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An Econometric Approach to Short and Long Run Analysis of the Nigerian Economy -Capital Flight in Nigeria

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ABSTRACT

Capital flight simply refers to the "flow or movement of resources from poor to rich countries" according to Tornell and Velasco. This research focused on how to reduce the movement of money or financial assets via investment from Nigeria to other countries with Capital Flight. This study estimates the magnitude and analysis of the trends of capital flight for the periods 1981 -2010 using the Engle granger two steps procedure for estimation, which captures both the long and short run dynamics of capital flight. The study found that the explanatory variables; defence expenditure, interest differentials, and investment are individually affecting the capital flight with standard errors (at 5%) of (2.29118), (2.45846), and (4.53176) respectively for the long run relationship. However, defence expenditure and inflation with high t-test values [-1.58372] and [2.31656] were significant in the short run. This study had confirmed that not only the country loosing substantial amounts of funds that could be otherwise used for development and further stabilization, capital flight also punishes long term economic growth.The study revealed that defence expenditure affects capital flight both in the long and short run. This implies that policy measures should be instituted to make the domestic economy more attractive for private investment if capital flight is to be controlled. Perhaps it is time to revisit the importance of having decisive policies and theories to strengthen macroeconomic management. The best option for the country is to provide business-friendly environment on continuous basis for the country to improve the economy through the increase in financial products that investors can invest in.

Keywords: Investors, Engle Granger Two Steps Procedure, Economic Growth, Domestic economy

INTRODUCTION

Nigeria, a country with a large poor population is classed among the developing countries of the world, though she earns much foreign exchange from crude oil exports, she is still in need of capital to develop, maintain and upgrade her infrastructure. Nevertheless, the country has been faced with continuous outflow of capital, which has made some scholars conclude *a priori* that the country is facing capital flight challenges.

Capital flight specifically refers to the movement of money or financial assets from investments in one country to another in order to avoid country-specific risks according to the holders perception (such as hyperinflation, political turmoil and anticipated depreciation or devaluation of the currency), or in search of higher yield. Walters (2002) describes capital flight and other flows as follows: "International flows of direct and portfolio investments under ordinary circumstances are rarely associated with the capital flight phenomenon. '....r*ather, it is when capital transfers by residents conflict with political objectives that the term 'flight' comes into general usage*." This description becomes instructive in the light of macroeconomic changes in Nigeria in the past seven to ten years (2000 – 2010). According to Eryar (2005), capital flight seems to be affected by loss of confidence in overall economy. In essence, if the residents of a country sees the macroeconomic instability as a threat to their holding of domestic assets, then, they tends to switch to foreign assets so as to protect the value of their assets from any sudden changes. These changes can be in the form of a freeze on assets in the banking system or a postponement of interest payments on public debts.One usually acceptable definition sees capital flight as all private capital outflows from developing countries, be they short-term or long-term, portfolio or equity investments (Ajayi 1992) and (Oloyede, 2002). The basis for this definition, Oloyede argues, is that developing countries, of which Nigeria is one, are capital poor and therefore should not have capital flowing out but staying, and that the country should

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be a net borrower in the development process, supplementing domestic resources with borrowed capital from abroad. The bottom line of the issue is that capital is lost to the country suffering from capital flight.

Nigeria is presently overwhelmed with the infrastructural deficit that has impeded the development of the country and its transformation into an industrial economy. In addition, the economy has constantly lost resources to capital flights over the years, on aggregate, Nigeria lost $233.9billion US dollars to capital flight transfers over the period 1970 – 2010(*The Guardian-From Laolu Akande, New York).*In short, capital flight reduces domestically available investible capital.It represents foregone investment in manufacturing plants, infrastructure, and other productive capacity. In addition, capital flight escapes government's taxation thus depriving nations of revenues capable of contributing to fiscal deficits and constraining expenditures on social welfare programs, defense, internal security and infrastructure development. Growth is reduced partly because investment has been diverted abroad and also because necessary imports are limited by the foreign exchange drain from both the flight itself and the fact that earnings on such assets are often not repatriated (Pastor, 1990).The study will help bring policy makers back to the issues that need to be addressed in order to attract further capital inflows in FDI and retain resident capital domestically and thereby reduce capital flight out of Nigeria.

Different definitions exist for capital flight by different studies using different estimates. The three commonest definitions are those of the World Bank (essentially from Cuddington), Dooley and Morgan Trust Banking Company which all came out in 1986. Though the different estimates point to the fact that capital flight estimates are country-specific, it nevertheless require that attention be paid to a specific definition that may allow the country to deal with the problem using the particular and the most significant estimates. The most significant determinants can then be used to unravel the main issues that need to be focused on in the search for the solution to the problem of capital flight in Nigeria.

This study analyses the following: The role of exchange rates volatility in a developing economy and attraction of foreign direct investment (FDI) in Nigeria. The investment environment and the attraction of capital flows. To investigate how risk-averse investors can build portfolios in order to optimize or maximize expected returns given a level of market risk. To analyse the short and long-run impact of capital flight's determinant in the Nigerian economy. The rest of the paper proceed as follows: following this introductory section, section 2 presents the methodological frameworks and data sources for estimating capital flight from Nigeria over the period of analysis, section 3 presents the estimates and analyses of the trends and magnitudes of capital flight flows from Nigeria, while section 4 presents the conclusions and policy recommendations.

METHODOLOGICAL FRAMEWORK

I utilized the methodology suggested by Engle and Granger (1987) commonly known as Engle-Granger two steps procedure, because it takes into account the long-term and short-term relationships among variables. It follows thus;

1. Pretest the variables for their order of integration:
   - Use DF or ADF tests to determine the order of integration
   - If variables are I(0) - Standard Time Series Methods
   - If the variables are integrated of different order (one I(0), one I(1) or I(2) etc.) then it is possible to conclude that the two variables are not co-integrated
   - If the variables are I(1), or are integrated of the same order, go on.
2. Estimate the Long Run Equilibrium Relationship:

$$Y_t = \beta_0 + \beta_1 X_t + e_t$$

If the variables are co-integrated, an OLS regression yields a "super-consistent" estimator of the co-integrated parameter β_0 and β_1. There is a strong linear relationship. Use the residual ***(e)*** of the estimated long run relationship. If ***(e)*** is stationary (according to ADF criteria) then we can conclude that the series are co-integrated.

3. Estimate the Error Correction Model:

- If the variables are co-integrated, the residual from the equilibrium regression can be used to estimate the Error Correction Model (ECM).
- Using the saved residual from the estimation of the long-run relationship, we can estimate the ECM as:

$$\Delta Y_t = a_0 + a_y(Y_{t-1} - \beta X_{t-1}) + \sum_{i=1}^{n} a_i \Delta Y_{t-i} + \sum_{j=1}^{m} b_j \Delta X_{t-j} + \varepsilon_t$$
$$\Delta Y_t = a_0 + a_y \hat{e}_{t-1} + \sum_{i=1}^{n} a_i \Delta Y_{t-i} + \sum_{j=1}^{m} b_j \Delta X_{t-j} + \boldsymbol{\varepsilon}_t$$

- Granger's representation theorem: if a set of variables are co-integrated then there always exists an error correcting formulation of the dynamic model and vice versa.

4. Assess Model Adequacy:

Asses if the ECM model estimated is appropriate using a General - Specific modelling approach.

Model

In the analysis of the determinants of capital flight in Nigeria, the following model is employed:

$CF_t = \alpha_0 + \alpha_1 Inf + \alpha_2 Exrate + \alpha_3 Intdif + \alpha_4 Rgdp + \alpha_5 Def + \alpha_6 Invstmt + \varepsilon_t$

Where,

CF_t - is the total yearly amount of capital flight in million (Naira).

Exrate - is the yearly average of exchange rate of one US dollar in Naira.

Inf - is the rate of inflation in the domestic economy.

Intdiff - is the interest rate differentials in millions (Naira).

Rgdp - is the growth of the economy as measured by the Real GDP (in millions Naira).

Def – is the defense expenditure in millions (Naira) by the government.

Invstmt – is the recorded investment on fixed assets.

ε_t - is the random error term.

Source of Data

Secondary source of data was employed so as to minimize error to the lowest degree of significance. Data on Real Gross Domestic Product (RGDP), average exchange rate (Exrate), and Defence expenditure (Def) were gotten solely from the Central Bank of Nigeria (CBN), Statistical Bulletin and annual report 2010. Whereas, data on Inflation rate (Inf), and Investment are obtained from the International Monetary Fund (IMF) 2011 world economic outlook. Interest rate Differentials (Intdiff) data is obtained from International Financial Statistics (IFS) and supported from CBN, Statistical Bulletin (2010).

ANALYSIS OF DATA AND RESULTS

Stationary Tests

Before the estimation of the equation, all the variables were subjected to stationary tests of times series data. If the data series is differenced and it is found that it is stationary then, they can be integrated to the order of one or greater; otherwise, a non-stationary series exists.

Table3.1.

Augmented Dickey Fuller Statistics of the Variables					
Variables	**ADF Statistics**	**1%**	**5%**	**10%**	**Decision**
Exrate	-5.038919	-3.689194	-2.971853	-2.625121	1(1)
Inf	-5.508908	-3.699871	-2.976263	-2.627420	1(1)
Intdiff	-4.405483	-3.724070	-2.986225	-2.632604	1(1)
CF	-8.782025	-3.689194	-2.971853	-2.625121	1(1)
Def	-4.724508	-3.689194	-2.971853	-2.625121	1(1)
Rgdp	-7.037308	-3.699871	-2.976263	-2.627420	1(2)
Invstmt	-3.887388	-3.699871	-2.976263	-2.627420	1(1)

The real gdp variable was subsequently dropped as it was not of the same order with the rest of the variable as these would produce spurious results if they were co integrated.

Capital Flight Regression Estimates

Table3.2.

Dependent variable	Independent variables					
	constant	Exrate	Inf	Intdiff	Def	Invstmt
CF	3.009045 (0.884981)	-0.758959 (-2.654529)*	0.149584 0.750888)	-1.179144 (-2.120992)*	0.344111 (1.422495)	0.443077 (0.929773)
R^2	0.33					
Adjusted R^2	0.17					
Durbin Watson	1.5					
F Statistics	2.06					
Observations	27					

Note: *t-test statistics are in parentheses *, ** denote the level of significance at 5, and 10 per cent respectively*.

The variables under consideration were logged because of the large volume of their values. Hence, instead of their original values we use their logged ones in our analysis.

Interest differential that represents the portfolio approach to capital flight is significant at 0.05 levels. The previous studies have always attributed the capital flight episodes to the investor's portfolio choice, which can be corroborated from this study. The investment variable is not significant in that the *t* is low. The implication is that the correlation between investment and capital flight is very low and. This means that as capital flight increases, investment reduces at a very slow rate.

The rate of exchange (*exrate*) is also significant at 0.05 levels. The significance of the variables is negative implying that capital flight has a significant negative impact on rate of exchange (*exrate*). The defence expenditure (*def*) variable is not significant because it has a low *t* value.

As a result of the logs, the dependent variables were not complete because of the reversal of capital flight in some years. The observation is 27 reducing by 3 as a result of the logs transformation.

Long Run Model

From the co-integration result, it is evident that the long run test indicates three co-integrating equations at 5% significance level.

Normalized co-integrating coefficients (standard error in parentheses)

The long run or co-integrating equation is presented as:

LOG(CF)	LOG(DEF)	LOG(INTDIFF)	LOG(INF)	LOG(INVSTMT)	LOG(EXRATE)
1.000000	-19.86435	-16.66005	13.52606	40.28652	-6.009877
	(2.29118)	(2.45846)	(1.05596)	(4.53176)	(1.77131)

The co-integrating equation as reported above indicates that the, defence expenditure, interest differentials, and investment are the significant variables in the co-integrating equation. The implication of this is that these are the variables of interest for the policymakers to deal with in order to put an end to capital flight and encourage investment in the economy.

Vector Error Correction Estimates (Short Run Behaviour)

The most affected of the endogenous variables is the defence expenditure and inflation in the economy with high *t-test* statistics-1.58372 (0.05 percent) and 2.31656 (0.05 percent) respectively under a one-year adjustment. Defence expenditure is negative in the short-run, implying that defence expenditure has a significant negative impact on capital flight in the country.

Error Correction:	D(LOG(DEF))	D(LOG(INTDIFF))	D(LOG(INF))	D(LOG(INVSTMT))	D(LOG(EXRATE))
CointEq1	-0.564197	-0.124317	0.105883	-0.113538	0.116174
	(0.22658)	(0.09644)	(0.18886)	(0.05577)	(0.15132)
	[-2.49004]	[-1.28909]	[0.56064]	[-2.03571]	[0.76773]
CointEq2	-1.688085	-1.201715	0.752186	0.053918	0.459536
	(0.74180)	(0.31572)	(0.61831)	(0.18259)	(0.49540)
	[-2.27567]	[-3.80623]	[1.21653]	[0.29529]	[0.92760]
CointEq3	0.423394	0.172814	-0.752273	0.018158	-0.279262
	(0.28879)	(0.12291)	(0.24071)	(0.07109)	(0.19287)

	[1.46611]	[1.40597]	[-3.12519]	[0.25544]	[-1.44796]
D(LOG(DEF(-1)))	-0.365473	0.023068	-0.534808	0.145506	0.044161
	(0.23077)	(0.09822)	(0.19235)	(0.05680)	(0.15412)
	[-1.58372]	[0.23486]	[-2.78037]	[2.56155]	[0.28654]
D(LOG(INTDIFF(-1)))	0.165254	0.020866	0.168049	-0.079792	-0.129741
	(0.35582)	(0.15144)	(0.29658)	(0.08758)	(0.23763)
	[0.46444]	[0.13778]	[0.56662]	[-0.91103]	[-0.54598]
D(LOG(INF(-1)))	-0.236945	-0.037802	0.399584	-0.070112	0.008666
	(0.20694)	(0.08808)	(0.17249)	(0.05094)	(0.13820)
	[-1.14499]	[-0.42919]	[2.31656]	[-1.37641]	[0.06271]
D(LOG(INVSTMT(-1)))	-0.427248	0.290685	0.689534	0.236137	0.356548
	(0.93519)	(0.39804)	(0.77951)	(0.23020)	(0.62457)
	[-0.45685]	[0.73030]	[0.88457]	[1.02580]	[0.57087]
D(LOG(EXRATE(-1)))	0.302725	0.037572	-1.065231	0.122852	-0.338610
	(0.70323)	(0.29931)	(0.58616)	(0.17310)	(0.46965)
	[0.43048]	[0.12553]	[-1.81729]	[0.70971]	[-0.72098]
C	1.213987	1.334731	-1.675346	0.012009	0.100501
	(1.57094)	(0.66862)	(1.30942)	(0.38669)	(1.04914)
	[0.77278]	[1.99624]	[-1.27946]	[0.03106]	[0.09579]
LOG(CF)	-0.109832	-0.166386	0.251046	0.000972	0.011584
	(0.19898)	(0.08469)	(0.16585)	(0.04898)	(0.13288)
	[-0.55199]	[-1.96470]	[1.51368]	[0.01985]	[0.08717]
R-squared	0.832731	0.852678	0.708486	0.778602	0.379861
Adj. R-squared	0.725201	0.757971	0.521084	0.636274	-0.018799
Sum sq. resids	3.921222	0.710339	2.724335	0.237587	1.748934
S.E. equation	0.529233	0.225252	0.441130	0.130271	0.353446
F-statistic	7.744163	9.003305	3.780569	5.470495	0.952844
Log likelihood	-12.31472	8.186280	-7.944568	21.32877	-2.625954
Akaike AIC	1.859560	0.151143	1.495381	-0.944064	1.052163
Schwarz SC	2.350416	0.641999	1.986236	-0.453208	1.543019
Mean dependent	0.207453	0.023861	0.122302	0.114622	0.183455
S.D. dependent	1.009576	0.457862	0.637436	0.216003	0.350170
Determinant resid covariance (dof adj.)		1.57E-06			
Determinant resid covariance		1.06E-07			
Log likelihood		22.41714			
Akaike information criterion		3.548572			
Schwarz criterion		6.739134			

CONCLUSION AND RECOMMENDATIONS

This study estimates the magnitude and analyzes the trends of capital flight for the periods 1981 -2010 using the Engle granger two steps procedure for estimation, for most of the periods, capital flight estimates has positive sign, indicating that residents consistently took capital out of Nigeria. On aggregate, Nigeria lost $233.9billion US dollars to capital flight transfers over the period 1970 – 2010.

This study had confirmed that not only is the country loosing substantial amounts of funds that could be otherwise used for development and further stabilization, capital flight also punishes long term economic growth. This implies that policy measures should be instituted to make the domestic economy more attractive for private investment if capital flight is to be controlled. Perhaps it is time to revisit the importance of having decisive policies and theories to strengthen macroeconomic management.

From the literature consulted, it is impossible for developing economies like Nigeria to eradicate capital flight, but its prevalence can be controlled. Unlike existing studies, this study further identifies the major causes of capital flight movements from Nigeria, the investment environment. Defence expenditure, which from this study is considered a yardstick to measuring the security challenges faced in Nigeria, showed a significant relationship with capital flight. Hence, as defence expenditure increases it alerts investors that the investment environment is not conducive (it poses risks) for doing

business thereby causing capital fleeing the economy. Therefore, attention needs to be given to creating an enabling environment that will pose minimal risk to investors.

The exchange rate is not significant from the estimates and results but high enough for concern. The correction term shows that capital flight for the country is not significantly influenced by exchange rate. This calls for the need to provide a good and conducive investment environment for both foreign and domestic investor. The relationship between investment and capital flight is interesting in the correction mechanism estimates, as *a priori* expectation was a high *t-test* statistic. This is an indication that higher investment may result in decrease in capital flight, and vice versa.

Therefore, the best option for the country is to provide business-friendly environment on continuous basis for the country to improve the economy through higher increase in the financial products that investors can invest in. It should be remembered that the investors anywhere can choose the country that host their investments and that Nigeria has competitors as investment seeking-countries continue to perfect their strategies by making their countries' environment investment friendly. Proper attention needs to be paid to the issue of exchange rate and the commitment to autonomous investment by the public and private sectors. The issue of market-determined exchange rate might seem costly but is necessary to transfer the cost implications of the foreign exchange market to the participant rather than the government. This enables a realistic exchange rate for the domestic currency, while autonomous investment would crowd in other investments and enable the private sector to thrive. The significance of this is that the more the investment undertaken in the economy, the less the capital available to transfer abroad.

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