

Unlocking the relationship between capital flows and economic growth in a small open economy of Kenya: An empirical investigation

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Abstract

By helping to augment domestic savings for investment, capital flows into a country such as foreign direct investment (FDI), remittances, debt, portfolio equity and official development assistance (aids) can stimulate economic growth. A key debate in economic literature is whether different types of capital flows have different effects on the economic performance of a country. The empirical literature has remained largely inconclusive on the matter. This paper provides further evidence on this issue by examining the relative effects on economic performance of the different types of financial flows in Kenya. This is against the backdrop of the fact that the government of Kenya has targeted attracting foreign capital inflows as one of the key measures to achieving the economic pillar of the Kenya Vision 2030, which aims to achieve an economic growth rate of 10 per cent annually and sustaining the same until 2030.

Using the autoregressive distributed lag model (ARDL) bounds approach and data for the period 1970 to 2017, the paper first, explores the direction of causal relationship between the level of economic growth and the different capital flows. Second, it examines the nature (i.e. the sign and size) of the effects of the different capital flows both in the long- and short- runs. After a very rigorous and careful model selection exercise, the results robustly reveal a very strong long-run causality running solely from portfolio equity to economic growth with a positive and significant effect on economic growth. In the short-run, the effect of portfolio equity on economic growth is also very positively strong. In contrast, all the other capital flows have very weak long run relationship with economic growth with causality running only from economic growth to the capital flows.

Keywords: Foreign capital flows, Economic growth, Kenya, ARDL

JEL Classification: C32, F21, F24

1. INTRODUCTION

Foreign capital inflow plays an important role in the economic growth of developing countries to supplement domestic savings for investment and growth. There is great need for foreign capital in Africa given its high poverty levels and low domestic capacity to save. The realisation of this need has led many African countries, including Kenya, to liberalise their financial systems to attract foreign capital. In Kenya, efforts to attract foreign capital flows began with the operation of rapid capital account liberalisation from 1991 to 1995. Such efforts included relaxing restrictions on foreign currency transactions and introducing foreign exchange bearer certificates of deposit (FEBCs). Restrictions on portfolio investments, excluding some exceptions, on capital account transactions were also removed (Yoshino, Kaji & Asonuma, 2015: 13). In 2008, Kenya launched its 'Vision 2030' initiative as a vehicle for accelerating transformation of the country into a rapidly industrialising middle-income nation by 2030. It also aims to make the country globally competitive and prosperous where every individual will have a high quality of life. This is expected to be achieved through internally generated resources while Kenya continues to benefit from remittances by the Kenyans in diaspora, increased foreign direct investment (FDI), foreign portfolio investment (FPI) and cooperation from its development partners to achieve higher economic growth rates in the region of 10% per annum (Government of Kenya, 2007).

A key debate in economic literature is whether different types of capital flows have different effects on the economic performance of a country. Despite these efforts, capital flows into Kenya have historically been moderate. Although official development assistance (ODA) has been high, it has declined recently. This raises two questions: How to attract foreign capital flows; and which one of these is best to focus on given that their relative contribution to economic growth may not be the same since the effects of capital flows on economic growth depend on the type of foreign capital and the type of economy (Aizenman, Jinjara & Park, 2013: 373-374).

A review of the available empirical literature reveals that the effects of capital flows on economic growth have not been consistent. Some researchers argue that foreign capital flows would improve economic growth in developing countries (Bailliu, 2000; Aizenman et al., 2013), while others argue that foreign capital flows have a negative effect on growth (Durham, 2004; Murshid & Mody, 2011). By and large, most studies conducted in the Kenyan context have focused on one particular capital flow, namely FDI (Abala, 2014; Ngeny & Mutuku, 2014), while others (Mwangi & Mwenda, 2015) concentrated on remittances. To the best of our knowledge, only one study compared some of these capital flows, namely FDI, FPI and cross-border interbank borrowing (Ocharo, Wawire, Kosimbei, & Ng'ang'a, 2014).

This study will contribute to the existing body of knowledge by investigating the relationship between capital flows and economic growth in the Kenyan context. The main aim of this study is to investigate and determine the effect of five foreign capital flows, namely FDI, portfolio equity, debt liabilities, foreign aid and remittances, on the economic growth of Kenya over the past four decades; and to determine which benefits the economy most. Even though it is important to know the contribution of each of the five identified capital flows in the economy, it is imperative to know the effect of the economy on each of these capital inflows. The study is motivated by the present agenda of the Kenyan government to pursue "Vision 2030" through increases in remittances and foreign capital flows such as foreign direct investment and foreign portfolio investment. To achieve the desired goal, the government may need to concentrate on the capital flow that contributes most to economic growth. This necessitates a study to determine the contributions of

each capital which will enable policymakers in Kenya know which specific capital flow is best to target.

In the next section, we look at the literature surrounding the theory on capital flows as well as review existing literature relating to this study in Kenya. In section 3, we focus on the foreign capital flows in the context of Kenya specifically. Section 4 presents the econometric procedure employed in the analysis, while section 5 presents and discusses the results. Section 6 summarises and concludes the paper with relevant recommendations.

2. LITERATURE REVIEW

2.1. Theoretical framework

This study employs the endogenous growth model – popularly known as the “AK model” – used by Pagano (1993) and its extended form by Bailliu (2000), who introduced international capital flows to capture the relationship between foreign capital flows and economic growth. Here, the aggregate output is a linear function of the aggregate capital stock:

$$Y_t = AK_t \quad (1)$$

where the above is a typical growth function, Y_t = aggregate output in time (t); K_t = capital stock in time (t) which is a combination of both physical and human capital; and A = marginal productivity of capital (MPK). It is assumed that (i) the population growth rate is constant; and (ii) the economy produces a single good, which can either be consumed or invested. If invested, the capital stock depreciates at the rate of δ per period, and then gross investment is given as:

$$I_t = K_{t+1} - (1 - \delta) K_t \quad (2)$$

However, the transmission of savings into investment requires financial intermediaries where a proportion of savings ($1 - \phi$) is taken as compensation for services offered. The remaining savings is equal to investment.

$$\phi S_t = I_t \quad (3)$$

The growth rate of output, g , from equations (1) - (3) without the time indices is given by:

$$g = A\left(\frac{I}{Y}\right) - \delta = A\phi s - \delta \quad (4)$$

where s = gross saving rate. Equation (4) is the steady state growth rate of a closed economy.

From the above, financial development has an impact on economic growth through financial intermediaries effectively allocating savings for investment. The expertise of banks through increased intermediation results in a reduction of the spread between lending and borrowing rates, which in turn leads to an increase in the proportion of savings invested, thereby leading to an increase in g through the increase in ϕ from equation (4). In addition, financial intermediation allocates capital to more productive investments and channels funds to investments where there is higher marginal productivity of capital, thereby leading to higher growth.

The above framework is extended to integrate foreign capital flows that draw on the work of Bailliu (2000) and Aziakpono (2013). The closed economy assumption is relaxed here to allow free

movement of capital into and out of the domestic economy. The above equilibrium conditions can be modified to adjust for the effects of foreign capital flows as follows:

$$\phi^*(S_t + FCF_t) = I_t^* \quad (5)$$

where FCF_t is the net foreign capital flows and $*$ represents open economy. The new steady-state growth rate is represented as:

$$g^* = A^* \frac{I^*}{Y} - \delta = A^* \phi^* \frac{(S+FCF)}{Y} - \delta = A^* \phi^* s^* - \delta \quad (6)$$

In the absence of any friction, the model suggests an increase in capital flows to the developing country ($FCF_t > 0$), which will help to augment domestic savings ($s^* > s$). In a situation where the foreign capital inflow is invested productively and not consumed, the level of domestic investment in the developing country will rise, which in turn will lead to an increase in economic growth ($g^* > g$).

The different capital flows, however, lead to growth in different ways. In the case of FDI, it leads to growth directly through increase in stock of physical capital in the host economy as the foreign capital is accumulated. FDI can also affect growth indirectly by inducing human capital development through training and skill acquisition; and strongly encouraging technological upgrading (De Mello, 1997: 8-10). Equity portfolios affect growth differently from FDI. According to Levine & Zervos (1998), liberalising constraints on foreign portfolio flows tends to increase domestic stock market liquidity, which could have a positive effect on productivity and growth.

Foreign aid affects the growth of an economy mainly through development projects and investment rather than consumption. The general argument behind the aid-growth theory is that physical capital leads to economic growth. Foreign aid is usually used to fill gaps in the economy, such as the savings gap (S-I)¹, which is a combination of the foreign exchange gap or external financing gap (X-M)², as well as the fiscal gap (G-T)³. The “two-gap” model specified in Easterly (2003) as developed by Chenery and Strout (1966) has been employed to explain the link between foreign aid and economic growth. This is shown as: $g = (I/Y) / \mu$; and $I/Y = A/Y + S/Y$, where I = required investment; Y = output; g = targeted GDP growth; A = aid; S = domestic savings and μ = Incremental capital-output ratio (ICOR). This model explains how foreign aid increases investment and how investment leads to increase in economic growth.⁴ This has also been used to explain foreign debt flows. According to Pattillo, Poirson and Ricci (2002), there are different aspects of the theory on foreign debt flows and economic growth. One view shows that a rational level of debt is expected to have a positive effect on growth, while another view suggests that large accumulated debt stocks may be a deterrent to growth. The third view combines both these perspectives.

Remittances generally help to develop financial markets, finance entrepreneurial activities, act as insurance against shocks, finance household expenditure and household human capital formation, and bridge the savings investment (S-I) and external financing (X-M) gaps. In turn, this would

¹ The savings gap is expressed as ‘S-I’ and refers to the difference between domestic savings (S) and domestic investment (I).

² The external financing gap is expressed as ‘X-M’ and refers to the difference between imports (M) and exports (X). This has to do with the interaction between countries on trade.

³ The fiscal gap is expressed as ‘G-T’ and refers to the difference between government expenditure and government income (taxation).

⁴ Refer to Easterly (2003) for a detailed account of this process.

lead to an increase in economic growth. The literature has grouped migrant remittances into two main components, namely the endogenous migration approach and the portfolio approach (Elbadiwi & Rocha, 1992; Chami, Fullenkamp & Jahjah, 2003). The endogenous migration approach is based on the economics of the family, which includes but is not limited to motivations based on altruism. The portfolio approach stems from the decision to invest in home country assets. The portfolio view is a theory of remittances that supports the view that remittances behave like other foreign capital flows.

2.2 Empirical evidence on foreign capital flows and economic growth

The literature is replete with various studies on foreign capital flows. Generally, capital flows have been found to have a range of effects, from positive (Bailliu, 2000) to negative (Levine, 2001; Murshid and Mody, 2011) with some studies recording no significant effect on the economic growth of the receiving country based on the type of foreign capital. Empirical literature that grapples with how foreign capital flows affect economic growth has grown over time and one can see that the observed effects are also often inconclusive. The growing analyses of this subject have focused on one aspect or form of capital flow or the other at a time. For example, studies that solely focused on FDI (Borensztein et al. 1998; Alfaro et al. 2004; Adjasi et al. 2012), equity portfolio investment (Levine and Zervos, 1998; Durham, 2004; Chinn and Ito, 2006), debt flows (Soto, 2000; Baharumshah and Thanoon, 2006), bank lending (Reien and Soto, 2001; Baharumshah and Thanoon, 2006), foreign aid (Burnside and Dollar/ 2000; Easterly et al. 2003), and remittances (Acosta et al. 2008; Guiliano and Ruiz-Arranz, 2009; Adenutsi et al., 2011; Lartey, 2013) have been previously documented in literature.

While numerous studies have focused on each type of capital flow, their results are still ambiguous and inconclusive. Very few attempts have actually been made in general in comparing the contribution on economic growth. A few exceptions are (Reisen and Soto, 2001; Aizenman et al. 2013; Driffield and Jones, 2013). Aizenman et al. (2013) observed that the link between growth and lagged capital flows depends on the type of flows, economic structure, and global growth patterns. In their study of 105 countries from 1990 to 2010 using panel data estimation, they found a robust relationship between FDI (both inflows and outflows) and growth but a smaller and less stable relationship between growth and equity flows. On the other hand, the relationship between growth and short-term debt was found to be nil before the 2008 financial crisis, and negative during the crisis period.

Closely related to this study is the work of Driffield and Jones (2013), one of the latest studies on capital flows and economic growth. They studied a large number of developing countries for the years 1984 to 2007 using the three stage least square (3SLS) panel system estimator and concluded that all sources of foreign capital observed by them (FDI, ODA and workers' remittances) have a positive and significant impact on growth. This was the case when institutions were taken into consideration as ODA became positive only when the bureaucracy of disseminating was taken into account. They used GDP per capita growth as a measure of economic growth and most of their data were obtained from the World Bank World Development Indicator database except the FDI data from UNCTAD⁵ and human capital data from the compiled data of Barro and Lee (2000).

⁵ United Nations Conference on Trade and Development

A similar earlier study conducted by Reisen and Soto (2001) on a sample of 44 countries using annual data from 1986 to 1997 revealed a similar result. They used generalized method of moments (GMM) technique to measure the independent growth effects of various capitals flows (FDI, equity and bond flows, long-term bank credit and short-term bank lending). Their result showed the capital flows exerted a positive significant impact on growth except for bank lending that revealed a positive effect only when the banking system is well capitalized. They therefore concluded that in order to achieve long-term growth targets, domestic savings should not be relied solely upon by developing countries, but attention should be paid to boost FDI and portfolio equity inflows.

The different results obtained emanate from differences across studies such as the measure of capital flows in the observation, time period covered, country sample groups mostly aggregating developed and developing countries together, econometric estimation method adopted and the control variables used. In spite of these variations, most studies hitherto seem to be in agreement that the effect on economic growth depends on the particular type of capital flow (Aizenman et al. 2013; Driffield and Jones, 2013, Adeola and Aziakpono, 2017).

2.3. Empirical evidence in Kenya

In this section, emphasis is on the few studies on Kenya that have used time series analysis which caters for the inherent flaws of cross-sectional and panel analyses on African countries that do not allow for country-specific inferences from the estimation.

Almost all the studies on Kenya adopted the ordinary least square (OLS) estimation technique and mostly focused on FDI (Nyamwange, 2009; Abala, 2014; Ngeny & Mutuku, 2014; Mwangi & Mwenda, 2015). These studies generally found that capital flows have a positive effect on the economic growth in Kenya. For example, Nyamwange (2009) found GDP growth has a positive relationship with the FDI ratio and is statistically significant to FDI in the study from 1980 to 2006 using OLS estimation. This implies that as the economy improves, more FDI is attracted. Similarly, Abala (2014) concentrated on the determinants of FDI on Kenya for the period 1970 to 2010 using OLS estimation. It was found that market size, political stability, openness of the economy and infrastructure increase FDI in Kenya. Ngeny and Mutuku (2014) found a positive effect of FDI on growth, but a negative effect of FDI volatility on growth in Kenya for the period 1970 to 2011 using the OLS estimation and Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) estimation techniques. They observed FDI volatility hinders long-run economic growth and therefore concluded that unstable inflows may inhibit investment, thereby affecting economic growth negatively.

An earlier time series study on Kenya was carried out by Amanja and Morrissey (2006), focusing exclusively on foreign aid. Using the Vector Autoregressive model (VAR) and Vector Error Correction Modelling (VECM) techniques, they found that foreign aid and private investment Granger cause output in Kenya for the period 1964 to 2002. They observed that aid in the form of net external loans has significant negative impact on long-run growth. Mwangi and Mwenda (2015) focused on remittances in Kenya and found that for the period 1993 to 2013, using OLS estimation and the Granger causality method, international remittance indicators were significant factors influencing economic growth.

The only study that explored the effects of different capital flows on the economic growth of Kenya was Ocharo et. al. (2014). This study focused on the causality between private capital inflows (FDI, portfolio investment and cross-border interbank borrowing) and economic growth in Kenya for the period 1970 to 2010 using OLS estimation and the Granger causality test. They observed a positive effect of FDI, FPI and cross-border interbank lending on GDP growth; however, while FDI was statistically significant, FPI and cross-border interbank borrowing were statistically insignificant. FDI was found to lead to economic growth, while economic growth causes cross-border interbank borrowing in Kenya. This study also employed the OLS estimation technique as previous studies discussed earlier whereas our study uses the Autoregressive distributed lag (ARDL) model.

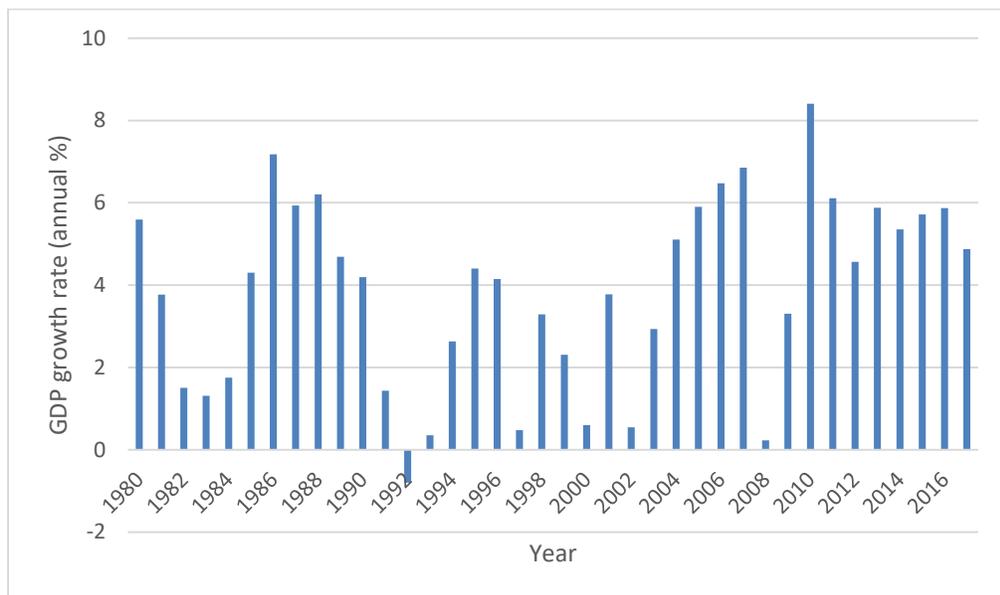
To the knowledge of the authors, there is no study on Kenya that covers the relationship between private capital flows, remittances and foreign aid on the one hand and economic growth on the other. Furthermore, no study has yet compared the relative contribution of these foreign capital flows to economic growth. This study therefore goes beyond the only previous similar study (Ocharo et. al., 2014) by covering more capital flows to include remittances and foreign aid, adopting a more advanced estimation technique and extending the analysis to 2017, thereby providing the most current evidence in Kenya. The next section looks at foreign capital flows and economic growth in the context of the Kenyan economy.

3. FOREIGN CAPITAL FLOWS IN KENYA

Kenya gained independence in 1963 and has since then operated a one-party state until 1991, when multiparty politics was introduced. Since the Kenyan transition to multiparty politics between 1991 and 1992, presidential elections have been characterised by violence. The tribal clashes that occurred in Kenya before the 1992 and 1997 elections have created fear in investors and might discourage increases in foreign capital flows into the country when elections are drawing near. The political violence in the country around 1992 might be partly responsible for the low and negative GDP growth around this period (Figure 1). This period also coincided with the period during which Kenya liberalised its capital account and opened its economy to the international community.

Kenya operated a closed capital account from 1970 to 1992 and therefore there was hardly any net portfolio flows during this period, except for 1975 to 1977 and in 1980. Kenya subsequently experienced rapid capital account liberalisation from 1991 to 1995, which included relaxing restrictions on foreign currency transactions and introducing foreign exchange bearer certificates of deposits (FEBCs). As at 1995, all remaining foreign exchange controls were abolished, although the Kenyan central bank retained the authority to license and regulate foreign exchange transactions. Restrictions on portfolio investments and capital account transactions were also removed. This was subject to a few exceptions: a ceiling on purchases of equity by non-residents (40% on aggregate, 5% for individual investors); requisite approval from the Capital Markets Authority prior to the issuance of securities locally by non-residents or abroad by residents as well as derivative securities; and prior government approval for the purchase of real estate (Yoshino et al., 2015: 13).

Figure 1: GDP growth rate in Kenya (1980-2017)



Source: Author's based on World Bank World Development Indicators database 2019

Like many sub-Saharan African countries, Kenya has adopted policies aimed at attracting foreign capital. Besides liberalization of its capital accounts, regional and economic integration policies and strategies were also adopted to increase foreign capital flows such as Kenya's membership of the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA) to encourage free trade between the regions.

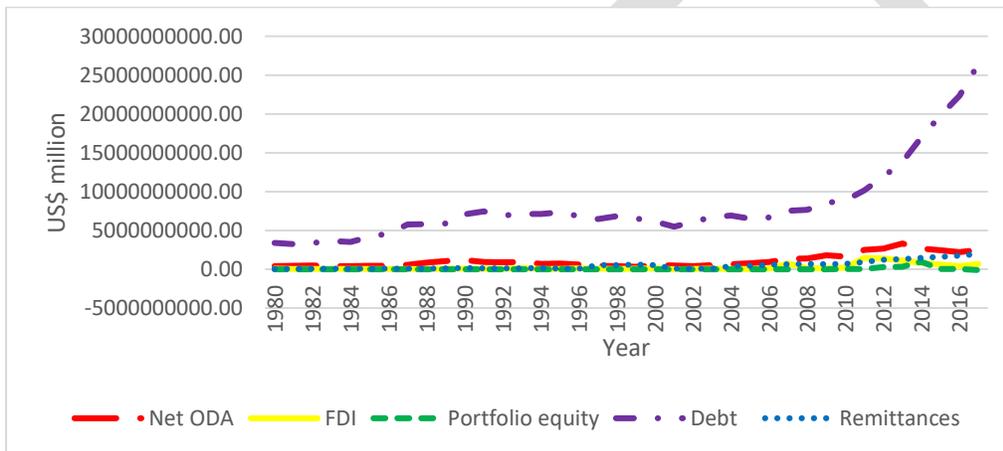
Among the interventions embarked upon in Kenya were the launching of Vision 2030 in 2008, with the objective of achieving global competitiveness by accelerating transformation of the country into a rapidly industrialising middle-income nation by 2030, and gaining economic prosperity with a high quality of life. This national initiative has inspired greater commitment to attracting FDI, portfolio investments and remittances to assist in achieving higher economic growth rates in the region of 10% per annum. A trade block was also formed in 2012 to enable free trade, encourage foreign investments without barriers from Southern Africa, the Eastern bloc and Northern Africa to help the growth of the African countries involved. These initiatives and the various policies Kenya has adopted, such as the liberalisation of its capital accounts, are mainly aimed at attracting foreign capital.

Kenya experienced a sharp downward spiral in economic growth from late 1991, with GDP growth plummeting from 4.19% in 1990 to 1.44% in 1991 and then to -0.8% in 1992 (Figure 1) while inflation rose drastically from 17.78% in 1990 to 45.98% by 1993 (WDI, 2015). GDP growth receded to its lowest average level in the 1990s, recording 2.24% per year on average for the decade. The period 1991 – 1995 was largely responsible for the low average growth rate recorded in the decade as a whole, with economic growth averaging a mere 1.61% per year for this period. GDP growth picked up notably in Kenya in the 2000s and by 2007, it stood at 6.99%. Following the onset of the global financial crisis in 2008, however, it again dropped to 1.53% as Kenya was a major hub for FDI in the Eastern African bloc. The political unrest following the 2007 elections

in the country might also have been a contributing factor to the drastic decrease in GDP growth observed in 2008. Nevertheless, by 2010 economic growth had rebounded to 8.41% and has been fairly stable above 4.5% during the last eight years up to 2017, averaging 5.85% per year over this period. However, the target of vision 2030 is not being met with the growth rates.

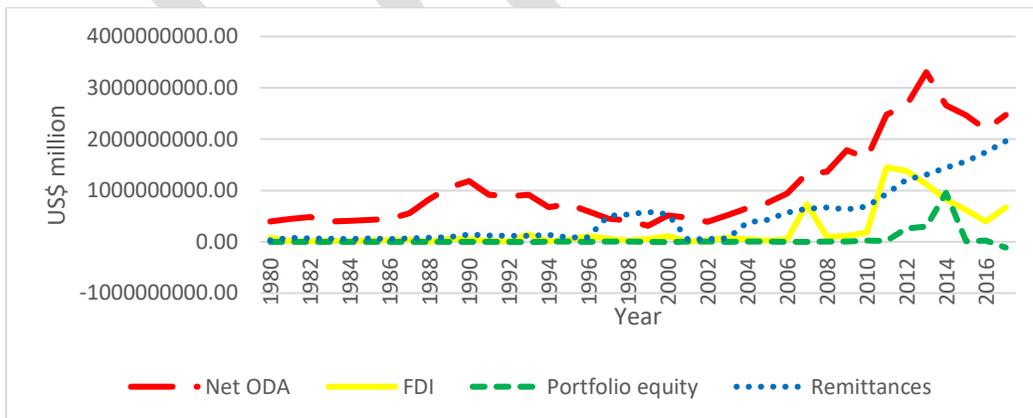
Looking back at Kenya’s history, the country was one of the main destinations for foreign direct investment in East Africa in the 1970s. In recent years foreign capital in Kenya has been on the increase, especially remittances and debts (Figure 2 and 3). For instance, remittances increased from US\$570 million in 2006 to a substantial US\$1.44 billion in 2014. FDI and portfolio equity also increased from US\$50.7 million and US\$1.8 million to US\$944 million and US\$954 million respectively over the same period. Debt liabilities increased from US\$565 million in 2009 to US\$1.977 billion in 2013, while ODA recorded the highest increase from US\$946 million in 2006 to US\$32.36 billion in 2013.

Figure 2: Foreign capital flows to Kenya in Millions (Current US\$)



Source: Author’s based on World Bank World Development Indicators database 2019

Figure 3: Foreign capital flows to Kenya in Millions (Current US\$) (without debt stock)

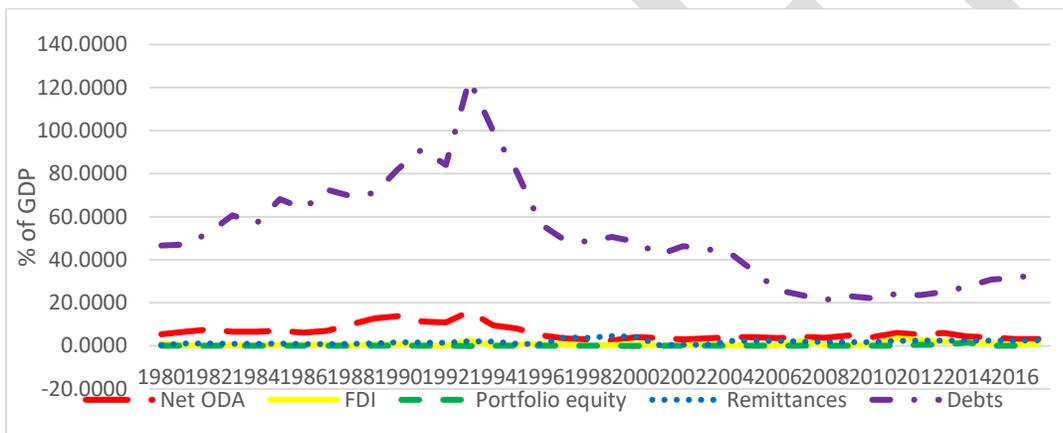


Source: Author’s based on World Bank World Development Indicators database 2019

Despite all these increases in foreign capital flows, their contribution to GDP has been moderate (Figure 4 and 5). Only ODA showed a fairly high contribution to GDP, especially in the 1990s. GDP growth was also relatively high around the period of high ODA.

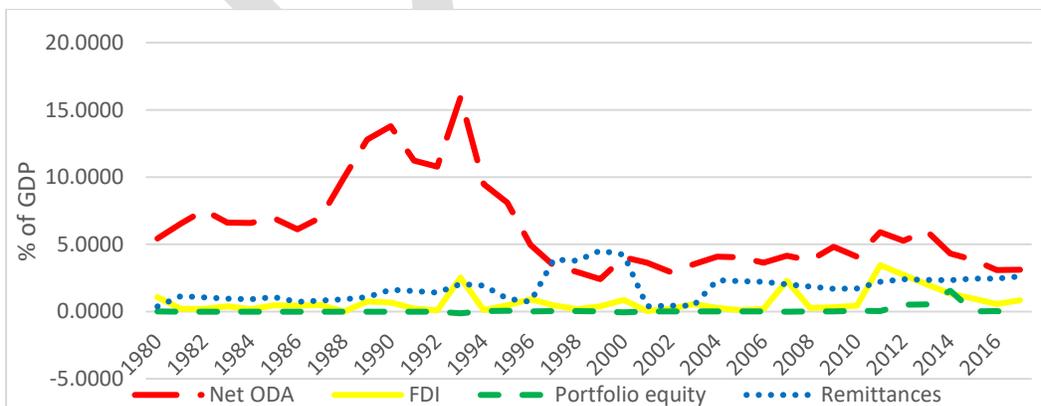
Since FDI is mainly market-seeking in Kenya (Abala, 2014), it has the tendency of increasing GDP growth in the country. This type of FDI can be affected by political instability, high levels of crime and general insecurity of life. A series of security issues has been identified in Kenya, which might have been responsible for the dip in FDI around incidents such as the United States embassy bombing of 1988, the 2002 Mombasa airport attack on an Israeli airplane as well as the Kikambala hotel bombing just after guests from Israel checked in. The relatively recent attacks in Kenya by the Islamic group Al-Shabab might also have resulted in a decrease in FDI into the country in 2012 (Figure 2). Furthermore, incidents such as the Westgate Shopping Mall shooting in 2013 and the Garissa University College attack early in 2015 might instil fear in foreign investors and deter them from establishing a footprint in Kenya, thereby reducing certain types of capital flows. This might also impact negatively on economic growth.

Figure 4: Foreign capital flows to Kenya as % of GDP



Source: Author's based on World Bank World Development Indicators database 2019

Figure 5: Foreign capital flows to Kenya as % of GDP (without debts)



Source: Author's based on World Bank World Development Indicators database 2019

4. EMPIRICAL ANALYSIS

4.1. Data and methodology

This study employs annual data obtained mostly from the World Bank's World Development Indicators (WDI) database and the World Bank's Global Financial Development Database (GFDD). Data on some of the capital flows such as the stock of FDI, portfolio equity and debt liabilities were obtained from the Lane and Milesi-Ferretti (LMF) updated dataset (External Wealth of Nations Mark II: Revised and updated 1970 – 2015). This period was chosen to capture the period of increased capital flows to Kenya and allow sufficient period for time series analysis. GDP per capita is used as a proxy for economic growth with five capital flows and eight control variables.

The capital flows are expressed as a percentage of GDP and converted to their natural logarithm (LN) form. The capital flows used in the estimation are foreign direct investment liability stock (FDI), portfolio equity liability stock (PES), debt liability stock (DLS), remittances (REM) and official development assistance (ODA). The explanatory variables used are the standard growth determinants obtained from the literature. These include gross fixed capital formation as a proxy for domestic investment (DI), inflation – for macroeconomic instability (INF), general government final consumption expenditure (GCE), exports of goods and services (EXP), imports of goods and services (IMP), openness to trade (XM), two measures of financial development: liquid liabilities (M3) as percentage of GDP (LL), and private credit by deposit money banks to GDP (PC).

4.2. Model specification and analytical framework

An autoregressive distributed lag (ARDL) model is specified as presented in Pesaran, Shin and Smith (2001). Each model is limited to four variables to avoid the problem of loss of degree of freedom where $X_t = f(Y, CF, CV1, CV2)$. The measure of economic growth is the same in all the models and is denoted as Y. The measure of the five different capital flows (CF) namely debt liability stock (DLS), foreign direct investment (FDI), portfolio equity stock (PES), foreign aid (ODA) and remittances (REM) is alternated and used consistently with two different control variables (CV1 and CV2). The control variables are LNDI, LNEXP, LNLL, LNGCE, LNIMP, LNINF, LNPC, and LNXM where LN stands for logarithm of each variable defined in the data section above.

For instance, in addition to the measure of economic growth, represented as Y, a capital flow is included starting with the log of debt liability stock (LNDLS) and introduce two uncorrelated control variables at a time until all eight control variables have been used in a model. The capital flow is replaced, in this case with log of foreign direct investment stock (LNFDI), and work through all the control variables until all the capital flows and control variables have been combined.

To compare the result, the coefficient of each of the measures of capital flows is observed to determine which one has the greatest impact on economic growth. The capital flow that has the highest and statistically significant positive effect on economic growth is regarded as the best for the economy.

4.3. Econometric Procedure

As is required for time series estimation, we commence with stationarity test for each of our variables to establish if our variables are stationary at level or first difference. We use the Augmented Dickey-Fuller (ADF) test as well as the break-point unit root test. We determine the optimal lag length for all our variables using the Schwarz Bayesian Information criteria.

We employ the ARDL model to determine the existence of a long-run relationship between foreign capital flows and economic growth in Kenya. This approach is favoured to the other cointegration techniques as it has some advantages according to Pesaran et al (2001). The ARDL is more efficient for small sample data sizes, it produces unbiased estimates of the long-run model and can be used where variables are integrated of different orders such as I(0) and I(1) variables, but not with I(2).

The ARDL model is specified as ARDL (p, q1, q2, q3) and it is represented as ARDL (Y, CF, CV1, CV2) since our model is limited to four variables. We use either Y or CF as the dependent variable therefore to determine if there is a long run relationship to specify an ARDL Model or ECM model. We conducted a bounds test as in equations 1 and 2 below and use the significance of the F-statistics test to determine if there is co-integration among the variables.

Bounds test specification:

$$\Delta \ln Y_t = \alpha_{01} + \beta_{11} \ln Y_{t-1} + \beta_{21} \ln CF_{t-1} + \beta_{31} \ln CV1_{t-1} + \beta_{41} \ln CV2_{t-1} + \sum_{i=1}^p \alpha_{1i} \Delta \ln Y_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln CF_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln CV1_{t-i} + \sum_{i=1}^q \alpha_{4i} \Delta \ln CV2_{t-i} + \varepsilon_{1t} \dots (1)$$

$$\Delta \ln CF_t = \alpha_{01} + \beta_{11} \ln CF_{t-1} + \beta_{21} \ln Y_{t-1} + \beta_{31} \ln CV1_{t-1} + \beta_{41} \ln CV2_{t-1} + \sum_{i=1}^p \alpha_{1i} \Delta \ln CF_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln Y_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln CV1_{t-i} + \sum_{i=1}^q \alpha_{4i} \Delta \ln CV2_{t-i} + \varepsilon_{1t} \dots (2)$$

Where there is no co-integration that is no long-run relationship among the variables, we specify an ARDL model as below:

$$\Delta \ln Y_t = \alpha_{01} + \sum_{i=1}^p \alpha_{1i} \Delta \ln Y_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln CF_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln CV1_{t-i} + \sum_{i=1}^q \alpha_{4i} \Delta \ln CV2_{t-i} + \varepsilon_t \dots (3)$$

$$\Delta \ln CF_t = \alpha_{01} + \sum_{i=1}^p \alpha_{1i} \Delta \ln CF_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta \ln Y_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln CV1_{t-i} + \sum_{i=1}^q \alpha_{4i} \Delta \ln CV2_{t-i} + \varepsilon_t \dots (4)$$

To determine whether or not cointegration exist, we use the two critical values provided for the regressors, q where $0 \leq q \leq 1$. 0 is the lower bounds value assuming the regressors are of order I(0) and 1 is the upper bounds value assuming the regressors are of order I(1). If the test statistics is greater than the upper bounds value, we conclude that a long-run relationship exists (cointegration among the variables) whereas if the test statistics is lower than the lower bounds value, we cannot reject the null hypothesis of no cointegration. However, if the critical value falls within the lower and upper bounds value, then we conclude that the test is inconclusive.

If a long-run relationship is confirmed, that is, there is co-integration among the variables, we go ahead to specify an error correction model (ECM) as:

$$\Delta \ln Y_t = \alpha_0 + \sum_{i=1}^p a_{1i} \Delta \ln Y_{t-i} + \sum_{i=1}^q a_{2i} \Delta \ln CF_{t-i} + \sum_{i=1}^q a_{3i} \Delta \ln CV1_{t-i} + \sum_{i=1}^q a_{4i} \Delta \ln CV2_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$$

.....(5)

$$\Delta \ln CF_t = \alpha_0 + \sum_{i=1}^p a_{1i} \Delta \ln CF_{t-i} + \sum_{i=1}^q a_{2i} \Delta \ln Y_{t-i} + \sum_{i=1}^q a_{3i} \Delta \ln CV1_{t-i} + \sum_{i=1}^q a_{4i} \Delta \ln CV2_{t-i} + \lambda ECT_{t-1} + \varepsilon_t$$

.....(6)

We then perform some residual diagnostics tests such as heteroscedasticity and autocorrelation tests to ensure the validity of our model. The reported models are those that have passed all these tests.

5. EMPIRICAL RESULTS

The empirical analysis commenced with unit root tests. The ADF unit root test was used and reported in Table 1 as well as the break point unit root test reported in Table 2. The results show that both or at least one of the tests indicate that most of the variables are stationary at first difference I(1) except for remittances, imports and inflation which are stationary at level I(0). From this unit root test, the ARDL bounds testing approach can be performed since this is best suited for variables with different degree of integration that is I(0) and I(1), but not I(2).

Table 1: ADF Unit root test results

Variable	Model	Lag length	Level	Lag length	1st difference	Degree of integration
lnypck	Trend	1	-1.6510	0	-5.2815***	I(1)
lncls	Trend	0	-1.6450	0	-5.8476***	I(1)
lnfdi	Intercept and trend	0	-3.3262*	0	-7.2173***	I(1)
lnoda	Intercept	0	-1.6251	0	-6.8137***	I(1)
lnpes	Trend	9	-0.1057	1	-8.3793***	I(1)
lnrem	Intercept and trend	1	-4.5982***	3	-6.0587***	I(0)
lnidi	Intercept	0	-3.3474**	1	-6.9730***	I(0)
lnexp	Trend	0	-2.3104	0	-6.4079***	I(1)
lngce	Trend	0	-3.3111*	0	-6.6586***	I(1)
lnimp	Intercept	0	-4.0985***	0	-8.7776***	I(0)
lninf	Intercept	0	-5.2133***	1	-7.9292***	I(0)
lnll	Trend	1	-2.9507	0	-5.2181***	I(1)
lnpc	Trend	3	-2.5273	0	-6.0456***	I(1)
lnxm	Intercept and trend	0	-3.1036	0	-7.5684***	I(1)

Notes: I(0) denotes degree of integration at level; I(1) denotes degree of integration at first difference.

*, **, and *** denotes the rejection of the null hypothesis of unit root at 10%, 5% and 1% level of significance respectively

Table 2: Breakpoint unit root test results

Variables	Model	Lag length	Level	Lag length	1st difference	Degree of intergration
Inypck	Trend	1	-3.8168	3	-6.6960***	I(1)
Indls	Trend	2	-3.1144	0	-6.9150***	I(1)
Infdi	Intercept and trend	9	-9.6391***	0	-7.6007***	I(0)
Inoda	Intercept	0	-4.0606	0	-7.7256***	I(1)
Inpes	Trend	8	-5.4407***	1	-9.0375***	I(0)
Inrem	Intercept and trend	2	-8.4493***	0	-7.0908***	I(0)
Indi	Intercept	0	-4.3812*	0	-7.8268***	I(1)
Inexp	Trend	0	-3.2610	0	-6.4496***	I(1)
Ingce	Trend	0	-3.4160	0	-6.6240***	I(1)
Inimp	Intercept	0	-5.2335***	0	-9.8575***	I(0)
Ininf	Intercept	0	-6.0682***	1	-10.0889***	I(0)
Inll	Trend	1	-2.9306	0	-5.6280***	I(1)
Inpc	Trend	3	-3.2977	0	-6.0549***	I(1)
Inxm	Intercept and trend	0	-4.1876	0	-7.8447***	I(1)

Notes: I(0) denotes degree of integration at level; I(1) denotes degree of integration at first difference.

*, **, and *** denotes the rejection of the null hypothesis of unit root at 10%, 5% and 1% level of significance respectively

The ARDL bounds testing approach was performed after the lag length selection. A total of 50 models were estimated, five for each of the five capital flows where economic growth was the dependent variable; and another five for each capital flow where the capital flows were the dependent variable. Table 3a and 3b presents the bounds test results. The models were tested for serial correlation and heteroscedasticity. In all the models performed, only a few of them were found to have co-integrating relation, which shows that a long-run relationship exists between them. Out of these models, a substantial part of them did not pass the residual diagnostics tests and therefore are not reported.

Model specification		Model	Critical values at 10%		F-Statistics	H0: No cointegration
Capital flow	Control variables		I(0)	I(1)		Do not reject/Reject H0
dls	di, exp	Equation 1	2.72	3.77	19.831	Reject
	gce, inf	Equation 2	2.72	3.77	2.452	Do not reject
	imp, ll	Equation 3	2.72	3.77	2.455	Do not reject
	di, pc	Equation 4	2.72	3.77	13.547	Reject
	di, xm	Equation 5	2.72	3.77	18.845	Reject
fdi	di, exp	Equation 6	2.72	3.77	21.200	Reject

	gce, inf	Equation 7	2.72	3.77	1.824	Do not reject
	imp, ll	Equation 8	2.72	3.77	3.585	Do not reject
	di, pc	Equation 9	2.72	3.77	12.749	Reject
	di, xm	Equation 10	2.72	3.77	2.869	Do not reject
oda	di, exp	Equation 11	2.72	3.77	18.938	Reject
	gce, inf	Equation 12	2.72	3.77	1.818	Do not reject
	imp, ll	Equation 13	2.72	3.77	0.696	Do not reject
	di, pc	Equation 14	2.72	3.77	12.888	Reject
	di, xm	Equation 15	2.72	3.77	15.745	Reject
pes	di, exp	Equation 16	2.72	3.77	6.132	Reject
	gce, inf	Equation 17	2.72	3.77	5.263	Reject
	imp, ll	Equation 18	2.72	3.77	5.252	Reject
	di, pc	Equation 19	2.72	3.77	5.488	Reject
	di, xm	Equation 20	2.72	3.77	6.836	Reject
rem	di, exp	Equation 21	2.72	3.77	19.517	Reject
	gce, inf	Equation 22	2.72	3.77	3.414	Do not reject
	imp, ll	Equation 23	2.72	3.77	1.049	Do not reject
	di, pc	Equation 24	2.72	3.77	12.805	Reject
	di, xm	Equation 25	2.72	3.77	2.683	Do not reject

NB: All variables are as previously defined.

*Each equation features economic growth as dependent variable, in addition to the capital flow, e.g Equation 1 has debt liability stock and the control variables corresponding to it- domestic investment and exports.

Model specification		Model	Critical values at 10%		F-Statistics	H0: No cointegration
Capital flow	Control variables		I(0)	I(1)		Do not reject
dls	di, exp	Equation 26	2.72	3.77	5.876	Reject
	gce, inf	Equation 27	2.72	3.77	2.418	Do not reject
	imp, ll	Equation 28	2.72	3.77	6.269	Reject
	di, pc	Equation 29	2.72	3.77	4.055	Reject
	di, xm	Equation 30	2.72	3.77	5.976	Reject
fdi	di, exp	Equation 31	2.72	3.77	3.151	Do not reject
	gce, inf	Equation 32	2.72	3.77	3.937	Do not reject
	imp, ll	Equation 33	2.72	3.77	3.820	Do not reject
	di, pc	Equation 34	2.72	3.77	2.093	Do not reject
	di, xm	Equation 35	2.72	3.77	3.598	Do not reject
oda	di, exp	Equation 36	2.72	3.77	1.358	Do not reject

	gce, inf	Equation 37	2.72	3.77	3.183	Do not reject
	imp, ll	Equation 38	2.72	3.77	2.329	Do not reject
	di, pc	Equation 39	2.72	3.77	1.730	Do not reject
	di, xm	Equation 40	2.72	3.77	1.286	Do not reject
pes	di, exp	Equation 41	2.72	3.77	0.545	Do not reject
	gce, inf	Equation 42	2.72	3.77	1.264	Do not reject
	imp, ll	Equation 43	2.72	3.77	4.569	Reject
	di, pc	Equation 44	2.72	3.77	1.046	Do not reject
	di, xm	Equation 45	2.72	3.77	3.563	Do not reject
rem	di, exp	Equation 46	2.72	3.77	6.803	Reject
	gce, inf	Equation 47	2.72	3.77	7.049	Reject
	imp, ll	Equation 48	2.72	3.77	9.404	Reject
	di, pc	Equation 49	2.72	3.77	8.281	Reject
	di, xm	Equation 50	2.72	3.77	6.803	Reject

NB: All variables are as previously defined.

*Each equation features economic growth as dependent variable, in addition to the capital flow, e.g Equation 1 has debt liability stock and the control variables corresponding to it- domestic investment and exports.

Granger causality was conducted to determine if there was a unidirectional causality from economic growth to capital flows or from capital flows to economic growth as well as to determine if a bi-directional causality existed. We established bi-directional causality only between portfolio equity and economic growth. There was no causality between official development assistance and economic growth. Causality was found from debt liability stock to economic growth while both foreign direct investment and remittances showed causality only from economic growth (Table 4).

Table 4: Pairwise Granger causality test

CF	Lag	Null hypothesis: H0	F-ststaistics	P-value	Reject / Do not reject H0 Decision	Causality
LNDLS	1	Y-> DLS	0,8300	0,3672	Do not reject	Uni-directional causality
		DLS -> Y	16,8812	0,0002	Reject	
	2	Y -> DLS	0,1555	0,8565	Do not reject	
		DLS -> Y	1,1072	0,3402	Do not reject	
	3	Y -> DLS	0,7157	0,5487	Do not reject	
		DLS -> Y	1,6788	0,1878	Do not reject	
	4	Y -> DLS	0,5462	0,7029	Do not reject	
		DLS -> Y	2,0387	0,1102	Do not reject	
LNFDI	1	Y -> FDI	1,8516	0,1805	Do not reject	Uni-directional causality
		FDI -> Y	0,5943	0,4449	Do not reject	
	2	Y -> FDI	4,7729	0,0137	Reject	

		FDI -> Y	0,6181	0,5439	Do not reject	
LNODA	1	Y -> ODA	0,0544	0,8166	Do not reject	No causality
		ODA -> Y	2,5996	0,1140	Do not reject	
	2	Y -> ODA	0,0345	0,9661	Do not reject	
		ODA -> Y	1,1524	0,3259	Do not reject	
LN PES	1	Y -> PES	0,0671	0,7970	Do not reject	Bi-directional causality
		PES -> Y	16,5730	0,0002	Reject	
	2	Y -> PES	1,2637	0,2945	Do not reject	
		PES -> Y	9,2744	0,0005	Reject	
	3	Y -> PES	2,9136	0,0483	Reject	
		PES -> Y	6,8194	0,0010	Reject	
	4	Y -> PES	1,6989	0,1754	Do not reject	
		PES -> Y	4,6877	0,0045	Reject	
LNREM	1	Y -> REM	3,7200	0,0602	Reject	Uni-directional causality
		REM -> Y	0,0195	0,8897	Do not reject	
	2	Y -> REM	2,0345	0,1437	Do not reject	
		REM -> Y	0,4112	0,6656	Do not reject	
	3	Y -> REM	1,8155	0,1608	Do not reject	
		REM -> Y	0,5897	0,6255	Do not reject	

Note: -> means does not granger cause

Debt liability stock and official development assistance did not show any long-run relationship with economic growth. Only one model each for both foreign direct investment and portfolio equity stock showed a long-run relationship while remittances had three models indicating a long-run relationship.

No causality was found between ODA and economic growth. We found evidence of causality running from economic growth to FDI. No co-integration was observed between these two capital flows and economic growth therefore, there was no long-run relationship between them in Kenya during the period of study. FDI however showed a negatively insignificant short-run relationship with economic growth. This is not consistent with previous findings of Ocharo et al. (2014), which observed both a positive and statistically significant influence of foreign direct investment on economic growth in Kenya. Ngeny and Mutuku (2014) also found that foreign direct investment has a positive influence on economic growth in Kenya. The discrepancy in results might be attributed to the use of different estimation techniques and the result of developments in the last few years as our data has been updated to reveal the current situation in Kenya.

For debt liability stock, we observed causality running from debt flows to economic growth. No long-run relationship was observed but a negatively and insignificant short-run relationship was observed here. Remittances on the other hand revealed causality running from economic growth to remittances and there is co-integration between them. This implies the existence of a long-run relationship. The relationship is positive but was significant 10% level. This is in line with a recent study

Table 5: ARDL / Short-run results – Economic growth (Y) as dependent variable

CF	CV	Obs	ARDL order	Intercept	Levels equation			Lag 1 Results		Lag (2) first difference results		Adj R ²	Diagnostics tests	
					lnCF	lnCV1	lnCV2	lnY(-1)	lnCF(-1)	ΔlnY(-2)	ΔlnCF(-2)		Het	Serial Corr
LNDLS	LNDI, LNEXP	47	1,0,0,0	1.55 (4.64) ^a	-0.01 (-1.13)	0.17 (4.95) ^a	-0.09 (-3.82) ^a	0.75 (17.75) ^a				0,949	16.81 [0.27]	2.97 [0.08]
	LNGCE, LNINF	46	2,0,0,0	0.37 (1.04)	-0.01 (-1.49)	-0.01 (-0.26)	-0.01 (-2.18) ^b	1.37 (12.43) ^a		0.40 (4.13) ^a		0,949	27.37 [0.13]	0.16 [0.92]
	LNIMP, LNLL	45	3,0,0,2	0.32 (0.93)	-0.03 (-2.92) ^a	-0.03 (-1.00)	-0.10 (-1.68)	1.52 (10.77) ^a		-0.87 (-3.82) ^a		0,959	45.00 [0.43]	6.90 [0.08]
	LNDI, LNXM	47	1,0,0,0	1.501 (4.43) ^a	-0.02 (-2.63) ^b	0.17 (4.86) ^a	-0.11 (-3.57) ^a	0.78 (20.57) ^a				0,947	16.48 [0.29]	3.99 [0.05]
LNFDI	LNDI, LNEXP	47	1,0,0,0	1.534 (4.70) ^a	0.04 (1.80) ^c	0.20 (6.49) ^a	-0.11 (-5.67) ^a	0.73 (17.98) ^a				0,951	21.44 [0.09]	1.53 [0.22]
	LNGCE, LNINF	46	2,0,0,0	0.388 (0.93)	-0.01 (-0.29)	-0.03 (-0.78)	-0.01 (-2.32) ^b	1.43 (12.84) ^a		-0.46 (-4.79) ^a		0,947	26.62 [0.15]	0.17 [0.92]
	LNDI, LNXM	46	2,0,0,0	0.607 (1.63)	0.03 (1.20)	0.13 (3.25) ^a	-0.08 (-2.43) ^b	1.21 (9.31) ^a		-0.31 (-2.97) ^a		0,951	27.62 [0.12]	0.01 [0.99]
LNODA	LNDI, LNEXP	47	1,0,0,0	1.585 (4.01) ^a	-0.00 (-0.02)	0.18 (6.00) ^a	-0.11 (-4.24) ^a	0.74 (15.32) ^a				0,947	18.45 [0.19]	2.38 [0.12]
	LNGCE, LNINF	46	2,0,0,0	0.350 (0.94)	0.00 (0.25)	-0.03 (-0.79)	-0.01 (-2.32) ^b	1.44 (14.32) ^a		-0.48 (-5.24) ^a		0,947	27.23 [0.13]	0.25 [0.88]
	LNIMP, LNLL	46	2,0,0,0	0.375 (0.98)	0.00 (0.11)	-0.01 (-0.43)	-0.03 (1.35)	1.45 (13.58) ^a		-0.51 (-5.20) ^a		0,941	23.14 [0.28]	0.09 [0.96]
	LNDI, LNXM	47	1,0,0,0	1.226 (3.20) ^a	-0.01 (-1.32)	0.20 (6.19) ^a	-0.11 (-3.38) ^a	0.80 (18.71) ^a				0,941	18.20 [0.20]	3.72 [0.05]
LNPES	LNDI, LNEXP	44	2,0,0,0	1.341 (3.03) ^a	0.03 (3.16) ^a	0.08 (2.35) ^b	-0.03 (-1.38)	1.08 (7.31) ^a		-0.30 (-2.08) ^b		0,965	19.97 [0.46]	0.94 [0.63]
	LNGCE, LNINF	44	2,0,0,0	1.126 (2.57) ^b	0.03 (3.40) ^a	0.02 (0.69)	-0.01 (-1.66)	1.25 (9.46) ^a		-0.43 (-3.19) ^a		0,963	24.42 [0.22]	0.55 [0.76]
	LNIMP, LNLL	44	2,0,0,0	1.933 (3.62) ^a	0.05 (4.21) ^a	-0.03 (-1.14)	-0.02 (-1.30)	1.26 (9.75) ^a		-0.52 (-3.83) ^a		0,963	27.16 [0.13]	1.38 [0.50]
	LNDI, LNPC	44	2,0,0,2	1.254 (2.57) ^b	0.04 (2.59) ^b	0.05 (1.24)	-0.07 (-1.30)	1.23 (8.39) ^a				0,964	41.37 [0.21]	4.46 [0.11]
	LNDI, LNXM	44	2,0,0,0	1.597 (3.37) ^a	0.03 (3.85) ^a	0.08 (2.64) ^b	-0.05 (-1.93) ^c	1.09 (8.04) ^a		-0.33 (-2.51) ^b		0,967	20.45 [0.43]	1.26 [0.53]

LNREM	LNDI, LNEXP	47	1,0,0,0	1.618 (4.83) ^a	0.01 (0.91)	0.19 (6.02) ^a	-0.10 (-4.91) ^a	0.73 (16.82) ^a				0,948	21.58 [0.09]	1.86 [0.17]
	LNGCE, LNINF	46	2,2,0,0	0.478 (1.37)	-0.01 (-0.86)	-0.10 (-2.01) ^c	-0.02 (-3.20) ^a	1.40 (14.34) ^a	0.01 (1.02)	-0.42(- 4.75) ^a	-0.04 (-2.65) ^b	0,953	40.99 [0.22]	0.07 [0.97]
	LNIMP, LNLL	46	2,0,0,0	0.298 (0.86)	-0.01 (-1.15)	-0.02 (-0.61)	0.03 (2.03) ^b	1.44 (13.78) ^a		-0.49(- 5.36) ^a		0,943	16.11 [0.71]	0.50 [0.78]
	LNDI, LNXM	46	2,0,0,0	0.678 (1.73) ^c	0.01 (0.92)	0.13 (3.12) ^a	-0.07 (-2.23) ^b	1.18 8.64) ^a		-0.29(- 2.71) ^b		0,950	23.66 [0.26]	0.05 [0.98]

Note: All variables are as previously defined. a, b, and c indicates statistical significance at the 1%, 5% and 10% significance levels respectively. Δ is the difference operator while (-1) represents lag of the variable. T-values for the coefficients are in parenthesis () while the probability values for the Chi squares are in parenthesis [].

Table 6: ARDL / Long-run error correction modelling results – Economic growth (Y) as dependent variable

CF	CV1, CV2	ARDL order	Intercept	EC/Adj term	Long-run coefficients – main independent variables (capital flows)					$\Delta \ln Y(-1)$	Adj R ²	Diagnostic tests	
				CointEq(-1)*	lnDLS	lnFDI	lnODA	lnPES	lnREM			Het	Serial cor
LNDLS	LNDI, LNEXP	1,0,0,0	1.55(4.64) ^a	-0.25(-5.89) ^a	-0.04(-1.06)						0.621	16.81 [0.27]	2.97 [0.08]
	LNDI, LNXM	1,0,0,0	1.501(4.43) ^a	-0.22(-5.64) ^a	-0.10(-2.37) ^b						0.608	16.48 [0.29]	3.99 [0.05]
LNFDI	LNDI, LNEXP	1,0,0,0	1.534(4.70) ^a	-0.27(-6.73) ^a		0.15(1.81) ^c					0.637	21.44 [0.09]	1.53 [0.22]
LNODA	LNDI, LNEXP	1,0,0,0	1.585(4.01) ^a	-0.26(-5.41) ^a			-0.00(-0.02)				0.609	18.45 [0.19]	2.38 [0.12]
	LNDI, LNXM	1,0,0,0	1.226(3.20) ^a	-0.20(-4.59) ^a			-0.06(-1.17)				0.562	18.20 [0.20]	3.72 [0.05]
LNPEP	LNDI, LNEXP	2,0,0,0	1.341(3.03) ^a	-0.22(-3.51) ^a				0.13(3.62) ^a		0.30(2.08) ^b	0.476	19.97 [0.46]	0.94 [0.63]
	LNGCE, LNINF	2,0,0,0	1.126(2.57) ^b	-0.18(-2.83) ^a				0.19(3.71) ^a		0.43(3.19) ^a	0.445	24.42 [0.22]	0.55 [0.76]
	LNIMP, LNLL	2,0,0,0	1.933(3.62) ^a	-0.26(-3.73) ^a				0.18(5.36) ^a		0.52(3.83) ^a	0.444	27.16 [0.13]	1.38 [0.50]

	LNDI, LNPC	2,0,0,2	1.254(2.57) ^b	-0.20(-3.23) ^a				0.19(3.46) ^a		0.43(2.83) ^a	0.455	41.37 [0.21]	4.46 [0.11]
	LNDI, LNXM	2,0,0,0	1.597(3.37) ^a	-0.24(-3.81) ^a				0.13(4.79) ^a		0.33(2.51) ^b	0.498	20.45 [0.43]	1.26 [0.53]
LNREM	LNDI, LNEXP	1,0,0,0	1.618(4.83) ^a	-0.27(-6.33) ^a					0.03(0.94)		0.617	21.58 [0.09]	1.86 [0.17]

Note: All variables are as previously defined. a, b, and c indicates statistical significance at the 1%, 5% and 10% significance levels respectively. Δ is the difference operator while (-1) represents lag of the variable. T-values for the coefficients are in parenthesis () while the probability values for the Chi squares are in parenthesis [].

of international remittances on economic growth in Kenya by Mwangi and Mwenda (2015) which revealed remittances showing positive and significant influence on economic growth in Kenya.

In all the capital flows observed, only portfolio equity showed a bi-directional causality and indicated a positive and significant long-run relationship as well as short-run relationship with economic growth in Kenya.

Overall, the evidence of a long-run relationship between economic growth and capital flows in Kenya is strong for only portfolio equity stock with the speed of adjustment ranging from 18% to 26%. We further explore the magnitude and sign of the causal effect. Residual diagnostic tests were conducted, and the LM-statistics from the serial correlation test and the probability are reported. Where the probability was above 5% significance level (which signifies that the null hypothesis of no serial correlation at lag order cannot be rejected), it was taken that the model had passed the serial correlation test. The heteroscedasticity test was also performed. Here, the chi-square and probability values are reported, and the model had to pass this test with a probability level above 5% as well for it to be qualified as a good model. The explanatory power of the model, the adjusted R^2 values are relatively large with over 30% in all the models reported. The summary of the results is reported in table 5 and 6.

6. CONCLUSION AND RECOMMENDATIONS

This study explored the relative contribution of the five major capital flows in Kenya to economic growth. The causal effect between the five capital flows and economic growth were analysed. Furthermore, the magnitude and sign of the long-run relationship between the identified capital flows and economic growth were investigated to determine which one contributes most to the economy. Residual diagnostic tests (heteroscedasticity and serial correlation) were conducted for all the models. We report only the models that satisfied all the residual diagnostic tests.

The results reveal that the causality between economic growth and capital flows in Kenya is mostly unidirectional except for portfolio equity, which indicated bi-directional causality but mainly causality running from capital flow to economic growth. There was uni-directional causality running from economic growth to capital flows for both FDI and remittances whereas debt liability showed uni-directional causality running from capital flow to economic growth. There was no indication of causality between official development assistance and economic growth.

The results robustly reveal a very strong long-run causality running solely from portfolio equity to economic growth with a positive and significant effect on economic growth. In the short-run, the effect of portfolio equity on economic growth is also very positively strong. In contrast, all the other capital flows have very weak long run relationship with economic growth with causality running only from economic growth to the capital flows

It is evident that only portfolio equity had a positive and significant effect on economic growth. Remittances, to a limited extent, exerts a weak positive effect on economic growth. If policies are to be aimed at stimulating growth in the economy and attracting foreign capital, Kenya is best advised to focus more on attracting portfolio equity and to some extent remittances through policies that promote the inflow of these types of capital flows. The recent trade bloc established between North Africa, East Africa and South Africa would help stimulate investment into Kenya,

being a major player in the Eastern African bloc. Receiving remittances especially those that are geared towards investment and not consumption will help stimulate economic growth. Such remittances depend on a stable political environment and affordable transfer rates into the country.

This study did not, however, examine if these growth trickles down to the masses in terms of poverty reduction and better standards of living. This is a potential topic to be considered in further studies.

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