



Exchange Rate and Capital Flight: An Empirical Analysis

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Exchange rate volatility and declining capital inflow are important policy issues that inform macroeconomic policies and strategies of developing countries. Most developing economies have small potential resource base, faces foreign exchange volatility and limited market of agricultural products, thus investigating the role of capital flight is significant for these states. Cognizant of this, the study will try to answer the paradox of capital outflow and exchange uncertainty. The research will investigate the influence of exchange rate differential on capital flight in East Africa economies for the year 1988-2018 using panel secondary data. The empirical analysis was guided by investment creation theorem. The study adopted ordinary least squares estimation to analyse the relation between the study variables. The study estimations has identified that exchange rate positively influences capital outflow in East African states. The positive effect of currency change on capital outflow implied that capital outflow was sensitive to currency depreciation. Accelerated currency devaluation erodes domestic investors confidence to hold local currency, citizens will likely move to foreign markets and assets to avoid negative effect of devaluation. Government policymakers should pursue strategies and policies that can slow currency uncertainty in order to tame capital outflow. These policies and strategies include fostering of both fiscal and monetary disciplines and good governance.

Keywords: Capital flight; exchange rate volatility; investment; enlargement.

JEL CLASSIFICATION: E5, E22, F21, F31

1. INTRODUCTION

Since 1980s and 1990s developing nations have implemented market liberalization of the capital accounts policies in order to increase capital inflow and be able to finance government physical expenditure and cut increasing foreign debt [1]. However the paradox is developing countries have experienced accelerated capital outflow as citizens of these states invest their scarce capital in industrialized nations. Accelerated capital outflow has led to reduced local investment in Sub-Saharan Africa (SSA), capital outflow has led to disappearance of capital formation that is significant in labour productivity growth, stimulate capital formation, increase economic growth and stabilize domestic currency (World Bank, 2017,[2].

According to economic growth-investment theorem, stimulated growth in capital inflow will imply increased output growth through increased foreign debt servicing capacity and accelerated growth in tax revenue collection, since dashed abroad assets cannot be taxed [3]. Increased capital outflow for developing countries will translate to negative economic development through underdeveloped domestic manufacturing sector, depreciating local currency, vulnerability to external financial and trade shocks and small base of revenue tax [4]. Majority of the countries in the SSA are primary commodity dependent, particularly on agriculture which forms the major contributor to the national output, which is an indicator of the infancy level of economic

development coupled with low and unstable agricultural prices [1].

Currency depreciation has been a problem within the East African states (Fig. 1). East Africa Community (EAC) exchange rate volatility spiraled up when the nations adopted the Structural Adjustment Policies (SAPs) and adopted market liberalization in early 1980s, a situation that made the capital inflow costly and unsustainable [5,6]. Fig. 1 present the trend of exchange volatility facing East African Countries.

The effect of capital flight from SSA has also been experienced in the EAC Member states with an increase in external debt and unstable exchange rate. As a result, EAC has experienced inflationary pressure thus forcing the residents to export local capital to developed economies in order to maximize profit on investment returns [8]. Poor currency depreciation policy decisions highlight the poor macroeconomic policy judgments being undertaken by developing economies [3]. Increased capital outflow weakens domestic currency as a result of reduced foreign currency inflow and less foreign aid and grants [3]. In addition, poor governance and macroeconomic decisions including high corruption rate has led to high capital flight from in East Africa [9]. The consequences of this macroeconomics instability and poor governance include high interest rate, low supply of money, running inflation, reduced local investment and poor economic growth.

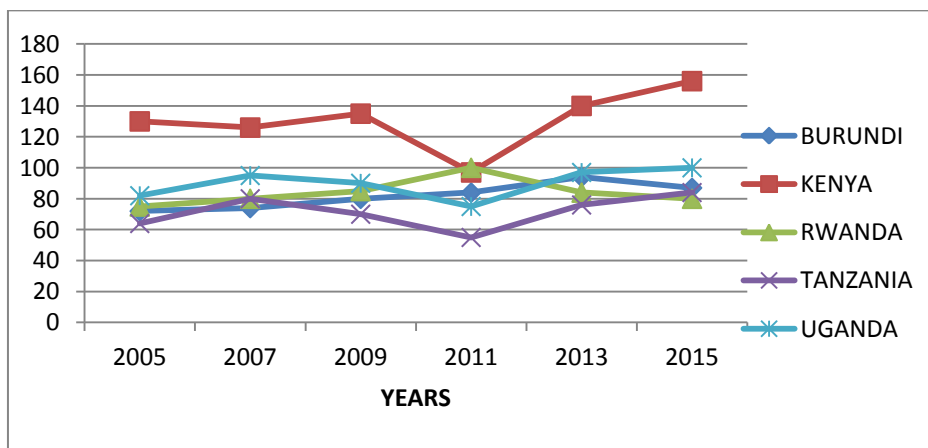


Fig. 1. Exchange Rate Trend for East African Economies

Source: IMF [7]

Table 1. Capital flight from EAC as a percentage of the real GDP

Year	Kenya CF (%)	Tanzania CF (%)	Uganda CF (%)	Rwanda CF (%)	Burundi CF (%)
1988	0.2	6.3	3.1	6.6	8.4
1990	4.9	0.4	7.9	4.8	11.3
1992	28	0.4	3.9	0.4	13.0
1994	2.1	1.2	4.1	10.5	4.3
1996	4.9	2.0	0.2	0.5	6.8
1998	5.3	2.0	0.3	2.3	13.5
2000	1.5	1.9	4.2	2.1	10.4
2002	3.6	1.7	6.8	1.1	17
2004	10.9	4.4	8.2	8.0	8.0
2006	1.3	21.4	18	21.6	27.2
2008	1.4	1.7	10.5	5.2	4.8
2010	0.7	5.3	5.9	3.6	1.8
2012	4.1	13	3.7	20.9	4.6
2014	6.2	7.4	2.8	7.0	10.9
2016	4.8	6.6	3.1	6.2	9.8
2018	4.0	6.2	3.0	5.4	10.8

Source: World Bank [11]

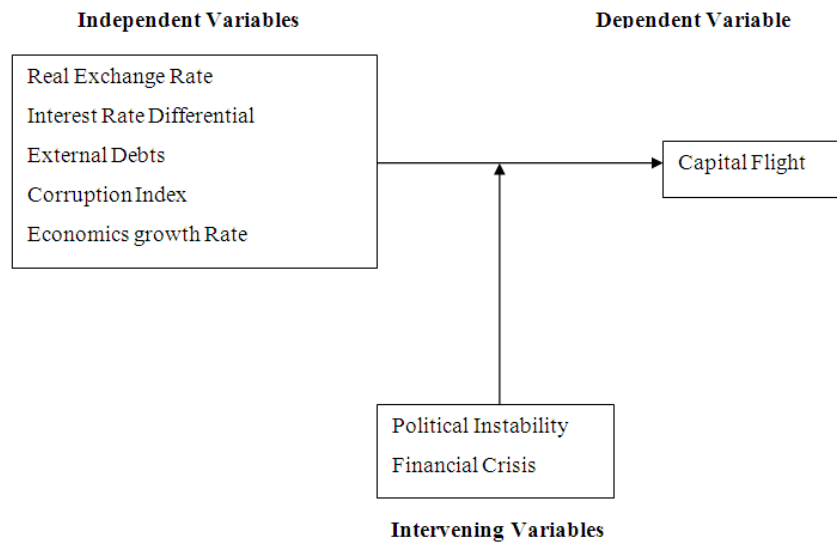


Fig. 2. Conceptual Framework

In aggregate the five East African countries have lost about 24 billions (US dollars) to developed countries in between the years 1988 and 2015 [10]. The loss of financial assets has been attributed to high currency volatility thus leading sustained financial and resources losses and poor economic performance in the last three decades [8]. Table 1 presents capital flight data with an interval of two years, from 1988 to 2018.

To address the problem, it demands for assessment of the possible determinants to the challenge and come up with a possible solution

or policy prescriptions [12]. To make sure the findings are robust, several control variables were identified from empirical works and introduced into regression function such as corruption, GDP, external debt and interest rate during the analysis. The objective of this research was to investigate the influence of unstable exchange rate on capital flight.

1.1 Literature Review

The Investment diversion and creation theory was first introduced by Dunning and Robson in

1988 as a continuation of empirical works of Viner [13] trade diversion theory. It states that political development and unstable macroeconomic environment translates to increased capital outflow from poor states to advanced states. Most industrialized countries have stable governance and better macroeconomic environment which leads to better tax climate, attractive interest rate and thus attracts private investors. As a result corrupt citizens are likely to dash their ill gotten riches in advanced economies to earn those benefits [7]. Most of increased capital outflow is as a result of lack of information about expected returns from local investment to both local and international investors. With risk of reducing in value of domestic held financial assets, local investors are likely to invest in foreign market and assets. If local investors move resources to developed economies then domestic tax revenue will reduce and thus slow economic growth further [14,15].

Many empirical studies have attempted to investigate the influence of currency depreciation on capital outflow and inflow. The finding of Bigsten and Kayizzi-Mugerwa [16] suggest depreciation of local currency may increase the price of imports while hurting the price of exports thus hurting local investors than foreign ones [14]. According to Ngeno [13] local investors need to invest in foreign market and assets to reduce income losses as a result of currency uncertainty. Cuddington [17] and Ndikumana, and Boyce [3] agree that increase in currency will translate to rise in external price as compared to domestic price of goods and can causes local economic agents to incur income losses. In contrast, Gouider and Noura [18] suggested depreciation of local currency has no significant effect on prices and capital flight. However, this contrasting result could be attributed to small sample size used.

In summary, from the previous empirical works, influence of exchange rate on capital outflow is inconclusive. Further, most empirical works were carried in advanced economies and did not cover post market liberalization period [15]. As a result, current research improved on the empirical gaps recorded above.

1.2 Conceptual Framework

The independent variables include exchange rate uncertainty, increased foreign debt, real GDP, interest rate differential and corruption incidence. The dependent variable is the capital flight whose magnitude in terms of its effects on

economic growth in EAC will be ascertained from its interaction with the independent variables. Investors will want to maximize the profit abroad; thus, reduction in real exchange rate will prompt the domestic investment to be unfavorable in terms of prices leading to increased capital flight. In between the explanatory and dependent variables are the intervening variables which are not accounted for. From empirical studies moderating variables can cause endogeneity, heteroscedasticity and serial correlation [19,20]. Consequently panel diagnostic tests including heteroscedasticity (Modified Wald test in Table 5) were applied. The intervening variables comprise of political instability and financial crisis. Most countries in the region ranked poorly in terms of political stability thus tackling crisis of democracy has persistent with little effort made to curb increased capital looting and dashed abroad [4]. Rumors of anticipated currency depreciation can trigger increased financial flight to developed economies. This flight capital is held offshore until the source of uncertainty is resolved. Fig. 2 presents study conceptual framework showing relationship between the research variables.

2. RESEARCH DESIGN AND METHODOLOGY

The research was informed by historical research design to explain the influence of exchange rate change on capital outflow in East Africa. 1988-2018 periods was chosen to cover post and pre market liberalization. The study area was East African five nations (Uganda, Kenya, Tanzania, Rwanda and Burundi). The region was chosen since the member states faces huge external debt, poor terms of trade, unstable currency exchange and high capital outflow [21]. East Africa is located in sub-Saharan Africa on the following latitudes (5°N, 29.2°E); (5°N, 41°E) and (11°S, 29.2°E); (11°S, 41°E) as shown in the map of the study area. Fig. 3 presents the target study area.

2.1 Panel Model Specification

The panel regression function was used to determine the estimates of the target relationship. Panel model equation was preferred as it allow for the control of unobserved individual effect of study variables [23]. The panel regression function is given as

$$f(\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, y, i, e, c, e) + \varepsilon \quad (1)$$

The estimated model is given as;

$$\ln f_{it} = \beta_0 + \beta_1 \ln e_{it} + \beta_2 \ln d_{it} + \beta_3 \ln c_{it} + \beta_4 \ln y_{it} + \beta_5 \ln i_{it} + \varepsilon_{it} \quad (2)$$

ε_{it} = Error term, β_0 , β_1 , β_2 , β_3 , and β_4 are slope coefficients.

During estimation natural logs were used to control for heteroscedasticity and misleading results.

2.2 Variable Measurement and Sources of Data

The description of study variables is given on Table 2.

2.3 Panel Data Analysis

The study used ordinary least squares (OLS) approach to analyse the relationship

between study variables. Hausman test [24] was applied to choose the best estimation method between fixed and random effect. However from analysis null was rejected and fixed effect chosen (Table 5). Unit root test is important to make sure all variables are stationary to avoid misleading result. The study adopted Levin Lin, and Chu (LLC) test which adopt augmented Dickey–Fuller test estimation for each cross-section with individual effects and controls for time trend [25]. To test for long run relationship the study employed Pedroni cointegration approach [26]. Finally diagnostic examinations were tested to assess the validity of the panel regression analysis and to reduce endogeneity issues in the study. The main tests include heteroscedasticity and autocorrelation.



Fig. 3. Map of East Africa Showing the Study Sites
Source: Tyner [22]

Table 2. Description of Variables

Variables	Description	Unit of Measurement	Source
$f_{i,t}$	Capital Flight	Sum of identified outflow	World Bank Data Catalog
$d_{i,t}$	External Debt	Gross external debt	Statistical Abstracts
$e_{i,t}$	Exchange rate	bilateral exchange rate	Central Bank database
$y_{i,t}$	Economic growth	Real GDP	Statistical Abstracts
$i_{i,t}$	Interest rate	US free interest rate less domestic interest rate	International Monetary Fund database
$c_{i,t}$	Corruption Index	Corruption Index per state	Transparency International index

Table 3. Descriptive Estimates

Variable	Sample	Mean	Std.	Min	Max
$f_{i,t}$	155	6.0299	1.3949	2.4880	8.7285
$c_{i,t}$	155	0.8845	0.2464	0	1.2527
$d_{i,t}$	155	3.8868	0.6958	2.6008	5.1696
$e_{i,t}$	155	1.9881	0.9236	3.7249	3.9786
$y_{i,t}$	155	4.9034	1.1982	3.6146	6.8471
$i_{i,t}$	155	2.0050	0.9203	3.5940	3.9086

3. EMPIRICAL FINDINGS AND DISCUSSION

3.1 Descriptive Analysis

Descriptive findings of the study are captured on Table 3.

The mean value of the capital flight was found to be 6.03 showing that for the period 1988-2018 in EAC, on average, capital flight was 6.03. The standard deviation in EAC of 1.395 is showing that capital flight did not deviate too much from the mean. According to Ndikumana (2015), in order to establish low capital flight in Sub-Sahara Africa, there is need to eliminate or reduce the volatility in the financial asset flight through enacting both fiscal and monetary policies [27]. The maximum value of capital flight was estimated at 8.73 while minimum value was estimated at 2.49. The estimated maximum and minimum provides the difference that captures the range of data for capital flight in East Africa.

On average, exchange rate was 1.99 during the period of study of 1988-2018. According to Nyoni [28], exchange rate offers lower return to exporters relative to other countries. Thus, 1.99 on average shows that exchange rate was low in EAC and hardly attracts foreign capital for investment. The standard deviation for exchange rate was recorded to be 0.92 which implied that the exchange rate did not deviate from the mean. This shows that EAC member states are relatively converging for a desirable a common currency [7]. The maximum value of the

exchange rate in EAC was 3.98 while the minimum value was 3.73 for the period of study of 1988 to 2018. Minimum and maximum difference captures the range of exchange rate data in the region.

The correlation statistics captures the correlation coefficients between the capital flight and the explanatory variables in the study. The correlation estimates explain the strength of the relationship between study variables. The correlation estimates ranges from -1 to +1 with 1 representing strong positive correlation between study variables. Table 4 present correlation estimates of study variables.

The correlation coefficient between exchange rate and capital flight is 0.1546. This implies that the relationship between exchange rate and capital flight is positive but weak. When there is appreciation of currency, capital outflow also increases and when the exchange rate decreases, capital flights also reduce. This can be attributed to appreciation of local currency which translates to increase in domestic price in comparison to international price thus necessitates the movement of capital flights with investors fleeing to countries where there is a favorable prices for the asset prices.

3.2 Empirical Analysis

3.2.1 Unit root estimates

Unit root examination was conducted and result presented on Table 5.

Table 4. Results of Correlation Coefficients

	LnCF	LnCI	LnED	LnER	LnGDP	LnIRD
$f_{i,t}$	1.0000					
$c_{i,t}$	0.1795*	1.0000				
$e_{i,t}$	0.3769**	0.2334**	1.0000			
$e_{i,t}$	0.1546**	0.0232**	-0.065**	1.0000		
$y_{i,t}$	-0.6062**	0.182***	-0.332***	0.2135***	1.0000	
$i_{i,t}$	0.142***	0.0277***	-0.0591***	0.3561***	0.2033***	1.0000

Significance *** 1%; ** 5% and * 10%

Table 5. Unit Root Test Estimates

Variable	level	Difference	p-value	Order of integration
$f_{i,t}$	-2.2547		0.0121	I(0)
$c_{i,t}$	-0.6670		0.2524	
		-3.5681	0.0002	I(1)
$e_{i,t}$	-0.0624		0.4751	
		-3.9082	0.0000	I(1)
$e_{i,t}$	-4.3974		0.0000	I(0)
$y_{i,t}$	1.7188		0.9572	
		-3.0643	0.0011	I(1)
$i_{i,t}$	-4.6390		0.0000	I(0)

Table 6. Regression Result

Variables	Coef.	Std.Err.	T	P> t	95% conf.Interval	
$c_{i,t}$	0.625**	0.40780	1.53	0.018	0.5739	0.6756
$d_{i,t}$	0.349**	0.1723	2.03	0.044	0.3278	0.3708
$e_{i,t}$	0.848**	1.2803	0.66	0.029	0.6878	1.0071
$y_{i,t}$	-0.811***	0.2325	-3.49	0.001	-0.8398	-0.7818
$i_{i,t}$	0.732*	2.0919	0.35	0.570	0.5719	0.8924
$cons_{i,t}$	-11.954**	5.7139	-2.09	0.038	-12.6664	-11.2412
R-sq: Overall	0.54				F(5, 145) =11.32 Prob>chi2 = 0.0000	

Implies significant level of *** 1%; ** 5% and * 10%

From unit root estimates (Table 5), interest rate, exchange rate and capital outflow were integrated of order zero signifying they were stationary at level. Further other variables were non -stationary, however they were differentiated to become stationary. As a result of differentiation, variables are likely to lose long run information and so cointegration test is necessary. However, considering the dependent variable was stationary, cointegration was not possible. Finally from Hausman test result, Table 6, fixed effect was the preferred estimation method. The strength of fixed effect model includes ability of unobserved individual effect to be correlated with the study variables.

3.3 Fixed Effect Regression Results

Table 6 presents the fixed effect regression findings.

From the result on Table 6, exchange rate had a positive and significant coefficient of 0.85 implying one percent increase in exchange rate will accelerate capital flight by 0.85. This meant in East Africa exchange rate was able to explain the reason for increase in capital flight and foreign investment to developed countries. Any increase in exchange rate increase foreign price than local price thus causing further depreciation of local currency and thus makes it difficult to attract foreign investors. The result is in agreement with theoretical works of Dunning and Robson [29] and Viner [12] on investment diversion and creation hypothesis. Investment and trade diversion theories argue that currency depreciation will translate to loss of asset value in the market by local investors. As a result in order to safeguard their assets the local investors are likely to invest in foreign market and assets and thus encourage capital outflow.

The estimates of the effect of exchange rate volatility on capital flight is in agreement with the past empirical works of Cuddington [16], Ngeno [13], Bigsten and Kayizzi-Mugerwa [15], and Ndikumana and Boyce [3]. Implying accelerated exchange rate appreciation will increase investor expectation of local currency depreciation which in turn will cause price of foreign goods to increase than domestic increase hence local investors will record losses. However our findings contrasted the similar studies by Gouider and Nourira [17] that recorded insignificance relationship between study variables. This inconsistency can be attributed to the study methodology and sample size Gouider and Nourira [17] used during the analysis.

From the estimation result foreign debt was positively significant in relation to capital flight. This could be attributed to ability of corrupt official to transfer borrowed funds into offshore accounts in private accounts denying the government opportunity to use them locally. Since government will not be able to pay back the borrowed money, it will lead to accelerated capital outflow associated with increased interest rate and non-payment risk which will discourage foreign investors. This estimates agree with the same works of Ajayi [30], Ndikumana and Boyce [31] and Ndiaye [32].

The estimate of GDP growth and capital outflow were significantly negative. It implies that as the performance of domestic economic improves less private wealth will be transferred to offshore accounts. This finding coincided with the results of Ndikumana and Boyce [30], Ndikumana and Sarr [9], Kipyegon [33], Ngeno [13], Nyoni [27], and Schneider [34] who found that real GDP expansion discourages capital flight.

Increased cases of corruption and bribe taking has a significantly positive effect on capital outflow meaning that under corrupt authorities, poor institutions and poor quality of governance conditions the public officials are likely to take advantage to hoard private wealth in overseas accounts. This finding are similar with the empirical findings of Le and Rishi [35] and Osei-Assibey et al. [36] who argue that cases of corruption explains capital outflow positively. Finally from the result interest rate differential is insignificant. This implies interest rate was not able to explain capital flight, and agrees with Alfayoumi et al. [14] findings. In contrast Uddin et al. (2017) reported a positive relationship attributed to the ability of high interest rate to

attract new asset inflow and discourage capital outflow.

From regression equation the overall R squared was estimated to be 0.54 implying about 54 percent of the change on the dependant variable are well captured by the explanatory variables that were included in the study framework, meaning the model was a good fit. The research carried a number of diagnostic tests to make sure the results were robust and not misleading. Heteroscedacity test (using Modified Wald estimate), correlation dependence test [37] and serial correlation (Wooldridge estimate) were found not to be a problem in the regression panel model.

4. CONCLUSION AND RECOMMENDATIONS

The study was carried out to empirically investigate the influence of exchange rate volatility on capital outflow in East African region over the years 1988 to 2018 [38]. From the estimates, descriptive matrix have shown that the volatility of the study variables were insignificant while the same estimates from correlation matrix showed presence of positively significant association between independent and dependent variables. The unit root test was carried out using Levin-Lin-Chu, from the estimate, exchange rate and capital flight were reported to be stationary at level. The study applied panel regression model framework. The fixed effect regression estimates showed the relation between exchange rate and capital flight was positively significant. The finding implied that capital flight was sensitive to currency depreciation in East Africa. Currency depreciation is likely to reduce the domestic assets value in comparison to foreign assets. As a result, domestic investors are likely to switch investment into foreign assets and market. This implies that East African states policymakers will have to employ fiscal and monetary policies that will slow exchange rate volatility to manage capital flight.

Through the Central bank and government intervention of the EAC member states, monetary policies should be adopted where foreign exchanges are kept at a point that allows for the country's currency to be exchanged at realistic exchange rate. The monetary policies should anchor the exchange rate uncertainty and build more foreign reserves to stabilize the foreign currency price [39]. This is because since exchange rate depreciation can cause an

increase in capital flight, thus, there is a serious need by the fiscal authorities to employ policy that creates less exchange rate volatilities. In addition, fiscal policies strategies should be implemented by the government officials of EAC to ensure that exchange rate movements are stable and this can also be complemented by closely observing the general rise in the general price level of goods and services in the EAC member economies.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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