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# Capital account liberalization, capital flows and exchange rates in sub-Saharan Africa

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## Abstract

Capital account liberalization (CAL) is the removal of restrictions on capital accounts to allow for the free movement of capital across countries. It has been suggested that CAL can lead to exchange rate appreciation by promoting an influx of capital flows. Evidence of this remains wanting, however, as few studies have been conducted with little consensus obtained. This paper, therefore, aimed at investigating this conjecture in sub-Saharan Africa (SSA) for the period between 1996 and 2013. System-GMM estimation techniques are employed from which we find that CAL leads to an exchange rate appreciation in SSA. However, higher levels of financial sector development (FSD) help to attenuate the appreciation effects. Individual country analyses for South Africa and Nigeria are also performed using Autoregressive Distributed Lag models. From this, we find that CAL causes an appreciation of exchange rates, only in the short run. The study makes contributions to the body of knowledge by including interactive terms for CAL and FSD thus unearthing the non-linear dynamics in the CAL-exchange rate nexus in SSA. In doing so, this also controls for some heterogeneous characteristics in the sample. 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.

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## 1. Introduction

In recent history, there has been an increase in globalization and this catapulted the removal of restrictions on capital flows. The collapse of the Bretton-Woods system, in the 1970s, brought about a wave of financial integration that saw many developed countries move towards more open capital accounts (Bordo, 1993). Following the trends in other parts of the world, sub-Saharan African countries began to liberalize capital flows in the mid-1980s under the auspices of the IMF/World Bank Structural Adjustment Programmes (SAP). A few early reformers began to implement reforms on the capital account as early on as the 1980s, however, a large bulk of Capital Account Liberalization (CAL) reforms began to be implemented in the 1990s (Murinde, 2009). This was often kick-started by eliminating or relaxing restrictions on long-term capital flows, such as Foreign Direct Investment (FDI) while maintaining controls on short-term capital flows. 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. 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 Biekpe, 2013). Before that, during the apartheid regime, the country had faced economic sanctions and was closed off to the rest of the world.

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 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-1990s. 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 policymaking. 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).

Whether CAL leads to an 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. Further deterioration of current account balances would, not only increase Africa's debt burden but could also render the region vulnerable to crises. Previous 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.

Furthermore, little is known if certain country conditions can help in attenuating the appreciation effects of CAL. Saborowski (2011) stated that

higher levels of financial sector development could attenuate the Dutch Disease effects of increased capital flows. This remains to be proven in the SSA context and can offer meaningful policy implications. Single country analyses are also conducted for South Africa and Nigeria 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. That is, with CAL developing countries are expected to experience capital inflows as opposed to developed countries which are expected to experience capital outflows based on their differing returns to capital (Henry, 2006). 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 the effects of CAL on exchange rates. Apart from this, 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 study also 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.

## 2. Literature review

### *2.1. Theoretical 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:

$$E = \frac{P*}{P} \tag{1}$$

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:

$$i - i* = \frac{F - E}{E} \tag{2}$$

Where $i$ and $i^*$ are the domestic and foreign interest rates respectively. Here, movements in interest rates result in movements in exchange rates.

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 that 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 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 that 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 (1976) critic, the importance of exchange rate expectations was emphasized and it was argued these might determine the 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 low-risk investors.

### 2.2. *Empirical literature*

The literature on the effects of CAL has steadily been growing in popularity. Early studies were mainly focused on examining the effects of CAL on economic

growth and capital flows. More recently, researchers have started to focus on the effects of CAL on other macroeconomic variables with a few studies on the effects on exchange rates recently cropping up. These studies have employed various methods in a bid to promote the understanding of the exchange rate effects of CAL.

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 cointegration 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 seven 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. For this study, we employ the Wang-Jahan index for CAL, which is a measure of capital control policies.

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 since different regions began to pursue CAL at different times and that effects for developed and developing countries differ. More importantly, the effects of CAL are expected to differ in regions that are largely less developed compared to developed regions. By focusing only on sub-Saharan Africa, this study overcomes this challenge.

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 could 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. The study focuses only on sub-Saharan Africa, thus overcoming this challenge.

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 that would have to be controlled. This study employs the Wang-Jahan index, which is a policy measure of CAL, which purely captures the effects of liberalizing the capital account.

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 that relate to the complex nature of CAL, including policy actions to remove barriers on capital flows. CAL is multi-faceted and has many aspects, which are captured in the Wang Jahan index employed in this study.

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. By employing the Wang-Jahan index, this study overcomes this challenge.

In summary, one of the major concerns from past studies like Lartey (2008) and Saborowski (2011) has to do with combining developing and developed countries. This does not consider the fact that most developed countries liberalized as early on as the 1970s, unlike SSA countries who largely liberalized in the 1990s when conditions were vastly different. As such, Henry (2006) emphasized the need for separate research for developed and developing countries. This can help offer more significant findings. More pertinent is the fact that developing countries are expected to experience a capital inflow whilst developed countries are expected to experience outflows. Thus Henry (2006) postulated that including both regions in a study can have opposing effects that may cancel out and provide insignificant findings. Furthermore, some of the studies such as Combes *et al*. (2010) and He *et al.* (2012) have relied on using de facto measures of CAL such as capital flows which only show the volume of capital flows as an indicator of openness. However, Edward's (1988) model of exchange rates advocates for the use of de jure measures of CAL which show the policy of liberalization. The summary of the literature discussed is provided in Table 1.

Table 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.

## 3. Methodology

### *3.1. Theoretical framework*

The theoretical framework for this paper draws from Edward's (1988) model of exchange rate determination and its 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 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 a 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:

$$ERER = e^{*} = f(\alpha, g_N, P_T, \psi) \tag{3}$$

Where $\frac{\partial f}{\partial \alpha} < 0; \frac{\partial f}{\partial g_N} < 0; \frac{\partial f}{\partial \varphi} < 0;$

The equation shows exchange rates as a function of real variables including the real worth of assets ($\alpha$), government spending ($g_N$), (the price of tradables ($P_T$), and trade and capital controls ($\psi$). 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:

$$rer = f(kal, tot, gov, tal, rdgpk, fdi) \tag{4}$$

Where *rer* is the real exchange rate; *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.

### 3.2. Empirical model specification

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

$$\Delta lrer_{it} = (\alpha - 1) lrer_{i,t-1} + \beta_1 lkal_{it} + \beta_2 lkal_{it} + \beta_3 ltot_{it} + \beta_4 lgov_{it} + \beta_5 lfdi_{it} + \beta_6 (kal*fsd)_{it} + \beta_7 lrgdpk_{it} + \varepsilon_{it} \quad (5)$$

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

*rer* is the exchange rate and is the dependent variable 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 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).

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.

*fdi* is foreign direct investments and is used to measure capital flows. This helps ascertain the direct impacts of capital flows on exchange rate as is posited by the Mundell (1963) and Flemming (1962) Model.

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. Inclusion of this also helps to address the issue of heterogeneity in the sample as some countries may have more developed financial sectors than others and could potentially experience different effects from CAL.

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 2.

Table 2: Description of Variables or Summary of Variables

| Variable category | Frequency | Definition | Source |
|---|---|---|---|
| *rer* | Annual | 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.

### *3.4. Estimation methods*

In the model, current and past exchange rates can be important determinants of capital flows (Saborowski, 2011). This may result in simultaneity bias in standard OLS regression methods. In this regard, 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.

### *3.5. 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 balance. 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.

$$\Delta curr_{it} = (\alpha - 1)curr_{i,t-1} + \beta_1 lkal_{it} + \beta_2 ltot_{it} + \beta_3 lrer_{it} + \beta_4 lgdpk_{it} + \beta_5 ltal_{it} + \beta_6 lexp_{it} + \varepsilon_{it} \quad (6)$$

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.

### *3.6. Effects of CAL on exchange rates in Nigeria and South Africa*

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.

*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 (Nwosu & 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 cointegrated, unlike the Engle and Granger (1987) approach.

The model can hence be specified as follows:

$$\Delta lrer = \alpha_o + \sum_{i=1}^{p} \beta_1 \Delta lrer_{t-i} + \sum_{i=1}^{q} \beta_2 \Delta lX_{t-i} + \lambda_1 lrer_{t-i} + \lambda_2 lX_{t-i} + \mu_t \qquad (7)$$

Where: $\alpha_o$ is the intercept, $\Delta$ is the difference operator, $\lambda$ are the long run multipliers and $\mu_t$ 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 cointegration 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. The bounds test has both lower and upper bound values. The lower bound values assume that the explanatory variables are integrated of order zero, or *I*(0), while the upper bound values assume that the explanatory variables are integrated of order one, or *I*(1). If computed *F*-statistic falls below the lower bound value, I(0), the null hypothesis of no cointegration cannot be rejected. Conversely, if the computed *F*-statistic exceeds the upper bound value, *I*(1) it is concluded that real exchange and its determinants are

cointegrated and approach a long-run equilibrium. However, if the test statistic lies between these two bounds, the result is inconclusive.

## 4. Discussion of results

### *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 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 1 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 one 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).

Examining the coefficients other explanatory variables indicates that GDP does not significantly affect exchange rates. The same is observed 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, we examine 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 3 below.

Table 3: Effects of CAL on Real Exchange Rates and the Current Account Balance

| Variable | Coefficient (Standard Error) | Variable | Coefficient (Standard Error) |
|---|---|---|---|
| Real Exchange Rate $_{t-1}$ | 0.666 (0.083)*** | Current Account Balance $_{t-1}$ | 0.28 (0.14)* |
| Foreign Direct Investment | -0.054 (0.03)* | Trade Openness | -4.53 (1.57)*** |
| CAL | -0.263 (0.2137)* | CAL | -0.76 (2.51) |
| CAL* Financial Sector Development | 0.081 (0.045)* | Real Exchange Rates | -0.08 (0.75) |
| Government Spending | 0.029 (0.027) | Exports | 5.59 (1.37)*** |
| Real GDP per capita | 0.136 (0.282) | Terms of Trade | -0.02 (0.07) |
| Terms of Trade | -0.006 (0.001) | Real GDP per capita | 0.14 (1.02) |
| Trade Openness | -0.209 (0.231) | AR (1) | 0.01 |
| AR (1) | 0.002 | AR (2) | 0.08 |
| AR (2) | 0.205 | Sargan OIR | 0.075 |
| Sargan OIR | 0.895 | DST for instruments | |
| DST for instruments | | GMM Instruments for levels: | |
| GMM Instruments for levels: | | Excluding group | 0.05 |
| Excluding group | 0.965 | Dif (null H=exogenous) | 0.661 |
| Dif (null H=exogenous) | 0.109 | Iv ( eq (level)): | |
| Iv ( eq (level)): | | Excluding group | 0.138 |
| Excluding group | 0.870 | Dif (null H=exogenous) | 0.037 |
| Dif (null H=exogenous) | 0.728 | Instruments | 37 |
| Instruments | 36 | Countries | 7 |
| Countries | 21 | Observations | 45 |
| Observations | 303 | | |

*Notes:* *** $P<0.01$, ** $P<0.05$ * $P<0.1$. Real Exchange Ratest-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. Correlation is significant at the 0.01 level (2-tailed).

### *4.2. Effects of CAL on the current account balance*

The findings of the effects of CAL on the current account balance are presented in Table 3 above. It is important to note, however, that the effect of exchange rates on the current account balance is insignificant. This could be because for exchange rates to increase competitiveness and subsequently improve the current account balance, the Marshall-Lerner condition must hold.[1] 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.

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.

### *4.3. Effects of CAL on exchange rates: Evidence from South Africa and Nigeria Findings from the Augmented Dickey-Fuller Tests for Nigeria and South Africa*

Table 4 and 5 present the findings of the Augmented Dickey-Fuller Tests for Nigeria and South Africa, respectively. It is evident that some of the variables

[1] 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.

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 4: 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 5: 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. 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: 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<br>Lower bound:2.03 | Upper bound: 4.26<br>Lower bound:2.03 |

*Source:* Author's computation in Stata.
*Note*: the null hypothesis is no levels relationship.

The findings from the ARDL models are thus presented in Table 7. 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 had 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 7: 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 Development | -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 Development | 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)** | - |

S*ource*: Authors computation in Stata. 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 8. These include the ARCH tests for autoregressive conditional heteroscedasticity ($X^2_{ARCH}$), the Breusch-Godfrey LM test for serial correlation ($X^2serial$), 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 8: 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 1. 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 1a: Stability Test for South Africa

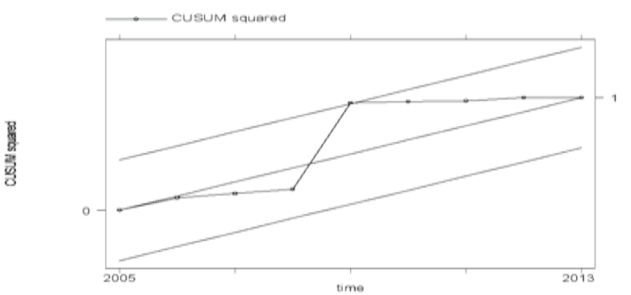
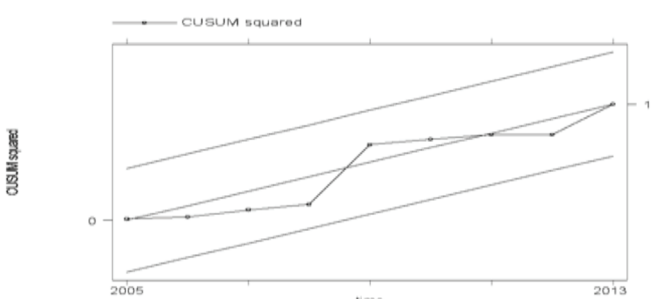



Figure 1b: Stability Test for Nigeria



## 5. Conclusions and policy recommendations

This paper 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 significant direct 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.

## Biographical Notes

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**Appendix 1:**

Countries in the sample:

Angola, Benin, Botswana, Ghana, Kenya, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia.