variable is the currency crisis dummy, *m3res* is the ratio of base money to foreign reserves; *curr* is the current account balance; $\Delta m3$ is the change in domestic credit and ΔGDP is the change in income; and Δrer is the change in exchange rates and *kal* is the measure of capital account liberalization measured by the Wang-Jahan index. From the findings, the coefficients are correctly signed, however, from this preliminary analysis only lagged values of the currency crisis dummy variable significantly explain future currency crisis.

Table 5.9: Currency crisis benchmark and augmented probit equations

	Dependent Variable: Currency Crisis	
Explanatory Variable	**Benchmark Equation**	**Augmented Equation**
M3 as a share of reserves$_{t-1}$	0.23(0.25)	0.22(0.35)
Current Account Balance$_{t-1}$	-0.004(0.004)	-0.009(0.007)
ΔGDP per capita$_{t-1}$	-0.0003(0.001)	0.00006(0.002)
Δ Real Exchange Rates$_{t-1}$	-0.006(0.01)	-0.004(0.01)
Δ Broad Money (M3)$_{t-1}$	0.000(0.0001)	0.000(0.0002)
CAL$_{t-1}$	-0.63(0.84)	-0.43(1.035)
crisis$_{t-1}$		2.17(0.99)**
No of observations	240	240
Pseudo R^2	0.1	0.27

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1. *crisis*=currency crisis dummy. Subscripts t-1 denote lagged values.

Propensity score matching and effects of CAL on currency crisis

From the *propensity score matching techniques*, it is found that even when sample selection bias is controlled for, CAL is linked with a reduced probability of a country experiencing a financial crisis. The result is the same regardless of whether *propensity score matching* or *nearest neighbor matching techniques* and *regression adjustment techniques* are used. The results are presented in Table 5.10. These findings from propensity score matching methods fully corroborate the findings from the regression analysis and further emphasize that CAL is linked with lower exchange market pressure.

Table 5.10: Findings from matching techniques using a *de jure* measure of CAL

De Jure CAL	***Propensity Score Matching***	***Nearest Neighbour Matching***	***Regression Adjustment Coefficients***
finop(1 vs 0)	Coeff (Std Error)	Coeff (Std Error)	Coeff (Std Error)
	-0.026(0.01)**	-0.045(0.02)**	-0.025(0.04)**

***P<0.01, ** P<0.05,* P<0.1. *finop* dummy variable taking the value of 1 for kal index>0.7 using the Wang-Jahan index for CAL

It is also observed that *de facto* total capital openness reduces the likelihood of experiencing a crisis. Just like in the regression analysis this effect is not statistically different from zero. The findings are highlighted in Table 5.11 below.

Table 5.11: Findings from matching techniques using *de facto* measure of CAL.

De Facto CAL	***Propensity Score Matching***	***Nearest Neighbour Matching***	***Regression Adjustment Coefficients***
Finop (1 vs 0)	Coeff (Std Error)	Coeff (Std Error)	Coeff (Std Error)
	-0.018(0.01)	-0.007(0.02)	-0,024(0.12)

***P<0.01, ** P<0.05,* P<0.1. *finop* dummy variable taking the value of 1 if capital inflows and outflows as a share of GDP exceed the median.

From both the methodologies employed, it is evident that CAL is associated with a lower likelihood of experiencing a currency crisis. This would seem to suggest that imposition of capital controls would only have distortionary effects. This has been seen in countries like Kenya, who experienced 6 currency crisis episodes between 1975 and 2004 despite the fact that they had capital controls in place during that time (Glick *et al*, 2006).

5.5 Conclusions and policy recommendations

This chapter sought to examine whether or not CAL will result in a financial crisis in SSA. To do so the chapter employed panel data regression techniques for a panel of 21 SSA countries between 1996 and 2013. The methods used include Fixed Effects, Least Square Dummy Variables, and System-GMM. The results of the chapter show that liberalizing capital accounts reduces exchange market pressure which is the measure of financial crisis. The reason for this outcome could be due to the fact that most capital flows into SSA are long-term and hence less volatile and less prone to reversals which can lead to crisis. For CAL to result in a crisis, there is a need for large inflows of volatile short-term capital flows which are susceptible to reversals and sudden stops.

The study also employs propensity score matching techniques and finds that, even after controlling for sample selection bias, CAL is still associated with a lower risk of experiencing a crisis. These results seem to suggest that CAL is beneficial for financial stability for SSA and that capital controls may only be distortionary. In other words, liberalizing of capital flows is not detrimental to financial stability. Hence it is imperative that SSA relax restrictions on the capital account in order to foster financial stability. In addition, there is a need to ensure sound macroeconomic fundamentals such as low inflation and money supply in order to prevent a crisis.

This is because inflation and money supply are found to be key determinants of increased EMP. SSA countries should, therefore, implement a sound monetary policy which fosters low inflation and money growth.

Furthermore, as SSA becomes more liberalized and as portfolio capital inflows increase, there is a need to have in place appropriate supervision and regulation. This is because, despite the fact that most capital flows to SSA are the long-term and stable variety, as the region becomes more integrated financially, it is likely to experience an influx of volatile capital flows such as portfolio flows in the future. Hence, there is a need to monitor the movements of such volatile capital inflows.

CHAPTER SIX

EFFECTS OF CAPITAL ACCOUNT LIBERALIZATION ON EXCHANGE RATES AND THE CURRENT ACCOUNT BALANCE IN SUB-SAHARAN AFRICA: EXAMINING DUTCH DISEASE EFFECTS

6.1 Introduction

Over recent years, there has been an increase in globalization and this has catapulted removal of restrictions on goods and services and as well as capital flows. The collapse of the Bretton-Woods system, in the 1970's, brought about a wave of financial integration which saw many developed countries move towards more open capital accounts (Bordo, 1993). Following the trends in other parts of the world, SSA countries began to liberalize capital flows in the mid-1980's under the auspices of the Structural Adjustment Programmes (SAP's). The rising interest in capital account liberalization has spurred great debate with regards to the pros and cons of liberalizing capital accounts. Pros of liberalizing capital accounts mostly draw from the neoclassical theory which postulates that capital account liberalization (CAL) will promote capital inflows to capital-scarce countries thus fostering investment and economic growth (Henry, 2006). In addition, CAL is believed to bridge the savings gap and increase economic convergence and catch up in developing countries (Ezzahid & Maouhoub, 2014). Furthermore, the Interest Group Theory postulates that opening up the trade and capital accounts can increase efficiency in the financial sector by fostering competition with the influx of foreign banks.

Economists acknowledge that CAL can also have adverse effects in implementing countries. One concern involves the potential of CAL to destabilize financial systems if there is an influx of short-term volatile capital inflows that are susceptible to sudden stops. This line of thought gained prominence after a wave of currency crises were experienced in Latin America and Asian countries in the mid-1990's. These crises were often attributed to rapid or premature capital account liberalization (Licchetta, 2006). Another potential negative effect of CAL, which is given less emphasis than the latter, is the potential of CAL to diminish a country's international competitiveness if capital flows result in an appreciation of exchange rates. It has been observed that, in many countries, capital flows have been accompanied by an appreciation of the real exchange rates (Calvo *et al*, 1993; Kim *et al*, 2003). This can be problematic in the sense that it can worsen the current account deficits bringing to the fore issues regarding current account sustainability.

Apart from this, real exchange rate appreciation can destabilize macroeconomic management and deter future investments (Saborowksi, 2011).

Furthermore, Combes *et al* (2011) suggested that exchange rate appreciation can increase vulnerability to financial crisis especially if the exchange rate becomes unstable as this makes it prone to speculative attacks. The appreciation of exchange rates could also have implications for policy making. Specifically, it can affect domestic policy in cases where policymakers intervene in foreign exchange markets to prevent exchange rate movements. This has been seen in regions like Latin America and Asia, where authorities would resort to sterilization to mitigate any exchange rate appreciation (Lartey, 2008). Other countries like Korea re-imposed capital controls as a means to remove excess foreign exchange holdings and preserve competitiveness (Kim *et al*, 2004).

Evidently, whether CAL leads to exchange rate appreciation is an issue of great policy significance. The significance of the issue has spurred a slew of research (Sabarowski, 2011; Lartey, 2008; Lartey, 2011; Ezzahid & Maouhoub, 2014). Despite this, there is still limited research that has been conducted for Sub-Saharan African (SSA) countries. This study, therefore, examines the effects of capital account liberalization on exchange rates in SSA between 1996 and 2013. This is imperative given the potential negative effects CAL can have on external competitiveness and current account balances in SSA. Moussa (2016) showed that 33 countries in SSA currently have current account deficits and of these 25 have a deficit of over 7 percent. A 5 percent deficit is considered a cause for concern. This study, therefore, also examines the effect of CAL on the current account balance in SSA. Any further worsening of the current account deficits is detrimental for SSA and it can also increase the debt burden in the African economies. Hence, any findings from this study could inform policymaking in SSA. Most of the studies done for the region have been single country studies. The advantage of a panel approach is that it offers a holistic way of assessing effects taking into consideration the heterogeneity of different countries.

It has also been suggested that well-developed financial sectors can attenuate an appreciation caused by CAL and capital flows (Saborowski, 2011). In this regards, the study also seeks to examine this conjecture. Single country analyses are also conducted for South Africa and Nigeria in order to enrich the understanding of the effects of CAL on exchange rates.

This study also contributes to knowledge in several key ways. Firstly, the study tests the predictions of CAL theory for SSA which has not been done and also examines the threshold effects of financial sector development.

This provides meaningful insight given that CAL theory points towards different effects for different regions thus prompting SSA specific research. The study also contributes to knowledge by examining the direct effects of CAL on current account deficits. By doing so, the study seeks to examine the reduced competitiveness which could result from CAL and this has not been examined in previous studies. Most studies that were done in other parts of the world end their analysis by only examining effects of CAL on exchange rates. Lastly, the study employs Autoregressive Distributed Lag Models to examine the effects of CAL on exchange rates in South Africa and Nigeria. This will help to enhance our understanding of CAL particularly regarding short term versus long term effects on exchange rates.

The remainder of this chapter is structured as follows. Section 6.2 is dedicated to reviewing the various theories explaining exchange rate movements and their link to capital flows as well as highlighting some of the prominent research that has been done in the area. Section 6.3 outlines the methodology used in this chapter and section 6.4 provides the results of the empirical analysis and section 6.5 concludes the chapter.

6.2 Literature review

6.2.1Theoretical literature

Capital Account Liberalization (CAL) involves removing controls on capital inflows such as foreign direct investment, portfolio flows and so forth (Ezzahid & Maouhoub, 2015; Henry, 2006). Removal of controls is believed to facilitate efficient resource allocation where capital moves from capital-rich countries to those that are capital-poor. The importance of capital flows as determinants of exchange rates became apparent after the fall of the Bretton-Woods system. Since then, there have been attempts to explain theoretically how increased capital flows affect exchange rates.

Traditional theories of exchange rate determination viewed the exchange rate as a means to equilibrate the trade in goods. One such theory is the Purchasing Power Parity (PPP) theory which stipulates that the equivalent price of a commodity in two countries should be the same (Syden, 2012). Under this theory the exchange rate is given as:

$$E = \frac{P^*}{P} \tag{6.1}$$

Where P^* is the foreign price and P is the domestic price. This model, however, does not take into consideration the presence of capital markets. When international capital flows became larger, theories began to incorporate the influence of capital flows (Syden, 2012). In this regard, the Asset Approach to exchange rate determination takes into consideration the existence of financial asset markets and assumes perfect capital mobility. In this model, the covered interest parity condition is assumed to hold and is given by:

$$i - i^* = \frac{(F - E)}{E} \tag{6.2}$$

Where i and i^* are the domestic and foreign interest rates respectively. Under the covered interest parity condition, changes in interest rates result in changes in exchange rates and thus exchange rates are viewed as prices which equilibrate markets for financial assets (Mensah, 1982).

A growing body of literature has been devoted to describing the effects of CAL on exchange rates through the Dutch Disease phenomenon. In the traditional sense, Dutch Disease is a phenomenon where a boom in the natural resources sector causes a decline in other sectors of the economy leading to exchange rate appreciation. The seminal works on Dutch Disease were put forward by Corden and Neary (1982) who sought to explain the resource movement and spending effects of a boom. In recent terms, the Dutch Disease term has been expanded to include financial aspects such as increases in debt or capital flows. Under this phenomenon, a large inflow of foreign capital can be regarded as a boom which induces increases in the marginal product of labor and wages in the booming sector causing resources to move out of other sectors (Lartey, 2011; He *et al*, 2012). This is the *resource movement effect*. The *spending effect* occurs when higher real income in the booming sector leads to increased demand for non-tradable goods thus increasing their prices. The increased price of non-tradables is what causes an appreciation in the exchange rate. The final outcome depends on which effect dominates. The Dutch Disease model is based on the assumption that labor is freely mobile across sectors. In the real world, however, this is rarely seen. This is especially true in cases where some forms of labor are specific to certain sectors and hence not perfectly mobile. The model also assumes commodity prices and factor prices are not distorted.

This again, may not apply in the real world especially in cases where countries impose price controls which may cause distortions.

In Edward's (1988) Model of Exchange Rate Determination, the economy is also divided into non-tradable and tradable sectors where nationals are believed to hold both domestic and foreign money. The exchange rate is assumed to deviate from its equilibrium level due to changes in real variables like terms of trade, government expenditure and trade openness (Chowdhury, 1999). Under this model, opening up to capital flows can lead to an influx of capital flows. This can increase the monetary base leading to increased capital expenditure and increased demand for non-tradables resulting in exchange rate appreciation (Chowdhury, 1999). This model can be lauded for the fact that, even though it was formulated in a time when capital controls were still relatively rampant around the world, it still recognizes the existence of some capital flows. However, in the earliest formulation of the model, the only capital flows that were considered where government flows, thus leaving out private capital flows. Lastly, the model also assumes perfect foresight, an assumption which may not always be realistic.

Another explanation of the effects of capital flows on exchange rates can be drawn from the Mundell (1963)-Fleming (1962) (M-F) Model. In this model, under perfect capital mobility, an influx of capital flows brings about a balance of payments surplus which in turn causes an excess supply of foreign currency (an excess demand for domestic currency). Therefore, to clear imbalances, under a flexible exchange rate regime, the exchange rate will appreciate clearing the foreign exchange markets (Mankiw, 2007; Blanchard, 2006). The beauty of this model lies in its ability to outline different scenarios whereby capital ranges from being perfectly immobile to perfectly mobile. However, in its most basic formulation, the M-F model, assumed that market agents had no expectations about future exchange rate movement. However, in Dornbusch's (1976b) critic, the importance of exchange rate expectations was emphasized and it was argued these may determine the final outcomes of the model. Lastly, the model also assumes that only risk-neutral investors are in the system. However, in the real world there are have all types of investors and with imperfect information, there is often difficulty in distinguishing the high risk versus the low-risk investors.

6. 2.2 Empirical literature

In a study for 42 developing countries, from 1980 to 2006, Combes *et al* (2010) examined the effects of capital flows on exchange rate regimes and the real effective exchange rate. They used dynamic panel co-integration techniques and regressed the ratio of total external financing (to represent capital flows) on the real effective exchange rate. The study found that both private and public capital flows cause the real effective exchange rate to appreciate.

It was also found that portfolio investment had 7 times the effect of FDI because portfolio flows are relatively unstable. This study, however, could have also examined the direct impact of capital controls on exchange rates by including measures of capital control policies as suggested in Edwards (1988) model of exchange rate determination.

Lartey (2008) examined the effects of capital inflows regarding inter-sectoral resource allocation and movements in exchange rates, under various monetary policy rules. Results showed that increased capital inflows induced Dutch disease effects when monetary policy was designed to maintain fixed exchange rates. Furthermore, Lartey (2011), using GMM, found that increased openness led to an appreciation of the real exchange rate. The study used data from 109 developing countries and transition countries from 1990 to 2003. The analysis was conducted using both System-GMM and Difference-GMM. This study looked directly at Dutch Disease effects and unearthed a trade-off between the resource movement and spending effect after an increase in capital. That is, the less the resource movement effect towards the non-tradable sector the greater was the real exchange rate appreciation. This study combined both developing and transition countries. However, Henry (2006) pointed that research for CAL is more informative if separate studies are conducted for different regions owing to the fact that different regions began to pursue CAL at different times and that effects for developed and developing countries differ.

Recent panel studies have recognized the importance of threshold effects when examining the effect of CAL on exchange rates. For instance, Saborowski (2011) showed that a well-developed financial sector can reduce the effect of capital inflows on real exchange rate appreciation. This was unearthed in a study for 84 developing and developed countries which employed dynamic panel methods for the periods 1990-2006. The study regressed real effective exchange rates on variables including capital flows and CAL proxied by the Chinn-Ito index. The study again combines countries at different levels of development and who have liberalized capital accounts at varied times. This may not give a clear picture of the effects of CAL for specific regions.

He *et al* (2012) studied the determinants of gross capital flows and analyzed the repercussions for the Renminbi exchange rate if China were to liberalize its capital account. They used the equilibrium real exchange rate behavioral equation to forecast trends in the Renminbi exchange until 2020. In the model, CAL was assumed to affect the exchange rate indirectly through the Net Foreign Asset (NFA) position.

They found that CAL would lead to a minor depreciation of 1 percent. However, when both CAL and future economic developments are taken into consideration, they found that the exchange rate would appreciate by 9.2 percent by 2020. This study employed the NFA to capture the capital account. This could be misleading since the NFA could be affected by other external factors which would have to be controlled for.

In a study for Morocco for 1980-2012, Ezzahid and Maouhoub (2015) found that CAL resulted in a momentary real effective exchange rate depreciation in the first year. Thereafter, it led to an appreciation from the second year. The study employed structural VAR techniques and also found that CAL, initiated under a fixed exchange rate regime, led to appreciation. The measure for CAL used in this analysis was international reserves in millions of us dollars. This measure may not be suitable since it only captures reserves and hence leaves out many aspects which relate to the complex nature of CAL including policy actions to remove barriers on capital flows.

Kim *et al* (2004) employ a vector autoregressive model for Korea between 1980 and 1999. They found that, as a result of CAL and its associated capital flows, Korea experienced a real appreciation in its exchange rate and subsequent current account deficits. However, they also found evidence of sterilization where the Government tried to alleviate the exchange rate appreciation. Capital flows were also seen to become more autonomous and unrelated to imbalances in the current account. The study measures CAL using the capital account as a share of GDP. This is a simplistic way of looking at CAL which does not take into consideration the policy aspirations of the government and its deliberate influence on the capital account and the intensity of capital account restrictions.

The summary of the literature discussed is provided in Table 6.1.

Table 6.1: Summary of selected empirical studies.

Author	Scope	Findings
Combes *et al* (2010)	42 developing countries	Capital flows lead to exchange rate appreciation
Saborowski (2011)	84 developing & developed countries (1990-2000)	CAL leads to exchange rate appreciation which is attenuated by financial sector development
Ezzahid & Maouhoub (2015)	Morocco (1980-2012)	CAL leads to an appreciation in the second year
Kim et al (2004)	Korea (1980-1999)	CAL & capital flows lead to exchange rate appreciation

Source: Authors survey.

6.3 Methodology

6.3.1 Theoretical framework

The theoretical framework for this chapter draws from Edward's (1988) model of exchange rate determination and it's adaptation by Chowdhury (1999). This model assumes a small open economy where tradables and non-tradables are produced. In this economy, agents hold both domestic and foreign money and the capital account is assumed to be a function of differentials in interest rates.

The government sector is assumed to consist of both tradables and non-tradables and government finances its expenditure by using taxes that are non-distortionary taxes and increasing money supply.

In this framework, exchange rates are determined by real variables and fundamentals play a role in determining long-run equilibrium exchange rates. Long run equilibrium hence occurs when non-tradables goods market and external sectors are in equilibrium simultaneously and the current account equals the capital account. Specifically, long-run equilibrium is attained when:

i. There is domestic equilibrium or where the non-tradable sector clears;
ii. There is external equilibrium;

iii. There is a balanced budget; and

iv. There is portfolio equilibrium.

The exchange rate derived in these equilibrium settings is the long run equilibrium real exchange rate (ERER). The equilibrium relationship between exchange rates and other variables is, thus, given as follows:

$$ERER = e^{*} = f(\alpha, g_N, P_T, \psi) \tag{6.3}$$

Where: $\frac{\partial f}{\partial \alpha} < 0; \frac{\partial f}{\partial g_N} < 0; \frac{\partial f}{\partial P_T} > 0; \frac{\partial f}{\partial \psi} < 0$

The equation shows exchange rates as a function of real variables including the real worth of assets (α), government spending, (g_N) the price of tradables (P_T) and trade and capital controls (ψ). According to Chowdhury (1999), the real exchange rate is also determined by changes in fundamentals which include, terms of trade shocks. The general model can thus be expressed as follows:

$$rer = f(kal, tot, gov, tal, rgdpk, fdi) \tag{6.4}$$

Where *rer* is the real exchange rates; *kal* is a measure of capital account liberalization; *gov* is government consumption; *tal* is trade openness; *rgdpk* is relative GDP per capita, and *fdi* is foreign direct investment.

6.3.2 Empirical model specification

The following dynamic panel model will be estimated to explore the relationship between capital account liberalization on exchange rates. This model is along the lines of that employed by Saborowski (2011) and Lartey (2011).

$$\begin{aligned}\Delta lrer_{it} &= (\alpha - 1) lrer_{i,t-1} + \beta_1 lkal_{it} + \beta_2 ltal_{it} + \beta_3 ltot_{it} + \beta_4 \lg ov_{it} \\ &+ \beta_5 lfdi_{it} + \beta_6 (kal * fsd)_{it} + \beta_7 lrgdpk_{it} + \varepsilon_{it}\end{aligned} \tag{6.5}$$

The subscripts "i" and "t" denote the country and time respectively where i=1, 2…N, and t=1, 2…T. ε_{it} is the white noise error term.

rer is the real exchange rate and is the dependent variable. This is measured as the bilateral real exchange between the domestic currency and the US dollar. This is calculated as the local currency unit per US dollar period average. The data for this is collected from the World Development Indicators. This measure is used in lieu of real effective exchange rates because data on the latter for SSA is severely lacking. The interpretation of the outcome remains the same, however.

kal is an indicator for capital account liberalization given by the Wang-Jahan index (2016). This measure disaggregates the 12 sub-components of the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and is able to capture capital control intensity. This measure is available on the IMF database. In Edwards (1988) model of exchange rates, if CAL increases capital flows the exchange rate will appreciate. However, the overall effect is dependent on whether or not prices of non-tradables increase and hence, the sign on this variable is the matter of interest for this study and could be in either direction.

tal is trade openness given as exports plus imports over GDP. This is used as a proxy for trade restrictions. Edwards (1988) posits that an increase in trade restrictions can worsen the current account position and increase demand and price of non-tradables. Hence, this variable is expected to be negatively related to real exchange rates.

tot is terms of trade. Their effects on exchange rates are ambiguous and depend on whether the income effect or the substitution effect is stronger. The income effect occurs when an increase in export prices increases the income of the economy causing an increase in the price of non-tradables subsequently resulting in an appreciation. The substitution effect occurs when non-tradables are relatively cheap and therefore an improvement in the terms of trade leads to exchange rate depreciation (Chowdhury, 1999).

gov is a measure of government consumption. This is one of the major determinants of exchange rates in Edwards (1988) Model of Exchange Rate Determination. An increase in public consumption increases the relative demand for non-tradables leading to an appreciation.

However, Saborowsi (2011) also suggested that government consumption can help to moderate the effects of capital flows on exchange rates by attenuating the increase in demand for domestic goods. Hence, the sign of this variable could be in either direction.

rgdpk is the real GDP per capita. This has been included to control for the relative size of tradable versus non-tradables. This measure captures Balassa-Samuelson effects and is often employed in the literature (Ruscher & Wolff, 2009). An increase in real GDP is expected to lead to an appreciation.

The inclusion of the interactive term (*kal*fsd*) helps to determine whether more developed financial sectors help to attenuate the Dutch Disease effects of CAL (Saborowski, 2011). To measure financial sector development net credit to the private sector is used.

The selection of countries for the study is largely based on the criteria that data be available for the major variables of interest during the time span. The study hence quantifies the effects of CAL on exchange rates by developing a panel of 21 SSA countries over the period 1996 to 2013. The period is chosen due to the fact that the measure of CAL used in this study ranges from that period. The summary of the variables used is provided in Table 6.2.

Table 6.2: Summary of variables

Variable category	**Frequency**	**Definition**	**Source**
Rer	Annual	Real exchange rates	IMF
Kal	Annual	Capital Account Liberalization	IMF
Tot	Annual	Terms of Trade	World Bank
Gov	Annual	Government consumption	World Bank
Fdi	Annual	Foreign Direct Investment	World Bank
Fsd	Annual	Financial Sector Development	World Bank
rgdpk	Annual	Relative GDP per capita	World bank

Source: Authors compilation

6.3.4 Estimation methods

In the model, current and past exchange rates can be important determinants of capital flows as well (Saborowski, 2011). This may result in simultaneity bias in standard OLS regression methods. In this regards, endogeneity is expected between FDI inflows and the real exchange rates. To counter this problem, the one-step System GMM estimators by Arellano and Bover (1995) are used. These help to correct for endogeneity and allow for weak exogeneity of the explanatory variables. The implication of this is that the independent variables are allowed to be related to the present and previous observations of the dependent variable (Saborowski, 2011). The one-step estimator is employed because Hwang and Sun (2015) argued that efficiency gains of the two-step estimator may not be materialized in finite samples and that researchers should employ the two-step estimator only if the benefits outweigh the costs.

To examine the validity in the model, the study employs the Arellano-Bond test for first and second order autocorrelation and examines the Sargan Test statistic to determine whether or not the model is overidentified. Obtaining a high P-value for this implies that the model has not been weakened by too many instruments.

6.4 Results and discussions

6.4.1 Effects of CAL on real exchange rates

Firstly, the findings of the System Generalized Method of Moments (Sys-GMM) are presented in Table 6.3. From the results, it is found that a percentage increase in capital account liberalization results in a 0.26 percent appreciation in the exchange rates. This is found to be statistically significant at the 5 percent level. An explanation for this is that the exchange rate appreciation occurs when opening up the capital account leads to increased capital flows which subsequently lead to a balance of payments surplus. With a balance of payments surplus, there is an excess supply of foreign exchange relative to domestic currency. As a result, there is excess demand for domestic currency relative to foreign currency and in order for the foreign exchange markets to be cleared, there is an ensuing exchange rate appreciation. Similar findings have been obtained in other parts of the world like Korea (Kim *et al*, 2004) and in Turkey (Ozguzen, 2012).

With regards to foreign direct investment inflows, the study finds that a percentage increase in foreign direct inflows induces a 0.054 percent appreciation of the exchange rate a finding both in confirmation with the predictions of the Mundell (1963) and Fleming (1962) Model as well as the Dutch Disease models. What this simply means is that the *spending effect* of a boom in capital flows outweighs the *resource movement effect* and causes increases in prices of non-tradables hence culminating in appreciation in exchange rates.

Such Dutch disease effects of a boom in either natural resources or capital flows have been experienced in SSA in recent history. Ezeala-Harrison (1993) showed that, in Nigeria, high oil reserves shrank the agriculture sector from 62 percent in 1960 to 20.6 percent in 1980 and the oil sector grew from 0.2 percent to 29 percent in the same period. Regarding financial flows, Nyoni (1998) and Sackey (2001) found that aid flows appreciated exchange rates in Tanzania and Ghana respectively. This finding was in line with that of Fielding and Gibson (2012) who found that, in their sample of 26 SSA countries, foreign aid induced an appreciation in all but 1 country. The appreciation effect was found to be much larger in economies with fixed exchange rate regimes. Further to this, Owusu-Sekyere and Van Eyden (2013) unearthed that remittances induced real exchange rate appreciation in SSA. However, this was seen to be mitigated by monetary policy intervention and hence did not lead to a loss of competitiveness. In some cases, however, like in a study for CFA countries by Ouattara and Strobl (2003), foreign aid flows were found not to lead to Dutch Disease. Hence, this study adds on the literature by concluding that liberalizing of capital accounts and capital inflows lead to an exchange rate appreciation in SSA.

From the findings, the interaction term between CAL and financial sector development (*kfsd*) is positively related to real exchange rates. Hence, this implies that well-developed financial sectors are able to attenuate the appreciation effects of CAL, a finding which corroborates that of Saborowski (2011). This attenuation occurs due to the fact that countries whose financial sectors are more developed are in a better position to manage and allocate large capital inflows. How this works is that well-developed financial sectors help countries to allocate inflows of capital into sectors without affecting the relative price of non-tradables and hence attenuating exchange rate appreciation. In addition, a well-developed financial sector provides readily accessible information on opportunities for investment and gives investors incentives to investigate their potential. As such, this makes it easy to monitor investment and enhances efficient allocation (Saborowski, 2011).

Looking at the situation on the ground in SSA, South Africa is one of the countries with a very high level of financial sector development. Interestingly, Hodge (2012) pointed out that South Africa was able to withstand the Dutch Disease effects of a boom in natural resources and that increases in commodity prices were linked with increases rather than decreases in domestic manufacturing. Though this analysis was for natural resources, it is still relevant to the application of capital flows given that, even if there is a boom in natural resources, this includes a boom in capital since foreign direct investment within the booming natural resources sector is likely to be large. This makes sense given that a majority of the FDI inflows to SSA are in the natural resources sector (World Bank, 2014).

Looking at the other variables, it is found that GDP per capita is associated with depreciation in the exchange rates. Intuitively, this makes sense given that international trade theory posits that higher national income will increase national absorption which includes imports. With higher disposable incomes, citizens will seek to expand their expenditure and to accommodate their increased living standards they will expand their expenditure which included imported goods. Hence increased imports can worsen the trade balance and cause a depreciation in exchange rates (Mankiw, 2007). However, the effect of GDP is not statistically significant. The same can be said for other variables like terms of trade and trade openness that are observed to be correctly signed yet have effects that are not statistically different from zero to warrant any meaningful economic interpretation.

To verify the validity of the GMM specification the analysis examines the Arrelano-Bond test for first and second order serial correlation. The findings from these tests seem to validate the model and validate the incorporation of the lagged dependent variable. Findings from the Sargan test for overidentifying restrictions are also presented and from this a P-Vale of 0.895 is observed which suggests that the model is not over identified. Results from the System GMM estimation are outlined in Table 6.3 below.

Table 6.3: Effects of CAL on real exchange rates

Variable	Coefficient (Standard Error)
Real Exchange Rate$_{t-1}$	0.666 (0.083)***
Foreign Direct Investment	-0.054 (0.03)*
CAL	-0.263 (0.2137)*
CAL Financial Sector Development*	0.081 (0.045)*
Government Spending	0.029 (0.027)
Real GDP per capita	0.136 (0.282)
Terms of Trade	-0.006 (0.001)
Trade Openness	-0.209 (0.231)
AR (1)	0.002
AR (2)	**0.205**
Sargan OIR	**0.895**
DST for instruments	
GMM Instruments for levels:	
Excluding group	**0.965**
Dif (null H=exogenous)	**0.109**
Iv (eq (level)):	
Excluding group	**0.870**
Dif (null H=exogenous)	**0.728**
Instruments	36
Countries	21
Observations	303

Note***P<0.01, ** P<0.05,* P<0.1. Real Exchange Rates$_{t-1}$ is the lagged values of real exchange rates. DST: Difference in Sargan Test for Exogeneity of Instruments. Dif: Difference. OIR: Over identifying restrictions test. AR (1) and AR (2) Test statistics for first and second-order autocorrelation. The significance of the bold terms reflects (a) Failure to reject the null of no autocorrelation b) validity of instruments in the Sargan OIR test.

6. 4.2 Effects of CAL on the current account balance

The study also estimates a dynamic level-log panel model to investigate the direct effects of capital account liberalization on the current account. The findings of the effects of CAL on the current account balance are presented in Table 6.4. By examining this, the objective was to investigate whether or not CAL will directly affect the current account balance in SSA. This is a major contribution to knowledge as studies have not examined this conjecture. The following model is estimated using the System-GMM estimator. The model specification and independent variable choice is based on the specification of Calderon *et al* (1999) and is specified as follows.

$$\Delta curr_{it} = (\alpha - 1)curr_{i,t-1} + \beta_1 lkal_{it} + \beta_2 ltot_{it} + \beta_3 lrer_{it} + \\ + \beta_4 \lg dpk_{it} + \beta_5 ltal_{it} + \beta_6 l\exp_{it} + \varepsilon_{it} \quad (6.6)$$

In this model, *curr* is the current account balance as a share of GDP. The analysis also includes terms of trade (*tot*), real exchange rates (*rer*) and GDP per capita (*gdpk*) and trade openness (*tal*) as extra determinants of current account balances. Furthermore, just as in Calderon *et al* (1999), exports *(exp*) are also included in the model. The results from this analysis indicate that, directly, capital account liberalization does not affect the current account balance in a manner that is economically significant. Hence, from this finding and the finding in the preceding section, it can be concluded that CAL only has indirect effects on the balance of the current account through its impact on the exchange rates.

It is important to note however that the effect of exchange rates on the current account balance are insignificant. This could be because, for exchange rates to increase competitiveness and subsequently improve the current account balance the Marshall-Lerner condition must hold[24]. In some country specific studies for SSA, it has been shown that this may not always hold. For instance, Schaling and Kabundi (2014) showed that a real exchange rate depreciation led to a worsening of the trade deficit in the short run in South Africa. This was attributed to the Marshall-Lerner condition not holding or the J-curve effect. The J-Curve effect being a situation where the trade balance initially worsens following a depreciation before improving. For Kenya Muiti *et al* (2015) found that the Marshal Lerner condition was only fulfilled for bilateral trade with certain countries.

[24]Exchange rate devaluation or depreciation will only cause a balance of trade improvement if the absolute sum of the long-term export and import demand elasticities is greater than unity.

Similarly, Loto (2011) found that devaluation did not improve the trade balance in Nigeria. It was argued that devaluation only improves trade balance in countries that are originally export based

With regards to the other explanatory variables, an increase in exports is seen to improve the current account balance as expected. This effect is statistically significant at all levels of significance. Trade openness on the other hand is seen to worsen the current account balance. This makes sense, given that most SSA countries are net importers and hence trade openness could only be increasing the imports and thus worsening the current account balance. This finding is in line with that of Kassim (2016) who found that trade openness worsened SSA current accounts by 2.5 percentage points of GDP.

The results, however, varied across countries as Kenya experienced a trade surplus after trade liberalization whilst Uganda experienced a deficit. Terms of trade and GDP per capita are seen to have effects that are not statistically different from zero.

Table 6.4: Effects of CAL on the current account deficit

Variable	**Coefficient (Standard Error)**
Current Account Balance$_{t-1}$	0.28 (0.14)*
Trade Openness	-4.53 (1.57)***
CAL	-0.76 (2.51)
Real Exchange Rates	-0.08 (0.75)
Exports	5.59 (1.37)***
Terms of Trade	-0.02 (0.07)
Real GDP per capita	0.14 (1.02)
AR (1)	0.01
AR (2)	**0.08**
Sargan OIR	**0.075**
DST for instruments	
GMM Instruments for levels:	
Excluding group	**0.05**
Dif (null H=exogenous)	**0.661**
Iv (eq (level)):	
Excluding group	**0.138**
Dif (null H=exogenous)	0.037
Instruments	37
Countries	7
Observations	45

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1. Current Account Balance$_{t-1}$ is the lagged values of the current account balance. DST: Difference in Sargan Test for Exogeneity of Instruments. Dif: Difference. OIR: Over identifying restrictions test. AR (1) and AR (2) Test statistics for first and second-order autocorrelation. The significance of the bold terms reflects (a) Failure to reject the null of no autocorrelation b) validity of instruments in the Sargan OIR test.

6.4.3 Effects of CAL on exchange rates: Evidence from South Africa and Nigeria

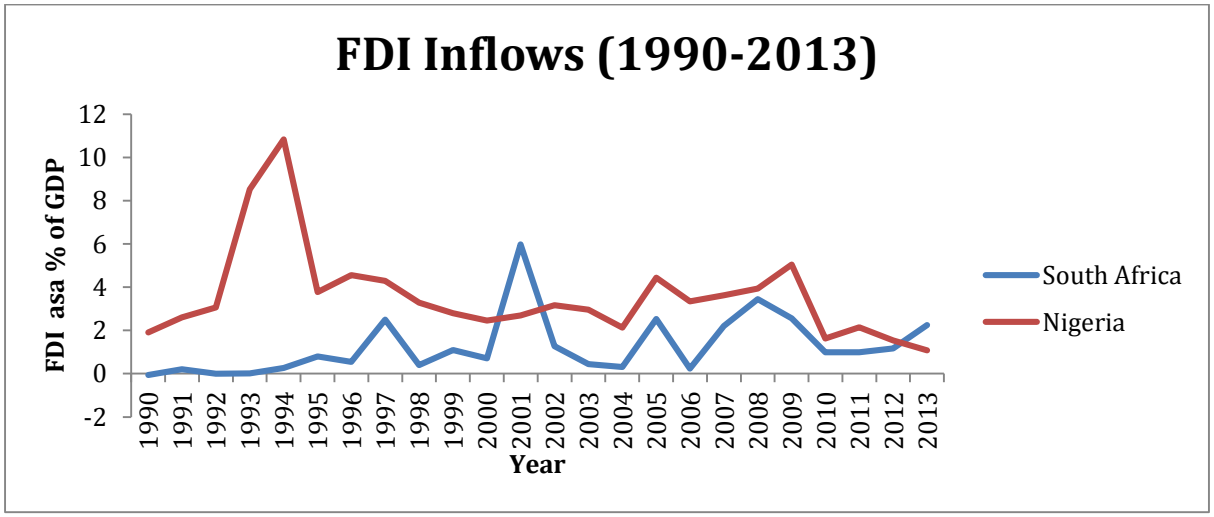
The study goes further and undertakes a comparative analysis of the effects of CAL and capital flows on exchange rates for Nigeria and South Africa. These two countries are selected because they receive very large inflows of capital compared to other SSA countries. Comparison of the two countries is made easy based on the fact that they are the two biggest economies in the SSA region.

During the apartheid era, South Africa faced many economic sanctions and remained closed off from the rest of the world. However, with the democratic elections of 1994, post-apartheid, South Africa became reintegrated with the rest of the world and began to experience a large influx of capital flows (Mohammed, 2012; Wesso, 2001; De Beer, 2015). The reforms the country undertook to liberalize capital flows included allowing non-residents to move capital freely and allowing capital to leave the country. As a result, the country moved from a net outflow of R13.7 billion in 1993 to an inflow of R2.6 billion in 1994 (Wesso, 2001).

However, capital flows to South Africa were negatively affected by the 1997 East Asian crisis and a subsequent domestic currency crisis in 2001 led to the re-imposition of some controls. It was also observed that capital flows declined in 2008 due to the contagion effects of the global financial crisis (Mohammed, 2012). Currently, South Africa's capital inflows are largely comprised of portfolio inflows unlike other parts of SSA (De Beer, 2015).

Nigeria on the other hand, along with many other SSA countries, began to relax restrictions on capital flows in the 1980s as part of the IMF Structural Adjustment Programmes (SAP's). As such, the country gradually began to encourage foreign participation of foreign investors and conducted infrastructure development programmes in a bid to attract more capital inflows (Nwosa & Akinbobola, 2016). According to Obienhina and Ukeje (2013), the Nigerian government also repealed the exchange control act and instituted policies aimed at macroeconomic stabilization all of which increased capital flows to Nigeria. Unlike South Africa, foreign direct investment has dominated capital flows in Nigeria. It was observed that between 2005 and 2010 FDI inflows increased by 30 percent (Olasode, 2015). Recently, however, portfolio flows have been increasing. Figure 6.1 shows the trend in FDI inflows for Nigeria and South Africa in the period between 1990 and 2013.

Figure 6.1: Foreign Direct Investment Inflows to South Africa and Nigeria (1990-2013)



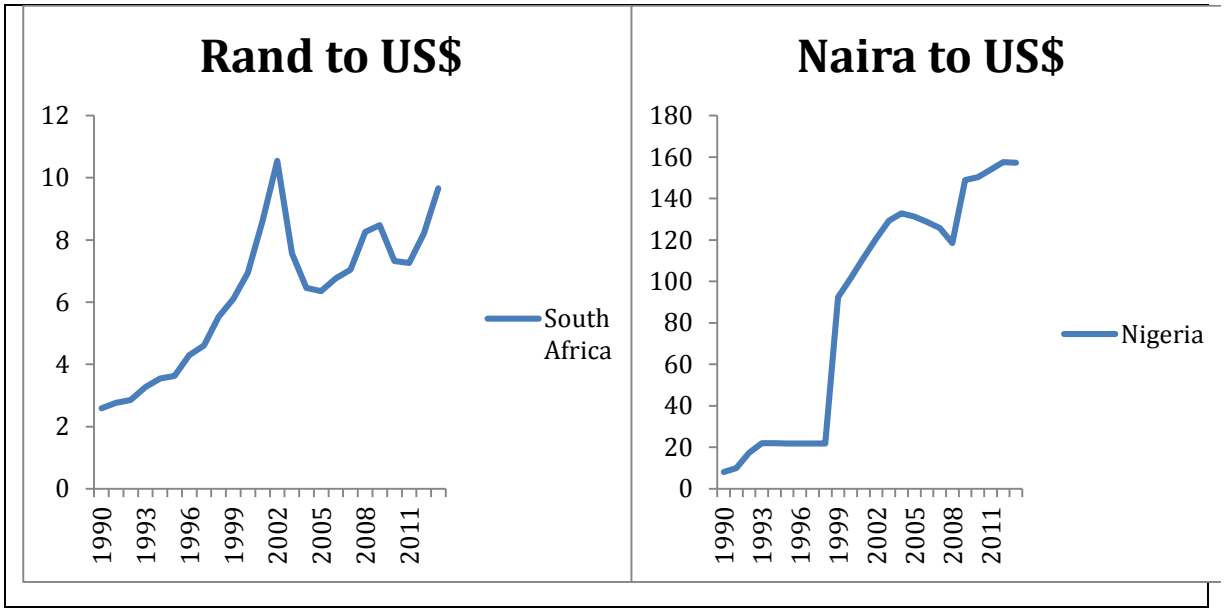
Source: World Development Indicators

With regards to exchange rate movements, the South African Rand has been gradually declining after the collapse of apartheid (Ricci, 2005). Historically, the rand has been negatively affected by crises which have occurred in other parts of the world.

This was observed during the East Asian crisis which saw the Rand depreciate by 41 percent in 1997 and by 39 percent during the 2008 global financial crisis (Hsing, 2016; De Beer, 2015). The rand also experienced bouts of volatility in 1998 and 2001 during the Rand crises (Ricci, 2005).

During the 1960's and 1970's, Nigeria pursued import substitution policies which saw an increase in its exports and led to an appreciation of its exchange rate (Owuvu & Farayibi, 2016). However, under the SAP's, many SSA countries were encouraged to devalue their currencies. This has led to volatility in the Naira. Hence, the Nigerian Naira has also been fluctuating over the years. Recently, the Naira has been experiencing bouts of depreciation and this was attributed to the depletion of foreign reserves as well as speculation by investors (Onavwote & Oyovwi, 2012). Figure 6.2 shows the trends in exchange rates in South Africa and Nigeria between 1990 and 2013.

Figure 6.2: Exchange Rate Trends in South Africa and Nigeria



Source: World Development Indicators

ARDL and Bounds Testing Methodology

To determine the nature of the relationship between capital account liberalization, capital flows and exchange rates in Nigeria and South Africa, the Autoregressive Distributed Lag Model (ARDL) developed by Pesaran and Shin (1998) is employed.

The advantage of this method is that it estimates the long and short run components of the model at the same time (Nwosa & Akinbobola, 2016). The ARDL approach can also be implemented regardless of whether variables in the model are integrated of order zero I (0) or of order one I (1) or co-integrated, unlike the Engle and Granger (1987) approach.

The model can hence be specified as follows:

$$\Delta lrer = \alpha_o + \sum_{i=1}^{p} \beta_1 \Delta lrer_{t-i} + \sum_{i=1}^{q} \beta_2 \Delta lX_{t-i} + \lambda_1 lrer_{t-i} + \lambda_2 lX_{t-i} + \mu_t \qquad (6.7)$$

Where: α_o is the intercept, Δ is the difference operator, λ are the long run multipliers and μ_t are the white noise error terms. In the model, *rer* is the real exchange rate and *X* is a vector of independent variables which include a measure of capital account openness (*kal*), government expenditure (*gov*), terms of trade (*tot*), trade openness (*tal*), foreign direct investment (*fdi*) and an interactive term for capital account liberalization and financial sector development (*kfsd*).

To perform the Bounds test that was developed by Pesaran *et al* (2001), the null hypothesis is given as $H_o = \lambda_1 = \lambda_2 = 0$ meaning there is no co-integration or long run relationship.

The alternative hypothesis is that $H_o \neq \lambda_1 \neq \lambda_2 \neq 0$ meaning that there is a long run relationship. Hence, if the F statistic obtained from the Bounds tests falls outside the critical values it can be concluded that there exists a long run relationship.

Results

Table 6.5 and 6.6 present the findings of the Augmented Dickey-Fuller Tests for Nigeria and South Africa respectively. It is evident that some of the variables are integrated of order 0, 1 and 2 respectively. That is some are stationary at levels whilst the other variables require differencing at first and second orders. This then provides support for implementing the Bounds Test cointegration techniques which does not require that the variables be differenced to the same order.

Table 6.5: Augmented Dickey-Fuller Tests for Nigeria

Variable	**Augmented Dickey-Fuller (ADF) Series**			**Ho: I (1)**
	At levels	**At Order 1**	**At order 2**	**Order of Integration**
Real exchange rates	-2.28	-3.921	-	I(1)
CAL	-5.88	-	-	I(0)
Financial sector development	-1.96	-3.37	-5.907	I(2)
Foreign Direct Investment	-1.59	-5.81	-	I(1)
Government expenditure	-2.05	-4.35	-	I(1)
Terms of trade	-0.61	-3.98	-	I(1)
Trade openness	-1.22	-5.16	-	I(1)
Gross domestic product	-0.16	-3.48	-5.379	I (2)
Inflation	-4.58	-	-	I(0)

MacKinnon critical values: 1%: -3.750, 5%:-3.00, 10%:=-2.63

Table 6.6: Augmented Dickey-Fuller Tests for South Africa

Variable	**Augmented Dickey-Fuller (ADF) Series**			**Ho: I (1)**
	Test Statistic	**At Order 1**		**Order of Integration**
Real exchange rates	-2.069	-2.67	-4.13	I(2)
CAL	-1.86	-6.93	-	I(1)
Financial sector development	-1.71	-4.14	-	I(1)
Foreign Direct Investment	-4.74	-7.23	-	I(1)
Government expenditure	-0.97	-2.88	-3.97	1(2)
Terms of trade	0.04	-1.37	-6.54	I(2)
Trade openness	-1.84	-4.50	-	I(1)
Gross domestic product	-0.39	-2.5	-4.61	I(2)
Inflation	-2.73	-3.96	-	I(1)

MacKinnon critical values: 1%: -3.750, 5%:-3.00, 10%:=-2.63

The findings of the Bounds test for Nigeria and South Africa are presented in Table 6.7. Findings from the Bounds tests, for both Nigeria and South Africa, show the presence of a long run relationship among the variables. Comparing the computed F-statistic with the critical values, it is observed that the computed F-statistic is larger than both the upper value and lower value critical values. Hence the null hypothesis of no long-run relationship is rejected in favour of the alternative that a long run relationship exists among the variables.

Table 6.7: Bounds Test for the existence of a long-run relationship

Test Statistics	**South Africa**	**Nigeria**
Computed F-statistics	66.93	5.806
Bound Testing Critical Values at 5%	Upper bound: 4.26 Lower bound:2.03	Upper bound:4.26 Lower bound:2.03

Source: Stata output Note: the null hypothesis is no levels relationship

The findings from the ARDL models are thus presented in Table 6.8. It can also be seen that in the short run, CAL is seen to cause exchange rate appreciation in both countries just as in the dynamic panel model. However, examining the long-run model, it is found that CAL is causing a depreciation of the exchange rates in the long run. The result seems to be consistent with the boom-bust cycle predictions. According to Kim *et al* (2004), CAL initially leads to influxes of capital flows, exchange rate appreciation, booms in investment and consumption and increases in prices of assets (boom phase). Over time, however, real exchange rates reduce the external competitiveness of firms leading to current account deficits. This all worsens the country's stand with investors who begin to view it negatively and hence withdraw their capital investments (bust phase) (Kim *et al*, 2004). Ultimately, the end result is a decline in net capital inflows and outflows increase and this can lead to exchange rate depreciation.

The findings also seem to suggest that the interactive term for capital account liberalization and financial sector development in the long run results in an appreciation of exchange rates. The opposite sign on this variable is also consistent with the boom-bust cycle as the economy is moving from one state of the business cycle to the next. Foreign direct investment is seen to lead to an appreciation in the exchange rates, in the long run, a finding consistent with the Dutch-Disease Effects.

Nigeria has historically had experiences with Dutch Disease when the discovery of oil led to a decline in the traditionally strong agriculture sector as well as in the chemical industry. With regards to government expenditure, it is observed that for Nigeria increased government expenditure appreciates the exchange rates just as predicted in Edwards (1988) model of exchange rate development. However, for South Africa, the opposite is true as an increase in government expenditure is seen to result in depreciation in the exchange rates. In this case, it can be argued that an increase in government consumption does not increase the demand for non-tradables in South Africa and rather helps to attenuate effects of capital inflows as suggested by Saborowski (2011). Hence it does not lead to an appreciation of exchange rates.

For Nigeria, terms of trade, GDP per capita and trade openness do not have statistically significant effects. For South Africa on the other hand, an increase in GDP per capita leads to a depreciation in the exchange rate. Hsing (2016) also find similar effects for South Africa in their study. This probably implies that increases in incomes lead to increased absorption which includes imports and subsequent trade deficit. This could explain the depreciation which could be a result of increased demand for foreign currency. The same can be said for an increase in trade openness which leads to a depreciation of exchange rate. An improvement in terms of trade also causes a depreciation in the exchange rate in South Africa. This means that the substitution effect of an increase in export prices makes non-tradables relatively cheaper than tradables and hence causes exchange rate depreciation (Edwards, 1988; Chowdhury, 1999). This outweighs the income effect where an in export prices increases the income of the economy and causes an increase in the price of non-tradables and results in an appreciation.

Table 6.8: ARDL results on the effects of CAL on real exchange rates.

	South Africa	**Nigeria**
D.lReal Exchange Rate	**Coeff (std.Err)**	**Coeff (std.Err)**
Long Run		
CAL	14.78(2.19)**	4.58(0.815)**
*CAL*Financial Sector*	-3.22(0.35)**	-1.81(0.434)*
FDI	-0.307(0.060)**	-0.476(0.106)**
Government Spending	11.505 (0.963)***	-1.11(0.297)*
Real GDP per capita	-7.39(0.942)**	-0.091(0.362)
Terms of Trade	-1.921(0.355)**	0.370(0.201)
Trade Openness	5.493 (0.67)**	0.015(0.131)
Short Run		
CAL	-10.04 (1.12)**	-17.23(5.409)*
*CAL*Financial Sector*	1.800(0.215)**	4.73 (2.133)
FDI	0.129(0.025)**	0.698 (0.2)*
Government Spending	-2.005(0.459)**	2.027 (1.22)
Real GDP per capita	-	-2.29 (1.86)
Terms of Trade	2.472(0.478)**	-1.08 (0.544)
Trade Openness	-1.647(0.257)**	-

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1

Residual Tests

In order to verify the validity of the models, several diagnostic tests on the residuals are performed. These are presented in Table 6.9. These include the ARCH tests for autoregressive conditional heteroscedasticity (X^2_{ARCH}), the Breusch-Godfrey LM test for serial correlation (X^2_{serial}), the Breusch Pagan test for heteroscedasticity (X^2_{hetero}) and the Doornik-Hansen test for normality (X^2_{normal}). The findings, from the diagnostic tests, show us that the model is robust and that the residuals are normally distributed. There is also no evidence of serial correlation as well as autoregressive conditional heteroscedasticity.

Table 6.9: Diagnostic Test Results

	Test Statistic	South Africa	Nigeria
1	X^2_{ARCH}	3.3 (0.069)	0. 87 (0.35)
2	X^2_{serial}	3.49 (0.31)	7.02 (0.229)
3	X^2_{hetero}	0.07 (0.79)	0.2 (0.657)
4	X^2_{normal}	24 (0.08)	15.9 (0.46)

Source: Stata output, Note: Figures in parentheses are probabilities of significance. The Null hypothesis of these tests are that 1. No autoregressive conditional heteroscedasticity 2. Residuals are serially uncorrelated 3. There is homoscedasticity 4. The residuals are normally distributed.

Stability tests are also performed to verify if the estimates are indeed reliable. These are the CUSUM and CUSUMSQ tests. The findings are shown in Figure 6.3. It is evident that the estimates lie within the 5 percent level of significance. This verifies the stability of the model and further confirms its validity.

Figure 6.3: Stability Tests

Figure 6. 3a: Stability Test for South Africa

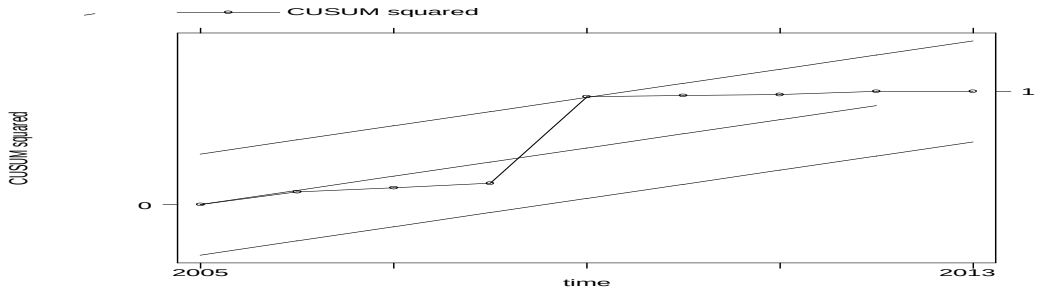
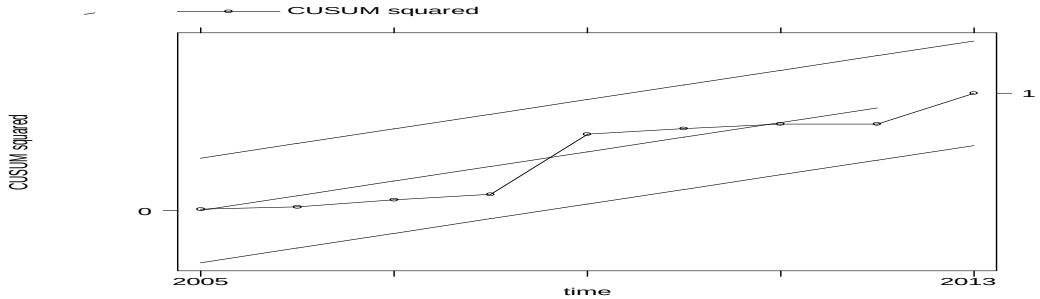


Figure 6.3b: Stability Test for Nigeria



6.5 Conclusions and policy recommendations

This chapter was aimed at examining the effects of capital account liberalization (CAL) on exchange rates in SSA. To do so, the study first employs System-GMM estimators and it is found that CAL leads to an appreciation in exchange rates between 1996 and 2013. However, higher levels of financial sector development are found to attenuate the appreciation effect. This is because countries with higher levels of financial sector development are better able to manage capital flows. In this regards, it is advisable for countries pursuing CAL to ensure that they develop their financial sectors in order to prevent any potential loss of competitiveness. Policies aimed at developing financial sectors in SSA could aim at increasing access to finance and credit, fostering enhanced access to financial services and increased efficiency in the financial sector. Specific policies could also include innovation of new financial products.

The study also examines the effects of CAL on the current account in SSA. System-GMM estimators are once again employed in the analysis. From this analysis, it is unearthed that there are no direct significant effects of CAL on current account balances. Hence, it can be concluded that CAL may only have indirect effects on the current account via its influence on real exchange rates. The results of the study also showed that exports help to improve the current account balance in SSA as expected. Hence, countries in SSA should put in place national export strategies which are aimed at broadening the export base as well as increasing exports as a whole.

Finally, the study also looked at the effects of CAL on exchange rates in South Africa and Nigeria. To do so, ARDL models were used to examine both the short and long-run effects. From the individual country analysis for South Africa and Nigeria, it is observed that in the short run, CAL leads to an appreciation in the exchange rate and a depreciation in the long run. This finding is consistent with boom-bust cycle predictions.

CHAPTER SEVEN

CONCLUSION AND POLICY IMPLICATIONS

7.1 Introduction

This thesis was aimed at examining the macroeconomic effects of capital account liberalization (CAL) in Sub-Saharan Africa between 1996 and 2013. The study was particularly aimed at examining the effects of CAL on, capital flows; financial sector development; financial crisis; and exchange rates. This was deemed vital given that these variables are not only important in their own right but have direct ramifications on economic growth in SSA. To explore the effects on capital flows, the study employed sample splitting, and threshold techniques. System-GMM estimation is employed to investigate the effects of CAL on financial sector development and exchange rates. This method is used to correct for any endogeneity. For the single country analysis on exchange rates for South Africa and Nigeria, ARDL models are employed in order to be able to distinguish the short term and long term effects of CAL. Lastly, propensity score matching techniques were also used to correct for sample selection bias in examining the relationship between CAL and financial crisis. From this, the study has made several key findings which have helped to shed light on the macroeconomic effects of CAL.

7.2 Key findings and conclusions

Firstly, it is observed that opening up of capital accounts helps to promote inflows of foreign direct investment in Sub-Saharan Africa. The study also finds evidence of significant threshold effects in SSA. That is, the effect of CAL on capital flows is enhanced by the institutional quality and financial sector development. Institutional quality is seen to enhance the effect of CAL on capital flows at all levels of institutional quality. Financial sector development, however, is seen to enhance the effects of CAL only at lower levels of development. With regards to portfolio inflows, the study finds that opening up to portfolio inflows does not significantly increase portfolio inflows in SSA. However, financial sector development is seen to play a key role in attracting portfolio inflows.

It is also unearthed that, pursued independently, CAL can be detrimental to financial sector development. However, the interactive term for capital account liberalization and trade openness has a positive influence on financial sector development. This suggests that trade openness plays a vital role in ensuring that CAL has a positive influence on the financial sector as postulated by Interest Group Theory.

The study also finds that, regarding financial sector development, institutions play a small role in enhancing effects of CAL. The non-linear effects of institutional quality were also found to be insignificant in this scenario. This is unlike the suggestions in studies done in other parts of the world (Klein & Olivei, 2001).

Regarding CAL and financial crisis, findings from this study are indicative of the fact that CAL does not lead to a currency crisis in SSA. Even after controlling for bias in sample selection, the results show that CAL does not lead to a higher likelihood of a crisis. Hence, liberalizing of capital accounts does not always result in crisis as was suggested after the experiences in East Asia, Latin America, and Russia in the mid-1990s. The reason for this is that SSA mostly receives a large amount of FDI which is a more stable capital flow compared to portfolio inflows. Portfolio inflows are the ones which are more volatile and most likely to enhance financial crisis if they are subject to reversals and sudden stops. Such findings justify the need to examine things in detail for specific regions instead of assuming events which occurred in other parts of the world are likely to occur in SSA.

Lastly, the thesis also finds that CAL and increased capital flows have Dutch Disease effects in SSA. That is, an increase in capital account openness leads to an exchange rate appreciation and this could ultimately affect domestic competitiveness. However, high levels of financial sector development help to attenuate this appreciation effect of CAL in SSA. This is because high levels of financial sector development help increase efficiency in the allocation of capital flows into sectors to mitigate potential Dutch Disease effects. The study also finds that CAL does not have a direct significant effect on the current account balance. Single country studies for South Africa and Nigeria revealed that CAL leads to an appreciation in the short run and a depreciation in the long run, a finding consistent with the boom-bust cycle predictions.

In summary, it is evident that CAL has both positive and negative effects in SSA. On the positive note, it leads to an increase in capital flows which can provide alternative sources of funding, smooth consumption and help foster economic growth. Furthermore, CAL is not found to hinder financial stability or lead to a financial crisis for SSA countries as has been argued by protagonists of CAL. On the downside, on its own CAL can have a potentially negative effect on financial sector development. However, trade openness helps to mitigate this and brings about a positive effect on the financial sector. Lastly, CAL can result in exchange rate appreciation which can affect external competitiveness.

However, this effect is mitigated by a country's level of financial sector development. This highlights the importance of having certain macroeconomic preconditions in place if a country is to benefit from CAL and to mitigate negative effects. This, thus, brings us to the policy implications of the study.

7.3 Policy implications

Firstly, the study unearthed that trade openness plays a vital role in ensuring that countries who liberalize capital accounts attain enhanced financial sector development. This is because it is suggested that more open countries are better able to withstand the negative effects of sudden stops of capital flows or their reversals. This is because there are better able to service their external obligations from their export earnings. Furthermore, the study has also shown that countries that are sufficiently open to trade are also able to attract larger FDI inflows. This brings to the fore the issue of sequencing which has been debated with arguments of what should come first between opening up current accounts and capital accounts or if it should be simultaneous. (Eichengreen, 2001) pointed out that CAL implemented in an environment of closed trade can result in poor allocation of capital to sectors which are inappropriate. Hence, as a policy recommendation, it is vital that countries pursuing CAL must ensure that they are sufficiently open to trade. Therefore, it is advisable for SSA, to abolish or reduce tariffs on trade as well as to remove any non-tariff barriers to trade such as import quotas. This will ensure that the SSA region is able to benefit fully from opening up to capital flows.

From the study, it is has been observed that institutions play a big role in attracting capital inflows. Currently, SSA countries are characterized by very poor institutions. There are rampant levels of corruption and political instability. Institutions are seen to play a more significant role with regards to attracting capital inflows but do not play a significant role in fostering financial sector development. This was attributed to the fact that levels of institutional development in SSA are very low. They range in mostly negative values save for a few countries like South Africa, Mauritius, and Seychelles. Prasad and Rajan (2008) argued that for institutions to play a big role in financial sectors, they have to be developed substantially in order to foster enhanced efficiency in the financial sectors. This further underscores the need for SSA to put in place measures to enhance institutional quality. Therefore, as a way forward, it is in the best interest of SSA countries for policymakers to scale up anti-corruption measures, increase transparency and accountability, enhance regulation and foster political stability if they are to benefit from CAL.

It is imperative that anti-corruption and governance bodies in SSA countries be capacitated and be able to operate independently of political interference if the continent is to make strides.

Findings of the study also show that financial sector development helps to attract capital inflows but plays a larger role in mitigating the exchange rate appreciation effects of capital inflows. Financial sector development was also seen to be an important determinant of portfolio inflows. Hence, it would serve SSA well if policymakers were to put in place policies and strategies that are aimed at fostering financial sector development. These strategies should tackle all aspects of financial sector development such as financial depth, access, and efficiency. There is also a need to foster financial inclusion, encourage the innovation or adoption of new financial services and products and broaden the financial sector in SSA countries. Specific policies could also aim at enhancing access to finance for firms and promoting private sector development. Financial deregulation should also be carried out, including the removal of credit controls and ceilings, which can lead to inefficient outcomes.

In general, CAL requires strong domestic financial systems, sufficiently open trade regimes, and institutions that are well-developed. On the aspect of institutions, there is also a need to enhance regulation and to promote adequate surveillance of market developments. This is because, while SSA has not received large inflows of volatile portfolio inflows, these are rising as countries become more open hence the need to ensure adequate regulation and supervision in order to help prevent any potential future financial crisis.

Lastly, there is also a need to implement sound macroeconomic policies aimed at fostering economic growth and inflation stability. This is because high levels of GDP and low inflation are seen to play significant roles in attracting capital flows, promoting financial sector development, and lowering the exchange market pressure index which is a measure of currency crisis.

7.4 Contribution to knowledge

The thesis ultimately sought to bridge the gap in the literature on CAL for SSA. This was deemed essential given that evidence for SSA at a panel level is lacking and that most studies have focused on unearthing effects of CAL on economic growth.

Furthermore, previous studies have suffered some flaws which include relying on one-dimensional measures of CAL as well as not exploring methodologies which take into consideration the threshold effects of CAL. All this has left room for further analysis. The study therefore bridges the gap in knowledge in several key ways.

Firstly, this study is the first of its kind to take a comprehensive look at the macroeconomic effects of CAL in SSA taking into consideration the fact that CAL affects a wide array of spheres in an economy apart from just economic growth. Prior to this study, there was limited evidence of effects on CAL on macroeconomic variables such as capital flows, financial sector development, exchange rates, and currency crisis. This is because previous studies on CAL have focused on effects on economic growth and a bulk of these studies where single country studies. A panel approach provides economists with a well-rounded way of examining economic relationships as it enables inference for many countries. Hence by conducting a panel study, the research was able to employ sample splitting methods and threshold effects which helped to examine the asymmetries in capital inflows in SSA. From this, the study was able to unearth that there are, indeed, significant threshold effects in the relationship between CAL and FDI since countries with higher institutional quality were found to be better able to attract foreign direct investment after liberalizing. The study is also novel in its approach in that it specifically examines the effect of foreign direct liberalization on FDI flows. This is unlike other studies that use aggregate measures of liberalization, overlooking the fact that CAL is multi-pronged.

In the same analysis on the effects of CAL on capital flows, the study also adopts an innovative approach of including infrastructure development as one of the other determinants of FDI inflows. For instance, the study departs from other studies on capital flows that have relied on using singular measures of infrastructure development and develops a composite index using Principal Components Analysis. The advantage of using a composite measure is that it helps to reduce measurement errors and hence offers more meaningful results.

Furthermore, the thesis makes a methodological contribution in examining the CAL and financial sector development nexus by probing into potential non-linearity. This is done by including an interactive term for CAL and institutional quality as well as an interactive term for CAL and the squared values of institutional quality. This is a method which has not been adopted in previous studies on the CAL-financial sector development nexus.

This provides a more meaningful analysis of thresholds in economic relationships which was imperative for this analysis and helped to establish whether or not there is a turning point in the effect of institutions on the CAL-financial sector development nexus. By using this technique, the study sought to examine if institutional quality can only enhance the effects of CAL on the financial sector up to a certain point.

Furthermore, a new measure of financial sector development is employed which is advantageous in that it is multifaceted and helps to capture overall financial sector development as well and the financial market and financial institutions development. By using this measure, the study was able to dig deeper into the intricacies of financial sector development apart from just taking a broad view of things. This is unlike other studies that rely on a singular measure such as the credit to the private sector or broad money. Hence, the results of this study are more informative since they are based on a more comprehensive index for financial sector development, unlike other indices which are singular. This measure has also enabled the analysis of effects of CAL on financial efficiency because it is disaggregated across those spheres. The advantage of this measure is that it captures how financial sectors have evolved with larger roles being played by non-bank financial institutions given that modern financial systems are now multi-faceted. This measure also captures the fact that financial markets have developed in ways which allow individuals and firms to diversify savings and it also captures access and efficiency of markets and institutions (Svirydzenka, 2016)

To examine the impact of CAL on financial crisis, this study develops an exchange market pressure index for SSA. This provides a methodological contribution in the sense that a new measure for financial crisis is developed which not only brings about richer knowledge on effects of CAL on currency crisis but also provides future researchers a ready-made means of measuring financial crisis for SSA. Such measures have been developed for other parts of the world, however, there was none which covered SSA on a wide scale hence the development of this new measure. Furthermore, apart from being the first of its kind to study the effects of CAL on financial crisis in SSA, the study also controls for potential sample selection bias which is lacking even in some studies done in other parts of the world. The importance of this approach is that it controls for the fact that sample selection may not always be random, a fact which can bias econometric results. The study also includes an interactive term for CAL and trade openness in the regressions in order to determine if trade openness enhances the effects of CAL. This was included based on the fact that researchers have debated on whether CAL should precede or supersede CAL or whether they capital and trade accounts should be open simultaneously thus shedding light on issues of sequencing.

Lastly, the study helped to unearth whether or not, liberalization will lead to Dutch Disease effects in SSA. Most studies have looked at Dutch disease effects from the perspective of a boom in natural resources, remittances or aid. This study focuses on a boom in capital flows brought about by CAL and hence provides some interesting insight for SSA.

Departing, from other studies done elsewhere, this study has also established the role which financial sector development plays in attenuating this effect in SSA. Another contribution of the study is that it examines the direct effects of CAL on current account deficits, an area which has not been examined by previous studies, be it in SSA or other parts of the world. Lastly, in the same analysis, the study goes a step further by providing a single country analysis for South Africa and Nigeria in order to further enrich our understanding of CAL. By using ARDL models for this part of the analysis, the study was able to observe that trends in exchange rates after countries liberalize capital accounts follow the boom-bust cycle predictions.

There are several other general methodological contributions made by this study. More pertinently is the use of a new measure of CAL which builds on and improves on old measures. This measure is able to capture the multifaceted nature of CAL and recognize that liberalization is broad and affects a multitude of assets and also recognizes that liberalization can be on outflows or inflows. To be specific the measure improves on other previous measures in several key ways: (i) It disaggregates CAL based on specific asset type and the direction of liberalization; (ii) It disaggregates CAL based on all 12 components of capital account liberalization in the IMF AREAER database, unlike the Chinn-Ito index which only disaggregates 4 components; and (iii) It offers more variability in CAL over the years and thus provides a richer index which captures the intensity of capital account restrictions more effectively.

Another major contribution of this study stems from the fact that it is conducted solely for SSA. This is vital given that CAL theory predicts different effects of CAL for developed and developing countries. This is unlike other policies whose effects are the same across the board. Hence studies on CAL which combine developed and developing countries in their sample are misleading since there are opposing effects which are expected from theory and these can cancel each other out (Henry, 2006).

In essence, by conducting research focusing on SSA on CAL, the study is implicitly testing whether or not the theoretical predictions of CAL hold for SSA. This essentially, helps us understand the economic theory better from a practical standpoint but also provides results specific for SSA taking into consideration that the region is characterized by different economic characteristics compared to other parts of the world.

7.5 Shortcomings and suggestions for future research

Despite its contributions to the field, there are a few areas in which future studies could build upon. Firstly, although the sample was representative of the total population of SSA, severe data limitations meant that some countries were dropped from the sample. Therefore, future studies could enhance the analysis for more SSA countries if data were to become available.

Secondly, the choice of the study period was determined by the fact that CAL reforms largely took place in this period (Ndikumana, 2003; Murinde, 2009; IMF, 2008). That is, most major conventional reforms, such as removal of FDI and portfolio flows, which were of interest in this study, were implemented during this period sampled. However, the Wang-Jahan index includes aspects such as money market liberalization, bond liberalization, and credit liberalization which are still happening. Hence future studies could also examine the effects of these forms of liberalization on aspects such as monetary policy. Specifically, studies could examine the effects of things like bond liberalization and credit liberalization which could provide interesting insight for SSA.

Future studies could also dig deeper into the analysis of the importance of institutions for CAL by possibly looking at property and company rights as these could have a direct bearing on capital flows as well. Last but not least, those seeking to conduct country-specific studies could benefit from examining the effects of CAL from a microeconomic perspective and look into the firm-level analysis to unearth the deep intricacies associated with CAL.

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APPENDICES

Appendix A: Countries used in the study

Chapter 3	Chapter 4:	Chapter 5:	Chapter 6:
Angola, Botswana, Kenya, Malawi, Mozambique, Mauritius, Nigeria, Rwanda, Seychelles, South Africa, Swaziland, Uganda, Zambia	Angola, Botswana, Malawi, Mauritius, Mozambique, Seychelles, South Africa, Swaziland, Zambia, Burkina Faso, Ghana, Liberia, Niger, Nigeria, Senegal, Togo, Central African Republic, Congo, Democratic Republic, Kenya, Rwanda, Tanzania, Uganda	Angola, Botswana Ghana, Kenya, Liberia, Malawi, Mauritius, Mozambique, Nigeria, Rwanda, South Africa, Swaziland, Tanzania, Uganda, Zambia	Angola, Benin, Botswana, Ghana, Kenya, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia

Source: Authors own compilation

Appendix B: Chapter Three Appendices

Robustness Tests

B.1: Effect of CAL on FDI after adding GDP and external debt as extra regressors

FDI	**Coeff.**	**Std. Err.**
CAL	4.64**	1.86
Real Interest Rate	-0.073**	0.032
Real Exchange Rate	-0.003	0.003
Inflation	-0.003*	0.002
Infrastructure Quality	0.165	0.355
Trade Openness	0.152***	0.02
GDP per capita	0.0004	0.0006
External Debt	0.002	0.006
Constant	-12.57***	2.9

Source: Stata Output. Note: ***P<0.01, ** P<0.05,* P<0.1.

B.2: Effect of CAL on FDI after adding transport infrastructure as an extra regressor

FDI	**Coeff.**	**Std. Err.**
CAL	4.5 **	2.2
Real Interest Rate	-0.07**	0.03
Real Exchange Rate	-0.001	0.003
Inflation	-0.003*	0.002
Institutional Quality	0.003	0.39
Trade Openness	0.14***	0.022
Transport	0.008	0.02
cons	-10.98**	3.82

Source: Stata output .Note: ***P<0.01, ** P<0.05,* P<0.1

B.3: Effects of CAL on Portfolio inflows

Port	**Coeff.**	**Std. Err.**
CAL	-5.2	4.46
Real Interest Rate	-0.037	0.074
Real Exchange Rate	0.002	0.007
Inflation	-0.0001	0.0035
Infrastructure Quality	-0.51	0.83
Trade Openness	-0.04	0.04
Financial Sector Development	0.414	0.12
cons	-0.58	5.3

Source: Stata output .Note: ***P<0.01, ** P<0.05,* P<0.1. *kal*=Capital account liberalization index, *rir*=real interest rates, *rer*=real exchange rates, *infl*=inflation, *iq*=institutional quality, *tal*=trade openness, *fsd*=financial sector development.

B.4: Effects of CAL on FDI: Where the Chinn-Ito *kaopen* index is used as a measure of CAL

FDI	**Coeff.**	**Std.Err.**
kaopen	1.34**	0.66
Real Interest Rate	-0.082**	0.032
Real Exchange Rate	-0.002	0.003
Inflation	-0.004**	0.002
Infrastructure Quality	-0.002	0.312
Trade Openness	0.149	0.02
cons	-6.97	2.35

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1. *kaopen*=Chinn-Ito capital account liberalization index,

Appendix C: Chapter Four Appendices

C.3: Robustness Test where the Chinn-Ito index is used to measure CAL

Variable	Chinn-Ito Index	Variable	FDI Liberalization
	Coeff. (Std. Err)		**Coeff. (Std. Err)**
findex_1	4.46 (0.76)***	*findex_1*	4.85 (0.58)***
kaopen	-1.5 (0.81)*	*kaldi*	-0.35 (0.17)**
ltal	-0.25(0.13)*	*ltal*	-0.29 (0.129)**
tkaopen	0.39(0.19)**	*ktal*	0.08 (0.03)**
linfl	-0.009 (0.15)	*linfl*	-0.03 (0.02)
lgdpk	-0.26 (0.2)	*lgdpk*	-0.27 (0.27)
inkaopen	-0.07 (0.17)	*kins*	0.365(0.07)***
inkaopen2	-0.26 (0.07)***	*kins2*	0.096(0.03)***
rir	-0.00004(0.0002)	*rir*	0.0003(0.0001)
lfdi	0.03 (0.02)*	*lfdi*	0.04 (0.02)*
Test for AR(1)	Pr>z=0.001	Test for AR(1)	Pr>z=0.000
Test for AR(1)	Pr>z=0.85	Test for AR(1)	Pr>z=0.9
Sargan Test	Pr>chi2=0.622	Sargan Test	Pr>chi2=0.084

Source: Stata output. Note: *findex* is the financial sector development index *kaopen*is the Chinn-Ito Index; *tkaopen* is the interactive term for CAL and trade openness; *inkaopen* and *inkaopen2* are the interactive terms for institutional quality and CAL; *kaldi*is liberalization of FDI;; *ltal, linfl, lgdpk, rir* and *lfdi*represent trade openness, inflation, GDP per capita, real interest rates and foreign direct investment respectively.
***P<0.01, ** P<0.05,* P<0.1

C.4: Robustness test examining effects of CAL on financial efficiency

Variable	Financial Efficiency Index
	Coeff. (Std. Err)
effeciency_1	0.25 (0.2)
kal	0.23 (0.211)
ltal	0.223(0.18)
lktal	-0.04 (0.047)
linfl	-0.013 (0.02)
lgdpk	0.33 (0.27)
kins	-0.0057 (0.072)
kins2	-0.141 (0.038)***
rir	0.0002 (0.0001)
lfdi	0.054 (0.023)*
Test for AR(1)	Pr>z=0.000
Test for AR(1)	Pr>z=0.187
Sargan Test	Pr>chi2=0.086

Source: Stata output. Note: e*ffeciency_1* is the lagged value of the dependent variable which is now financial efficiency; *NCP_1* is the lagged value of the dependent variable for the model where net credit to the private sector (NCP) is the dependent variable; *kal*is liberalization of capital account; *ltal, linfl, lgdpk, rir* and *lfdi*represent trade openness, inflation, GDP per capita, real interest rates and foreign direct investment respectively; *kins* and *kins2* are the interactive term for CAL and institutional quality and its squared term respectively.
***P<0.01, ** P<0.05,* P<0.1

Appendix D: Chapter Five Appendices

D.1: Results of Hausman Test and Modified Wald test for Heteroscedasticity

Hausman Test	**Ho: Difference in coefficients not systematic**
Chi2 (6)	9.71
Prob>chi2	0.137
Modified Wald Test	**Ho: Homoscedasticity**
Chi(15)	45196
Prob>chi2	0.000

Source: Stata output

D.2: LSDV Regression for Portfolio Equity (kaleq) and FDI liberalization (kaldi).

Variable	**Kaldi** **Coeff. (SE)**	**kaleq** **Coeff. (SE)**
kal	-0.017(0.02)	0.036(0.03)
ktal	0.010(0.016)	0.036(0.028)
lm3	0.003(0.006)	0.005(0.0057)
lrer	-0.005(0.008)	-0.018(0.026)
linfl	-0.002(0.005)	-0.0003(0.0054)
lgdp	-0.03(0.02)	-0.02(0.03)
Constant	0.23(0.22)	0.27(0.22)

Source: Stata output. Note: ***P<0.01, ** P<0.05,* P<0.1. *kal* =capital account liberalization; *ktal*=capital account liberalization*trade openness, *lm3*=broad money, *rer*=real exchange rates, *infl*=inflation, *gdp*=gross domestic product, the prefix l stands for log.

D.3: Results of the Regression with Unweighted EMP

Variable	**Un-weighted EMP** **Coeff. (SE)**
kal	-1.64(1.17)
ktal	0.324(0.41)
lm3	0.28(0.20)
lrer	-2.13(1.45)
linfl	-0.319(0.005)
lgdp	-0.025(0.03)
Constant	0.27(0.22)

Source: Stata output
Note: ***P<0.01, ** P<0.05,* P<0.1
kal =capital account liberalization; *ktal*=capital account liberalization*trade openness, *lm3*=broad money, *rer*=real exchange rates, *infl*=inflation, *gdp*=gross domestic product, the prefix l stands for log.

D4. Results using *De Facto* measures of Capital Flows

Variable	Total capital openness	FDI openness	Portfolio inflow openness
	Coeff. (SE)	**Coeff. (SE)**	**Coeff. (SE)**
kal	-0.0000(0.0000)	-0.0000(0.0000)	-0.0000(0.000)
lm3	0.012(0.007)	0.012(0.007)	0.012(0.007)
lrer	-0.063(0.039)	-0.063(0.04)	-0.07(0.04)
linfl	0.0085(0.006)	0.008(0.007)	0.008(0.007)
lgdp	0.008(0.063)	0.007(0.06)	0.019(0.067)
Constant	0.11(0.39)	0.12(0.38)	0.053(0.416)

Source: Stata output
Note: ***P<0.01, ** P<0.05,* P<0.1
kal =capital account liberalization; *lm3*=broad money, *rer*=real exchange rates, *infl*=inflation, *gdp*=gross domestic product, the prefix l stands for log.