Corruption, institutions and capital flight: evidence from Sub-Saharan Africa

Eric Osei-Assibey, Kingsley Osei Domfeh and Michael Danquah
Department of Economics, University of Ghana, Accra, Ghana

Abstract
Purpose – The purpose of this paper is to investigate the effect of corruption and institutional governance indicators on capital flight in Sub-Saharan Africa.
Design/methodology/approach – Using a Portfolio Choice Framework, the study employs two different estimation techniques as Generalized Method of Moment and Fixed Effect Regression on panel data sets of 32 countries in Sub-Saharan Africa over the period 2000-2012.
Findings – The variable of interest, corruption, retains its expected positive sign and statistically significant across all the estimations. The relationship remains very strong even when other equally important institutional variables such as regime durability, rule of law and independence of the executive are taken into account. This suggests that a higher perception of corruption among public authorities as in bribery, kickbacks in public procurement, embezzlement of public funds, among others facilitates an increase in capital outflow from SSA. The findings further indicate that regime durability and rule of law are important institutional variables that also significantly influence capital flights in SSA.
Practical implications – The findings imply that institutional reforms should be encouraged if SSA is to win the war against corruption and by extension against capital flight. There should be a creation of democratic environment and good governance practices that foster stronger governance institutions, decline in corruption and better domestic investment climate to help reverse the high spate of capital flight in the region.
Originality/value – The main value of this paper is using the portfolio choice framework to analyze the relationship between capital flight and corruption in the Sub-Saharan African context.
Keywords Governance, Sub-Saharan Africa, Corruption, Institutions, Capital flight
Paper type Research paper

1. Introduction
The issue of capital flight has remained a serious concern to many developing countries since the early 1980s. This is because of its deleterious impact, not only on macroeconomic stability and economic growth, but also on income distribution and welfare of the people (Zheng and Tang, 2009).
Capital flight has been defined differently by different authors in the extant literature, indicating that there is no clear cut definition. For instance, Cuddington (1986) defined capital flight as a short-term private capital outflow which occurs in the response “not only to political crisis but also to economic policy failure.” Deppler and Williamson (1987) also indicated that capital flight is “acquisition or retention of a claim of non-residents, that is motivated by the owner’s concern that the value of his asset would be subject to discrete losses or impairment if his claims continued to be held domestically.” At the very basic, capital flight is a large-scale outflow of financial assets and capital from a nation due to events such as political or economic instability, currency devaluation or the imposition of capital controls.
The link between capital flight and corruption discussed in the literature is limited, especially in the Sub-Sahara African region. The greatest concern, according to Transparency International’s (TI) 2010 Corruption Perceptions Index (CPI), indicated that the most corrupt region in the world is Africa. The CPI report defines corruption as the abuse of entrusted power for private gain, in public and private sectors. More so, six African countries (Angola, Burundi, Chad, Equatorial Guinea, Sudan and Somalia)
were ranked among the ten most corrupt countries of the 173 countries surveyed by the Berlin-based group. It provides scores of countries on a ten-point scale, with zero being the most corrupt. Accordingly, out of 47 African nations surveyed, 44 scored less than five on the index, showing serious levels of corruption. The report again indicated that the least corrupt African nation (Botswana) scored 5.8 indicating the severity of corruption in Africa.

The negative effect of corruption and capital flight in Sub-Saharan Africa is enormous as it leads to the widening of the gap between domestic savings and investment. Agents of the economy lose trust in the social-political and macroeconomic environment of the country. Empirical evidence in the literature has shown that in Sub-Saharan Africa, corruption impairs political, economic and social development and hinders administrative development and performance (Makumbe, 1994; Osoba, 1996; Hope, 1997). Corrupt practices leads to an unstable economic environment resulting in high cost of operation and a greater level of risk and expected lower returns for investors (Acemoglu et al., 2001).

This paper relies on panel data sets of 32 countries in Sub-Saharan Africa over the period 2000-2012. The paper employs the portfolio choice framework that takes into consideration rate of return and risk differential as the drivers of capital flight. The theory describes how capital moves across countries in response to rate of return and risk differentials. Here, emphasis is placed on the assessment of domestic investment risk and uncertainty that lead individuals to choose to hold assets abroad instead of investing domestically. The study, therefore, sees corruption as a domestic investment risk function and seeks to answer the following two questions: What is the effect of corruption on capital flight in SSA? How do other governance indicators such as rule of law, political stability and regime durability also influence capital flight?

The rest of the paper is organized as follows. Section 2 presents a brief overview of capital flight and corruption in Sub-Saharan Africa. Section 3 reviews literature on the relationship between capital flight and corruption while Section 4 discusses methodology and data sources. Section 5 presents estimation results and discussions of findings while Section 6 concludes with policy implications of the findings.

2. Overview of capital flight and corruption in SSA
In order to appreciate the state of capital flight and corruption in the Sub-Saharan region, this section provides a trend analysis of the estimates of capital flight and corruption for the period under consideration. Trend analysis on the average corruption as well as capital flight estimates for individual Sub-Saharan African country under consideration is also reported.

From Figure 1, capital flight from Sub-Saharan Africa has shown both upward and downward trends. However, capital flight between 2000 and 2012 periods had increased in most part of the years than it has fallen.

Specifically, in the year 2000 it was high, and declined in 2002 but regains its rising mode from 2003 reaching its highest in 2007 and then declined again through to 2011 and upward again in 2012. Total real capital flight in the combined Sub-Sahara African countries was highest in the year 2007. This may be due to the productive nature of countries in the sub region, which have abundant oil and other natural resources, poor governance and weak institutions, and poor macroeconomic environment.

On the other hand, it recorded the lowest in the year 2002. This may be due to the healthy macroeconomic environment, good governance and quality institutions that many African countries are experiencing in recent times. Between 2002 and 2003, capital flight in Sub-Saharan Africa recorded the highest percentage change, thus, it grew by 227 percent in 2003 followed by a 64 percent increase in 2011. This informs us that capital flight is still an issue that needs particular attention in the sub region.
2.1 Trend analysis of corruption in SSA (2000-2012)
The period (2000-2012) under review depicts an upward trend in the corruption index in Sub-Saharan Africa. The region began the period with a corruption index of 12.7 in 2000, depicting a highly corrupt period as compared to the other periods in Figure 2. Subsequently, the figure shot to 38.2 in 2001 and later fell to 31.9 in 2002. Since then, corruption index in SSA has remained on an increasing trend recording the highest score of 95.10 in 2012. The increasing rise in corruption index in the region depicts a good omen for the sub region since it assures us of a very clean region thus a reduction in corrupt practices.

The phenomenon is as a result of a decline in bribery and embezzlement of funds, especially by public officials who amass wealth using their official positions.

3. Literature review
This section is aimed at reviewing the theoretical and empirical studies on capital flight and corruption.

3.1 Theoretical literature on capital flight and corruption
Generally, the concept of the causes and determinants of capital flight has been linked to four main hypotheses by many scholars. These are portfolio choice framework, debt-driven flight
thesis, investment diversion thesis and tax – depressing thesis. However, in undertaking a critical look at the link between capital flight and corruption, this thesis follows tune to the use of Portfolio Choice framework based on Collier et al. (2001, 2004), Le and Zak (2006) and Ali and Bernard (2011) to explain how corruption affects capital flight in SSA.

By viewing corruption as a contributor to domestic investment risk, this paper considers an economy, say a country in Sub-Saharan Africa with a vast number of infinitely-lived identical agents. The economic agents optimize their consumption patterns based on the return on wealth which they allot to one-period investment in the domestic economy or foreign country. This study assumes that there exists only one investment in each country such that agents’ consumption from the return on wealth is allocated to one-period investment in the domestic country or to a single foreign country. Excluding labor and considering the population as constant, the wealth \(W\) is also normalized to unity and the assumption of a single homogenous commodity produced in both countries.

Investment in the domestic economy is denoted by \(I_t\) at time \(t\). This investment earns a rate of return \(RR_t\). It is assumed that, in the domestic economy, investment is risky due to poor governance (e.g. in this case is corruption) while that of the foreign investment earn a risk-free rate of return \(RR_f\) when agents invest \(I'_f\) in, say, a US Treasury bill. With these options, the problem is on the representative Sub-Saharan African agent to choose an investment portfolio that maximizes utility of his wealth by solving:

\[
\text{Max}_w E \sum_{t=0}^{\infty} \beta^t U(W_t) \tag{1}
\]

Subject to:

\[
W_t = (1 + RR_t)I_t + \left(1 + RR'_f\right)I'_f - I_{t+1} - I'_{t+1} \tag{2}
\]

The necessary and sufficient conditions below depicts the optimal allocation of the portfolio where \(U(w)\) is strictly increasing, continuous and strictly concave:

\[
I^*_{t+1} = \frac{E(RR_{t+1} - RR'_f)}{\theta \text{VAR}(RR_{t+1})} \tag{3}
\]

The \(\theta \text{VAR}(RR_{t+1})\) represents the variance of the return on investment in the domestic economy, whereas the risk aversion is \(\theta = -E[U''(W_{t+1})]/E[U'(W_{t+1})]\). Assuming the presence of a related problem the individual agents are solving in other countries, the net capital flight is given by \(N'_{t+1} = I'_{t+1} + I^*_{t+1}\), where \(I'_{t+1}\) and \(I^*_{t+1}\) are capital outflows and inflows, respectively. Then the average capital invested in the domestic economy from time \(t\) to time \(t+1\) is given by:

\[
V_{t+1} = I^*_{t+1} + N'_{t+1} \tag{4}
\]

The fourth equation indicates equilibrium of the capital stock which is made up of domestic investment and net foreign investment. An arrangement of the Equation (4), however, will produce the equilibrium capital flight as below:

\[
N'_{t+1} = V_{t+1} - E(RR_{t+1} - RR'_f) \tag{5}
\]

Equation (5) indicates that a high capital flight is associated with low expected returns on domestic investment (i.e. domestic investment risk is high).
The degree of capital flight is basically affected by political risk factors while return differentials and economic risk are controlled. From this perspective, we test the hypothesis by estimating the equilibrium capital flight in Equation 5. So, to obtain capital flight as a ratio of physical capital stock, Equation (5) is divided by $V_t$, as below:

$$\frac{N^f_t}{V_t} = \frac{1}{C_0} \left( \frac{E(R_tR_t^e)}{\var{VAR(R_t)}{t}} \right)$$

We now look at the determinants of domestic investment risk which happens to be our main interest and in so doing, we break down the variance in the equilibrium capital flight. The variation associated with the returns is made up of the political instability, $\delta^2_{p,t}$, economic risk, $\delta^2_{e,t}$, and policy uncertainty, $\delta^2_{u,t}$. The domestic investment risk now becomes:

$$VAR(R_t) = \delta^2_{p,t} + \delta^2_{e,t} + \delta^2_{u,t} + Cor_t$$

From this perspective, Equation (7) shows that the variance of inflation measures the domestic economic risk, and corruption is added as contributor to domestic economic risk. Also, the political risk and uncertainty is measured by rule of law, regime durability and independence of the executive authority.

Lastly, we inculcate the decomposed variance of returns in Equations (7) to (6) to get the capital flight equation to be estimated:

$$CF_t = \beta_0 + \beta_1 (R_tR_t^e) + \beta_2 COR_t + \beta_3 \delta^2_{p,t} + \beta_4 \delta^2_{e,t} + \beta_5 \delta^2_{u,t} + \epsilon_t$$

Equation (8) indicates that given the return differential, economic risk factors, political and policy risk factors and uncertainties, corruption can influence capital flight by raising the domestic investment risk.

From the above theoretical analysis of portfolio choice theory, a higher capital flight occurs when expected returns domestically are low and domestic economic risk is high. That is, corruption-driven funds move from a country because corrupt governments are feared with the notion that they will not provide a stable and conducive environment for investment. This corruption-driven money explains the earlier statement that corruption is a contributing factor to domestic investment climate through risk and uncertainty. The approach has been used by some authors in their empirical works of corruption and investment decisions because of its importance in being able to explain capital flows from developing countries. Some of these authors are Tanzi and Davoodi (1997). These authors reiterated that corruption can lead to lowering of the quality of investment in an economy and also destroy the quality of domestic investment climate through uncertainty and insecurity.

### 3.2 Empirical literature on capital flight

The empirical literature on the determinants of capital flight has revealed a vast array of factors. This can be linked to the different definitions, measurements and the econometric model used. The most widely mentioned and consistent factors include the macroeconomic factors, capital inflows, governance and institutional quality, financial development, fiscal policy and rate of return differentials.

#### 3.2.1 Governance and institutional indicators

Six institutional variables that capture various types of political institutions that the literature has identified as important drivers of capital flight are political competitiveness as proxied by the level of democracy, institutional and political constraints on executive, an index of political accountability, government fractionalization and political stability. The five indicators of governance include the World Bank’s estimates of regulatory quality; the rule of law; government effectiveness; political risk; corruption; and the World Banks “Ease of Doing Business” rankings.
Quality institutions are generally believed to be a crucial catalyst for domestic investment climate. Empirical literature has shown a positive relationship between poor governance and institutions. North (1990) established that taking a decision to invest in the domestic economy depends on whether property rights and other investment-promoting institutions are in place and that well developed institutions indirectly increase the potential for higher rates of return within the domestic economy by lowering transaction costs.

Weak institutions including weak democracy and political freedom aggravate an illegal outflow of capital from poor countries, diverting scarce resource from injecting the development pipeline (Lensink et al., 2000). Studies by Hermes and Lensink (2002) acknowledged that perceived ill institutional variables in any economy may give rise to capital flight because citizens lose confidence in the domestic economy thereby holding their funds abroad. The lack of strong institutional system and good governance exposes elites to corrupt the capital market at the cost of the national interest (Ndikumana and Boyce, 2003).

A study by Pepinsky (2006), examining the political bases of portfolio investment using a unique cross-national data set on net portfolio flows did establish that countries with “better institutions” were no less vulnerable to portfolio outflows than countries with “worse institutions.” It indicated that governance quality is the strongest predictor of portfolio capital flows, while political institutions perform poorly. The existing empirical literature is consistent with the findings that a good institutional development is associated with a lower incidence of capital flight (see, e.g. Le and Zak, 2006; Cerra et al., 2008). Ajayi and Ndikumana (2015), in using the Generalized Method of Moment (GMM) regressions in their bid to describe the nature of capital flight, the methodologies used to measure it, and its drivers, relied on 39 African countries for the period 1970-2010 and found that capital flight is lower in better governed regimes, but that it increases with regime duration. Their work also indicated that the coefficients are not statistically significant when omitted country-specific fixed effects are accounted for.

3.2.2 Macroeconomic indicators. Variables including external debt, foreign borrowing, the rate of inflation, domestic investment, budget deficit, real exchange rate and real GDP, among others, are what the literature has indicated to be crucial determinants of capital flight.

The government budget is crucial to capital movements. Larger budget deficits motivate domestic investors to move capital abroad to escape higher future taxation risk through expectations of higher future inflation (Boyce, 1992; Schineller, 1997; Loungani and Mauro, 2000). Fofack and Ndikumana (2009), in their study, indicate that capital flight affects the government budget balance by shrinking the tax base through reduced domestic economic activity.

Also, the degree of currency over-valuation is an indicator that affects the rate of returns for both domestic and overseas investors. Collier et al. (2001), in a study using data sample from African, indicated that currency over-valuation helps to explain the occurrence of capital flight in Africa in all specifications. The coefficient of this variable was found to be positive and highly significant, implying that, on average, African economies with misaligned exchange rates tend to experience more capital flight, perhaps reflecting expectations. Similarly, poor exchange rate management, such as an overvalued currency or a black market premium, may contribute to economic uncertainty, as they generate incorrect signals to economic agents (Edwards, 1989). The existing evidence suggests that currency over-valuation, in particular, can be harmful since it may result in lower economic growth, a higher probability of speculative attacks, increased current account deficits, shortages of foreign exchange, balance of payments crises and corruption (Rodrik, 2008).

Moreover, domestic inflation reduces real returns on domestic capital. More capital tend to flee abroad to the extent that the government depends on taxing domestic financial assets
through money creation (Dooley, 1988; Pastor, 1990; Loungani and Mauro, 2000). According to Fischer (1993), high inflation makes domestic asset holders react to the erosion of the real value of their assets by moving their assets abroad. Also, since inflation is often regarded as an indicator of the government's overall ability to manage the economy, a rising inflation rate tends to undermine that ability. Contrary to the above findings, Hermes and Lensink (2000) found an insignificant effect of the uncertainty relating to inflation on capital flight. Again capital flight can result in inflation if domestic sources of revenue generation are eroded and the government resort to printing money to finance its development activities (Ndikumana and Boyce, 2003).

Accordingly, Capital inflows/Foreign Direct Investment influences capital flight, thus increase in capital inflows provides more resources, thus leading to more capital flight. Ajayi (1997), in his analysis, argued that the simultaneous occurrence of capital inflows and capital outflow are a major cause of capital flight. Foreign aid is still one of the most important sources of finance for most African countries available even though the impact of some types of private capital flows such as FDI on capital flight is ambiguous. On the other hand, Kant (1998), in his study, suggests that FDI reduces capital flight through its beneficial effect on the domestic investment climate. Similarly, studies by Cerra et al. (2008) confirm this empirically. In addition, Knack (2001) argued that aid may be detrimental to the investment climate of recipient countries as it tends to encourage corruption and rent seeking.

3.2.3 Structural features. Structural features are believed to be a catalyst for particular economic shocks which may adversely affect a country economic performance. An important factor in this case is the availability of natural resource in a country. Empirical evidence suggests that most African countries that are rich in oil and minerals have experienced relatively high levels of capital flight (Boyce and Ndikumana, 2012). The phenomenon is as a result of poor governance and inadequate management capabilities.

3.2.4 Risk and rate of return differentials. Investors are always keen on achieving higher returns on their investment and as such interest rate differentials between domestic countries and the world market has been a major factor in their investment decision making. A situation where there is a large differential implies that domestic agents, in an attempt to maximize their portfolios, may substitute into foreign assets where the yield on short-term instruments is higher. In this case, capital flight may occur simply because the returns on assets are higher abroad as compared to assets held domestically.

Numerous studies confirm that capital flight may take place in response to poor returns to domestic investments. For example, Fedderke and Liu (2002) indicated that the domestic and foreign rates of return play a crucial role in explaining capital outflows from South Africa. Furthermore, Boyce and Ndikumana (2001) indicated that the level of risk associated with investment in a country also has an impact on the level of investment. They reiterated that it determines the level of domestic and foreign investment that investors allocate after taking into account risk-adjusted returns. Collier et al. (2004) reported that returns to capital abroad and domestic economy as well as political conditions determine capital flight in their sample of countries.

3.2.5 Financial development. Generally, empirical studies have examined the relationship between financial development and capital flight. The relationship between capital flight and financial development has been shown empirically as sensitive to the choice of variable used as a measure of financial development. For instance, Ndikumana and Boyce (2003) used credit to the private sector as a measure of financial development and indicated a negative and statistically significant effect on capital flight from Sub-Saharan Africa. The findings suggest that an increase in the amount of credit for the private sector is not enough to facilitate investors to invest in the domestic economy, hence a fall in the illegal outflow of capital from SSA.
In contrast, however, Ndiaye (2011) established a negative and significant impact of ratio of deposit to GDP on capital flight. Accordingly, he explained that a rise in domestic savings will encourage and increase financing domestic investment, thereby reducing capital flight.

3.2.6 The portfolio choice theory. The original idea of portfolio theory of capital movement can be linked to Williams (1938). The principal idea was interest rate differentials as the cause of capital flows. It took MacDougal type models (determinants of capital flows framed in inter-temporal optimization context), to place particular attention on risk and not only on return differential (see Tobin, 1958). The literature on capital flight has built on these earlier theories. Notable among these authors included Khan and Hague (1987) who indicated that capital flows can arise in an instance of where investors face an asymmetric risk of expropriation. In this instance, investors in the domestic economy will send their funds abroad when facing a higher risk. Also, Dooley (1988) placed emphasis on the notion of asymmetric risk by expanding the focus to a wide range of implicit taxes resulting from either a rise in inflation or exchange rate depreciation. This led the authorities to depend more on the inflation tax, resulting in the erosion of the value of financial assets in the domestic economy, hence, capital flown to acquire foreign assets.

Accordingly, Ndikumana and Boyce (2003) viewed capital flight movement as resulting from investors who in their bid to maximize profits allocate funds between domestic and foreign investment based on the relative risk-adjusted rate of return at home and abroad. The indication is that developing countries with riskier investment environment will result in lower net risk-adjusted returns. This phenomenon has invariably been able to explain why capital continues to flow out to foreign lands. In addition, foreign investors can be discouraged to invest in the domestic economy if the situation of risky environment discourages domestic investment.

Accordingly, Ndikumana and Boyce (2003) viewed capital flight movement as resulting from investors who in their bid to maximize profits allocate funds between domestic and foreign investment based on the relative risk-adjusted rate of return at home and abroad. The indication is that developing countries with riskier investment environment will result in lower net risk-adjusted returns. This phenomenon has invariably been able to explain why capital continues to flow out to foreign lands. In addition, foreign investors can be discouraged to invest in the domestic economy if the situation of risky environment discourages domestic investment.

According to Pinheiro (1997), the movement of capital flight can be ascertained from the portfolio adjusted behavior. He indicated that the portfolio adjusted behavior is a situation where the holder of wealth holds a vast array of both foreign and domestic assets and that the relative rates of return and the risk component on domestic and foreign assets influences the decisions on the assets demand. Investors put their money abroad due mainly to loss of confidence accompanied by suspicion and fears resulting from a rise in the perception of risk escalated by either political instability and/or consequence of poor economic performance.

In addition, Lawanson (2007) employed the portfolio choice approach to undertake a study on the econometric analysis of capital flight from Nigeria for the period 1970-2001. The econometric analysis showed that a number of factors including real interest rate differential, domestic debt, real GDP growth, and change in inflation rate, parallel market exchange rate premium, fiscal deficit, and inflows of debt capital provides an explanation to the portfolio behavior of holders of private wealth in Nigeria.

4. Methodology and discussion of estimation results
This study estimates capital flight employing the methodology outlined by Boyce and Ndikumana (2001) which is a variant of the World Bank (1985) residual method. The method calculates capital flight as the residual difference between capital inflows and recorded foreign-exchange outflows. Adjustments made include: trade mis-invoicing, under-reporting of remittances, inflation and exchange rate. Capital flight is estimated for country i in year t using the following equation:

\[
CF_{it} = \Delta DebtAdj_{it} + DFI_{it} - (CA_{it} + \Delta RES_{it}) + MISINV_{it}
\]

where: \(CF_{it}\) is Capital Flight; \(\Delta DebtAdj_{it}\) is the change in the country’s stock of external debt adjusted for exchange rate fluctuations; \(DFI_{it}\) is net direct foreign investment; \(CA_{it}\) is the current account deficit; \(\Delta RES_{it}\) is the change in the net stock of foreign reserves; \(MISINV_{it}\) is net trade mis-invoicing.
4.1 Adjustment for exchange rate fluctuations
The adjustment is made to the change in the long-term debt stock for fluctuations in the exchange rate of the dollar against other currencies. This is meant to correct for potential discrepancies. The estimate for country \(i\), the US dollar value of the beginning-of-year stock of debt at the end-of-year exchange rate is obtained as follows:

\[
NEWDEBT_{i,t-1} = \sum_{j=1}^{7} (\beta_{ij,t-1} \times LTDEBT_{i,t-1})/(EX_{jt}/EX_{j,t-1}) \\
+ IMFCR_{i,t-1}/(EX\_{SDR,j}/EX\_{SDR,t-1}) + LTOTHER_{i,t-1} \\
+ LTMULT_{i,t-1} + LTUSD_{i,t-1} + STDEBT_{i,t-1}
\]

where \(LTDEBT\) is the total long-term debt; \(\beta_{ij}\) the proportion of long-term debt held in currency \(j\), for each of the non-US currencies; \(EX\) the end-of-year exchange rate of the currency of denomination against the dollar (expressed as units of currency per US dollar); \(IMFCR\) the use of IMF credit; \(LTOTHER\) the long-term debt denominated in other unspecified currencies; \(LTMULT\) the long-term debt denominated in multiple currencies; \(LTUSD\) the long-term debt denominated in US dollars; \(STDEBT\) the short-term debt; \(DEBT\) the total debt stock as reported by the World Bank.

The exchange rate adjustment is given as: \(ERADJ_t = NEWDEBT_{t,t-1} - DEBT_{t,t-1}\).

Finally, the adjusted change in debt is given as: \(\Delta Debt\_Adj_{t,t} = DEBT_{t,t} - NEWDEBT_{t,t-1}\).

4.2 Estimating trade mis-invoicing
Trade mis-invoicing is calculated by comparing a country’s declared import and export statistics to those of its trading partners considering the addition of the cost of freight and insurance. For the purpose of this study, the researcher calculates trade mis-invoicing of Sub-Saharan African countries relative to that of Advanced/Industrialized countries, and use this as a benchmark to compute overall trade mis-invoicing. The method for calculating trade mis-invoicing is as follows:

\[
KXIC_{it} = IMAC_{it} - (EXAC_{it} \times CIF_t) \\
KMIC_{it} = MIC_{it} - (EXIC_{it} \times CIF_t)
\]

where \(KXIC_{it}\) is the SSA Country \(i\) in time \(t\) export discrepancies with industrialized countries; \(IMAC_{it}\) the value of imports from the African country as reported by the industrialized trading partners; \(EXAC_{it}\) is African country’s exports to industrialized countries as reported by the African country; \(KMIC_{it}\) the SSA Country \(i\) in time \(t\) import discrepancies with industrialized countries; \(MIC_{it}\) the African country’s imports from industrialized countries as reported by the African country; \(EXIC_{it}\) the industrialized countries’ exports to the African country as reported by the industrialized trading partners; \(CIF\) the c.i.f/t.o.b factor, representing the costs of freight and insurance; \(TTM\) the total trade mis-invoicing; \(TEX\) the country’s total exports; \(TIM\) the country’s total imports.

Finally:

\[
TTM_{it} = \frac{KXIC_{it}}{TEX_t} + \frac{KMIC_{it}}{TIM_t}
\]

4.3 Adjustment of underreporting of remittances
Sub-Saharan African countries receive enormous inflows of remittances from their citizens working outside the region and these inflows are under-reported in the official BOP statistics. Accordingly, we estimate the quantum of unreported remittances comparing estimated inflows from industrialized countries to the total inflows recorded in the official BOP statistics.
The discrepancy would be calculated based on 2006 data (the year for which the alternative estimates are available), and extrapolate from this to estimate discrepancies for earlier years:

\[
 RID_{it} = (ARI_{i, 2006} - BPRI_{i, 2006}) \times \frac{BPRI_{i, 2006}}{BPRI_{i, 2006}}
\]

where \( RID_{it} \) is the remittance inflow discrepancy in country \( i \) in year \( t \); \( ARI_{i, 2006} \) the alternative measure of remittance inflows to African countries as a whole in years \( t \) and 2006; \( BPRI_{i, 2006} \) the BOP measure of remittance inflows in country \( i \) in year 2006; \( BPRI_{i, 2006} \) and \( BPRI_{i, 2006} \) the BOP measures of remittance inflows to African countries as a whole in years \( t \) and 2006, respectively.

4.4 Inflation adjustment
Inflation is adjusted so as to make annual capital flight comparable over an extended period of time. The US producer price index with base year of 2010 is employed to convert nominal flows to constant dollars. The method for calculating inflation adjusted real capital flight is calculated as \( IACF = ACF/PPI \). Where, \( IACF \) is the inflation adjusted capital flight; \( ACF \) is the adjusted capital flight; and \( PPI \) is the US producer price index.

4.5 Model for empirical estimation
Using the dynamic panel system GMM estimation, the actual econometric model to be estimated is written as:

\[
 CF_{it} = \beta_0 + \beta_1 (RR_{it} - RR^t) + \beta_2 COR_{it} + \beta_3 RL_{it} + \beta_4 RD_{it} + \beta_5 IEA_{it} + \beta_6 X_{it} + \epsilon_{it}
\]

However, Equation (9) is estimated to test the objective of this study where \( CF_{it} \) is the capital flight for each country at time \( t \); \( COR_{it} \) the corruption for each country at time \( t \); \( RL_{it} \) the rule of law for each country at time \( t \); \( RD_{it} \) the regime durability for each country at time \( t \); \( IEA_{it} \) the independence of the executive authority for each country at time \( t \); \( X_{it} \) the control variables for each country at time \( t \); \( \epsilon_{it} \) the error term; \( \beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6 \) represent the parameters to be estimated. Independence of the executive authority is proxies by executive constraints. Control variables capture the macroeconomic environment proxied by GDP growth and Inflation.

4.6 A priori expectation, sources of data and variable description
4.6.1 The dependent variable. Capital flight is expressed in millions of constant US dollars. The data of capital flight are taken from the database of Boyce and Ndikumana (2012). The capital flight data are updated by the researcher using data obtained from World Development Indicators of the World Bank in respect of 32 countries in Sub-Saharan Africa comprising: Angola, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo DR, Congo Republic, Cote d'Ivoire, Ethiopia, Gabon, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mauritania, Mozambique, Nigeria, Rwanda, Seychelles, Sierra Leone, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. Three different methods have been identified as a measure of capital flight. These are the direct measures, indirect measures and the Dooley measure. This study employs the indirect method which is also called the residual method, the most widely used measure in the available literature. It is considered to be the broadest estimate of capital flight in order to minimize potential biases in narrower measures. The method looks at measurement under the assumption that capital inflows will be used as a basis of capital outflows. In other words, capital flight is measured indirectly from balance of payments statistics by comparing the sources of capital inflows (Net increases in external debt and the net inflow of foreign investment) with the use of these inflows (the current account deficit and additions to foreign reserves).

Table I indicates description of the independent variables, their sources, and expected signs are reported.
5. Estimation results

5.1 Introduction

Focusing on the idea of static panel data model with different estimation methods, this section presents the main parts of the econometric results. The section presents the estimation results of the explanatory variables using the fixed effects – GLS regression and the System GMM estimation. Tables II and III display the regression results for the FE and GMM respectively. Diagnostic test results are also reported. Six specifications of the econometric model were tested. The main variable of interest in this case corruption entered the model in specification (1). The idea is to check the singular effect of corruption on capital flight when all other variables used in the model are kept constant. Specifications (2), (3) and (4) capture rule of law, regime durability and independence of the executive authority, respectively. Specifications (2), (3), and (4) were intended to ascertain whether the other equally important institutional governance indicators singularly have an effect on capital flight in SSA.

Moreover, specification (5) includes the variable of interest thus, corruption and all other institutional variables used in the model. It excludes the control macroeconomic variables used in the model. This is intended to find out the combined significance and effects of all the institutional variables used in the model on capital flight. Specification (6), on the other hand, comprises the full model thus, all the explanatory variables to determine their combined significance.

We carried out the panel unit-root test before proceeding to the estimation. This is intended to prevent any distortions in estimated regression relations as well as spurious regression due to time-series process (Green, 1997). The results of the Augmented Dickey-Fuller test for unit-root indicates that we reject the null hypothesis for tests in all the variables implying that all variables were found stationary at levels with the exception of corruption at first difference (Table AIII). Also, the Granger Causality test is conducted to understand the interrelationships between the respective variables under consideration (Table AIV). The results indicate a unidirectional causal relationship running from corruption to capital flight at the 5 percent significance level.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Variable description</th>
<th>Expected sign</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption</td>
<td>Defined as the perceived levels of public sector corruption</td>
<td>Positive (+)</td>
<td>CPI of Transparency International</td>
</tr>
<tr>
<td>Rule of law</td>
<td>Captures perceptions of the extent to which agents have confidence in and abide by the rules of society</td>
<td>Negative (−)</td>
<td>ICRG &amp; World Bank data base</td>
</tr>
<tr>
<td>Regime durability</td>
<td>End of transition period defined by the lack of stable political institutions</td>
<td>Positive</td>
<td>Polity IV database</td>
</tr>
<tr>
<td>Independence of executive authority</td>
<td>Indicates the extent to which the chief executive takes into account preferences of others when making decisions</td>
<td>Positive (+)/negative (−)</td>
<td>Polity IV database</td>
</tr>
<tr>
<td>Inflation (CPI)</td>
<td>Reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services</td>
<td>Positive (+)</td>
<td>World Bank, WDI</td>
</tr>
<tr>
<td>GDP growth</td>
<td>At purchaser’s price is the sum of gross value added by all resident producers in the economy</td>
<td>Negative (−)</td>
<td>World Bank, national accounts data</td>
</tr>
<tr>
<td>Return differential</td>
<td>Estimated as the domestic real interest rate minus the average US government bond rate</td>
<td>Negative (−)</td>
<td>International Financial Statistics</td>
</tr>
</tbody>
</table>

**Source:** Author’s Computation (2015)
5.2 Fixed effects estimation results

Table II depicts the fixed effects regression results. The appropriateness of the fixed-effects model for all regression specifications is confirmed by the Hausman test. Results from the fixed effect model suggest that the return differential is negative and statistically significant to capital flight at 5 percent level of significance in specifications (5) and (6). Also, in all the specifications the variable of interest, thus, corruption appeared, it is found to be explaining the occurrence of capital flight in Sub-Saharan Africa. The coefficient is positive and statistically significant at 1 percent level of significance, indicating that economies in Sub-Saharan African region with high corruption tend to experience more capital flight. The result conforms to empirical findings reported by Le and Rishi (2006), who considered the role of corruption in impelling capital flight in developed and developing countries using a panel data analysis, they reiterated a positive and significant effect of corruption on capital flight.

In addition, the empirical results show a statistically insignificant relationship between rule of law and capital flight as well as independence of the executive authority and capital flight. This implies that these two institutional and governance indicators do not play any crucial role in explaining capital flight using the fixed effect model. However, regime durability, another institutional variable, is found to be positive and statistically significant to capital flight at 10 percent level of significance in specification (6).

Moreover, the controlled macroeconomic variables of inflation and GDP growth showed a statistically insignificant effect in the specification they were included. This result indeed explains that the macroeconomic indicators used in this analysis play no important role in explaining capital flight from SSA. Due to the presence of potential endogeneity, this research did replicate the above econometric exercise using the System GMM as presented in Table II.

5.3 System GMM estimation results

Following the empirical estimation and discussion of the fixed effect regression results, the study suspected the presence of autocorrelation, heteroscedasticity and the potential endogeneity problem. As part of the robustness check, the system GMM is used to
<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return differential</td>
<td>-0.006*** (0.0009)</td>
<td>-0.002*** (0.003)</td>
<td>-0.0037* (0.0022)</td>
<td>-0.0036*** (0.0014)</td>
<td>-0.0027*** (0.0013)</td>
<td>-0.016*** (0.0051)</td>
</tr>
<tr>
<td>Corruption</td>
<td>1.290*** (0.284)</td>
<td>1.0614*** (0.2685)</td>
<td>0.748* (0.311)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule of law</td>
<td>-0.898* (0.484)</td>
<td>-1.216*** (0.432)</td>
<td>-1.138** (0.0629)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regime durability</td>
<td></td>
<td>-0.0704*** (0.0215)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence of executive auth.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of observations</td>
<td>156</td>
<td>171</td>
<td>176</td>
<td>176</td>
<td>144</td>
<td>138</td>
</tr>
<tr>
<td>No. of groups</td>
<td>32</td>
<td>32</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>No. of instruments</td>
<td>76</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>77</td>
<td>79</td>
</tr>
<tr>
<td>AR1</td>
<td>0.2536</td>
<td>0.4522</td>
<td>0.236</td>
<td>0.4122</td>
<td>0.791</td>
<td>0.0458</td>
</tr>
<tr>
<td>AR2</td>
<td>0.1257</td>
<td>0.4735</td>
<td>0.6598</td>
<td>0.9825</td>
<td>0.1063</td>
<td>0.8333</td>
</tr>
<tr>
<td>Sargan</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Notes:** The dependent variable is capital flight. The figures in parenthesis are the Standard Errors of the estimates. *,**,*** Represent the statistical significance of the estimates at 10, 5 and 1 percent levels, respectively.
undertake these diagnostic tests to ensure that the data fits the model and that the results from the system GMM estimation are valid and reliable. The GMM procedure is best because it resolves the dynamic panel bias problem resulting from the endogeneity associated with such models. The GMM technique is preferable as it uses the lags of the endogenous variables as instruments; in which case, the endogenous variables are predetermined and, therefore, not correlated with the stochastic error term. The use of GMM allows correcting for insufficiencies related to problems of simultaneity bias, inverse causality and omitted variables (Guillaumont et al., 2005).

Table III reports the results of the system GMM on the relationship between capital flight and corruption. The research found that the return differential retain the expected sign, thus, the effect it has on capital flight is negative and statistically significant at 1 percent level of significance in most of the specifications it appeared. This conforms with the theory that a rise in the return differential induces capital flight to decline. Moreover, the panel data analysis shows that corruption is positively related to capital flight and statistically significant across all the specifications it appeared. This actually means that a higher perception of corruption among public authorities as in bribery of public officials, kickbacks in public procurement, embezzlement of public funds among others facilitates an increase in illegal outflow of capital from Sub-Saharan African countries. The results confirm that of Le and Rishi (2006), who reported a positive and significant effect of corruption on capital flight. Their econometric analysis indicated that corruption does have a positive and significant impact on capital flight holding other determinants of capital flight constant. The unique feature about this research results and which Le and Rishi (2006) did not show is the statistically significant positive relationship obtained between corruption and capital flight from the econometric analysis when other controlled macroeconomic and equally essential governance and institutional variables are included in the model. The coefficient of corruption in specification (6) which is the full model in particular implies that a rise in corruption by one standard deviation is associated with a rise in capital flight in Sub-Saharan Africa by approximately 0.75 percent. This result indicates the extent of threat corruption poses to capital flight in SSA.

In addition, other equally important institutional variables such as rule of law which appeared in the model retained its expected sign, thus, negatively related to capital flight and statistically significant at 10, 1 and 5 percent levels of significance in specifications (2), (5) and (6), respectively. This outcome implies that a decline in the perceptions of the extent to which agents have confidence in and abide by the rules of society will lead to a rise in capital flight. Additionally, regime durability retained its expected negative sign in all the specifications it appeared in and was statistically significant at 1 and 5 percent levels of significance in specifications (3) and (6), respectively. However, Independence of Executive Authority did not retain its expected sign even though it was statistically significant in specifications (4) and (5).

On the other hand, the controlled macroeconomic variables in the specifications they were included, thus, the full model depicted statistically insignificant effect on capital flight. This result tells us that the macroeconomic environment does not have any significant impact on capital flight in Sub-Saharan Africa. Finally, the two out of the three other equally institutional variables (regime durability and the rule of law) in most of the specifications it appeared indicate a negative and statistically significant effect on capital flight. This is consistent with existing empirical evidence that good institutional development is associated with a lower incidence of capital flight (see, e.g. Lensink et al., 2000; Collier et al., 2004).

6. Conclusions
This paper estimates capital flight on corruption as well as other controlled macroeconomic and equally important institutional variables of the model. Accordingly, the return differential retained its expected sign, thus, a negative and statistically significant effect on capital flight at 1 percent level of significance in most of the specifications it appeared. The result is
consistent with the theory that a rise in the return differential leads to a decline in capital flight. In addition, the variable of interest, thus, corruption regressed on capital flight retain its expected positive sign and statistically significant across all specifications it appeared in the model. The relationship remains very strong even when macroeconomic variables and other equally important institutional variables that have been used in empirical literature and significantly affect capital flight are taken into account. The result was consistent with empirical evidence. This provides us enough evidence to conclude that poor governance and weak institutions, in this case an increase in corruption, strongly leads to a rise in capital flight in Sub-Saharan Africa and that a rise in corruption by one standard deviation is associated with a rise in capital flight in Sub-Saharan Africa by approximately 0.75 percent.

Moreover, other equally important institutional variables regressed on capital flight also revealed interesting results, including a statistically significant negative effect between rule of law and capital flight as well as between regime durability and capital flight. The findings indicate that regime durability and rule of law is an important institutional variable that play a critical role in explaining their effects on capital flight in SSA. However, most controlled macroeconomic variables entered the model insignificantly.

The findings imply that institutional reforms are encouraged to be undertaken in order to reduce corruption and by extension capital flight. There should be a creation of democratic environment linked to stronger governance institutions, decline in corruption and better domestic investment climate. In addition, a common development agenda needs to be instituted among member countries to streamline accountability and development projects. This will help reduce the level of corruption in the economy and its effect on capital flight.

References


Pepinsky, T. (2006), “Institutions, economic recovery, and macroeconomic vulnerability in Indonesia and Malaysia”, paper prepared for the workshop East Asia, Ten Years After the Crisis, University of California, Berkeley, CA, November 3-4.


**Further reading**


**Appendix 1**

<table>
<thead>
<tr>
<th>Variables</th>
<th>CF</th>
<th>RRD</th>
<th>COR</th>
<th>RD</th>
<th>RL</th>
<th>IEA</th>
<th>INF</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRD</td>
<td>-0.099</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COR</td>
<td>-0.1144</td>
<td>-0.0174</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>-0.0912</td>
<td>-0.0374</td>
<td>0.4323</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RL</td>
<td>-0.2345</td>
<td>-0.0714</td>
<td>0.4159</td>
<td>0.4543</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEA</td>
<td>0.0009</td>
<td>0.0381</td>
<td>-0.026</td>
<td>-0.0647</td>
<td>-0.0259</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INF</td>
<td>0.1384</td>
<td>-0.2233</td>
<td>-0.0314</td>
<td>-0.1031</td>
<td>-0.0974</td>
<td>0.0692</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>0.1369</td>
<td>-0.1318</td>
<td>-0.0425</td>
<td>-0.0257</td>
<td>0.056</td>
<td>0.0575</td>
<td>-0.0748</td>
<td>1</td>
</tr>
</tbody>
</table>

Table AI: Pairwise correlation coefficients of regression model

**Note:** The table above report pairwise correlation of the variables under consideration.
Appendix 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>(b) fixed</th>
<th>(B) random</th>
<th>(b-B) difference</th>
<th>Sqrt (diag(V_b-V_B)) SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return differential</td>
<td>0.0241978</td>
<td>0.0206959</td>
<td>0.0035019</td>
<td>0.0014034</td>
</tr>
<tr>
<td>Corruption</td>
<td>1.266257</td>
<td>1.177186</td>
<td>0.0890707</td>
<td>0.0747536</td>
</tr>
<tr>
<td>Regime durability</td>
<td>0.0645018</td>
<td>0.0183366</td>
<td>0.046152</td>
<td>0.0152658</td>
</tr>
<tr>
<td>Rule of law</td>
<td>−0.4938856</td>
<td>−1.831224</td>
<td>1.337338</td>
<td>0.5645919</td>
</tr>
<tr>
<td>Ind. of exec. authority</td>
<td>0.0034338</td>
<td>0.0027519</td>
<td>0.0006819</td>
<td></td>
</tr>
<tr>
<td>Inflation</td>
<td>0.352412</td>
<td>0.373689</td>
<td>−0.0212771</td>
<td>0.0577682</td>
</tr>
<tr>
<td>GDP growth</td>
<td>−0.0136993</td>
<td>−0.009126</td>
<td>−0.0045732</td>
<td></td>
</tr>
</tbody>
</table>

Notes: $b$ = consistent under Ho and Ha; obtained from xtreg. $B$ = inconsistent under Ha, efficient under Ho; obtained from xtreg. Test: Ho: difference in coefficients not systematic. $\chi^2 (7) = (b-B)([(V_b-V_B)^{-1}] (b-B) = 22.37$. Prob $> \chi^2 = 0.0022$. $(V_b-V_B$ is not positive definite)

Source: Hausman test result

Table AII. Hausman test

Table AIII. Augmented Dickey-fuller tests (system GMM)

Table AIV. Pairwise granger causality tests on capital flight and corruption

Appendix 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Lag structure</th>
<th>Value</th>
<th>Probability value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital flight</td>
<td>Level</td>
<td>7.6549</td>
<td>0.0000</td>
</tr>
<tr>
<td>Return differential</td>
<td>Level</td>
<td>19.586</td>
<td>0.0000</td>
</tr>
<tr>
<td>Corruption</td>
<td>First diff</td>
<td>12.5794</td>
<td>0.0000</td>
</tr>
<tr>
<td>Rule of law</td>
<td>Level</td>
<td>9.9873</td>
<td>0.0000</td>
</tr>
<tr>
<td>Regime durability</td>
<td>Level</td>
<td>3.4162</td>
<td>0.0003</td>
</tr>
<tr>
<td>Ind. of exec. auth.</td>
<td>Level</td>
<td>9.7493</td>
<td>0.0000</td>
</tr>
<tr>
<td>GDP growth</td>
<td>Level</td>
<td>17.89</td>
<td>0.0000</td>
</tr>
<tr>
<td>Inflation</td>
<td>Level</td>
<td>58.2851</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Notes: NB: statistical values reported are based on the Modified inv. $\chi^2 Pm$

Source: Author’s Computation 2015

Appendix 4

Sample: 1,416
Lags: 2
Null hypothesis

<table>
<thead>
<tr>
<th>Observations</th>
<th>$F$-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corruption does not granger cause capital flight</td>
<td>106</td>
<td>3.1263</td>
</tr>
<tr>
<td>Capital flight does not Granger Cause Corruption</td>
<td>2.80521</td>
<td>0.0652</td>
</tr>
</tbody>
</table>

Source: Boyce and Ndikumana (2012), and data sample expanded using data from IMF, IFS, DOTS, WDI, and GDF; CPI of TI

Corresponding author
Eric Osei-Assibey can be contacted at: oassibey@yahoo.com

For instructions on how to order reprints of this article, please visit our website:
www.emergalgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: permissions@emeraldinsight.com