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Capital Flight-Growth Nexus in Sub-Saharan Africa: The Role of Macroeconomic Uncertainty

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Abstract

In this paper, we investigate capital flight-growth nexus and the role of macroeconomic uncertainty in 28 Sub-Saharan African countries for the period 1986 to 2010. We utilize the newly updated estimates of capital flight from SSA by Boyce and Ndikumana (2012). Using heterogeneous panel methods, we find that the adverse effects of capital flight on growth of SSA seem incontrovertible and these effects may be escalated by macroeconomic uncertainty. In addition, capital flight has more devastating effects on long run growth of the oil exporting region than their non-oil counterpart when confronted with macroeconomic uncertainty. We also establish that the inflow of foreign direct investment and foreign aid are not adequate to compensate for capital flight from SSA. On this basis, fiscal and monetary authorities need to show serious commitments towards addressing the prevalent macroeconomic uncertainty in SSA to mitigate its influence on capital flight and growth in the region.

JEL Classification: C23, F21, F32, O40, O55

Key Words: Capital flight, Macroeconomic uncertainty, Growth, Sub-Saharan Africa (SSA), Heterogeneous panels

Capital Flight-Growth Nexus in Sub-Saharan Africa: The Role of Macroeconomic Uncertainty

1.0 Background

There is no gainsaying that capital is indispensible for the actualization of sustainable growth and development in any economy. This view has been well documented in the literature (see for example: Levine and Renelt, 1992; Sala-i-Martin, 1997; Hoefler, 2002; Cinyabuguma and Putterman, 2010). To promote economic growth and development, capital sourced from both external (in form of foreign aid, foreign private investment and trade) and internal (in form of domestic investment and domestic borrowing) is very crucial. Thus, systematic siphoning of the much needed capital may endanger growth and development of a country. Consequently, addressing the problem of resource gap becomes inevitable particularly for underdeveloped/less developed countries seeking to achieve sustainable growth and development.

In Sub-Saharan Africa (SSA thereafter), there have been impressive prospects towards the actualization of meaningful economic progress in recent times. For instance, the region grew by about 3% on average making it the second fastest growing region in the world during the global financial crisis. However, this optimism about the growth prospects of SSA may be short-lived owing to the widening resource gaps evident in the region. The Boyce and Ndikumana (2012) report covering a group of 33 SSA countries reveals a total of $814 billion dollars (constant 2010 US$) from 1970 to 2010 has been lost by the region to capital flight. This figure exceeds the amount of official development aid ($659 billion) and foreign direct investment ($306 billion) received by these countries in the same period.

The problem of resource gap may become exacerbated with the high incidence of capital flight and unstable macroeconomic environment. Why are these two factors critical for resolving the problem of resource gap in Africa? There are three major reasons that can be adduced for this opinion. First, external sources of capital particularly FDI and foreign aid are volatile and therefore cannot be totally relied upon for sustainable growth (see Asiedu et al., 2012). Moreover, Africa accounts for a very low share of global FDI flows (2.8 per cent in 2012) and, more importantly, FDI flows to the continent are concentrated in a few countries and largely in the extractive sector (see UNCTAD Report, 2013). Second, domestic resources are usually less volatile but they can be less effective when chunk of these resources are eroded through capital flight. Thirdly, an unstable macroeconomic environment evident in most African countries may drag growth through its negative effects on investment. For example, Bloom et al. (2012) using various measures of uncertainty, show that shocks to uncertainty lead to a temporary fall in output and investment. Therefore, an in-depth understanding of the interactions between capital flight and macroeconomic uncertainty is a necessary preliminary step towards resolving the problem of resource gap and achieving sustainable growth and development in Africa in the long run.

Against this background, the following questions become pertinent. First, to what extent has capital flight affected the growth prospects of SSA? Second, what have been the comparative trends between capital flight from and major external sources of capital to SSA? And third, what is the impact of macroeconomic uncertainty on capital flight-growth nexus in SSA?

Following from these questions therefore, the broad objective of this study is to examine the capital flight-growth nexus in SSA and the role of macroeconomic uncertainty over the period 1986 to 2010. This period is fairly long enough to capture probable dynamics in capital flight and growth in SSA. Specifically, the study considers the following: (i) it evaluates the comparative trends between capital flight and major external sources of capital to SSA; (ii) it estimates the effects of capital flight on economic growth in SSA; and (iii) it examines the impact of macroeconomic uncertainty on capital flight – growth nexus in SSA.

In addition to the mentioned objectives, this study adds to the existing literature in the following distinctive ways:

(1) It utilizes the newly updated estimates of capital flight from SSA by Boyce and Ndikumana (2012) which are more robust and quite representative of the severity of capital flight in the region. In addition, these new estimates improve on the previous measures and to the best of our knowledge; the new data sets have not been used to model growth dynamics in the literature.

(2) It adopts recent measures of macroeconomic uncertainty (MACU) that capture both the fiscal and monetary policy sides of the economy. The underlying framework for the computation of MACU is the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) which involves using the time-varying

conditional variance of the series and thus incorporates past information set on shocks to the fiscal and monetary variables.[1] The GARCH framework has in fact been used in different settings in the literature. For instance, Fountas et al. (2006) and Fountas and Karanasos (2007) use the bivariate version of GARCH to determine the respective uncertainties of inflation and output growth. Similarly, Grier et al. (2004) and Bredin and Fountas (2009) use GARCH-in-mean models to estimate the uncertainties for inflation and output growth. Also, Talavera et al. (2013) consider the same framework when investigating the relationship between macroeconomic uncertainty and bank lending in Ukraine. One distinguishing feature between these studies and the present one lies in the consideration of both fiscal- and monetary-oriented MACU in addition to those obtained from the traditional variables namely inflation and output. Therefore, we are able to ascertain how much of the uncertainties can be attributable to each of them and their influence on capital flight-growth nexus in SSA.

In order to more carefully examine the impact of MACU on capital flight and economic growth, we initially specify a baseline model without the MACU and thereafter, we extend the baseline to account for the different indicators of MACU. Thus, we are able to estimate as many regressions as the number of different proxies for MACU.

(3) It considers robust heterogeneous panel methods that allow for slope heterogeneity usually evident when dealing with panel data with large N and large T. Essentially, these methods are referred to as the Mean Group (MG) and Pooled Mean Group (PMG) estimators and they have been employed in a variety of applied research. For example, Freeman (2000) uses the estimators to evaluate state-level alcohol consumption over 1961-1995. Martinez-Zarzoso and Bengochea-Morancho (2004) use them in an estimation of an environmental Kuznets curve in a panel of 22 OECD nations over 1975-1998. Frank (2005) equally employs them to evaluate the long-term effect of income inequality on economic growth in a panel of U.S. states over 1945-2001 (see also Blackburne and Frank, 2007). More recently, Bangake and Eggoh (2012) use the PMG estimator to investigate the relationship between the savings and investment rates for 37 African countries over the period 1970–2006. Also, Salisu et al. (2012)

[1] Talavera et al. (2012) and Berger and Herz (2013) provide various advantages of using the GARCH framework for modelling macroeconomic uncertainty.

employ the PMG estimator to model money demand for 24 SSA countries between 1980 and 2010.

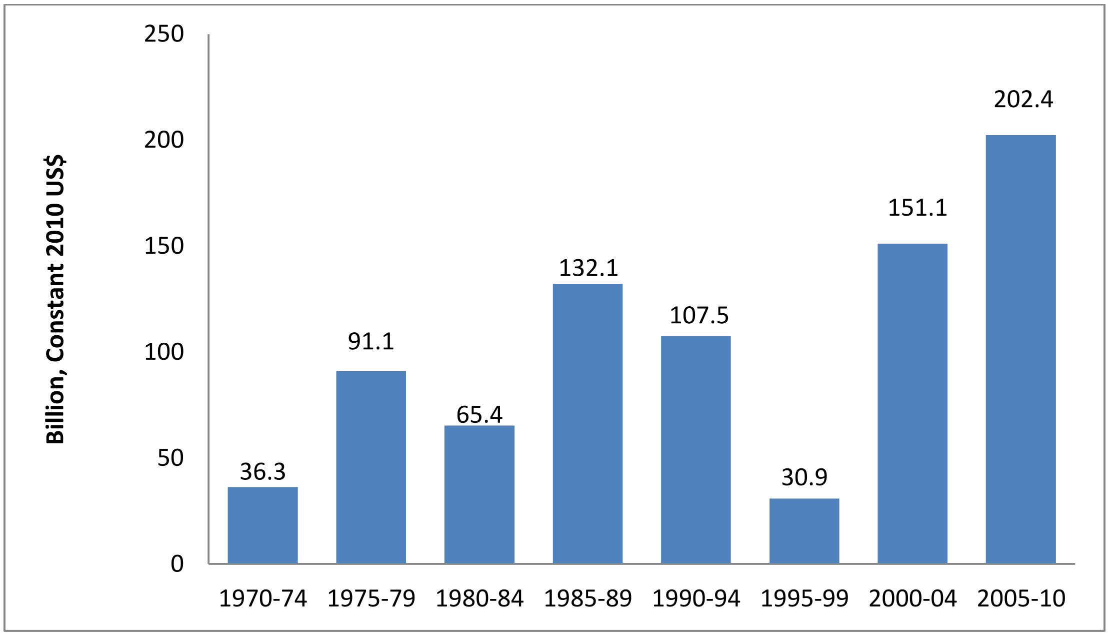
We prefer these methods to the traditional panel estimation techniques such as the fixed effects and random effects estimators as well as the generalized method of moment estimator as these traditional methods rely on slope homogeneity which may be inappropriate particularly where the time series dimension is large and the variables are nonstationary. To validate this point, Robertson and Symons (1992) examine the properties of some panel data estimators when the slope coefficients are heterogeneous but are assumed homogeneous in estimation for both stationary and nonstationary regressors. They find that severe biases can occur in dynamic estimation even for relatively small parameter variation. This conclusion has also been confirmed by Pesaran and Smith (1995); Pesaran, Shin, and Smith (1997, 1999); Phillips and Moon (2000) and Im, Pesaran, and Shin (2003).

Some stylized facts about capital flight and external financing in SSA are provided in section 2. Relevant empirical studies on measurements, determinants and impacts of capital flight are reviewed in section 3. While section 4 describes the methodology employed, section 5 presents and discusses the empirical results. Section 6 concludes the paper with policy implications.

2.0 Stylized Facts about Capital Flight and External Financing in SSA

The importance of domestic investment climate in attracting foreign investment has long been recognised in the literature. However, a related but neglected issue is the role domestic investment climate can play in encouraging the retention of investment portfolios domestically. According to economic theory, capital-scarce less developed countries should be able to retain domestic capital, since the marginal returns should be relatively higher yet capital flight seems to defy this logic as demonstrated in Figure 1 below.

Figure 1: Capital Flight from 33 SSA Countries



Source: Graphed by the authors using Boyce and Ndikumana (2012) estimates

Using 5-year averages, although it followed an unsteady pattern since 1970, capital flight from Africa (based on the selected 33 SSA countries) [2] has however risen astronomically from $36.3 billion in 1970-1974 to $202.4 billion in 2005-10. The total capital flight amounts to $816.8 billion in constant dollars between 1970 and 2010. The individual countries contributions to the incidence of capital flight are also presented (see table 1). These countries are grouped into oil exporting and non-oil exporting countries. One expects the oil producing countries of the SSA to have inspired optimism on the region's prospects for accelerating progress towards its developmental goals given their surplus earning from oil revenue. Surprisingly, evidence from table 1 suggests that capital outflows rose rapidly among the few major oil-exporting countries. Rather than retaining the surplus earnings from oil domestically and use same to fill their resources gap, these countries lost $583.3 billion to the rest of the world. This accounts for about 71.5% of capital flight from SSA between 1970 and 2010. Meanwhile, a greater number of the SSA countries that are non-oil exporting, only account for 28.5%

[22] These countries are Angola, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo Democratic Republic, Congo Republic, Cote d'Ivoire, Ethiopia, Gabon, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mauritania, Mozambique, Nigeria, Rwanda, Sao Tome and Principe, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe.

of capital flight from the region. Among the sampled oil exporting countries, Nigeria recorded the highest magnitude of capital flight of about $311.4 billion which is over 50% of the total for this category of countries and in fact exceeded those of the non oil-exporting countries combined. Distantly next to Nigeria is Angola with $77.5 billion while Chad recorded the lowest. Among the non-oil exporting countries, South Africa recorded the highest scale of capital flight followed by Ethiopia while the lowest is evident in Lesotho.

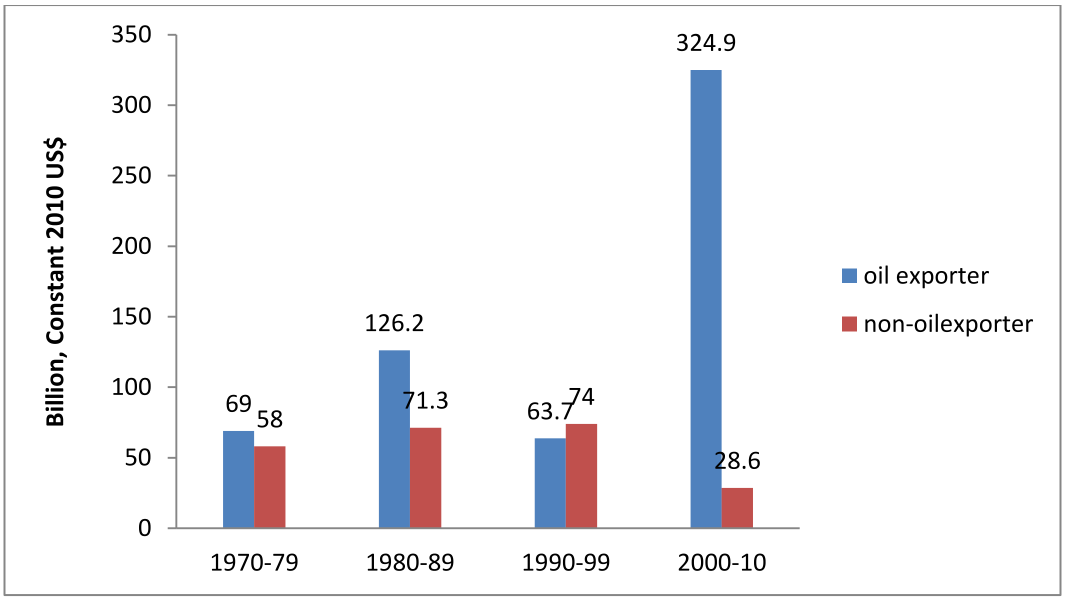
Table 1: Illicit Capital Flight (Oil Exporter vs. Non-Oil Exporter) 1970-2010

Panel A: Oil Exporting Countries					
Cumulative Value 1970-2010 (Billion, Constant 2010 US$)					
Country/Period	**1970-79**	**1980-89**	**1990-99**	**2000-10**	**1970-2010**
Angola	0.0	19.0	14.9	43.6	77.5
Chad	0.5	0.5	0.6	-0-0	1.6
Cameroon	2.3	14.1	5.7	-2.5	19.6
Congo, DR.	12.5	6.7	2.9	11.7	33.8
Congo, Rep.	-1.2	4.7	-1.6	18.0	19.9
Cote d'Ivoire	11.0	19.9	16.0	9.2	56.1
Gabon	2.1	5.7	2.6	15.1	25.5
Nigeria	38.7	51.1	26.1	195.5	311.4
Sudan	3.2	4.5	-3.6	34.3	38.4
Total	69.4	126.2	63.7	324.9	583.8
Percentage Share	54.5	63.9	46	91.9	71.5
Panel B: Non-Oil Exporting Countries					
Cumulative Value 1970-2010 (Billion, Constant 2010 US$)					
Country/Period	**1970-79**	**1980-89**	**1990-99**	**2000-10**	**1970-2010**
Botswana	-1.0	-1.2	0.0	6.0	3.8
Burkina Faso	0.8	1.7	-0.4	-0.6	1.5
Burundi	0.0	1.0	2.3	3.5	6.8
Cape Verde	0.0	0.5	1.2	1.8	3.5
Central African Republic	0.5	1.1	0.8	0.2	2.6
Ethiopia	-0.7	8.8	1.3	15.5	24.9
Ghana	0.8	3.1	2.2	6.2	12.3
Guinea	0.0	1.6	2.1	-2.1	1.6
Kenya	5.4	1.0	1.0	-2.5	4.9
Lesotho	0.0	0.1	-0.1	0.4	0.4
Madagascar	2.3	5.4	4.8	-0.8	11.7
Malawi	1.3	1.4	0.7	-2.1	1.3
Mauritania	1.4	-0.9	1.6	1.0	3.1
Mozambique	0.0	6.4	11.0	2.1	19.5
Rwanda	6.6	3.2	0.8	-1.3	9.3
Sao Tome and Principe	0.1	0.3	0.3	0.3	1.0
Seychelles	0.0	3.2	0.1	1.1	4.4
Sierra Leone	1.7	2.8	3.2	2.4	10.1
South Africa	21.6	11.4	26.6	-10.4	49.2
Swaziland	0.4	-0.1	0.4	0.3	1.0

Tanzania	0.4	-0.1	0.4	0.3	1.0
Uganda	11.3	1.4	1.3	0.7	14.7
Zambia	0.4	2.2	-0.3	6.1	8.4
Zimbabwe	4.0	8.4	4.8	0.1	13.3
Total	58.1	71.3	74.7	28.6	232.7
Percentage Share	45.6	36.1	54	8.1	28.5

Source: Based on Boyce and Ndikumana (2012) estimates

Figure 2: Capital Flight: Oil Exporter vs. Non-Oil Exporter (Billion, Constant 2010 $)



Source: Graphed by the Authors using Boyce and Ndikumana (2012) estimates

Figure 2 also illustrates the comparative degrees of capital flight from both oil exporting and non-oil exporting countries. The figure is a clear demonstration of the fact that higher incidence of capital flight from SSA could be traced to the oil-exporting countries particularly in recent times.

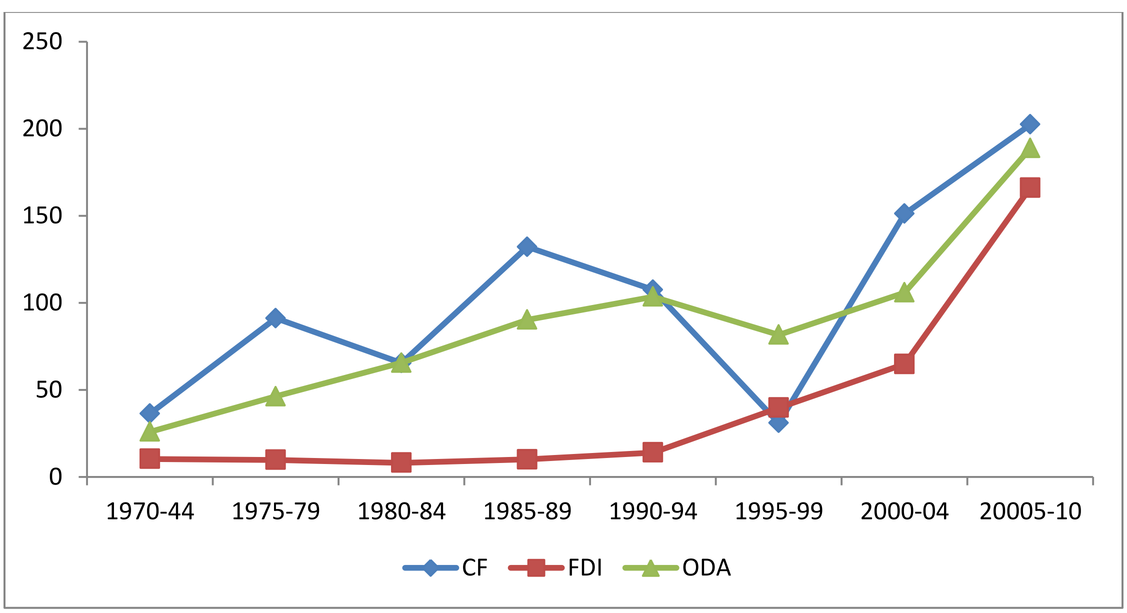
Despite this, the outflow of capital seems substantial for a region with evidence of resource constraints. For instance, between 1970 and 2010, the total outflow of capital from SSA outweighs FDI and ODA. In specific terms, total capital flight of $816.8 billion was considerably higher than FDI of $322.9 billion and somewhat higher than ODA of $708 billion. Thus, most of the SSA countries seem to rely more on ODA as a source of capital inflow than FDI. In addition, there are noticeable instances of higher capital outflow than the combination of these two major sources of capital inflow. During the period 1975-79 and 1985-89 for example, capital flight was larger than ODA+FDI by 62.4% and 31.6% respectively; slightly lower by just 11.3%, 8.5% and 11.5% in 1980-84, 1990-94 and 2000-04 respectively and relatively of the same magnitude in 1970-74. It is therefore not surprising that capital flight overwhelms FDI and ODA individually in virtually all the sub-periods considered. Figure 3 provides a graphical representation of capital flight, FDI and ODA and it clearly depicts the severity of capital flight in SSA as compared to the external sources of capital inflow. With the exception of 1995-99, inflows of capital to SSA in form of FDI and ODA fall below capital flight over the period under consideration.

Table 2: Capital Flight, FDI and ODA (1970-2010)

Cumulative Value (Billion, Constant 2010 US$)					Ratios/Percentage		
Period	**CF**	**FDI**	**ODA**	**FDI+ODA**	**CF/FDI (%)**	**CF/ODA (%)**	**CF/FDI+ODA (%)**
1970-74	36.3	10.3	26	36.3	352.4	139.6	100
1975-79	91.1	9.8	46.3	56.1	929.6	196.8	162.4
1980-84	65.4	8.1	65.6	73.7	807.4	99.7	88.7
1985-89	132.1	10.1	90.3	100.4	1307.9	146.3	131.6
1990-94	107.5	14	103.5	117.5	767.9	103.9	91.5
1995-99	30.9	39.7	81.6	121.3	77.8	37.9	25.5
2000-04	151.1	64.8	105.9	170.7	233.2	142.9	88.5
2005-10	202.4	166.1	188.8	354.9	121.9	107.2	57
1970-2010	816.8	322.9	708	1030.9	252	115.4	79.2

Source: Authors' computation using estimates of Boyce and Ndikumana (2012)

Figure 3: Capital Flight (CF) constant 2010 $), Foreign Direct Investment (FDI) constant 2010 $) and Net Official Development Assistance and Official Aid Received (ODA) constant 2011 $), 1970-2010



Source: Graphed by the authors using Boyce and Ndikumana (2012) estimates

We also analyze capital flight in per capita terms and relative to the size of the economy. The former offers some insights into the amount per head that is lost to the rest of the world from SSA while the latter shows how much the capital flight worth in terms of national income. In several countries, total real capital flight per capita over the period exceeds current per capita income. In Cape Verde for example, capital flight per capita of ($7,198) is more than twice its per capita income of ($3,380) in 2010 and other countries following similar trends include Burundi, Cameroon, the Republic of Congo, Congo DR., Côte d'Ivoire, Gabon and Nigeria.

Table 3: Capital Flight Relative to GDP and Population

Country	Total Real Capital Flight, Billion (2010 $)	Total Real Capital Flight Per Capita (2010 $)	GDP Per Capita (2010 $)	Real Capital Flight/GDP (%)
Angola	77.5	3963.4	4316.8	12.5
Botswana	3.8	1907.8	7544.3	1.7
Burkina	1.5	99.3	567.6	0.9
Burundi	6.9	745.2	125.6	20.1
Cameroon	20.0	970.0	108.6	3.3
Cape Verde	3.5	7194.6	3380	17.0
Central Africa Rep.	2.7	626.4	462.8	4.3
Chad	1.6	139.9	647.4	1.7
Congo DR.	33.9	544.6	211.4	4.8
Congo Rep.	19.9	4834.3	2893.6	13.4
Cote d'Ivoire	56.0	2952.2	1200.4	8.6
Ethiopia	24.9	285.6	22.1	9.7
Gabon	25.5	16359.7	8360.9	9.9
Ghana	12.4	5090.7	12899.5	2.7
Guinea	1.6	143.6	414.7	1.5
Kenya	4.9	119.6	767.8	0.8
Lesotho	1.0	496.6	1061.5	2.8
Madagascar	11.7	554.6	413.7	5.1
Malawi	1.4	92.0	340.1	1.4
Mauritania	3.1	865.3	1007.4	4.5
Mozambique	19.8	824.9	400	13.3
Nigeria	311.4	1950.0	1212.6	9.3
Rwanda	9.3	859.7	519.3	8.4
Sao Tome & Principe	1.0	5868.3	1104.2	70.9
Seychelles	4.4	49385.1	10433.4	22.2
Sierra Leone	10.0	1738.4	331.2	15
South Africa	49.2	983.9	7275.4	0.7
Sudan	38.4	1077.2	1740.3	4.2
Swaziland	1.0	832.5	3055.2	1.6
Tanzania	14.7	326.2	512.7	5.2
Uganda	8.4	247.9	500.5	2.6
Zambia	17.3	1307.3	1225.2	6.0
Zimbabwe	18.3	1396.3	571.5	5.2

Source: Based on Boyce and Ndikumana estimates with additional information obtained from WDI.

Also, Sao Tome and Principe lost about 70% of its GDP to the rest of the world via capital flight while countries such as Seychelles, Burundi, Sierra Leone and Angola lost about 22%, 20%, 15% and 12% respectively with many of the other countries hovering around 10%. These percentage shares of capital flight in GDP clearly absorb the growth rates of most of the SSA countries; thus, justifying the severity and consequences of capital flight on the growth process of SSA.

3.0 A Brief Literature Review

3.1 Measurements of Capital Flight

The definitions and measures of capital flight appear elusive. Several attempts have been made over the years to describe the concept in the literature. Examples of early attempts include, but not limited to, Erbe (1985), World Bank (1985), Cuddington (1986), Morgan Guaranty Trust Company (1986), Deppler and Williamson (1987), Lessard and Williamson (1987), Gordon and Levine (1989), Varman-Schneider (1991), Anthony and Hallet (1992), Dooley and Kletzer (1994), Kosarev and Grigoryev (2000) and those edited by Ajayi and Khan (2000). Recently, we have studies like Schneider (2003), Kar (2010), Kar and Cartwright-Smith (2010), Kar and Curcio (2011), Ndikumana and Boyce (2001, 2010), UNDP (2011) and Boyce and Ndikumana (2012).[3] Tables 4a and 4b below provide an overview of definitions and measures of capital flight.

Table 4a: An Overview of Definitions of Capital Flight

1.	**Broad definition of capital flight** (i) All outflows of resident capital. This is based on the assumption that if these outflows are invested in the domestic economy, they would yield a higher rate of social return. (ii) A variant of this concept is a narrower approach often termed **hot money flows** in which only resident outflows which accrue in the short term or those which get reflected in the errors and omissions category in the balance of payments are treated as capital flight.
2.	**Capital flight defined as a response to discriminatory treatment of domestic capital** In this concept, capital flight is only that part of resident capital outflow which is a response to asymmetric risk.
3.	**Illegal transaction concept of capital flight** This concept links only those outflows of capital to capital flight which are illegal.

Source: See Schneider (2003).

[3] see Schneider (2003), Gusarova (2009) and Boyce and Ndikumana (2012) for a survey of the literature.

Table 4b: An Overview of Measures of Capital Flight

1.	**Broad measure of capital flight** (i) This is an indirect measure of capital flight. (ii) Capital flight can be treated as a measure of resident capital outflows. (iii) The technique compares the sources of finance (i.e. the increase in gross external debt and the net inflow of direct investment capital, both liabilities and assets) with the uses of finance (i.e. changes in official reserves, current account deficits, and capital outflows). Since the accumulation of private assets are not properly recorded in the balance of payments due to capital flight motives or incomplete reportage due to inadequate balance of payments recording procedures, an indirect method is used for their estimation. (iv) Proponents of this approach include the World Bank (1985), Morgan Guaranty Trust Company (1986), Claessens and Naude (1993) and Ajayi and Khan (2000). Capital flight is computed under this measure as: $KO = TB + PI + BA + CF$ where KO is capital outflow and denotes the broad measure of capital flight; TB is the transaction balances flowing abroad; PI are the portfolio investments; BA are the assets of the banking sector and CF is capital flight. Thus, this approach emphasizes that capital flight is only a sub-set of the gross capital outflow.
2.	**Capital flight measured as a response to discriminatory treatment of domestic capital** (i) This approach is based on the assumption that domestic investors are aware of the differences in risk involved in investing at home and abroad. (ii) For example, investment risks can be higher at home due to the taxation structure and/or unattractive rates of return combined with an underdeveloped financial system. (iii) The asymmetric structure usually provides the motivation for foreign sources of finance flowing in and private capital from developing countries moving out. (iv) Proponents of this approach include Dooley (1986), Khan and Ul Haque (1987), Deppler and Williamson (1987) and Varman-Schneider (1991). Capital flight is computed under this measure as: CF = SC - I/i where CF is capital flight, SC is the stock of claims, I denotes Investment income, and i is the market interest rate.
3.	**Capital flight measured as an Illegal transaction** (i) It captures illegal foreign exchange transactions due to systematic under-invoicing of exports or over-invoicing of imports which can be detected through the use of partner country trade statistics.

(ii) The measurement is based on the assumption that domestic traders falsify trade documents when incentives exist to keep capital abroad.

(iii) Proponents of this approach include Bhagwati (1964), Bhagwati, Krueger, Wibulswadia (1974), Gulati (1987), and recently, are authors like Kar (2010), Kar and Cartwright-Smith (2010) and Kar and Curcio (2011).

Capital flight is computed under this measure as:

Export Misinvoicing = (Xi/CIF factor) - Xc
Import Misinvoicing = (Mc/ CIF factor) - Mi

where Xi are imports from that country as reported by the industrialized countries CIF; Xc are exports as reported by the country FOB to the industrialized countries; Mc are imports as reported by the country with the industrialized countries as trade partner; Mi are exports to that country as reported by the industrialized countries; CIF is the cost of insurance and freight; and FOB is free on board, i.e. without transaction costs.

Source: Summarized from Schneider (2003). Details of the methodological procedure for the computation of Capital flight under each approach can be found in the paper.

As earlier noted, we employ the approach of Boyce and Ndikumana (2012) that defines capital flight as unrecorded capital flows between a country and the rest of the world. They introduced methodological innovations in the computation of capital flight as an illegal transaction. This measure of capital flight is preferred to other methodologies for some reasons. First, their estimates systematically include trade misinvoicing, which can substantially increase or reduce estimated capital flight. In their view, the imperfect data on misinvoicing are more accurate than the alternative assumption that net misinvoicing equals zero. Second, their methodology includes an estimate of unrecorded remittances. As reported by AfDB and World Bank (2011), remittances from overseas workers have become a major source of private capital inflows in most African countries, and they are often substantially underestimated in the official Balance of Payments statistics. The authors demonstrate that unrecorded remittances have the same effect on capital flight estimates as underreported exports earnings. Third, they allow for the possibility that there can be 'reverse' flows of capital flight; that is, capital that left the country may return as economic and political circumstances change.

3.2 Macroeconomic effects of Capital Flight

The issue of macroeconomic effects of capital flight has been studied majorly from two perspectives. Some studies have examined effects of capital flight on external debt (see Forfack, 2009 for a survey of the literature) and they find that increasing external finances create incentives for capital flight in the presence of political uncertainty. A number of studies have also estimated capital flight – growth nexus (see Gusarova, 2009 for a survey of the literature) and the dominant evidence in the literature is that capital flight retards economic growth. One common feature evident in most of these studies is that they control for relevant macroeconomic variables such as inflation, fiscal and exchange rate policies, financial intermediation, terms of trade changes and foreign assistance. Thus, in addition to our contributions to the literature as previously spelt out, we also account for some of the control variables in growth dynamics.

4.0 Methodology and Data

4.1 The Model

The main objective of our empirical analysis is to examine capital flight-growth nexus as well as the role of macroeconomic uncertainty in selected SSA countries. We have followed the procedure of seminal papers of Barro (1991) and Mankiw et al. (1992) in the initial empirical specification of our model referred to as a baseline model. They argue for the inclusion of initial level of per capita income and a human capital variable when modelling growth. Thus, as a preliminary exercise, we look at the direct effect of capital flight on growth and consequently, each of the indicators of macroeconomic uncertainty is evaluated and compared with the baseline to determine whether there is any significant difference in the estimates after accounting for the role of macroeconomic uncertainty.

4.1.1 The Baseline Specification

The baseline equation is specified as follows:

$$GROWTH_{it} = \beta_0 + \beta_1 GROWTH_{it-1} + \beta_2 CAPR_{it} + Z'\gamma + \mu_i + \varepsilon_{it} \qquad (1)$$

where the number countries $i = 1, \ldots, N$; the number of periods $t = 1, \ldots, T$; $GROWTH_{it}$ is the log of real GDP per capita, $GROWTH_{it-1}$ is the proxy for initial level of capital, $CAPR_{it}$ is the ratio of capital flight to GDP and Z is a $k \times 1$ vector of control variables. The latter includes domestic physical capital proxied by ratio of investment to GDP, foreign capital proxied by ratio of foreign direct investment to GDP ($FDIR_{it}$) and ratio of foreign aid to GDP ($AIDR_{it}$) and human capital captured by secondary school enrolment (SSE_{it}).[4] The regression parameters are $\beta_0, \beta_1, \beta_2$ and γ (which denotes a $1 \times k$

[4]We are careful not to include proxies for macroeconomic uncertainty in the baseline specification as these variables form the components of the extended specifications.

vector of parameters on the control variables); μ_i is the country-specific effect while ε_{it} is the regression disturbance term.

4.1.2 The Extended Specification

The extended specification accounts for the role of macroeconomic uncertainty and it is expressed as follows:

$$GROWTH_{it} = \beta_0 + \beta_1 GROWTH_{it-1} + \beta_2 CAPR_{it} + \beta_3 \left(CAPR_{it} \times MACU_{it} \right) + \beta_4 MACU_{it} + Z'\gamma + \mu_i + \varepsilon_{it} \quad (2)$$

Where $MACU_{it}$ is an indicator of macroeconomic uncertainty. We have as many regressions as the number of indicators of macroeconomic uncertainty. Thus, each regression uses a different indicator for estimation of the extended specification. In the literature, there have been considerable research efforts towards measuring macroeconomic uncertainty ranging from moving standard deviation (Ghosal and Loungani, 2000), disagreement among forecasters (Driver and Moreton, 1991), to conditional variance of a GARCH model (Driver et al., 2005; Byrne and Davis, 2005; Talavera et al., 2012; Berger and Herz, 2013; Neanidis and Savva, 2013). In this study, we follow the GARCH framework to measure macroeconomic uncertainty. We adopt the indicators of macroeconomic environment of Aizenman and Marion (1993) to determine the corresponding macroeconomic uncertainty. Unlike most studies on macroeconomic uncertainty that utilize only inflation and output variability, although not all-inclusive, Aizenman and Marion (1993) allow for the demarcation of these indicators into fiscal and monetary thus making the representation broader and more realistic. On the fiscal side, selected policy variables include the share of government consumption expenditure in GDP, the share of public investment in GDP, the ratio of government revenue to GDP, and the government budget deficit scaled by GDP. On the monetary side, we consider on the domestic credit expansion and money growth (see also Talavera et al., 2012). Also, we consider inflation and output uncertainty as these have been studied in the previous literature as proxies for macroeconomic uncertainty (see Neanidis and Savva, 2013 for a review of the literature).[5]

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[5]Ndiaye (2009) also justifies these variables as the channels through which capital flight affects domestic investment.

4.2 Estimation Techniques

In this study, we employ robust heterogenous panel method namely mean-group (MG) and pooled mean-group (PMG) estimators for nonstationary dynamic panels in which the parameters are heterogeneous across groups. These techniques are appropriate in this case due to large N and large T dimensions. The asymptotics of large N and large T dynamic panels are different from the asymptotics of traditional large N and small T dynamic panels (Blackburne and Frank, 2007). For example, estimators for Small T panel estimation such as fixed - and random-effects estimators and generalized method-of-moments estimator usually require pooling individual groups and allowing only the intercepts to differ across the groups while the slope coefficients are assumed to be homogenous. Pesaran, Shin, and Smith (1997, 1999), among others, have however demonstrated that the assumption of homogeneity of slope parameters is often inappropriate when dealing with large N and large T. More worrisome is the fact that ignoring the slope parameter heterogeneity when in fact it exists may produce inconsistent and potentially misleading results. However, the MG estimator of Pesaran and Smith (1995) and the PMG estimator of Pesaran, Shin, and Smith (1997, 1999) have been developed to capture any inherent slope heterogeneity in the panel data model and any potential bias that may result from using the traditional methods. Essentially, the MG involves estimating N time-series regressions and averaging the coefficients, whereas the PMG estimator requires a combination of pooling and averaging of coefficients.

In any case, the two estimators employ an autoregressive distributive lag (ARDL) model which allows for the combination of $I(1)$ and $I(0)$ series.
In order to obtain consistent estimates, Pesaran and Smith (1995) present four different estimation procedures when using the MG estimator:
(1) aggregate time series regressions of group averages;
(2) cross-section regressions of averages over time;
(3) pooled regressions allowing for fixed or random intercepts; or
(4) separate regressions for each group, where coefficients estimates are averaged over these groups. (see also Baltagi, 2008)

Following these procedures therefore, the MG estimator ensures that the intercepts, slope coefficients, and error variances are all allowed to differ across groups. However, the difference between the MG estimator and the PMG estimator lies in the way the long run coefficients are treated. Unlike the MG estimator, the PMG estimator constrains the long-run coefficients to be equal across groups (as in the case of FE estimator) although the intermediate estimator still allows the intercept, short-run coefficients, and error variances to differ across the groups (as in the case of MG estimator). Due to the nonlinearity of the parameters, Pesaran, Shin, and Smith (1999) develop a maximum likelihood method to estimate the parameters. The maximum likelihood is obtained by taking the log of the product of each cross-section's likelihood as expressed below:

$$l_T\left(\beta',\alpha',\sigma^{2\prime}\right) = -\frac{T}{2}\sum_{i=1}^{N}\ln\left(2\pi\sigma_i^2\right) - \frac{1}{2}\sum_{i=1}^{N}\frac{1}{\sigma_i^2}\left\{\Delta y_i - \alpha_i\omega_i\left(\beta\right)\right\}' H_i\left\{\Delta y_i - \alpha_i\omega_i\left(\beta\right)\right\} \qquad (5)$$

where $\omega_i\left(\beta\right) = y_{i,t-1} - X_{i,t-1}\beta_i$; $H_i = I_T - W_i'\left(W_i'W_i\right)W_i$; I_T is an identity matrix of dimension T and $W_i = \left(\Delta y_{i,t-1},\ldots,\Delta y_{i,t-p+1},\Delta X_{it},\Delta X_{i,t-1},\ldots,\Delta X_{i,t-q+1}\right)$.

The estimation procedure of the PMG estimator follows maximum likelihood involving the following steps:

(i) Begin with an initial estimate of the long-run coefficient vector, $\widehat{\beta}$;

(ii) Regress Δy_i on $\widehat{\omega}_i$ and W_i in order to obtain the short-run coefficients and the group-specific speed of adjustment terms;

(iii) Use the conditional estimates in (ii) to update the estimate of β;

(iv) Iterate the steps (i) to (iii) until convergence is achieved.[6]

4.3 Data Issues and Sources

Data utilized in this study cover the period 1986 to 2010 based on data availability for all the variables of interest. As earlier emphasized, several measures have been developed in the literature to measure capital flight, however, in this paper; we employ the most recent update by Boyce and Ndikumana (2012) as it improves the previous measures.[7] Other variables of interest to the study such as the ratio of foreign direct investment to GDP, ratio of foreign aid to GDP, human development variable (using secondary school enrolment), share of government consumption expenditure in GDP, the share of public investment in GDP, the ratio of government revenue to GDP, the ratio government expenditure to GDP, ratio of government consumption to

[6] Blackburne and Frank (2007) also provide STATA codes for estimating dynamic panels with the MG and PMG estimators.

[7]The capital flight data including a comprehensive algorithm for computation is downloadable using the link below :
http://www.peri.umass.edu/300/hash/ffdacd5deac5e531eca56634855ec770/?tx_peripubs_pi1%5Bpage_id%5D=2

GDP, domestic credit expansion and money growth, inflation and output are readily available at the World Bank, IFS and Nigerian Bureau of Statistics databases. Meanwhile, macroeconomic uncertainties were computed by the authors. The selected SSA countries covered in our analysis are Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo Democratic Republic, Congo Republic, Cote d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mauritania, Mozambique, Nigeria, Rwanda, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe.

5.0 Preliminary Analyses

5.1 Panel unit root and cointegration

We start by investigating the issue of non-stationarity of the series by applying the panel unit root tests of Levin, Lin and Chu (2002) (LLC thereafter), Im, Pesaran and Shin (1997) (IPS thereafter) and the ADF Fisher unit root test proposed by Madala and Wu (1999) (MW thereafter). For each test, the null hypothesis is that of a unit root while the optimal lag is obtained by applying the Schwartz Information Criterion (SIC). Like most of the unit root tests in the literature, the LLC test also assumes that the individual processes are cross-sectionally independent. Thus, the LLC test may be viewed as a pooled DF or ADF test, potentially with different lag lengths across the different sections in the panel. The major drawback of the LLC test however, is that it restricts the autocorrelation coefficient to be homogeneous across all individuals. To this end, the IPS test extends the LLC test by allowing for heterogeneity in the autocorrelation coefficient and it involves averaging individual ADF unit root tests. The MW is similar to IPS but combines the p-values from individual ADF tests. Nonetheless, the MW test has the advantage over the IPS as its value does not depend on different lag lengths in the individual ADF regressions. In addition, Maddala and Wu (1999) find that the MW test is superior to the IPS test.

The results of the different panel unit root tests are reported in table 5. As expected of a transformed variable, all the variables of macroeconomic uncertainty (MACU) which are computed using GARCH framework are stationary at level across the three tests. Regarding the control variables in the model, *FDI* and *AID* are $I(0)$ while SSE is $I(1)$. Also, LLC, IPS and MW tests could not reject the null hypothesis of unit root for *LRGDPC* at level; however, the tests uniformly indicate that *CAPR* and *INVR* are $I(0)$.

Table 5: Panel unit root tests

Variable	Level			First Difference		
	LLC	IPS	MW	LLC	IPS	MW
GROWTH	0.7853[a]	1.5865[b]	62.3555[b]	-15.3745[b*]	-14.9947[a*]	308.071[a*]
CAPR	-31.2762[b*]	-20.4239[b*]	539.011[b*]	-	-	-
INVR	-3.776[a*]	-4.3790[a*]	112.067[a*]	-	-	-
FDIR	-7.2608[b*]	-8.2693[b*]	187.094[b*]	-	-	-
AIDR	-7.6787[b*]	-7.1678[b*]	164.134[b*]	-	-	-
SSE	1.7432[b]	3.3012[b]	65.3210[b]	-14.3600[a*]	-14.2971[a*]	303.888[a*]
MACU_DCE	-4.1419[a*]	-14.6025[a*]	438.530[a*]	-	-	-
MACU_MGR	-7.0631[a*]	-82983[a*]	172.133[a*]	-	-	-
MACU_INFL	-41.3321[b*]	-23.4198[b*]	423.776[b*]	-	-	-
MACU_SGE	-3.2681[a*]	-8.7026[a*]	188.054[a*]	-	-	-
MACU_YGR	-8.1761[a*]	-7.4090[a*]	161.534[a*]	-	-	-

Note: [a] Indicates a model with individual effect but without linear trend; [b] is the model with individual effect and linear trend. *and ** signify rejection of the unit root hypothesis at the 1% and 5% levels respectively.

Having determined the stationarity status of the series, which by indication is a mixture of $I(0)$ and $I(1)$, the next step is to test for the existence of long-run cointegration among the variables in the model including both the dependent and independent variables. The most relevant cointegration test approach in this context is the Bounds test approach proposed by Pesaran et al. (2001).[8] The underlying test regression is the Autoregressive Distributed Lag (ARDL) model. Although, several cases are highlighted in Pesaran et al. (2001), we adopt Case III that allows for unrestricted intercepts and no trends. After imposing the restrictions, the following ARDL representation is used to test the existence of long-run relationship in the model:

$$\begin{aligned} GROWTH_{it} &= \beta_{0i} + \sum_{j=1}^{p} \beta_{1i}^{j} \Delta GROWTH_{it-j} + \sum_{j=0}^{p} \beta_{2i}^{j} \Delta CAPR_{it-j} + \sum_{j=0}^{p} \beta_{3i}^{j} \Delta INVR_{it-j} + \sum_{j=0}^{p} \beta_{4i}^{j} \Delta FDIR_{it-j} + \sum_{j=0}^{p} \beta_{5i}^{j} \Delta AIDR_{it-j} \\ &+ \sum_{j=0}^{p} \beta_{6i}^{j} \Delta SSE_{it-j} + \sum_{j=0}^{p} \beta_{7i}^{j} \Delta MACU\_DCE_{it-j} + \sum_{j=0}^{p} \beta_{8i}^{j} \Delta MACU\_MGR_{it-j} + \sum_{j=0}^{p} \beta_{9i}^{j} \Delta MACU\_INF_{it-j} \\ &+ \sum_{j=0}^{p} \beta_{10i}^{j} \Delta MACU\_SGE_{it-j} + \sum_{j=0}^{p} \beta_{11i}^{j} \Delta MACU\_YGR_{it-j} + \beta_{12i} GROWTH_{it-1} + \beta_{13i} CAPR_{it-1} \\ &+ \beta_{14i} INVR_{it-1} + \beta_{15i} FDIR_{it-1} + \beta_{16i} AIDR_{it-1} + \beta_{17i} SSE_{it-1} + \beta_{18i} MACU\_DCE_{it-1} + \beta_{19i} MACU\_MGR_{it-1} \\ &+ \beta_{20i} MACU\_INFL_{it-1} + \beta_{21i} MACU\_SGE_{it-1} + \beta_{22i} MACU\_YGR_{it-1} + \mu_i + \varepsilon_{it} \end{aligned} \tag{12}$$

[8] The underlying assumption for the choice of cointegration test is that the countries in question will attain convergence in the long run. Thus, the long run estimates are not expected to vary across the units analyzed. In other words, for each of the slope coefficients say β_{1i}; $\beta_{11} = \beta_{12} = \cdots = \beta_{1N}$ in the long run. The validity of this assumption is further corroborated by the Hausman test for choosing between PMG and MG estimators which suggests that the former estimator is preferred. Meanwhile, the PMG estimator assumes homogeneity of slope coefficients in the long run.

To determine the optimal lag for the ARDL model in equation (12), lag selection criteria such as the SIC are employed and the lag combination that minimises these criteria is the optimal lag for the model.

Investigating the presence of a long run relationship among the variables in equation (12) given the chosen lag requires the use of the Wald test (or F-test) in which the joint significance of the coefficients for lagged one variable is tested with F-statistics calculated under the null. We perform a joint significance test, where the null hypothesis (H_0: β_{12i} = β_{13i} = β_{14i} = β_{15i} = β_{16i} = β_{17i} = β_{18i} = β_{19i} = β_{20i} = β_{21i} = β_{22i}= 0) implies that there is no long-run relationship against the alternative (H_1: at least one of the parameters is not equal to zero) there is long-run relationship.

The computed F-statistic value is evaluated with the critical values tabulated in table CI (iii) of Pesaran et al. (2001). According to these authors, the lower bound critical values assume that the explanatory variables are $I(0)$, while the upper bound critical values assume that they $I(1)$. Therefore, if the computed F-statistic is smaller than the lower bound value, then the null hypothesis is not rejected and we conclude that there is no long-run relationship in the model. Conversely, if the computed F-statistic is greater than the upper bound value, then growth and its determinants are cointegrated. On the other hand, if the computed F-statistic falls between the lower and upper bound values, then the results are inconclusive. In table 6, the results of the bounds co-integration test suggest that the null hypothesis of no cointegration is rejected at the 5% significance level. The computed F-statistic of 4.707 is greater than the upper critical bound value of 4.01, thus indicating the existence of cointegration among the variables in the model.

Table 7: Bound test for Cointegration Analysis

Critical Value	Lower Bound Value	Upper Bound Value
1%	3.74	5.06
5%	2.86	4.01
10%	2.45	3.52

Note: Computed F-statistic: 4.707 (Significant at 0.05 marginal values).Critical Values are cited from Pesaran et al. (2001), table CI (iii), Case III: Unrestricted intercepts and no trend.

5.2 Estimation Results and Discussion

In the estimation, we find that the results of the PMG estimator seem more plausible than those of the MG estimator judging by the Hausman test and therefore the latter is suppressed in the presentation and discussion of results. This is an indication that growth trends in SSA countries, driven by the fundamentals incorporated in the equations specified, will converge in the long run. The results obtained from the PMG estimator are presented in tables 7, 8, 9, 10 and 11. Essentially, tables 7 and 8 capture the full sample while tables 9, 10 and 11 cover the oil exporting and non-oil exporting countries respectively. This demarcation is motivated by the striking features from our stylized facts revealing that the chunk of CF from SSA is attributable to the oil exporting countries. It may therefore be necessary to see how oil resource abundance influences CF-growth nexus. Also, under each classification, the analyses are structured into two namely; the baseline model results and the extended model results. The latter, as previously mentioned, accounts for the role of MACU in CF- growth nexus in SSA. The MACU captures both the monetary and fiscal sides of the economy of SSA. As earlier mentioned, the monetary variables used in the computation of MACU for the monetary side are domestic credit expansion, money growth and inflation rate and are denoted in the results tables as DCE, MGR and INFL respectively. We have previously defined macroeconomic uncertainties obtained from these variables as MACU_DCE, MACU_MGR and MACU_INFL while their corresponding interaction terms with capital flight are represented as DCE_CAPR, MGR_CAPR and INFL_CAPR. Similarly, proxies for the fiscal side of MACU are share of government expenditure and output growth denoted respectively by SGE and YGR in the results tables. Like the monetary side, the macroeconomic uncertainties for the fiscal side are MACU_SGE and MACU_YGR with their interactions terms code named as SGE_CAPR and YGR_CAPR correspondingly. It is expected that an effective and well-structured financial system coupled with efficient fiscal tools could attract inflow of capital and reduce its outflow.

5.2.1 Full Sample Analyses (all countries)

We start with the results of the baseline specification. The increasing capital flight in SSA appears to have damaging effects on their growth. There is a significant negative relationship between capital flight and growth in SSA. This evidence is found for both long run and short run equations although the impact is more pronounced in the former than the latter. Thus, capital flight is likely to have more devastating effects on the growth potential of SSA in the long run, *ceteris paribus*. We also account for the role of FDI and AID in the growth process of SSA and whether these inflows have the potential to offset the negative effect of capital flight. We find that these inflows of capital from the rest of the world via FDI and AID to SSA appear less a substitute to offset the negative impact of capital flight on the growth of SSA. For instance, the results reveal that the inflows of FDI and AID to SSA have been found to be rather significant in their dragging effects on growth in most of the equations estimated. Even when we complement these inflows with domestic investment, the combined slope coefficients still fall short of that of capital flight. Nonetheless, the positive and significant impact of real domestic investment (INVR) and human capital (SSE) on growth of SSA both in the short run and long run is an indication that sustainable growth in SSA can be best realized within rather relying on volatile external assistance.

These findings are further reinforced by the extended specification both in terms of sign, size and significance. Furthermore, we look at the impact of capital flight on growth via its interaction with macroeconomic uncertainty. This consequently leads to the inclusion of macroeconomic uncertainty variables as separate regressors in addition to the interaction terms to avoid specification bias. In relation to the former, virtually all the macroeconomic uncertainty variables for both the fiscal and monetary sides show statistically negative effects on growth in SSA. Thus, both fiscal and monetary shocks have the tendency of undermining the growth of SSA. In addition, this finding further lends support to the significance of macroeconomic stability in the growth process of a developing nation like those of SSA. In essence, maintaining a stable macroeconomic environment with manageable level of uncertainty may be one of the prominent preconditions for the actualization of sustainable growth in SSA.

Let us now turn to the role played by macroeconomic uncertainty in capital flight-growth nexus as spelt out in the extended specification. This is captured with the inclusion of the interaction terms. However, the interpretation of the coefficients on these interaction terms is not direct; some further simplifications are usually required. Essentially, two statistics are of interest here and are discussed comparatively. These statistics are the slope coefficients of capital flight with and without the interaction terms.[9] The computed slope coefficients for the two scenarios are presented in table 8.

Considering the long run effects, the results depict that capital flight has a larger depressing effect on growth for the Interacted than the Non-Interacted when monetary

[9]Theoretically, the two coefficients are computed as follows:
Recall equation (2):

$$GROWTH_{it} = \beta_0 + \beta_1 GROWTH_{it-1} + \beta_2 CAPR_{it} + \beta_3 \left(CAPR_{it} \times MACU_{it}\right) + \beta_4 MACU_{it} + Z'\gamma + \mu_i + \varepsilon_{it}$$

The slope coefficient for the Interacted is obtained as : $\frac{\partial GROWTH_{it}}{\partial CAPR_{it}} = \beta_2 + \beta_3 MACU_{it}$ where $MACU_{it}$ is evaluated at its mean value. The slope coefficient for the Non-Interacted capital flight is evaluated at $MACU_{it} = 0$ and that gives β_2. However, both slope coefficients are not statistically different from each other if the coefficient on the interaction term $\left(\beta_3\right)$ is not significant (which implies that $\beta_3 = 0$).

policy shock due to domestic credit expansion (DCE) is conjectured. This appears to suggest that an unanticipated increase in domestic credit to the economy may enhance the outflow of capital from SSA. However, fiscal shock due to an unanticipated rise in output reduces the depressing effects of capital flight on growth in the case of the Interacted compared to the Non-Interacted. Nonetheless, the long run effects of capital flight on growth for both the Interacted and the Non-Interacted are not statistically different from each other when shocks to money growth and inflation are assumed. In the short run however, with the exception of shocks to money growth, all the proxies of both fiscal and monetary shocks have similar effects on capital flight-growth nexus.

In addition, we also compare the long run and short effects of capital flight in the baseline model (drawn from table 7 and incorporated into table 8 for clarity) with those of the extended model under both Interacted and Non-Interacted (see table 8). In virtually all the cases and for both long run and short run analyses, capital flight has a smaller negative effect on growth when the baseline model is considered (that is, where macroeconomic uncertainty and relevant interaction terms are not captured). Therefore, ignoring the extended model may undermine the effects of capital flight on the growth of SSA.

Finally, we also evaluate the speed of adjustment of the short run equations of the baseline and extended models to their long run equilibriums. This involves the inclusion of error correction term in the short run equation. The results as shown in table 7 indicate that all the error correction terms have the expected negative sign and are statistically significant. This further authenticates the existence of long run equilibrium in the models considered. However, given the magnitude of the coefficient under each equation, the speed of adjustment is quite low when there are shocks to growth in the short run.

Table 7: Full-Sample PMG Regression Estimates (All Countries)

Dependent Variable: Growth		**Extended Model Specification**				
		Monetary Side			**Fiscal Side**	
Variable	**Baseline Model Specification**	**DCE**	**MGR**	**INFL**	**SGE**	**YGR**
Long run Estimates						
Const	0.4816*	0.6131*	0.3304*	0.4079*	0.4155*	0.0321
CAPR	-0.0056*	-0.0004	0.0032	-0.0073**	-0.0073**	-0.0289***
INVR	0.0461*	0.0328*	0.0474*	0.0663*	0.0553*	0.0607*
FDIR	-0.0422*	-0.0106	-0.0119	-0.0530*	-0.0263***	0.0230
AIDR	-0.0088*	-0.0137*	-0.0170*	-0.0423*	-0.0101**	0.0297
SSE	0.0165*	0.0084*	0.0635*	0.0111*	0.0117*	0.0339*
MACU_DCE		-0.0047**				
*DCE*CAPR*		-0.0004*				
MACU_MGR			-5.5500			
*MGR*CAPR*			-5.8400			
MACU_INFL				-1.2600		
*INFL*CAPR*				5.5600		
MACU_SGE					-0.0025	
*SGE*CAPR*					0.0005***	
MACU_YGR						88.1474*
*YGR*CAPR*						0.1039
Short run Estimates						
ΔRCAPR	-0.0004	0.0006	-0.0047***	-0.0012	-0.0001	-0.0051
ΔINVR	-0.0067*	-0.0065**	-0.0084**	-0.0077**	-0.0078*	-0.0017
ΔFDIR	0.0028	-0.0013	0.0007	0.0027	0.0016	0.0019
ΔAIDR	-0.0203*	-0.0172*	-0.0183*	-0.0177*	-0.0187*	-0.0219*
ΔSSE	0.0161*	0.0181*	0.0081	0.0173**	0.0148**	0.0084***
ΔMACU_DCE		0.0963				
*ΔDCE*CAPR*		0.0014				
ΔMACU_MGR			0.0002			
*ΔMGR*CAPR*			0.00004***			
ΔMACU_INFL				-0.0023		
*ΔINFL*CAPR*				-0.00007		
ΔMACU_SGE					0.0198	
*ΔSGE*CAPR*					0.0016	
ΔMACU_YGR						-28005**
*ΔYGR*CAPR*						0.1776
ECM	-0.0899*	-0.0984*	-0.0746*	-0.0785*	-0.0769*	-0.0124
No. of Observations	670	643	643	643	643	643

Source: Authors' Computation

Note: The DCE, MGR and INFL in the monetary side of the extended model denote domestic credit expansion, money growth and inflation rate used in computing their respective macroeconomic uncertainty variables. Similarly, the macroeconomic uncertainty for the fiscal side of the extended model is computed using share of government expenditure and output growth denoted as SGE and YGR. *, ** and *** imply significance at 1%, 5% and 10% levels respectively while the X^2 test is used to test for the joint significance of the explanatory variables in the model.

Table 8: Capital Flight–Growth Nexus in SSA (Full Sample): Interacted vs. Non-Interacted

Monetary and Fiscal Sides	Long Run Effect of CF			Short Run Effect of CF		
	Baseline	Non-Interacted	Interacted	Baseline	Non-Interacted	Interacted
DCE	-0.0056	-0.0004	-0.0226	-0.0004	0.0006	$= \beta_2$
MGR	-0.0056	-0.0032	$= \beta_2$	-0.0004	-0.0047	7.7291
INFL	-0.0056	-0.0073	$= \beta_2$	-0.0004	-0.0077	$= \beta_2$
SGE	-0.0056	-0.0073	$= \beta_2$	-0.0004	-0.0078	$= \beta_2$
YGR	-0.0056	-0.0289	0.0242	-0.0004	-0.0017	$= \beta_2$

Source: Authors' Computation

5.2.2 Oil Exporting Countries vs. Non-oil Exporting Countries

As previously indicated, we further disaggregate our analyses into two in respect of non-oil exporting and oil exporting countries and the results are presented in tables 9 and 10 respectively. We first analyze the PMG regression results of the baseline model. We find that, in the short-run, growth reaction to changes in capital flight is adverse which is in tandem with the evidence from the full sample. However, the adverse effect is more severe for the non-oil exporting countries than the oil exporting countries even in the long run. Similarly, human capital development and foreign direct investment offer greater positive impact on the long run growth of oil exporting countries than their non-oil counterpart. However, the positive impact of human capital on growth in the short run is only evident in the non-oil exporters. The impact of foreign direct investment in the short run, on the hand, is weak in both subsamples. In addition, while foreign aid does not have any significant influence on the growth of oil exporting countries, the impact of this variable seems notably negative for the non-oil exporting countries both in the long run and short run. Nonetheless, domestic investment is more growth enhancing in non-oil exporting countries than the oil exporting countries. These findings on the control variables further attest to the rather volatile and weak contribution of capital inflow to the growth process of most SSA and the need to strengthen the domestic investment and human capital for sustainable long run growth.

Also, some striking results are evident in the extended model. First, the impact of macroeconomic uncertainty on both the long run and short run growth for the two sub-samples is mixed. For instance, in the case of non-oil exporting countries, uncertainty due to domestic credit expansion retards growth in the long run while contrary evidence is found for uncertainty due to output growth. However, the two macroeconomic uncertainty variables are growth enhancing for oil exporting in the long run. This seems to suggest that shocks to credit and growth may be good for the growth process of oil exporting countries in the long run.

The second part of the extended model relates to the role of domestic investment, foreign aid, foreign direct investment and human capital in the growth process. Unlike the baseline results, the positive impact of human capital development on growth is more pronounced in the non-oil exporting countries than the oil exporting both in the long run and short run. Also, domestic investment, consistent with the evidence of the baseline, drives higher long run growth in the non-oil exporting than in the oil exporting while the evidence is weak in the short run. Conversely and as previously noted, foreign aid has statistically significant negative effect on growth in the non-oil exporting countries both in the long run and short run. Similar evidence is only obtained for the oil exporting countries in the short run while foreign aid does not appear to matter for these countries in the long run. Also, like the baseline, the beneficial effect of foreign direct investment on the long run growth is only noticeable in the oil exporting countries while it appears to be perverse in the non-oil exporting. Meanwhile, its effect on growth in the short run is very weak in both sub-samples. In any case, the incentive for capital inflow to the oil exporting countries is understandable; it is therefore not surprising why the chunk of the inflows are directed towards the extractive sector of the economy of these oil exporters.

The third part of the extended model involves the recalculated capital flight effects due to the inclusion of interaction terms in the model. The results are presented in table 11 covering both the long run and short run. On the long run effects of capital flight, our findings indicate that the oil-exporting region of SSA is worse hit by the escalating capital flight from SSA as the Interacted coefficients, in most of the proxies considered, are greater than those of the non-oil region of SSA. This further corroborates our stylized facts indicating a sustained larger magnitude of capital flight from the oil region. As a consequence, growth potentials of the oil region may be crippled if the increasing trends in capital flight due to macroeconomic uncertainty are not consciously addressed. In the short run however, the non-oil region is more susceptible to the depressing impact of capital flight on growth when the region is confronted with macroeconomic uncertainty.

Table 9: PMG Regression Estimates (Non-Oil Exporting Countries)

Dependent Variable: Growth		**Extended Model Specification**				
		Monetary Side			**Fiscal Side**	
Variable	**Baseline Model Specification**	**DCE**	**MGR**	**INFL**	**SGE**	**YGR**
Const.	0.7165*	0.9634*	-0.0293	0.5018*	0.4949*	0.0869**
CAPR	-0.0043*	0.0063***	0.0459*	-0.0030	-0.0048***	-0.0329**
INVR	0.0294*	0.0789*	0.0761*	0.0664*	0.0559*	0.0526*
FDIR	-0.0314*	-0.0132	-0.0307	-0.0611*	-0.0379**	0.0213
AIDR	-0.0095*	-0.0619*	0.0778*	-0.0384*	-0.0185*	0.0278
SSE	0.0149*	-0.0007	0.1344*	0.0127*	0.0111*	0.0325*
MACU_DCE		-0.0045*				
*DCE*CAPR*		-0.0004*				
MACU_MGR			0.0001			
*MGR*CAPR*			-1.2100			
MACU_INFL				0.00001		
*INFL*CAPR*				-4.3000		
MACU_SGE					0.0018	
*SGE*CAPR*					0.0005***	
MACU_YGR						78.6904*
*YGR*CAPR*						0.1764
ΔRCAPR	-0.0018**	-0.0003	-0.0079*	-0.0031	-0.0010	-0.0058
ΔINVR	-0.0037	-0.0019	-0.0009	-0.0035	-0.0050	-0.0013
ΔFDIR	0.0002	-0.0065	-0.0042	0.0003	0.0001	0.0005
ΔAIDR	-0.0165*	-0.0097*	-0.0134*	-0.0134*	-0.0153*	-0.0179*
ΔSSE	0.0180**	0.0207*	0.0156	0.0194***	0.0193**	0.0074
ΔMACU_DCE		0.0562				
*ΔDCE*CAPR*		0.0024				
ΔMACU_MGR			0.0002			
*ΔMGR*CAPR*			0.0001***			
ΔMACU_INFL				-0.0021		
*ΔINFL*CAPR*				-0.0001		
ΔMACU_SGE					0.0084	
*ΔSGE*CAPR*					0.0027	
ΔMACU_YGR						-3.0957***
*ΔYGR*CAPR*						0.2209

ECM	-0.1262*	-0.1326*	0.0024	-0.1011	-0.0905*	-0.0279
No of Observations	480	460	460	460	460	460

Source: Authors' Computation
Note: The DCE, MGR and INFL in the monetary side of the extended model denote domestic credit expansion, money growth and inflation rate used in computing their respective macroeconomic uncertainty variables. Similarly, the macroeconomic uncertainty for the fiscal side of the extended model is computed using share of government expenditure and output growth denoted as SGE and YGR. *, ** and *** imply significance at 1%, 5% and 10% levels respectively while the X^2 test is used to test for the joint significance of the explanatory variables in the model.

Table 10: PMG Regression Estimates (Oil Exporting Countries)

Dependent Variable: Growth		Extended Model Specification				
		Monetary Side			Fiscal Side	
Variable	**Baseline Model Specification**	**DCE**	**MGR**	**INFL**	**SGE**	**YGR**
Const.	0.6588	0.8167***	0.6696***	-0.1596	0.4908	-0.0161
CAPR	0.0475**	0.0213***	-0.0091	0.0070	-0.0092	0.0983***
INVR	-0.0946*	-0.0824*	-0.0878*	0.1725	-0.1224*	0.0987**
FDIR	0.0680*	0.0679*	0.0789*	0.0694	0.1048*	-0.1778***
AIDR	0.0037	-0.0122	0.0318***	-0.2695	0.0450	0.0822
SSE	0.1774*	0.1598*	0.1649*	1.4935	0.0226*	0.0254
MACU_DCE		0.0270*				
*DCE*CAPR*		-0.0029**				
MACU_MGR			-7.0400			
*MGR*CAPR*			-4.5700			
MACU_INFL				0.0032		
*INFL*CAPR*				-0.0001		
MACU_SGE					-0.1078***	
*SGE*CAPR*					0.0067	
MACU_YGR						90.8322**
*YGR*CAPR*						-6.5519**
ΔCAPR	-0.0021	-0.1683**	0.0054	0.0038	0.0027	-0.0031
ΔINVR	0.0024	-0.0004	-0.0085***	-0.0146***	-0.0025	-0.0068
ΔFDIR	-0.0021	-0.0008	0.0017	0.0079	-0.0017	0.0054
ΔAIDR	-0.0281	-0.0253***	-0.0330***	-0.0277***	-0.0289**	-0.0310*
ΔSSE	-0.0216	-0.0236	-0.0132	-0.0151	-0.0185	0.0149
ΔMACU_DCE		0.1715				
*ΔDCE*CAPR*		0.0012**				
ΔMACU_MGR			0.0003			
*ΔMGR*CAPR*			-0.0002			

ΔMACU_INFL				-0.0022		
*ΔINFL*CAPR*				0.0001		
ΔMACU_SGE					0.0669	
*ΔSGE*CAPR*					-0.0025	
ΔMACU_YGR						-0.3528
*ΔYGR*CAPR*						0.0374
ECM	-0.1432	-0.1683**	-0.1642**	-0.0079	-0.1231***	-0.0035
No of Observation	192	184	184	184	184	184

Source: Authors' Computation

Note: The DCE, MGR and INFL in the monetary side of the extended model denote domestic credit expansion, money growth and inflation rate used in computing their respective macroeconomic uncertainty variables. Similarly, the macroeconomic uncertainty for the fiscal side of the extended model is computed using share of government expenditure and output growth denoted as SGE and YGR. *, ** and *** imply significance at 1%, 5% and 10% levels respectively while the X^2 test is used to test for the joint significance of the explanatory variables in the model.

Table 11: Capital Flight – Growth Nexus in SSA (Oil Exporting and Non-Oil Exporting Countries): Interacted vs. Non-Interacted

Monetary and Fiscal Sides	**Long Run Effects of Capital Flight**			
	Non-Interacted		**Interacted**	
	Oil-SSA	**Non-oil-SSA**	**Oil-SSA**	**Non-oil-SSA**
Domestic Credit Expansion (CDE)	0.0213	0.0063	0.0003	-0.0247
Money Growth (MGR)	-0.0091	0.0459	-0.0091	0.0459
Inflation Rate (INFL)	0.0070	-0.0030	0.0070	-0.0030
Share of Govt. Expenditure (SGE)	-0.0092	-0.0048	-0.0092	-0.0014
Growth of Output (YGR)	-0.0983	-0.0329	-0.3603	-0.0329
	Short Run Effects of Capital Flight			
	Oil-SSA	**Non-oil-SSA**	**Oil-SSA**	**Non-oil-SSA**
Domestic Credit Expansion (CDE)	-0.1683	-0.0003	-0.1596	-0.0003
Money Growth (MGR)	0.0054	-0.0079	0.0054	0.0347
Inflation Rate (INFL)	0.0038	-0.0031	0.0038	-0.0031
Share of Govt. Expenditure (SGE)	0.0027	-0.0010	0.0027	-0.0010
Growth of Output (YGR)	-0.0031	-0.0050	-0.0031	-0.0050

Source: Authors' Computation

6.0 Conclusion and Policy Implications

The indispensable role of capital in the pursuit of sustainable economic growth has been well recognized in the growth literature. For most developing countries including many of the SSA countries, the need for sustainable inflows of capital to complement their low production base is indisputable. While there has been increasing evidence of these inflows to SSA, the capacity to retain this capital for long run growth in SSA appears weak given the high incidence of capital flight. It is against this background that this study examines the impact of capital flight on the growth prospects of SSA. In an attempt to determine what policy instrument could effectively minimize the adverse effect of capital flight on growth, the study also considers the impact of macroeconomic uncertainty on capital flight-growth nexus of SSA.

Specifically, the study focuses on the following: (i) it evaluates the comparative trends between capital flight and major external sources of capital to SSA; (ii) it estimates the effects of capital flight on economic growth in SSA and; (iii) it examines the impact of macroeconomic uncertainty (MACU) on capital flight-growth nexus in SSA. In relation to the modelling framework, we initially specify a baseline model without the MACU and thereafter, we extend the baseline to account for the different indicators of MACU. Thus, the extended model is sequentially estimated with each MACU indicator captured separately. The heterogeneous panel cointegration methods that allow for slope heterogeneity usually evident when dealing with panel data with large N and large T are employed. In addition, we consider sub-samples for oil exporting and non-oil exporting countries in order to more carefully tease out some specificities attributable to these regions in relation to capital flight-growth nexus. This demarcation is necessitated by the notable distinctions in the recorded capital flight from the two regions.

On the basis of our results, this demarcation is indeed justifiable. We find that capital flight has more devastating effects on long run growth of the oil exporting region when confronted with MACU. However, the non-oil region may be more prone to the depressing impact of capital flight in the short run. We also find evidence supporting the significance of domestic investment and human capital on growth in both regions. However, the effects seem to be more pronounced in the non-oil exporting countries than the oil exporting both in the long run and short run. Conversely, foreign aid has statistically significant negative effect on growth in the non-oil exporting countries while it does not appear to matter for long growth in the oil exporting countries.

Moreover, the beneficial effect of foreign direct investment on growth is only noticeable in the oil exporting countries while it is found to be perverse in the non-oil exporting.

Drawing from the results of the full sample, the adverse effects of capital flight on growth of SSA seem incontrovertible and these effects may be escalated by macroeconomic uncertainty. Therefore, ignoring the extended model may undermine the effects of capital flight on the growth of SSA. We also establish that the inflow of foreign direct investment and foreign aid are not adequate to compensate for the high incidence of capital flight from SSA. Nevertheless, domestic investment and human capital have proven to be vital in enhancing growth performance of SSA. Above all, stricter capital control measures should be put in place to deter the outflow of capital from SSA. Also, serious and conscious effort may be committed towards addressing the prevalent macroeconomic uncertainty in SSA in order to mitigate its influence on capital flight. This commitment lies in the responsibility and effectiveness of fiscal and monetary authorities in promoting and sustaining macroeconomic stability in SSA.

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