Original Research Article

Exchange rate and capital flight: An empirical assessment

Abstract

Capital flight has become an important issue for policy makers in developing countries, especially since the emergence of the exchange rate uncertainty and the associated drastic decline in capital inflows from industrialized countries. Given their smaller resource base and limited market, the problem of capital flight justifies a serious attention particularly among East African countries. Cognizant of this, the study intends to contribute to this body of knowledge by filling a noticeable gap. The study examined the role of exchange rate on capital flight from East African Community countries using panel data for the period 1988 to 2018. The study was guided by Investment diversion theory that helped to analyze the motive of fleeing capital from developing economies to industrialized countries. The study adopted panel ordinary least squares technique to analyse the relationship between the study variables. The fixed effect regression results showed that exchange rate had a positive and statistically significant effect on capital flight in East Africa. As a result, policy makers should therefore take exchange rate volatility into consideration when designing policies and strategies to prevent and reduce the outflows of capital from EAC. These policies include a combination of good governance and fostering both fiscal and monetary disciplines.

Comment [D1]: "adopted panel ordinary least squares technique" or Panel regression? You can have Ordinary Least Squares Regression or Panel regression. Thus, based on your data, you adopted Panel regression not panel ordinary least squares technique .

Keywords: Capital Flight, Exchange Rate, Exchange Rate Volatility, Investment

JEL Classification: E5, E22, F21, F31

Article Classification: Original Scientific Paper

1. Introduction

After the 1990s, sub-Sahara African countries prescribed to liberalize their capital accounts and followed a number of standard policy solutions in order to attract foreign capital inflows to finance investment as well as their rising debt stocks (Forson et al., 2017). However, capital flows take place in the opposite direction as the residents of these countries move the already scarce capital to developed economies. According to World Bank (2017), capital flight has led to disappearance of capital for domestic investment in Eastern Africa, thus leading to a fall in the rate of capital formation that is important in promoting economic growth and sustainable development (Gisore, 2021).

Given the investment-growth nexus, capital flight has contributed to the sluggish growth in affected economies through reduction in government tax revenue and its debt servicing capacity since income earned abroad cannot be taxed. According to World Bank findings (World Bank, 2006), consequences of capital flight in Sub-Sahara Africa (SSA) includes the over reliance on a few exports due to the under development of the manufacturing sectors, unstable exchange rate , high vulnerability to terms of trade shocks and a narrowed taxation. Majority of the countries in the Eastern African region are commodity dependent, particularly on agriculture which forms the major contributor to the annual gross domestic product, which is an indicator of the infancy level of economic development (Forson et al., 2017).

Due to severe macroeconomic disproportions in the early years of 1980s and 1990s, majority of the African nations adopted liberalization of their markets. The transformations commenced enclosed exchange rate and global trade liberalization in concurrence with Structural Adjustment Policies (SAPs) transformations (Mwangi *et al.,* 2014). During post 1980s, several East African countries experienced overwhelming currency instability and changes in exchange rate regimes. It was at the same time that significant levels of capital flight from Africa commenced. Exchange rates have been highly volatile within the East African region (Figure 1). East Africa Community (EAC) exchange rate volatility spiraled up when the nations adopted the SAPs in early 1980s, a situation that made the capital inflow costly and unsustainable (Kaboro & Mose, 2021). Figure 1 present the trend of exchange volatility facing East African Countries.

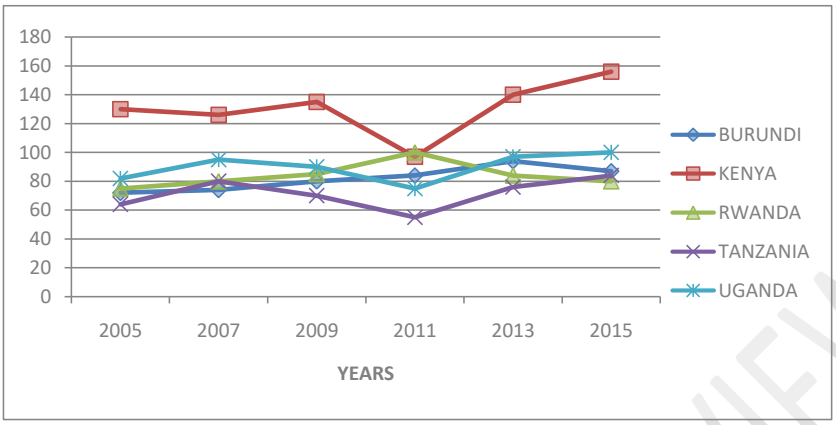

Figure 1: Exchange Rate Trend of East African Countries
Source: IMF (2016).

The East African Community (EAC) re-emerged in 2000 after the ratification of the EAC treaty signed earlier in 1999 by member states of Kenya, Uganda and Tanzania. Rwanda and Burundi joined the union in 2007 (IMF, 2016; World Bank, 2018). The effect of capital flight from SSA has also been experienced in the EAC Member states with an increased external debt and fluctuating exchange rate. As a result, EAC has experienced inflationary pressure thus forcing the residents to export capital to developed economies in order to maximize profit on investment returns (Makochekanwa, 2007; UNCTAD, 2011). According to Ndikumana and Boyce (2012), exchange rate misalignment highlights the errors in macroeconomic policy, which presents a case for capital flight. Uncertainty arising from expected currency depreciation and appreciation offers an interesting paradox for asset losses by economic agents (Makochekanwa, 2007).

The magnitude of East Africa Community (EAC) Member States' capital flight is staggering both in absolute monetary values and in relative GDP. According to Ndikumana and Sarr (2016), on average, EAC lost US $23.28 billion between 1988 to 2015 alone. From Table 1, the EAC members have lost a considerate amount of capital through capital flight which has led to economic sluggish growth in the region over the last 30 years. The Table 1 was adopted from the Global Development Indicators Database (World Bank, 2018) with an interval of two years from 1988 to 2018.

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

	EAC Countries				
	Kenya	Tanzania	Uganda	Rwanda	Burundi
Year	**CF (%)**	**CF (%)**	**CF (%)**	**CF (%)**	**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 (2018).

1.1 Problem Statement

For the past four decades, most EAC Member States' economic performance has been characterized by economic stagnation. Further, in the recent decades, capital flight has been both sizable and costly relative to scare capital formation in EAC. The loss of scarce capital and foreign exchange potentially leads to a loss of investment in countries that are in great need of more infrastructure, plant and equipment, and human capital. The regressive impact of capital flight is therefore compounded when financial imbalances result in devaluation: the wealthy that hold external assets are insulated from the effects, while the poor enjoy no such cushion. From the interaction, it can be conclude that stable economic growth through stable exchange rate,

domestic saving and investment promotes a favorable environment for the retention of capital flight. It is therefore on the ground of these findings that this study aim to investigate the role of exchange rate on capital flight from East African countries.

1.2 Objectives of the Study

The general objective of this study was to examine the effect of exchange rate on capital flight.

2. Literature Review

The Investment diversion theory was first developed by Dunning et al., in 1988. It states that political development and macroeconomic risk in developing countries results to high capital flight from developing countries to advanced countries. This is because the simultaneous existence of stable macroeconomic and political condition in advanced countries gives better investment opportunities such as high interest rate, favorable tax climate and secrecy of account condition. This leads to some unscrupulous corrupt leaders and private investors stealing their scarce capital resources from their countries to advanced countries (Makochekanwa, 2007). Simultaneous capital inflow and outflow may be due to asymmetric information about expected returns on domestic assets between domestic and foreign investors.

Residents face a higher risk or a reduction in the value of their domestically held assets as compared to foreign investors. This may lead to a situation where domestic investors buy foreign assets while foreign investors buy domestic assets at the same time. When residents hold large amounts of foreign assets, the tax base is reduced considerably. Under these circumstances, the tax burden due to increased public expenditures and foreign borrowing has to be shared by a smaller tax base, hence increasing the burden per unit or domestically held asset. Erosion of future wealth is based on the expectation that domestic political instability causes rising macroeconomic instability, leading to rising budget deficits, current account deficits, exchange rate uncertainty and high inflation. As a result of rate of return differentials, capital flight may occur simply because the returns of assets are higher abroad as compared to assets held domestically. Increased capital inflows resulting from growing government guaranteed foreign debt may increase expectations about exchanged rate depreciation, which provides a stimulus to hold foreign assets.

Many empirical studies have attempted to examine the effect of exchange rate on capital flight. The findings of Bigsten and Kayizzi-Mugerwa (2001) and Al-fayoumi et al. (2012) empahasized that exchange rate overvaluation leads to high expectations of depreciation on domestic currency which in turn leads to an increase in the prices of foreign goods compared with prices of domestic goods hence resulting in losses in real incomes. Ngeno (2000) suggested that to avoid loss in real income, domestic residents should hold at least part of their assets overseas. In addition, increase in exchange rate leads to a decline in terms of trade which in turn causes capital flight to increase. However, a reduction in terms of trade leads to a fall in government income and the government will increase tax in order to pay its obligations. As investors expect an increase in tax, they will hold their assets overseas. In addition, a decline in government income due to a decline in terms of trade makes the government to proceed with money creation which is a source of inflation. If inflation persists, individuals may decide to transfer their assets outside the country in order to avoid inflation tax (Ndikumana & Boyce, 2012).

Cuddington (1986) studied the economic determinants of resident capital flight for Argentina, Mexico, Uruguay, and Venezuela from 1974 to 1982 using portfolio-adjusted model. The study by Cuddington (1986) found that with an increase in the real exchange rate, it depicts a rise in the foreign price level compared to the domestic price level thus leading to real depreciation of the local currency. Ndikumana and Boyce (2012) studied the determinants of capital flight in North African countries from 1970 to 2010 using panel data and concluded that exchange rate misalignment results in macroeconomic error policies that accelerates rise in expected real currency depreciation resulting in paradox of asset loss by the economic agents. The results are not consistent with the findings of Gouider and Nouira (2014), who argue that undervaluation has no effect on capital flight. This disparity can be explained by the methodology Gouider and Nouira (2014) used.

In summary, from the previous empirical studies, role of exchange rate on capital flight is inconclusive. Further, most studies were carried out long time ago with no study majoring on the East African countries using panel data (Bigsten & Kayizzi-Mugerwa, 2001). At the same time, these studies did not cover post and pre capital liberalization from 1980s to millennium years. As a result, this study improved on the limitations identified.

2.2 Conceptual Framework

The independent variables include exchange rate, external debt, real GDP, interest rate differential and corruption. 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 addition, environmental factors, political instability and black swan events i.e. unexpected events which can destabilize the economy such as terrorist attack, thus, affect the capital flight in terms of geographical locality relative to countries economic performance. Figure 2 presents study conceptual framework showing relationship between research variables.

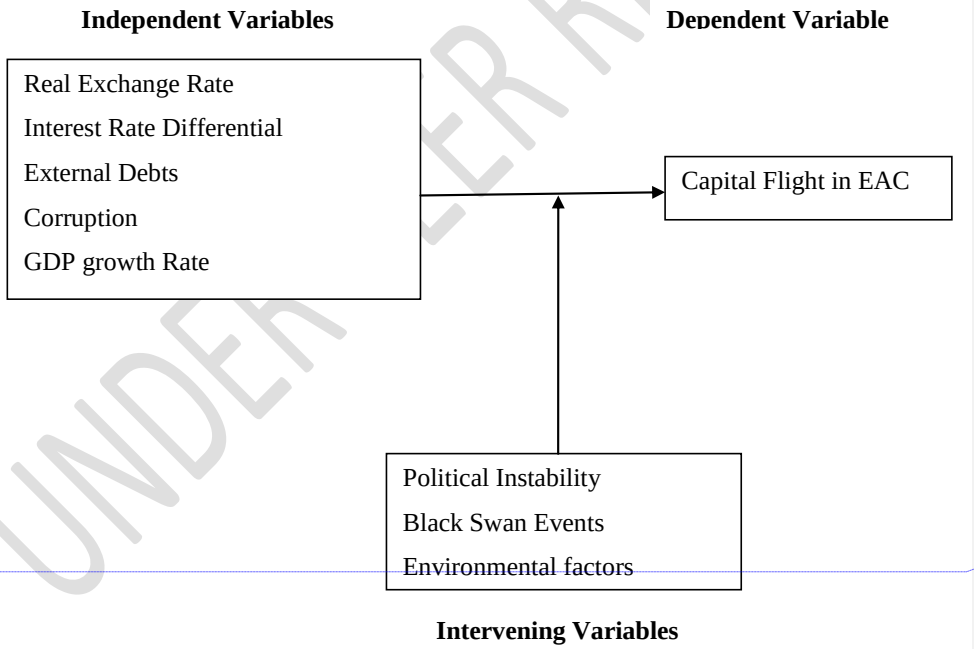

Figure 2: Conceptual Framework.

Comment [D2]: This paragraph and the study conceptual framework suggest that the researcher(s) intend to use environmental factors, political instability and black swan as moderating variables, but there is no strong justification as to why environmental factors, political instability and black swan can stand moderating variables in the study. Please, I suggest the researchers should consult these studies for beteer understanding about interaction studies,

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Dawson, J. F. (2014). Moderation in management research: What, why, when, and how. *Journal of business and psychology*, *29*(1), 1-19.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.

Comment [D3]: This is not how to present **Intervening Variables**

3. Research Methodology

The study used historical design as it seeks to evaluate the effect of exchange rate on capital flight in East Africa Community over the period 1988-2018. According to Buckley (2016), the main purpose of historical design is to collect, verify, and synthesize evidence from the past to establish the facts that tries to refute hypothesis. This research design was chosen because enabled the researcher to capture the trend and effect of exchange rate on capital flight of the member countries of EAC. The study covered East African Community (EAC) comprising of five member states: Kenya, Uganda, Tanzania, Burundi and Rwanda and the time period was chosen based on the availability of data. The EAC is found in Africa and is located between (5^0N, 29.2^0E); (5^0N, 41^0E) and (11^0S, 29.2^0E); (11^0S, 41^0E) respectively as shown in the map of the study area. The block was chosen since the countries have had a long history of budget deficit given that lots of capital flew from the region while their exchange rate volatility accelerate the process of capital outflow from the region (World Bank, 2010). Figure 3 presents the target study area.

Figure 3: Map showing the five countries of the EAC

Source: Tyner (2018).

3.1 Panel Model Specification

The study used panel data regression analysis where by a linear regression analysis was used to estimate the relationship between capital flight and independent variables in EAC member states. Panel data contain information on both the inter-temporal dynamics and the individuality of the entities and may allow one to control the effects of unobserved variables (Hsiao, 2007).

This can be explained using the functional form;

$$CF = CF(\beta 1, \beta 2, \beta 3, \beta 4, \beta 5, RGDP, IRD, \mathrm{IRD}, \mathrm{CI}, \mathrm{RER}) + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The estimated model is given as;

$$\ln CF_{it} = \beta 0 + \beta 1 InCI_{it} + \beta 2 InED_{it} + \beta 3 InRER_{it} + \beta 4 InRGDP_{it} + \beta 5 InIRD_{it} + \varepsilon_{it} \quad \text{..... (2)}$$

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Where:

CF = Capital Flight,

CI= Corruption Index,

ED = External Debt,

RER = Real Exchange Rate,

RGDP = Real Gross Domestic Product,

IRD = Interest Rate Differential,

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

The data was converted to their natural logs to address the problem of large values and eliminate heteroscedasticity. Data was retrieved from the World Bank Data Catalog, Stastical abstracts, International Monetary Fund database and Central Bank Statistics.

3.2 Variable Measurement and Sources of Data

Capital Flight: Capital flight is used as the dependent variable in the study and the data was retrieved from the World Bank Data Catalog for all countries' capital flight from 1988 to 2018. The variable's changes depended on the signicant of the independent variables used in the study.

Real Exchange Rate: Since local currency devaluation erodes the value of domestic assets vis-à-vis foreign assets, local residents respond to the possibility of impending currency devaluation by switching into foreign assets. Hence, lower than expected real exchange rates alert capital owners to the possibility of imminent currency devaluation and prompt them to send their capital abroad. Data for the Real Exchange Rate was retrieved from the the study area countries' Central

Bank Statistics. Employing the finding of Cuddington (1986), a positive relationship between real exchange rate and Capital Flight is expected.

Real Gross Domestic Product: Real gross domestic product is an inflation-adjusted measure for all value of goods and services produced by an economy in a given year. It is measured as annual percentage growth rate of GDP at market prices based on constant local currency (World Bank, 2010). Data for the Real Gross Domestic Product was retrieved from the countries' National Bureau of Statistics. A negative relationship is expected between capital flight and domestic real GDP growth rate since a stable economy minimizes capital flight given public confident on domestic market to invest.

Interest Rate Differential: Interest Rate Differentials was estimated as the US risk free interest rate minus the domestic real interest rate. Data for the Interest Rate Differential Rate from EAC member States is obtained from the the International Monetary Fund (IMF) database. A positive relationship is expected between capital flight and interest rate differential because a higher domestic return rate compared to the foreign return rate would result in capital reversal (Liew et al., 2016).

External Debt : According to Ndikumana and Boyce (2003), external debt is used with intention to measure the risk of private asset expropriation. To measure the external debt, the study uses gross external debt, which measures the total debt that a country owes to foreign creditors, i.e. it considers only the liabilities of that country (Ndikumana and Boyce, 2003). Data for the External Debt is gotten from the EAC countries' National Bureau of Statistics. A positive relationship between the external debt and capital flight is expected.

Corruption Index: Due to the difficulty in measuring corruption qualitatively, the study employed the Corruption Perceptions Index (CPI) developed by Transparency International. The CPI ranks countries by the degree to which corruption is perceived to exist among public officials and politicians. The scores range between 10 (highly clean) and 0 (highly corrupt) is used to estimate the Corruption Index per country. Data for the Corruption Index was retrieved from the the Transparency Interational Reports for the duration of the study. A positive relationship is expected between capital flight and Corruption (Mose, 2021).

3.3. Panel Data Analysis

3.3.1 Panel Unit Root Test

Panel Unit Root Test was conducted to ensure that the variables are stationary and that none of them is of an order greater than I (I). There are various tests used to test for panel unit root which includes Levin Lin, and Chu; Harris and Tzavalis; Im-Pesaran and Shin; Breitung; and Hadri. Levin Lin and Chu (2002) unit test is superior test power for the long-run relationships in panel data analysis than Im-Pesaran and Shin which begin by specifying a separate ADF regression for each cross-section with individual effects and no time trend.

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where $i = 1, \ldots, N$ and $t = 1, \ldots, T$

3.3.2 Co-integration Test

The study tested for the existence of a long-run cointegration among capital flight and the independent variables using panel cointegration tests suggested by Pedroni (1999). Differencing leads to lose of long run relationship between variables and so co integration test was conducted using Pedroni (1999) to check whether the variables have got long run relationship or not. The procedures proposed by Pedroni make use of estimated residual from the hypothesized long-run regression of the following form:

$$y_{i,t} = \alpha_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \ldots + \beta_{Mi} x_{Mi,t} + e_{i,t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

for t = 1,…..,T; i = 1,….,N; m = 1, …., M,

Where;

T is the number of observations over time,

N number of cross-sectional units in the panel,

M number of regressed variables

In this set up, α_i is the member specific intercept or fixed effects parameter which varies across individual cross-sectional units. The same is true of the slope coefficients and member specific time effects $\delta_i t$.

3.3.3 Hausman Test

The study adopted panel ordinary least squares (POLS) technique to analyse the relationship between the study variables. Panel data can be estimated by two techniques, fixed effect or random effect model. Therefore to establish whether to employ fixed effects model or random effects model, this study conducted Hausman test (1978) which tries to establish whether the error terms are correlated with the regressors, where null hypothesis states the absence of such correlation. Therefore, the test's null hypothesis posits that the preferred model is the random effects model against the alternative hypothesis denoting preference of fixed effects model. One advantage of fixed effects model is that it allows the unobserved individual effects to be correlated with the included variables.

Comment [D5]:

Comment [D6R5]: "adopted panel ordinary least squares technique" or Panel regression? You can have Ordinary Least Squares Regression or Panel regression. Thus, based on your data, you adopted Panel regression not panel ordinary least squares technique .

Comment [D7]: The researcher(s) ought to have used heteroscedasticity test to check for the presence or otherwise of heteroscedasticity in the data set.

Comment [D8]: Please, check, are you not contradicting your arguments in the abstract claiming that you used Fixed Effect Model?

3.4 Post Estimation Diagnostic Tests

Diagnostic tests were carried out to assess the validity of the regression analysis and the models used in the study. As a result, it involved econometric tests for the adequacy of the statistical findings of the analysis. Lagging the dependent variable in a dynamic model may cause it to become correlated with the error term. This may lead to the problem of endogeneity of some explanatory variables. According to Khan and Hossain (2010), such model suffers from the problem of serial correlation and heteroscedasticity. Therefore, tests for the mentioned problems were conducted before estimation which includes cross-sectional dependence, autocorrelation, and heteroscedasticity.

4. Results and Discussion

4.1 Descriptive Analysis

Table 2 presents the descriptive statistics of both the dependent and independent variables for the period 1988-2018.

Table 2: Results of Descriptive Analysis

Variable	N	Mean	Std.	Min	Max
LnCF	155	6.0299	1.3949	2.4880	8.7285
LnCI	155	0.8845	0.2464	0	1.2527
LnED	155	3.8868	0.6958	2.6008	5.1696
LnER	155	1.9881	0.9236	3.7249	3.9786
LnGDP	155	4.9034	1.1982	3.6146	6.8471
LnIRD	155	2.0050	0.9203	3.5940	3.9086

The mean value of the capital flight was found to be 6.0299 showing that for the period 1988-2018 in EAC, on average, capital flight was 6.0299. The standard deviation in EAC of 1.3949 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 capital flight through enacting both fiscal and monetary policies. The maximum value of capital flight was observed at 8.7285 while minimum value was observed at 2.4880. The difference between the maximum and the minimum values, informed the range of data for the capital flight during the duration of the study.

On average, exchange rate was 1.9881 during the period of study of 1988-2018. According to Nyoni (2000), low interest rate offers lenders in an economy a lower return relative to other countries. Thus, 1.9881 on average shows that exchange rate was low in EAC and hardly attracts foreign capital for investment. The standard deviation for exchange rate was 0.9236 which demonstrated 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 once the union is accomplished (Kaboro & Mose, 2021). The maximum value of the exchange rate in EAC was 3.9786 while the minimum value was 3.7249 for the period of study of 1988 to 2018. The difference between the maximum and the minimum values, informed the range of data for the exchange rate in EAC

The correlation matrix presents the correlation coefficients between the capital flight and the explanatory variables in the study. The correlation analysis explains the strength of the relationship between the capital flight and the explanatory variables. Correlation coefficient ranges from -1 to +1 with closeness to absolute 1 showing a strong correlation between variables.

Table 3: Results of Correlation Coefficients

	LnCF	**LnCI**	**LnED**	**LnER**	**LnGDP**	**LnIRD**
LnCF	1.0000					
LnCI	0.1795*	1.0000				
LnED	0.3769**	0.2334**	1.0000			
LnER	0.1546**	0.0232**	-0.065**	1.0000		
LnGDP	-0.6062**	0.182***	-0.332***	0.2135***	1.0000	
LnIRD	0.142***	0.0277***	-0.0591***	0.3561***	0.2033***	1.0000

*** is significance at 1%; ** is significance at 5% and * is significance at 10%

Table 3 presents correlation results with diagonal matrix indicating values being unity (1) which implies that a variable is perfectly correlated with itself. The correlation coefficient between exchange rate and capital flight is 0.1546. This means that there is a weak positive correlation between exchange rate and capital flight. When there is increase in exchange rate, capital flight also increases and when the exchange rate decreases, capital flight also decreases. The positive correlation of 0.1546 between exchange rate and capital flight is statistically significant at 5% level. This is because an increase in real exchange rate depicts a rise in the foreign price compared to domestic prices thus necessitates the movement of capital flights with investors fleeing to countries where there is a favourable prices for the asset prices.

4.2 Regression Analysis

4.2.1 Panel Unit Root Test

Panel unit root test was conducted to find out whether the variables were stationary at level or whether they were non stationary at level.

Table 4: Levin-Lin-Chu Panel Unit Root Test

Variable	LLC (level)	LLC(first difference)	LLC(p-value)	Order of integration
LnCF	-2.2547		0.0121	I(0)
LnCI	-0.6670		0.2524	
		-3.5681	0.0002	I(1)
LnED	-0.0624		0.4751	
		-3.9082	0.0000	I(1)
LnER	-4.3974		0.0000	I(0)
LnGDP	1.7188		0.9572	
		-3.0643	0.0011	I(1)
LnIRD	-4.6390		0.0000	I(0)

5% significance level

From Table 4, capital flight and exchange rate were found to be stationary at level that is integrated of order zero. The results reveal that all the other variables are non-stationary at level. However, they become stationary after the first difference implying that the variables are integrated of order one, I (1).

4.2.2 Cointegration Test

Usually after differencing, variables tend to lose long run relationship and so cointegration test is being conducted to establish whether variables have got long run relationship after differencing. The test's null hypothesis is that there is no cointegration while the alternative one is that all panels are cointegrated. Since some variables were found to be stationary at level and others stationary after first differencing, conducting cointegration test was impossible since the variables were now not integrated of the same order.

From the Hausman test, the p-value is 0.0000 which is less than 0.05 which means that the difference is statistically significant and so the null hypothesis of the preferred model being random effects model was rejected. Thus, the fixed effects regression model was used to analyze the relationship between the dependent variable and the independent variables.

4.3 Fixed Effect Regression Results

Table 5 presents the fixed effect regression results based on the panel data analysis. This is because panel data controls for endogeneity, omitted variables and also explores data across time.

Table 5: Fixed Effects Regression Result

LnCF	Coef.	Std.Err.	t	P>|t|	95% conf.Interval	
LnCI	0.625**	0.40780	1.53	0.018	0.5739	0.6756
LnED	0.349**	0.1723	2.03	0.044	0.3278	0.3708
LnER	0.848**	1.2803	0.66	0.029	0.6878	1.0071
LnGDP	-0.811***	0.2325	-3.49	0.001	-0.8398	-0.7818
LnIRD	0.732*	2.0919	0.35	0.570	0.5719	0.8924
-cons	-11.954**	5.7139	-2.09	0.038	-12.6664	-11.2412
R-sq: within	0.5208				F(5, 145) =11.32	
R-sq: Between	0.8451				Prob>chi2 = 0.0000	
R-sq: Overall	0.5434					

*** is significance at 1%; ** is significance at 5% and * is significance at 10%

The coefficient of exchange rate from the fixed effect regression results is 0.85. This means that a percentage increase in exchange rate leads to 85% increase in capital flight and p-value is positively significant. The result is positive and conforms to economic theory of Investment diversion theory postulated by Dunning et al. (1988) which suggests that currency depreciation will bring about the fear of loss of asset value by the economic agents. This is because in the midst of expected currency depreciation, citizens would anticipate the economic agents to safeguard their assets by demanding higher valued currencies thus engaging in capital flight.

The result of the effect of real exchange rate volatility on capital flight is consistent with the findings of Cuddington (1986), Ngeno (2000), Bigsten and Kayizzi-Mugerwa (2001), and Ndikumana and Boyce (2012), which empahasized that exchange rate overvaluation leads to high expectations of depreciation on domestic currency which in turn leads to an increase in the prices of foreign goods compared with prices of domestic goods hence resulting in losses in real incomes. Cuddington (1986), in Argentina, explained that with an increase in the real exchange

rate, it depicts a rise in the foreign price level compared to the domestic price level thus leading to real depreciation of the local currency. In addition, increase in exchange rate leads to a decline in terms of trade which in turn causes capital flight to increase. However, a reduction in terms of trade leads to a fall in government income and the government will increase tax in order to pay its obligations. As investors expect an increase in tax, they will hold their assets overseas. In addition, a decline in government income due to a decline in terms of trade makes the government to proceed with money creation which is a source of inflation. If inflation persists, individuals may decide to transfer their assets outside the country in order to avoid inflation tax (Ndikumana & Boyce, 2012). The results are not consistent with the findings of Gouider and Nouira (2014), who argue that exchange rate has no effect on capital flight. This disparity can be explained by the methodology and sample size Gouider and Nouira (2014) used.

The positive and statistically significant interactive effect of corruption index on capital flight implies that under situations of poor governance and bad institutional quality, corrupt public authorities take advantage to hoard personal wealth overseas thus leading to low tax and capital accumulation to improve the well-being of citizens and even to increase investment in the domestic developing countries. This finding concurred with the findings of Le and Rishi (2006) and Osei-Assibey et al. (2018) who found that corruption leads to capital flight in the various regions and time periods that they conducted their studies.

The negative and statistically significant relationship between real GDP and capital flight could be because deterioration in the performance of the economy increases the proportion of private wealth portfolio held abroad. This finding coincided with the findings of Ndikumana and Boyce (2003); Ndikumana and Sarr (2016); Kipyegon (2004); Ngeno (2000); Nyoni (2000), and Schneider (2003) who found that real GDP growth leads to capital flight decrease.

The positive and statistically significant effect of external debt on capital flight could be because most of the external borrowings in EAC are transformed instantaneously from capital inflow to capital flight, ultimately ending up abroad, usually in a private foreign account. As a result, with increased failure in repaying back debt or when there is a high potential of default, it will lead to capital outflows from developing countries associated with non-repayment risks. This finding coincided with the findings of Ajayi (1997), Ndikumana and Boyce (2003) and Ndiaye (2011) who found that increase in external debt leads to increased capital flight.

The coefficient for the interest rate differential is insignificant a 5 percent. According to Al-fayoumi et al. (2012), the higher the interest rate differential is positive and insignificant, the more attractive the foreign investments on assets which in turn induces net capital outflow. It also reduces expected returns on domestic investment thus encouraging domestic capital owners to send their capital abroad. However in East Africa interest rate differential is not statistically significant and agrees with Al-fayoumi et al. (2012) studies. In addition, the result did not conform with the findings of Uddin et al. (2017) who studied the determinants of capital flight in Bangladesh between 1973 and 2013 and showed that interest rate differential is one of the most significant factors in determining capital flight.

From the results in Table 5, the probability of F-statistics is 0.0000 which is less than 0.05 implying that the model is good fit and all explanatory variables are jointly statistically significant. The overall R squared is 0.54. This means that 54 % of the changes on the dependent variable (capital flight) in EAC are explained by the explanatory variables that are included in the model. Pesaran's (2011) test for cross-sectional dependence showed that there was no cross-sectional dependence. Wooldridge's (2006) test for autocorrelation was used to establish whether the error terms of different periods are correlated or not and the results of the test showed they are not correlated. A heteroscedasticity test was carried out to establish whether the error terms exhibit constant variance across observations or not. Modified Wald test for group-wise heteroscedasticity was employed and results showed no heteroscedasticity.

5. Conclusions and Recommendations

5.1 Conclusions

The general objective of this study was to examine the role of exchange rate on capital flight in East Africa Community over the period 1988-2018. From the analysis, descriptive statistics showed that the volatility of the variables was very low while the correlation analysis showed that there were positive correlations between the dependent variable and the explanatory variables except in the dependent variable. Levin-Lin-Chu panel unit root test was carried out and capital flight and exchange rate were found to be stationary at level. The fixed effect regression results showed that exchange rate had a positive and statistically significant effect on capital flight. The positive and statistically significant interactive effect of real exchange rate on capital flight implied that capital flight was sensitive to currency depreciation. Since currency

devaluation erodes the value of domestic assets vis-à-vis foreign assets, residents respond to the possibility of impending currency devaluation by switching into foreign assets. This therefore showed that EAC regions have to work hard in implementing both monetary and fiscal policies that will control exchange rate and reduce capital flight.

5.2 Recommendations

Through the Central Bank 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 prices. The monetary policies should anchor the exchange rate volatilities and build more foreign reserves to stabilize the exchange rate. This is because since real exchange rate depreciation can cause an increase in capital flight, there is a serious need by the fiscal authorities to pursue policy that creates less exchange rate uncertainties. In addition, fiscal policies should be implemented by the national government authorities of EAC to ensure that real exchange rate movements are stable and this can also be complemented by closely observing the general rise in the price level of goods and services. In order to boosts domestic investors' confidence in the local economy and restrain the outflow of capital, EAC member states should promote higher foreign exchange reserves that will allow the governments to avert balance-of-payments crises and help dispel symptoms of economic trouble.

There is need for uniformity in the practice of the monetary policies in the region which has been characterized by coexistence of multiple interest rate regimes and currency regimes. The interaction between capital flight and monetary policy should be affected only by the exchange rate array and the interest rate structural models. As a result, there is need to assess whether application of the fixed-exchange rate can be differentiated from floating exchange rate relative to capital flight-monetary policy nexus. In addition, there is need for EAC to maintain low interest rate regime in order to balance their floating exchange rate relative to capital flight. EAC should also consider implementing the IMF recommendation of a three to four month minimum import cover as a prudential target for foreign exchange reserves in order to help in accumulating foreign exchange reserves. This is because with excess foreign reserve, EAC will be able to increase their international investment and also reducing the charges on domestic investments thus leads to increased investments that will be able to minimize capital flight.

Lastly, the governments of the EAC should put more emphasis on revising its infant industries such as coffee, fee, and sugar industries that enables for full capability operation. This will help to reduce over dependence on the imported goods thus helps to preserve countries foreign reserves. There is also need to reduce parallel market for the foreign exchange rate trading with major trading anchored on the Central Banks of the EAC countries only. This will therefore encourage a de facto measure of exchange rate flexibility thus making exchange rate more flexible and dampen real appreciation that can lead to increased capital flight. As a result, there is also need to resist nominal appreciation of the exchange rate through intervention in the foreign exchange market in order to avoid real appreciation locally. By allowing exchange rate some flexibility, EAC Member states would cure appreciation stemming that accelerates capital flight and avoid a significant loss of competitiveness.

5.3 Suggestion for Further Research

Based on this study, the scope was limited and more studies should be done on more countries including sub-Saharan Africa and increase the time period.

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