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Abstract

According to conventional economic theory, high interest rates are expected to stem capital flight by raising the relative rate of return to investment in domestic assets. However, African countries have experienced high capital flight over the past decades despite high interest rates and improved macroeconomic stability, implying that capital flight is not driven by arbitrage on the basis of the risk-adjusted rate of return to investment. Drawing on panel data covering 39 countries over 1970–2010, this study investigates the interactions between capital flight and monetary policy in Africa. The econometric analysis in this study finds no evidence of an impact of monetary policy instruments or targets on capital flight. Specifically, neither the domestic interest rate nor the interest rate differential with the rest of the world has an impact on capital flight. The evidence, however, shows that capital flight has a negative effect on monetary policy targets. It discourages domestic investment and retards the adjustment of output to its long-term growth rate. Two implications follow from the analysis. First, conventional policy prescriptions may not be effective for stemming capital flight from African countries. Second, capital flight may make monetary policy less effective in stimulating domestic demand and growth. This poses an important dilemma that calls for a serious rethinking of the monetary policy orientation in Africa.

Keywords: Capital flight; monetary policy; Africa; sub-Saharan Africa; domestic investment; interest rate

JEL Classifications: G11; E43; E52; O55

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1. Introduction

The last decade has seen increased attention to capital flight from developing countries in the research and development community alike (Fofack and Ndikumana, 2010; Ndiaye, 2009; Ndikumana and Boyce, 2011a, 2011b; UNDP, 2011; World Bank, 2007). The increased attention to this phenomenon is partly due to the magnitude of these outflows and their adverse effects on economic growth and development effectiveness, especially in the context of increased pressure on development assistance budgets recently exacerbated by the deepening fiscal and sovereign debt crisis in Europe.[1] Moreover, the growing global concern about capital flight is also due to its illicit nature. Indeed, the bulk of the unrecorded outflows are illicit because they were acquired illegally, transferred abroad illegally, held abroad illegally, or all of the above. The main motivation for such outflows would be to avoid prosecution for the illicit origin of the assets, or to evade taxation.

Despite the growing attention to the phenomenon, capital flight remains the hallmark of development anathema in Africa. According to the latest estimates, its cumulative value, including compound interest payments, has increased dramatically over the last three decades to reach $1.7 billion in 2010 (Boyce and Ndikumana, 2012; Ndikumana and Boyce, 2012a; Ndikumana et al., 2014). This largely exceeds the stock of external debt owed by the region to its foreign creditors. Paradoxically, the most capital-scarce region of the developing world has emerged as a "net creditor" to the rest of the world.

Salient characteristics of the dynamics of capital flight in the region include the "uphill" direction of financial flows—from poorer to richer countries; their sustained increase over time and across the board, including in countries that heavily depend on external financing; and the acceleration of capital flight in the post-HIPC era over the last decade (Fofack, 2012). The post-HIPC acceleration has been consistent, irrespective of the stage of development (low and middle-income countries), the degree of integration into global financial markets, and exchange rate regimes (fixed and flexible exchange rates).

[1]However, the increased attention to the capital flight phenomenon in recent years is also due to its potentially lethal effect in the case of terrorism financing in the post-September 11 era.

This "uphill" flow of resources from sub-Saharan Africa to richer countries in the north is at odds with the theoretical foundation of economic development and neoclassical growth models (Lucas, 1990). Attempts to explain this departure from conventional economic theory have largely drawn on portfolio diversification models (Collier et al., 2001). According to these models, capital flight is part of a risk mitigation strategy where risk-averse investors look for high-return opportunities away from source countries confronted with macroeconomic instability. The latter is arguably fueled, in part, by expansionary fiscal and monetary policy.

Much work has been done to establish whether monetary policy and macroeconomic uncertainty can fuel and exacerbate capital flight (for a literature review, see Ndikumana and Boyce (2011b). In contrast, less attention has been paid to the reverse relationship, namely the potential effects of capital flight on the conduct of monetary policy and on monetary policy outcomes.[2] Yet capital flight is expected to affect monetary policy in several ways. For instance, capital flight drains foreign exchange reserves, thereby exerting pressure on the exchange rate and causing a depreciation of the national currency. Capital flight may also intensify exchange rate volatility in Africa, in part because most countries are heavily dependent on natural resources and primary commodities. The vulnerability of these countries to negative terms of trade shocks may exacerbate contraction in international reserves. Finally, capital flight is a leakage in aggregate money supply, and as such it may weaken monetary policy transmission.

The objective of this paper is to fill this gap in the research on capital flight from Africa by analyzing the capital flight and monetary policy nexus in the region. Of particular interest is the extent to which capital flight may affect the monetary transmission mechanism and ultimately affect monetary policy outcomes. Moreover, assessing and quantifying the implications and potential costs of capital flight for monetary policy can also shed light on policies to curb capital flight. This is all the more relevant given that sound monetary policy has emerged as the most actively used policy instrument for macroeconomic stability and economic well-being in the era of fiscal dominance (Romer and Romer, 1998). To our knowledge, this is the first study that investigates the implications of capital flight for monetary policy in Africa.

[2] While considerable attention has been paid to the effects of sudden stops in capital flows and capital flow reversals on the conduct of monetary policy in emerging market economies (Calvo, 1998; Calvo and Reinhard, 2002; Edwards, 2005; Reinhart and Smith, 1998), little has been written on the implications of capital flight for the conduct of monetary policy in sub-Saharan Africa.

We propose an analytical framework to investigate the implications of capital flight for the conduct of monetary policy and its impact on monetary policy outcomes, taking into account the behavior of private economic agents and monetary authorities. We use panel data for 39 African countries from 1970–2010 for which we have data on capital flight. The study explores the impact of monetary policy instruments and targets on capital flight, and the effects of capital flight on monetary policy outcomes, with a focus on investment and short-run growth dynamics. Our econometric analysis takes into account omitted, but possibly important, country-specific effects using fixed-effects estimation methods; potential bias due to outliers using iterated reweighted least squares (IRLS); and potential endogeneity of regressors using the system generalized method of moments (GMM). These alternative estimation methods enable us to test the robustness of the results.

The empirical results show that measures of the monetary policy stance and monetary policy targets have no statistically significant relationship with capital flight. The results suggest that monetary policy has not been a direct driver of capital flight in the region. The policy of maintaining high interest rates to boost domestic savings has not deterred capital flight in the region; instead, by raising the cost of capital it has emerged as a drag on growth and domestic private investment. Conversely, the sustained increase in capital flight from the region, irrespective of the monetary policy stance, has adversely affected monetary policy outcomes in the region. In particular, the results clearly show that capital flight operates as negative saving and therefore reduces domestic investment. It is a constraint to short-run adjustment of GDP growth to its long-run level.

The rest of the paper is organized as follows. Section 2 provides an overview of monetary policy in Africa and discusses the challenges associated with the conduct of monetary policy in a context of sustained capital flight. Section 3 describes the analytical framework used to investigate the implications of capital flight for monetary policy in the region. Section 4 presents and discusses the empirical results, and Section 5 concludes with policy implications.

2. Monetary policy in African countries

African countries did not escape the global wave of monetary dominance that emerged in the early 1970s in the face of hyper-inflation fuelled in part by the oil crisis. The adoption of monetarist policy was part of the package of structural adjustment measures prescribed by the International Monetary Fund (IMF) to countries confronted with sustained external imbalances. These policies are commonly known as the Washington Consensus (for more details, see Rodrik, 2006). The golden era of monetarist dominance continued throughout the end of the 20th century and was briefly interrupted in 2008–09 as governments adopted countercyclical policy responses to mitigate the effects of the global economic and financial crisis (Brixiova and Ndikumana, 2013; Fofack, 2010; Kasekende et al., 2010).

Under the monetarist framework, containing inflationary pressures and anchoring inflation expectations have been the primary objective of monetary policy, regardless of a country's initial conditions (low growth, high unemployment, and high poverty rates) and irrespective of potential distortions in the monetary transmission mechanism that may originate from capital flight (Heintz and Ndikumana, 2011; Kasekende and Brownbridge, 2011). This policy stance has been maintained even when countries embarked on capital account liberalization, even though increased capital mobility raises the risk of capital flight and sudden stops in capital flows, and may therefore weaken monetary policy transmission mechanisms (Calvo, 2003).

In practice, central banks have pursued price stability by largely focusing on operational and intermediate targets such as monetary aggregates, the exchange rate, the interest rate, foreign reserves, and private sector credit. In particular, and regarding monetary targets, many countries in Africa have relied on unremunerated reserve requirements to control the monetary base (IMF, 2008, 2009). The targeting of monetary aggregates provides the link to the credit channel of monetary policy transmission. The adoption of a foreign reserves target—central to the IMF stabilization programs— is expected to provide an implicit insurance against recurrent balance of payments crises which may be exacerbated by capital flight under the revolving door hypothesis (Boyce, 1992; Fofack, 2009).

However, unlike the bank credit, exchange rate, and interest rate channels of monetary policy transmission, which are all emphasized in the conduct of monetary policy, the asset price channel

that is used extensively in the more advanced economies has seldom been considered in Africa, owing to the low level of financial deepening (Baldini et al., 2012; Cihak et al., 2012; IMF, 2008). African financial markets are indeed characterized by short-term maturities, a limited investor base, and illiquid secondary markets; they are also largely dominated by government securities (EIB, 2013).

Another salient characteristic of African economies is the limited effectiveness of the interest rate channel in the conduct of monetary policy. In the case of the French-speaking countries, whose monetary policy is anchored to the currency union with a fixed exchange rate (the CFA zone)[3], they have adjusted official interest rates only sparingly. Instead, they have relied heavily on differentiated reserve requirements (IMF, 2008). Even in countries where monetary policy is underpinned by a floating exchange rate regime, imperfections in the financial sector have limited the effectiveness of the interest rate channel as a monetary policy transmission mechanism.

Although the pegging of the CFA franc to the euro has reduced the risks of exchange rate volatility and contributed to a relatively stable interest rate environment, interest rates and interest spreads have remained high in CFA-member countries (Baldini and Ribeiro, 2008; EIB, 2013; Ndiaye, 2009). In addition to raising the risk of adverse selection in the allocation of credit, the high costs of capital in these countries may partly explain the lower level of domestic credit to the private sector (EIB, 2013; Sacerdoti, 2005).

At the same time, the benefits associated with fixed exchange rate arrangements (such as reduced exchange rate volatility and relatively stable interest rates) should be contrasted with potential costs, in particular the loss of competitiveness and risk of capital flight in a context of free capital mobility within the CFA zone. In fact, Ndiaye (2011) found that capital flight has been significant within the CFA monetary zone, despite the relatively better macroeconomic performance achieved by member countries. The strengthening of the euro against the US dollar after 2007 resulted in a loss of competitiveness for CAF countries. Even though appreciating

[3] These countries are part of two monetary arrangements that regroup former French colonies under the Central African Economic and Monetary Community (CEMAC) and the West African Economic and Monetary Union (WAEMU). Monetary policy in these two zones is determined at the currency union level by BEAC and BCEAO, which are the two central banks (for more details on the working of the CFA zone, see Tchundjang Pouemi (1981)).

pressures have somehow subsided over the last two years, partly on account of the banks and sovereign debt crisis in the euro zone, the real effective exchange rate of the CFA remains overvalued.

With the exception of Mauritius, South Africa, and Ghana, where inflation targeting was introduced in 1998, 2000, and 2007, respectively, the conduct of monetary policy outside the CFA zone has focused on several intermediate targets (Heintz and Ndikumana, 2011; Kasekende and Brownbridge, 2011; Khadaroo, 2003). In that context, the accumulation of reserves has been used to stabilize the official exchange rate. This has been the staple of monetary policy in Nigeria, for example, where the naira has undergone sustained depreciation against the US dollar over time (Batini, 2004; Zakaree, 2012). In some countries, money targeting has been used as the official nominal anchor; in others, the exchange rate has been used as an operational target to achieve the inflation objective (IMF, 2008; Kasekende and Brownbridge, 2011).

Over time, the exchange rate has emerged as an important channel of monetary transmission in Africa. For instance, (Cheng, 2006) found that the impact of policy-driven changes in the short-term interest rate by the Central Bank of Kenya operate primarily through high pass-through of exchange rate fluctuations rather than through expenditure-switching effects. Reflecting the implications of exchange rate dynamics for price stability, monetary policy in a floating exchange rate environment has been guided by two complementary objectives: price stability and the reduction of exchange rate volatility (Baldini et al., 2012; IMF, 2008). According to the 2008 review of monetary policy in Africa by the IMF, the stability of the exchange rate is a policy objective in 19 countries. These countries are either concerned with external competitiveness, exchange rate smoothing, or both (IMF, 2008).

Depending on each country's specific conditions, the choice of the policy regime falls along a continuum ranging from emphasis on intermediate targets on one end (the overwhelming majority of countries in Africa) to a direct focus on inflation objectives on the other (South Africa, and Ghana). However, in most cases, the intermediate targets appear to be subordinate to the overarching inflation target objective. In other words, achieving price stability is the main objective of monetary policy across Africa, whether formally or informally. This goal trumps the broader objectives of growth and full employment.

Regardless of the operational and intermediate targets considered by various central banks, the conduct of monetary policy is likely to be undermined by sustained capital flight. In particular, reserve money is likely to be affected by capital flight, as the latter constitutes a reduction in the stock of foreign reserves. The reduction of foreign reserves as a result of capital flight may undermine the policy objective of stabilizing the exchange rate, which depends on the size of foreign exchange reserves available in the central bank. Since the 1997 Asian financial crisis, the accumulation of foreign reserves has been used by East Asian emerging market economies as a precautionary insurance to stabilize their exchange rate against speculative attacks and "sudden stops" (European Central Bank, 2006). More recently, the central bank of Nigeria drew on reserves from the oil boom to stem the depreciation of the naira in the aftermath of the global downturn (Zakaree, 2012).

Furthermore, under the fixed exchange rate regime in the CFA zone, capital flight is made even easier by the free convertibility of the CFA franc into the euro, which allows capital to exit CFA-member countries and enter Europe without any oversight (Ndiaye, 2009, 2011). In addition, there are no limits to the convertibility of the CFA franc because CFA-zone member countries are mandated to deposit a significant fraction of their foreign reserves into the so-called "operations account" managed by the French Treasury, in order to guarantee the convertibility of the CFA franc into euros.

In addition to a direct reduction in the foreign reserves base, other intermediate targets such as the level of private sector credit and monetary aggregates also stand to be affected by capital flight. In particular, the reduction in the stock of money has direct effects on banks' balance sheets and may constrain their capacity to issue credit and meet prudential norms and requirements. In an empirical study focusing on CFA member countries, Ndiaye (2011) found that capital flight results in a reduction of bank deposits and a decrease in the level of credit to the private sector.

Despite the multitude of channels through which capital flight may undermine monetary transmission mechanisms, the phenomenon has seldom been taken into account both in the conduct of monetary policy in African countries as well as in the design of development assistance programs carried out by international organizations such as the IMF and the World

Bank. In the survey of monetary and exchange rate policies in sub-Saharan Africa published by the IMF in the aftermath of the global economic and financial crisis, the word "capital flight" was not mentioned even once. Instead, thin credit markets and excess liquidity in the banking system were cited as the major source of uncertainty surrounding monetary policy transmission mechanisms in the region (IMF, 2008).

The lack of attention to the problem of capital flight in the conduct of monetary policy partly reflects the view of capital fight as an outcome of portfolio choice (Collier et al., 2001; Kant, 2002; Khan and Haque, 1985). This view regards capital flight as the consequence of macroeconomic instability—in particular inflation and exchange rate volatility—and holds that achieving macroeconomic stability should curb capital outflows. But there is little evidence in the empirical literature to support this view (Ndikumana and Boyce, 2003, 2011b; Ndikumana et al., 2014). In fact, studies on CFA countries show that the relatively better macroeconomic performance in terms of exchange rate and price stability has not deterred capital flight from the sub-region (Ndiaye, 2009, 2011). Moreover, capital flight from Africa has continued to grow unabated and even accelerated over the last decade, even though the majority of countries have transitioned from a prolonged period of deep fiscal imbalances and chronic inflation to improved macroeconomic stability (Devarajan and Shetty, 2010; Fofack, 2012; Ndikumana et al., 2014).

The acceleration of capital flight in the midst of improving macroeconomic stability suggests that capital flight may also be motivated by a host of factors other than risk-adjusted returns to investment and opportunities offered by global financial markets. Moreover, the persistence of capital flight in a period of macroeconomic stability clearly suggests that the phenomenon is not cyclical—driven by macroeconomic volatility—but structural. In this regard, and to the extent that capital flight has significant implications for growth and macroeconomic instability—including through its effects on monetary transmission mechanisms—it should be taken into account in the conduct of monetary policy. In the next section we propose an analytical framework for assessing the potential implications of capital flight for the conduct of monetary policy and its impact on monetary policy outcomes.

3. The capital flight-monetary policy nexus: an analytical framework

The relationship between capital flight and monetary policy may run both ways. The outcomes of monetary policy affect economic agents' investment and saving decisions, which may indirectly affect capital flight. Capital flight in turn has implications for the effectiveness of monetary policy and affects the degrees of maneuver of monetary policy authorities in their attempt to influence economic activity. In this section, we present an analytical framework of the behavior of private economic agents and monetary policy authorities to motivate the empirical analysis of the linkages between monetary policy and capital flight in African countries.

3.1. Private agents

Under the portfolio theory of international capital flows, capital flight is an outcome of portfolio choice by economic agents as they choose between domestic and foreign assets to maximize risk-adjusted returns to their investments (Collier et al., 2001; Kant, 2002; Khan and Haque, 1985). In this context, the agents' decisions are primarily driven by the following factors: the interest rate differential between the source and destination countries abroad; the exchange rate, or more specifically the expected rate of appreciation or depreciation of the exchange rate; the costs of transferring capital abroad (direct and indirect costs); and other determinants of the rate of return to investment.

The agents decide how much of their wealth to transfer and hold abroad in a manner that maximizes the expected returns. We focus here on capital flight, leaving aside normally recorded outward investment flows. The decision can be formally represented as follows:

$$\max_{\boldsymbol{F}} \boldsymbol{R} = \boldsymbol{i_f F} + \boldsymbol{i_d}(\boldsymbol{W} - \boldsymbol{F}) - \boldsymbol{h}(\boldsymbol{F}) \qquad (1)$$

where F is capital flight, i_f the foreign interest rate (adjusted for expected exchange rate appreciation/depreciation), i_d the domestic interest rate, W total wealth, and $h(F)$ the cost of transferring capital abroad, which we assume to depend on the volume of capital flight. That is, $\boldsymbol{h}(\boldsymbol{F}) = \boldsymbol{\rho}(\boldsymbol{F}).\boldsymbol{F}$, where $\boldsymbol{\rho}(\boldsymbol{F})$ is the unit cost function. We elaborate further on the cost function below.

The first-order condition is:

$$\frac{\delta R}{\delta F} = \left(i_f - i_d\right) - (\rho + F.\rho_F) = 0 \quad (2)$$

which yields:

$$\boldsymbol{i_f - i_d = \rho + F.\rho_F} \quad (3)$$

Equation (3) states that the interest differential is equal to the marginal cost of transferring capital abroad. The unit cost of transferring capital abroad depends on the volume of capital flight. This partly reflects the fact that operators "learn by doing" in the practice of smuggling capital abroad. Over time, agents acquire the skills and establish networks that enable them to evade regulatory scrutiny and smuggle capital abroad with impunity. This may be referred to as "habit formation" in capital flight (Ndikumana and Boyce, 2003). As a result, the unit cost of transferring funds abroad would decline as capital flight increases; that is $\rho_F < 0$.

There are other factors that affect the marginal cost of transferring funds abroad other than the volume of capital flight. These include the regulatory environment and the legal system. In particular, financial liberalization, capital account liberalization, and full currency convertibility can make it easier to move money across borders. In contrast, an efficient legal system makes capital flight more costly. An extreme case would be where capital flight is punished by death penalty, which can effectively deter capital flight.

There are also indirect and implicit costs of transferring capital flight, which include potential foregone opportunities not reflected in the interest rate. These may be proxied by, among others, the growth rate in the source country.

Three conclusions can be inferred from the above first-order condition: (1) a positive interest rate differential in favor of the rest of the world encourages capital flight (equation 2); (2) the cost of transferring capital flight abroad reduces the domestic interest rate "premium" needed to deter capital flight (equation 3); (3) an increase in the domestic interest rate is perfectly consistent with a simultaneous increase in capital flight (because the unit cost of transferring capital abroad decreases as capital flight increases). This result has important policy implications for addressing capital flight from Africa. In particular, and on the basis of a portfolio diversification theory, a gap between foreign and domestic interest in favor of the former may be bridged either by raising domestic interest rates, or by raising the cost of transferring capital out of the continent.

The traditional view has implicitly focused on the former by emphasizing the rate of return differential as a driver of capital flight. But in fact, African countries may be more successful in fighting capital flight by focusing on the latter, i.e., by making it more costly for agents to acquire and transfer capital illicitly. Indeed, given the substantial economic and social costs of high domestic interest rates, strategies for preventing capital flight should focus on raising the costs of smuggling capital through effective legal and regulatory innovations, rather than on raising interest rates. Raising interest rates may not deter capital flight, but it may depress domestic economic activity, especially private domestic investment.

3.2. Monetary policy

The primary mandate of central banks in African countries is price stability. Traditionally, central banks have targeted money supply as a means of controlling inflation. In this case, the main policy tool is the monetary base, or "high-powered money." However, empirical evidence suggests that money supply targeting is not effective for controlling inflation. Innovations in the payments system and other factors that render money demand unstable ultimately weaken the relationship between money supply and the goals pursued by the central bank, notably price stability and output growth.

Following the Taylor rule, modern central banks utilize the interest rate as a tool for targeting inflation and, indirectly, the rate of unemployment (Taylor, 1993).[4] If the central bank's goal is to achieve a particular inflation rate, it can accomplish it by adjusting the nominal interest rate as follows:

$$i_t = i^* + \alpha(\pi_t - \pi^*) - \gamma(u_t - u^*) \qquad (4)$$

where i_t is the actual interest rate, i^* the target interest rate, $\boldsymbol{\pi_t}$ the actual inflation rate, $\boldsymbol{\pi}^*$ the target inflation rate, u_t the actual unemployment rate, and u^* the natural rate of unemployment.

When inflation and unemployment deviate from the desired or target level, the central bank responds by adjusting the interest rate to offset the undesired change in inflation and unemployment. The ability of the central bank to achieve this goal, however, depends on the

[4] Also see Taylor (1999, 2012).

strength of the transmission mechanisms of monetary policy innovations in the real economy. One such mechanism is the bank credit channel, whereby a change in the interest rate or the monetary base affects the cost and quantity of bank credit, hence domestic demand and ultimately economic activity in general. The strength of this mechanism depends on the behavior of banks, especially their willingness to effectively utilize increased volume of loanable funds and take advantage of lower interest rates to meet increased demand for loans. The increased liquidity could, in contrast, be used to finance capital flight, which would weaken monetary policy transmission. Banks could also simply hoard cash, thus undermining the effectiveness of monetary policy.

3.3. Linkages between capital flight and monetary policy

Monetary policy can theoretically affect capital flight through its impact on the return to investment (through the interest rate) and its impact on investment risk (through macroeconomic uncertainty, especially inflation and exchange rate volatility). Capital flight, in turn, can have an impact on the effectiveness of monetary policy. First, capital flight raises uncertainty and risk, as it reflects a lack of confidence in the local economy. If it is perpetrated by the political elite, as is commonplace in African countries (Ndikumana and Boyce, 2012b), then it sends negative signals to private investors. In this context, attempts by the central bank to influence private investment through interest rate adjustment will be ineffective. In other words, capital flight can weaken the transmission mechanisms from monetary policy to real economic activity.

Second, capital flight depletes resources in the domestic financial system. Specifically, it constitutes leakages in aggregate money supply and the stock of reserves. Capital flight is partly financed by reserves, some of which are from external borrowing, as documented in empirical studies showing a tight relationship between debt inflows and capital flight (Ndikumana and Boyce, 2003, 2011b). Capital flight may also be financed by resources from the domestic banking sector. One example is the massive capital flight from South Africa in the period leading to liberation from the Apartheid regime, as the white population shipped their capital abroad for safekeeping. The capital exported in that case was from the domestic financial system. When domestic capital leaks out of the country, the bank credit channel of monetary policy is weakened, with accompanying adverse effects on private sector activity, especially investment.

These adverse effects of capital flight imply that a reduction in the interest rate may not generate the expected increase in private investment. Similarly, inflation may remain high despite attempts by the central bank to keep interest rates high. Therefore, the conventional channels of monetary policy transmission can ultimately be weakened by capital flight.

Third, as discussed in Section 2, capital flight affects the exchange rate by draining foreign reserves. It may also increase exchange rate instability, which in turn causes output volatility, especially in countries where investment may be contingent upon imports of intermediate inputs.[5] As a result the central bank may have to spend more resources to stabilize the exchange rate in the presence of capital flight.

3.4. Econometric specification

The foregoing discussion suggests two empirically testable propositions. First, capital flight may be affected by monetary policy. This can be the result of the influence of monetary policy on portfolio decisions by domestic economic agents as they choose between domestic and foreign assets. Thus it may be postulated that the interest rate regime followed by the central bank may affect capital flight. Second, monetary policy may in turn affect capital flight through its impact on liquidity in the financial sector, domestic credit, and the exchange rate. We test these conjectures by estimating the following model:

$$\boldsymbol{F_{it} = \beta_0 + \beta_1 m_{it} + \mathbf{X}_{it}\boldsymbol{\theta} + \varepsilon_{it}} \qquad (5)$$

where F is capital flight, m an indicator of monetary policy instruments (e.g., the interest rate) or an indicator of monetary policy targets (e.g., domestic credit), $\mathbf{X}$ a vector of control factors suggested by the model derived in equations 1-3, and $\boldsymbol{\varepsilon}$ an error term. If the conjecture that capital flight is driven by portfolio choice considerations holds, we would expect the indicators of monetary instruments to have negative coefficients. That is, a high interest rate would induce wealth owners to save their wealth in domestic assets, which would reduce capital flight.

The choice of the variables included in the vector $\mathbf{x}$ is informed by the empirical literature on capital flight. In the base econometric model, this vector includes past capital flight, annual

[5] See especially studies on the policy 'trilemma' (Aizenman et al., 2008; Obstfeld et al., 2005).

inflows of external borrowing, the stock of capital flight and GDP growth, all of which have been found to have significant effects on capital flight (Ndikumana and Boyce, 2003, 2011b; Ndikumana et al., 2014).

Second, the linkages between monetary policy and capital flight may arise from the impact of capital flight on monetary policy objectives, such as inflation, exchange rate stability, investment, and output dynamics. If *y* represents an indicator of monetary policy objective, this proposition can be tested by estimating the following model:

$$y_{it} = \alpha_0 + \alpha_1 F_{it} + \mathbf{z}_{it}\phi + \nu_{it} \quad (6)$$

where **z** is a vector of determinants of *y* other than capital flight, and ν the error term.

In this study we explore the effects of capital flight on domestic private investment and short-run output dynamics. The identification of the factors included in the vector **z** draws from both theoretical and empirical evidence in the literature. For the investment equation, we first build on the "accelerator" tradition that emphasizes a key role of output growth for the demand for investment. Second, we incorporate the fact that capital mobility is imperfect, which results in a tight relationship between domestic saving and domestic investment (Feldstein and Horioka, 1980). We also incorporate other factors representing the structure of the economy, the political and governance environment, and open economy dimensions, notably total trade, terms of trade, external debt, and foreign exchange reserves.

In the analysis of the impact of capital flight on growth, we focus on short-run growth dynamics. Specifically, we investigate whether capital flight affects the process of adjustment of the growth rate to its long-run level. We follow the methodology used in Sebastian Edwards's study of the costs of current account reversals (Edwards, 2005). The empirical test is based on the following equation:

$$\Delta g_{it} = \lambda\left(g_i^* - g_{i,t-1}\right) + \gamma F_{it} + \boldsymbol{w}_{it}\varphi + \mu_{it} \quad (7)$$

where g* is the country's long-run growth rate, *g* the country's actual growth rate, **w** a vector of presumed correlates of short-run growth dynamics, and μ the random error term. The vector **w** includes macroeconomic, institutional, and structural factors. In particular, we include measures of the structure of the economy, the rate of capital formation (investment), trade openness (the

sum of exports and imports as a ratio of GDP), an index of terms of trade shocks, and indicators of the country's external debt position.

The econometric models specified above are estimated using panel data methods. We account for country-specific fixed effects with the fixed-effects estimation method, and apply the generalized method of moments (GMM) to address the problem of endogeneity of regressors. Potential outliers are controlled for using iterated reweighted least squares. The results are discussed in the next section.

4. Empirical results

4.1 Data and sources

The study uses a sample of 39 countries for which data on capital flight are available, over the period 1970–2010. The data on capital flight are from the Political Economy Research Institute (Boyce and Ndikumana, 2012; Ndikumana and Boyce, 2012a). Other variables are obtained from the World Bank's *World Development Indicators*, the IMF's *International Financial Statistics* (IFS), and the African Development Bank.[6] The list of variables used in the analysis is provided in Table A.1 in the appendix.

We present two sets of regression results. In the first set, we use annual panel data with the intention of capturing short-term dynamic interactions between monetary policy indicators and capital flight. In the second set, the original panel of annual data from 1970–2010 are collapsed into five-year non-overlapping pooled cross-sections, thus producing a maximum of 8 data points per country. The objective is to test for medium-term linkages between monetary indicators and capital flight. Using pooled data also has the advantage of smoothing out potentially large annual fluctuations due to temporary shocks that may bias the results. In addition to assessing short-term and medium-term interactions between capital flight and monetary policy, a dual empirical strategy utilizing annual data and pooled cross-section data is also used as a robustness and consistency check.

[6] Investment data are missing for Nigeria in WDI. The series were obtained from the African Development Bank's open data portal (www.afdb.org).

4.2 Implications of monetary policy for capital flight

In this section we present the results of the test for the prediction that the monetary policy stance, namely its instruments and targets, may affect capital flight. Tables 1 and 2 report the results for interest rates as monetary policy instruments, namely the discount rate (also called the bank rate or repo rate), the real interest rate differential (corrected for inflation), and the covered interest rate differential (accounting for exchange rate depreciation) using annual panel data (Table 1) and pooled cross-section data (Table 2). In the regression results with annual panel data, the coefficient on the discount rate points to a counterintuitive positive effect in the Iterated Reweighted Least Squares (IRLS) and Generalized Methods of Moments (GMM) models. For other indicators, however, the results are similar for annual data and pooled cross-section data. The coefficients on the three measures of the interest rate have the expected negative sign, but they are statistically insignificant. Clearly, the results do not support the view that capital flight is driven by portfolio choice either in the short run (annual panel analysis) or medium term (pooled cross-section analysis). The results are robust against the incorporation of country fixed-effects, outliers (IRLS) and possible endogeneity of regressors (GMM). Specifically, high interest rates reflecting high returns to saving in Africa do not deter capital flight.

Table 3 and Table 4 report the results for monetary policy targets, namely the inflation rate, the growth rate of the stock of money, and exchange rate variability (measured as the percentage deviation of the actual exchange rate from its trend)[7], using annual panel data (Table 3) and five-year pooled cross-sections (Table 4). The results from the annual panel data refute the view that the monetary policy stance is a factor that drives capital flight. The coefficients on inflation, money growth, and the exchange rate are insignificant. In the regressions with pooled data, the sign on the coefficients of all three targets is negative, and they are statistically significant in GMM estimates, contrary to theoretical prediction. The results in Tables 1–4 suggest that the monetary policy stance has not been a direct driver of capital flight, either through the interest rate regime or monetary policy targets.

Financial development appears to have no effect on capital flight in the regressions with annual panel data (Table 3). However, the results with pooled cross-section data (Table 4) show that

[7] The exchange rate trend is obtained from a simple linear model regressing the exchange rate on time and its lag.

financial development is negatively related to capital flight. Overall, the relationship between financial development and capital flight is not robust. Specifically, the result does not hold once we control for country-specific fixed effects and outliers (IRLS).

The coefficients on the ratio of foreign exchange reserves to GDP are insignificant in eight of the nine regressions with annual panel data. But they are positive and statistically significant in the GMM estimates with five-year pooled cross-section data. This suggests that, at least in the medium term, foreign reserves may contribute to fueling capital flight. Indeed, capital flight has exploded over the past 2 decades, the same period that witnessed the resource boom in African countries, especially among mineral- and oil-rich countries (Boyce and Ndikumana, 2012). Thus, rather than serving to boost domestic investment and growth, some of the export revenues have cycled out of the continent as capital flight.

The results in Tables 1–4 confirm earlier findings in the literature about the impact of past capital flight, external debt, and growth on capital flight (Ndikumana and Boyce, 2003, 2011b; Ndikumana et al., 2014). In particular, they confirm "habit formation" as illustrated in the positive and statistically significant coefficient on the lagged dependent variable. This suggests that many African countries face a "capital flight trap" whereby high capital flight leads to higher capital flight. This is an indication of underlying country-specific structural and institutional factors that drive capital flight over time. The result implies that explicit and targeted policies are needed to break the capital flight trap.

The empirical results also confirm the "revolving door" phenomenon as illustrated by a strong and robust relation between annual inflows of external borrowing and capital flight. The results with five-year pooled data suggest that half or more of each dollar borrowed seeps out of the continent in the form of capital flight in the same 5-year period. These results challenge the legitimacy of external debts that fuel capital flight. These debts may be deemed odious and therefore call into question whether the African people are responsible for repaying such loans.[8]

[8] This issue is discussed extensively in Ndikumana and Boyce (2011a).

4.3 Impact of capital flight on domestic private investment

The results presented above show that monetary policy does not have any discernible direct impact on capital flight. Here we present the results on the reverse question, namely whether capital flight has an impact on monetary policy outcomes. We focus on domestic private investment and short-run growth dynamics. The results for private investment are presented in Table 5 and Table 6 and those for growth are in Table 7 and Table 8.

According to the results in Table 5 and Table 6, capital flight has a strong negative effect on domestic private investment. The coefficient on capital flight is negative and significant in all regressions with annual panel data (Table 5) and in 7 out of the 9 regressions with pooled cross-section data (Table 6). The results are robust to country-specific effects, outliers, and possible endogeneity of regressors. The results suggest that capital flight drains valuable resources away from domestic investment. In fact, capital flight operates as negative saving, which reduces domestic investment. The coefficient on domestic saving is positive as expected, and it is in the same order of magnitude as the coefficient on capital flight, but with an opposite sign. The results suggest that a dollar of domestic saving and a dollar of capital flight have nearly offsetting effects on domestic private investment.

These results have important implications for monetary policy. Specifically, the empirical evidence shows that efforts aimed at stimulating domestic saving to finance domestic investment can be undermined by capital flight. By draining resources out of the country, capital flight reduces the positive impact of increased domestic saving on domestic investment. As a result, monetary policy needs to be accompanied by strategies to keep African capital onshore in order to achieve the desired rate of capital accumulation.

The results become even more economically significant when we bring in the impact of monetary policy instruments on domestic investment and capital flight. As can be seen in Table 5 and Table 6, the interest rate has a negative and statistically significant effect on domestic investment. Specifically, high interest rates discourage domestic private investment. In contrast, as we saw earlier in Table 1 and Table 2, domestic interest rates do not deter capital flight. The evidence has important implications for the practice of monetary policy in African countries. In

general, central banks in Africa pursue low inflation target strategies mainly by keeping interest rates high.

However, empirical results suggest that in doing so, they have discouraged domestic private investment or domestic demand in general. At the same time, such a policy has not stopped the leakage of capital out of the continent. Thus, while tight monetary policy might have been effective at containing inflationary pressures, it has done so at high costs. In addition to its ineffectiveness and inability to deter capital flight, tight monetary policy may have been detrimental to domestic capital accumulation, with accompanying negative impacts on long-run growth.

The results for open-economy indicators are also quite insightful and consistent with the evidence in the literature. Openness to trade, as measured by the ratio of the sum of imports and exports to GDP, is positively related to private domestic investment. The coefficients on this variable are positive and significant in all regressions. The result is consistent with the fact that production in modern African economies is heavily dependent on imported inputs and equipment. Thus an increase in imports is positively correlated with domestic investment. On the other hand, an increase in exports reflects rising demand for African products, which stimulates domestic investment.

The regression results in Table 5 and Table 6 show that the terms of trade shocks have a negative impact on domestic investment. The coefficients on this variable are systematically negative and statistically significant in all regressions. The results have implications for industrial policy in African countries. They suggest that policies aimed at promoting domestic investment need to emphasize the expansion of the manufacturing sector and export diversification to minimize exposure to terms of trade shocks.

The country's foreign reserve position appears to be negatively related to private investment (Table 5 and Table 6). The coefficients on this variable are negative, statistically significant, and robust to alternative specifications and estimation procedures. The results suggest that the accumulation of reserves, especially in the context of the oil and mineral booms of the past two decades, has not benefited African countries with respect to domestic investment. These results

are consistent with the findings in earlier studies in the literature (see Elhiraika and Ndikumana, 2009). In addition to the poor management of reserves, this result may reflect the leakage of reserves through capital flight, as reflected in the positive coefficient on reserves in the capital flight regressions presented in Tables 1–4.

4.4 Capital flight and short-run output dynamics

The results in Table 7 and Table 8 show the importance of capital flight and other determinants of short-run output dynamics. Consistent with findings in the literature, the results show that the change in GDP growth is positively related to the growth gap, the difference between the long-run growth rate and actual GDP growth rate (lagged) (Edwards, 2005). The coefficients suggest a rapid adjustment of GDP growth to its long-run level. Specifically, the growth gap is fully bridged within the 5-year period. This result is probably influenced by the rapid growth achieved by countries in the region over the past decade where the growth rate was consistently higher than the long-run average.

We next look at the impact of monetary policy on output short-run dynamics. The results vary depending on the tool used. In the regressions with annual panel data (Table 7), the discount rate is negatively and statistically related to short-run change in growth. The interest rate differential —inflation-adjusted or exchange rate depreciation-adjusted—has no impact on short-run growth dynamics. In the regressions with five-year pooled data, the discount rate and the interest rate differential have no impact on the growth adjustment dynamics. The coefficient on the interest rate differential corrected for exchange rate depreciation has the "wrong sign" (positive) and it is significant. The overall results suggest that there is no robust impact of monetary policy indicators on the growth dynamics either in the short run or the medium run.

Three results on the other determinants of short-run growth dynamics stand out and have potent policy implications. First, as expected, domestic private investment contributes positively to short-run growth dynamics. The coefficients on this variable are systematically positive and statistically significant in all but one of the 9 regressions in each set of regressions (Table 7 and Table 8). The results imply that stimulating private investment helps to boost growth. But the results also suggest that negative shocks to private investment will drag down growth in the short

run. This underscores the potentially damaging effects of monetary policies that focus on keeping interest rates high for the sake of controlling inflation. Such policies are costly in terms of depressed private investment and the accompanying negative effects on growth.

Second, the coefficient on external debt as a ratio of GDP is negative and statistically significant. The result suggests that debt overhang is a drag on growth in African economies. It illustrates the need to pursue efforts to alleviate the debt burden on these economies and to prevent the resurgence of a new cycle of external indebtedness in the post-HIPC period.

Third, the stock of total reserves as a ratio of total debt has a negative and statistically significant coefficient in the regressions with annual panel data (Table 7), but it is not significant in regressions with five-year cross sections (Table 8). Normally, a high reserve to debt ratio and an increase in the ratio indicate a strengthening external position for the country with higher degrees of freedom and greater fiscal space in meeting its debt obligations and settling current account transactions. The results suggest that this is not necessarily the case for African countries. In other words, high reserve positions and the rapid accumulation of reserves observed over the past decades have not substantially helped African countries to improve their short-run growth performance. This raises the issue of efficiency in the management and allocation of foreign exchange reserves in these countries.

5. Conclusions

The results presented in this paper have generated useful insights on the linkages between monetary policy and capital flight. Equally important, they have articulated the implications of capital flight for the attainment of monetary policy targets and national development goals, especially the promotion of domestic investment and economic growth. The evidence suggests that capital fight has undermined the effectiveness of monetary transmission mechanisms in the region. They also suggest that it has been a drag on African countries, notably by undermining domestic investment. This is a matter of concern, especially given the critical importance of domestic private investment for long-run growth and short-run growth dynamics.

Informed by the portfolio hypothesis, monetary policy in the region has been primarily guided by the pursuit of macroeconomic stability. The expectation was that the pursuit of low inflation

targets primarily achieved by keeping interest rates at high levels will mitigate capital flight. However, empirical evidence suggests that in addition to failing to stem capital flight, high interest rates have been detrimental to domestic investment and growth in the region. The coexistence of high interest rates and sustained increases in capital flight from the region suggests that the latter is not motivated by arbitrage on the basis of portfolio considerations.

These results clearly indicate that other strategies are needed to curb capital flight from Africa. In particular, raising the cost of smuggling capital out of the continent by tightening the regulation of financial transactions and raising penalties for breaking these regulations may be a better alternative policy response to capital flight than maintaining high interest rates. In addition, institutional reforms need to focus on increasing transparency in public debt management to seal the revolving-door phenomenon of debt-fueled capital flight. However, for these domestic strategies to be effective, they must be supported by reforms to increase transparency in the global financial system, especially by overhauling banking secrecy practices and promoting automatic exchange of financial information between African countries and their counterparts in the rest of the world, especially countries with offshore financial centers.

At the same time, the practice of monetary policy in the region has not been uniform, but rather characterized by the coexistence of multiple interest rate regimes and currency regimes (mainly flexible exchange rate regimes and fixed-exchange rate zones such as CFA). The interactions between capital flight and monetary policy could well be affected by exchange rate arrangements and interest rate structure. In this regard, it would be useful to investigate whether countries in fixed-exchange rate zones, such as the CFA zone, are distinguishable from those with floating exchange rate regimes with respect to the capital flight-monetary policy nexus. Similarly, it would be worth investigating whether countries that have maintained low interest rate regimes have fared better or worse than their counterparts with respect to capital flight.

Furthermore, the accumulation of foreign exchange reserves in recent years is another important macroeconomic development in the region. The IMF typically recommends a 3–4 month minimum import cover as a prudential target for foreign exchange reserves. While some countries have struggled to meet and sustain foreign exchange reserves at that target, many others, especially oil-exporting countries, have frequently maintained their reserves at higher

levels. An interesting research and policy question is the role of "excess" foreign reserves in the interactions between capital fight and monetary policy on the one hand, and their implications for domestic investment and short-run output dynamics on the other hand. Future research on the interplay between capital flight and monetary policy in Africa should explore these questions.

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Table 1: Capital flight and monetary policy instruments (interest rates) – Regressions with annual panel data

	Discount rate			Real interest differential			'Covered' interest differential		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	IRLS	FE	GMM	IRLS	FE	GMM	IRLS	FE	GMM
Change in debt/GDP	0.520***	0.217***	0.243***	0.351***	0.182**	0.221***	0.374***	0.190***	0.189***
	(0.000)	(0.002)	(0.000)	(0.000)	(0.015)	(0.000)	(0.000)	(0.006)	(0.000)
Lagged debt stock/GDP	0.000	0.027	0.019***	0.008*	0.012	0.016	0.007*	0.015	0.014*
	(0.916)	(0.129)	(0.000)	(0.065)	(0.545)	(0.143)	(0.092)	(0.433)	(0.070)
Lagged capital flight/GDP	0.329***	0.160***	0.100***	0.330***	0.151***	0.145***	0.338***	0.153***	0.143***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged GDP growth	-0.058	-0.209	-0.200***	0.011	-0.185	-0.178***	0.001	-0.167	-0.168***
	(0.173)	(0.107)	(0.000)	(0.815)	(0.203)	(0.000)	(0.989)	(0.209)	(0.000)
Discount rate	0.050***	0.091	0.065**						
	(0.005)	(0.215)	(0.025)						
Real interest rate differential				-0.031***	-0.003	-0.004			
				(0.000)	(0.644)	(0.651)			
Covered interest rate differential							-0.010	-0.005	-0.009
							(0.225)	(0.240)	(0.184)
Private sector credit/GDP	-0.000	-0.059	-0.049	-0.001	-0.085	-0.106	-0.005	-0.088	-0.252*
	(0.973)	(0.377)	(0.656)	(0.945)	(0.259)	(0.350)	(0.698)	(0.225)	(0.076)
Reserves including gold/GDP	0.002	0.036	0.255	-0.006	-0.006	-0.023	-0.005	-0.012	-0.041
	(0.882)	(0.634)	(0.164)	(0.720)	(0.940)	(0.544)	(0.768)	(0.881)	(0.101)
Constant	0.481	3.147	--	1.372**	7.122**	7.138**	1.370**	6.604**	--
	(0.414)	(0.208)		(0.034)	(0.013)	(0.017)	(0.034)	(0.016)	
Overall R-squared	0.507	0.078		0.463	0.071		0.449	0.075	
Within R-squared		0.045			0.035			0.040	
Between R-squared		0.435			0.424			0.435	
Test for 1st order autocorrelation			-3.37			-3.178			-3.263
			(0.000)			(0.001)			(0.001)
Sargan test (H_0: instruments are valid)			--			32.666			--
						(1.000)			
Observations	1,039	1,041	993	920	923	875	978	981	931
Countries		38	38		38	37		38	38

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. Dependent variable = capital flight as a percentage of GDP. IRLS, FE, and GMM stand for iteratively reweighted least squares, fixed effects, and general method of moments

Table 2: Capital flight and monetary policy instruments (interest rates) – Regressions with 5-year panel data

	Discount rate			Real interest differential			'Covered' interest differential		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	IRLS	FE	GMM	IRLS	FE	GMM	IRLS	FE	GMM
Change in debt/GDP	0.416***	0.581***	0.634***	0.321***	0.511***	0.553***	0.388***	0.560***	0.712***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged debt stock/GDP	0.018**	0.060**	0.077***	0.011	0.038	0.056***	0.012	0.039	0.067***
	(0.020)	(0.017)	(0.000)	(0.143)	(0.191)	(0.000)	(0.110)	(0.121)	(0.000)
Lagged capital flight/GDP	0.202***	0.200***	0.278***	0.218***	0.211***	0.291***	0.217***	0.207***	0.293***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Real GDP growth	-0.208	-0.455*	-0.420***	-0.087	-0.196	-0.162***	-0.097	-0.234	-0.125**
	(0.121)	(0.052)	(0.000)	(0.526)	(0.387)	(0.000)	(0.462)	(0.264)	(0.042)
Discount rate	-0.001	-0.101	-0.004						
	(0.969)	(0.184)	(0.889)						
Real interest rate differential				-0.005	-0.002	-0.002			
				(0.211)	(0.803)	(0.286)			
Covered interest rate differential							-0.004	-0.001	-0.001
							(0.219)	(0.914)	(0.310)
Private sector credit/GDP	0.012	-0.031	-0.003	0.002	-0.048	-0.086***	0.005	-0.038	-0.076***
	(0.625)	(0.694)	(0.907)	(0.923)	(0.555)	(0.000)	(0.834)	(0.624)	(0.000)
Reserves including gold/GDP	-0.001	0.042	0.089***	-0.006	0.062	0.168***	-0.000	0.057	0.095**
	(0.988)	(0.648)	(0.002)	(0.865)	(0.535)	(0.000)	(0.992)	(0.549)	(0.021)
Constant	1.777	1.324	-2.378***	2.269*	0.959	-1.857***	1.838	0.670	-2.818***
	(0.170)	(0.687)	(0.000)	(0.083)	(0.793)	(0.000)	(0.142)	(0.842)	(0.000)
Overall R-squared	0.265	0.216			0.268			0.284	
Within R-squared		0.184		0.250	0.184		0.270	0.199	
Between R-squared		0.243			0.302			0.284	
Test for 1st order autocorrelation			-2.974			-3.001			-3.058
			(0.002)			(0.003)			(0.002)
Sargan test (H_0: instruments are valid)			25.011			25.194			28.721
			(0.969)			(0.967)			(0.908)
Observations	200	201	163	174	175	137	186	187	148
Countries		37	35		36	34		37	35

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. Dependent variable = capital flight as a percentage of GDP. IRLS, FE, and GMM stand for iteratively reweighted least squares, fixed effects, and general method of moments estimation results, respectively.

Table 3: Capital flight and monetary policy targets – Regressions with annual panel data

	Inflation			M2/GDP growth			Exchange rate volatility		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	IRLS	FE	GMM	IRLS	FE	GMM	IRLS	FE	GMM
Change in debt/GDP	0.429***	0.288***	0.286***	0.466***	0.297***	0.299***	0.470***	0.300***	0.263***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged debt	0.011***	0.025	0.021***	0.007**	0.027*	0.025***	0.009**	0.031**	0.028***
stock/GDP	(0.002)	(0.106)	(0.001)	(0.044)	(0.059)	(0.001)	(0.016)	(0.030)	(0.000)
Lagged capital	0.336***	0.150***	0.132***	0.336***	0.167***	0.160***	0.333***	0.162***	0.138***
flight/GDP	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged GDP growth	-0.023	-0.144	-0.136***	-0.043	-0.178	-0.174***	-0.044	-0.165	-0.179***
	(0.582)	(0.231)	(0.000)	(0.282)	(0.105)	(0.000)	(0.270)	(0.133)	(0.000)
Inflation	0.0001	0.0002	0.0005*						
	(0.680)	(0.801)	(0.070)						
M2/GDP growth				0.005	-0.000	-0.004			
				(0.373)	(0.998)	(0.101)			
Exchange rate							0.001	0.001	0.002
Variability							(0.707)	(0.874)	(0.162)
Foreign reserves	0.005	0.030	0.021	0.010	0.035	0.044*	0.010	0.024	0.020
	(0.741)	(0.685)	(0.474)	(0.536)	(0.619)	(0.089)	(0.531)	(0.727)	(0.506)
Private sector	0.004	-0.054	-0.005	0.001	-0.059	0.003	0.001	-0.058	0.129
Credit	(0.703)	(0.401)	(0.965)	(0.960)	(0.334)	(0.979)	(0.922)	(0.346)	(0.275)
Constant	0.756	4.533**	3.566	0.824	3.949*	2.517	0.751	3.802*	0.525
	(0.170)	(0.044)	(0.156)	(0.125)	(0.062)	(0.347)	(0.176)	(0.077)	(0.839)
Overall R-squared	0.469	0.084		0.485	0.091		0.494	0.091	
Within R-squared		0.046			0.057			0.056	
Between R-squared		0.474			0.438			0.438	
Test for 1st order autocorrelation			-3.536			-3.625			-3.624
			(0.000)			(0.000)			(0.000)
Sargan test (H_0: instruments are valid)			32.192			32.921			31.817
			(1.000)			(1.000)			(1.000)
Observations	1,134	1,136	1,092	1,229	1,231	1,186	1,236	1,237	1,192
Countries		39	38		39	39		39	39

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is capital flight as a percentage of GDP. IRLS, FE, and GMM stand for iteratively reweighted least squares, fixed effects, and general method of moments estimation results, respectively.

Table 4: Capital flight and monetary policy targets – Regressions with 5-year panel data

	Inflation			M2/GDP growth			Exchange rate volatility		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	IRLS	FE	GMM	IRLS	FE	GMM	IRLS	FE	GMM
Change in debt/GDP	0.320***	0.692***	0.640***	0.349***	0.551***	0.616***	0.349***	0.698***	0.803***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lagged debt	0.014**	0.049**	0.047***	0.019***	0.052***	0.086***	0.013*	0.060***	0.089***
stock/GDP	(0.047)	(0.035)	(0.000)	(0.007)	(0.010)	(0.000)	(0.058)	(0.005)	(0.000)
Lagged capital	0.261***	0.190***	0.278***	0.232***	0.187***	0.288***	0.372***	0.188***	0.288***
flight/GDP	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Real GDP growth	-0.167	-0.292	-0.267***	-0.137	-0.283	-0.243***	-0.173	-0.281	-0.195***
	(0.191)	(0.195)	(0.000)	(0.254)	(0.160)	(0.000)	(0.154)	(0.177)	(0.000)
Inflation	0.005	-0.002	-0.003***						
	(0.193)	(0.208)	(0.000)						
M2/GDP growth				-0.041*	-0.015	-0.010***			
				(0.075)	(0.730)	(0.007)			
Exchange rate							-0.004	-0.000	-0.007***
Variability							(0.446)	(0.956)	(0.000)
Foreign reserves	0.006	0.058	0.087***	0.006	0.043	0.099***	0.013	0.043	0.069***
	(0.841)	(0.523)	(0.003)	(0.855)	(0.615)	(0.000)	(0.685)	(0.625)	(0.007)
Private sector	0.011	-0.062	-0.035*	0.011	-0.046	-0.052***	0.014	-0.043	-0.023
Credit	(0.636)	(0.434)	(0.078)	(0.639)	(0.534)	(0.008)	(0.553)	(0.570)	(0.158)
Constant	1.866	0.991	-0.243	1.609	0.337	-3.727***	1.245	-0.715	-4.327***
	(0.110)	(0.756)	(0.430)	(0.155)	(0.909)	(0.000)	(0.295)	(0.817)	(0.000)
Overall R-squared		0.257			0.208			0.227	
Within R-squared	0.292	0.204		0.267	0.161		0.507	0.198	
Between R-squared		0.263			0.268			0.198	
Test for 1st order autocorrelation			-3.134			-3.160			-3.433
			(0.002)			(0.002)			(0.001)
Sargan test (H_0: instruments are valid)			29.887			31.085			30.156
			(0.878)			(0.842)			(0.871)
Observations	209	211	173	228	229	190	230	230	191
Countries		38	37		39	38		39	38

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is capital flight as a percentage of GDP. IRLS, FE, and GMM stand for iteratively reweighted least squares, fixed effects, and general method of moments estimation results, respectively.

Table 5: Private investment and capital flight, and monetary policy indicators – Regressions with annual panel data

	Discount rate			Interest rate differential			Covered interest rate differential		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	IRLS	FE	GMM	IRLS	FE	GMM	IRLS	FE	GMM
Lagged investment			0.539***			0.556***			0.390***
			(0.000)			(0.000)			(0.000)
Capital flight	-0.037***	-0.044***	-0.030***	-0.026*	-0.052***	-0.027***	-0.029**	-0.051***	-0.025***
	(0.003)	(0.001)	(0.000)	(0.050)	(0.000)	(0.000)	(0.029)	(0.000)	(0.000)
Discount rate	-0.067***	-0.027	-0.028						
	(0.000)	(0.117)	(0.104)						
Interest rate differential				0.023**	-0.003**	-0.000**			
				(0.012)	(0.038)	(0.026)			
Covered interest differential							0.009	-0.002**	0.001
							(0.105)	(0.048)	(0.139)
Private sector credit	-0.003	0.040**	0.022**	0.008	0.035**	0.030***	0.011	0.035**	0.032***
	(0.751)	(0.023)	(0.027)	(0.430)	(0.044)	(0.002)	(0.257)	(0.043)	(0.003)
Gross domestic saving	0.088***	0.124***	0.038	0.064***	0.121***	0.050***	0.075***	0.123***	0.074***
	(0.000)	(0.000)	(0.130)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.009)
GDP growth	0.053	0.070*	0.015	0.050	0.063*	-0.004	0.050	0.058	0.003
	(0.113)	(0.054)	(0.141)	(0.145)	(0.090)	(0.620)	(0.136)	(0.104)	(0.780)
Agriculture value added	-0.125***	0.056	0.043	-0.127***	0.100**	0.076*	-0.117***	0.098**	0.104***
	(0.000)	(0.183)	(0.195)	(0.000)	(0.023)	(0.055)	(0.000)	(0.024)	(0.009)
Presidential regime duration	-0.043**	-0.057**	-0.024	-0.035	-0.045	-0.051***	-0.035	-0.041	0.005
	(0.045)	(0.043)	(0.103)	(0.118)	(0.111)	(0.000)	(0.107)	(0.137)	(0.810)
Terms of trade index	-0.024***	-0.022***	-0.011***	-0.023***	-0.021***	-0.013***	-0.025***	-0.022***	-0.013**
	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.017)
Total trade	0.034***	0.094***	0.054***	0.032***	0.099***	0.060***	0.032***	0.100***	0.042***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Foreign exchange reserves	-0.042***	-0.063***	-0.021	-0.028**	-0.030	-0.061**	-0.027**	-0.030	-0.023*
	(0.000)	(0.003)	(0.162)	(0.015)	(0.156)	(0.033)	(0.018)	(0.152)	(0.077)
Constant	15.852***	6.122***	1.874	15.170***	4.235**	1.023	14.823***	4.142**	2.293
	(0.000)	(0.001)	(0.211)	(0.000)	(0.023)	(0.357)	(0.000)	(0.024)	(0.141)
Overall R-squared	0.377	0.164		0.304	0.109		0.311	0.115	
Within R-squared		0.141			0.147			0.148	
Between R-squared		0.203			0.113			0.104	
Test for 1st order autocorrelation			-3.367			-3.553			-3.539
			(0.000)			(0.000)			(0.000)
Sargan test (H_0: instruments are valid)			28.037			25.206			20.986

			(1.000)			(1.000)			(1.000)
Observations	759	759	696	773	774	718	798	799	736
Countries		36	36		37	36		37	37

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is private investment as a percentage of GDP. IRLS, FE, and GMM stand for iteratively reweighted least squares, fixed effects, and general method of moments estimation results, respectively.

Table 6: Private investment, capital flight and monetary policy indicators – Regressions with 5-year panel data

	Discount rate			Real interest rate differential			Covered interest rate differential		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	IRLS	FE	GMM	IRLS	FE	GMM	IRLS	FE	GMM
Lagged investment			0.108***			0.211***			0.209***
			(0.004)			(0.000)			(0.000)
Capital flight	-0.066*	-0.068*	-0.122***	-0.050	-0.088**	-0.116***	-0.051	-0.089**	-0.119***
	(0.076)	(0.088)	(0.000)	(0.211)	(0.033)	(0.000)	(0.189)	(0.028)	(0.000)
Discount rate	-0.048**	-0.005	-0.028						
	(0.038)	(0.894)	(0.175)						
Interest rate differential				0.032	-0.010**	-0.013***			
				(0.112)	(0.012)	(0.000)			
Covered interest differential							0.013	-0.007**	-0.009***
							(0.321)	(0.013)	(0.000)
Private sector credit	0.002	0.056	0.045**	0.002	0.042	0.046**	0.005	0.041	0.043**
	(0.935)	(0.125)	(0.042)	(0.936)	(0.257)	(0.042)	(0.811)	(0.259)	(0.048)
Gross domestic saving	0.079***	0.203***	0.100***	0.016	0.183***	0.068**	0.020	0.182***	0.078**
	(0.003)	(0.004)	(0.001)	(0.559)	(0.008)	(0.027)	(0.459)	(0.007)	(0.012)
Real GDP growth	0.272**	0.268**	0.149	0.150	0.253*	0.166	0.166	0.256*	0.134
	(0.021)	(0.048)	(0.102)	(0.230)	(0.058)	(0.114)	(0.183)	(0.051)	(0.200)
Agriculture value added	-0.126***	0.029	0.008	-0.168***	0.038	0.076	-0.161***	0.038	0.080
	(0.002)	(0.736)	(0.909)	(0.000)	(0.674)	(0.217)	(0.000)	(0.669)	(0.186)
Presidential regime duration	-0.044	-0.075	-0.054*	-0.040	-0.069	-0.039	-0.038	-0.066	-0.036
	(0.376)	(0.226)	(0.075)	(0.453)	(0.282)	(0.171)	(0.462)	(0.296)	(0.187)
Terms of trade index	-0.023**	-0.024**	-0.014***	-0.018*	-0.020*	-0.014***	-0.020**	-0.020*	-0.015***
	(0.011)	(0.021)	(0.002)	(0.071)	(0.069)	(0.000)	(0.030)	(0.064)	(0.000)
Total trade	0.039***	0.078***	0.064***	0.034**	0.079***	0.070***	0.034**	0.080***	0.072***
	(0.003)	(0.006)	(0.000)	(0.021)	(0.007)	(0.000)	(0.015)	(0.006)	(0.000)
Foreign exchange reserves	-0.052**	-0.081*	-0.098***	-0.033	-0.045	-0.072***	-0.030	-0.045	-0.075***
	(0.027)	(0.063)	(0.000)	(0.206)	(0.306)	(0.008)	(0.225)	(0.297)	(0.006)
Constant	14.911***	6.344	7.020***	16.492***	5.737	3.301*	16.264***	5.725	3.305*
	(0.000)	(0.104)	(0.000)	(0.000)	(0.170)	(0.091)	(0.000)	(0.161)	(0.077)
Overall R-squared		0.151			0.125			0.128	
Within R-squared	0.440	0.254		0.368	0.274		0.367	0.272	
Between R-squared		0.152			0.103			0.105	
Test for 1st order autocorrelation			-1.062			-1.318			-1.289
			(0.288)			(0.187)			(0.197)
Sargan test (H_0: instruments are valid)			16.759			17.642			18.063
			(0.606)			(0.546)			(0.518)

Observations	168	168	113	170	171	117	174	175	120
Countries		36	33		37	33		37	34

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is private investment as a percentage of GDP. IRLS, FE, and GMM stand for iteratively reweighted least squares, fixed effects, and general method of moments estimation results, respectively.

Table 7: Growth gap, capital flight, and monetary policy: Fixed effects regression results with annual panel data

VARIABLES	Baseline: monetary policy indicators			Including structure of the economy			Including trade and external debt		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth gap	0.943***	0.915***	0.917***	0.950***	0.956***	0.951***	0.992***	1.006***	0.988***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Discount rate	-0.009**			-0.009**	-0.011**	-0.009**	-0.035*	-0.043**	-0.048***
	(0.042)			(0.039)	(0.016)	(0.040)	(0.059)	(0.027)	(0.009)
Interest rate differential		0.000							
		(0.912)							
Covered interest rate differential			0.000						
			(0.980)						
Capital flight / GDP	0.010	-0.002	-0.007	0.010	0.008	0.009	0.000	0.002	-0.005
	(0.462)	(0.871)	(0.624)	(0.486)	(0.556)	(0.505)	(0.999)	(0.878)	(0.727)
Private investment	0.121***	0.090***	0.091***	0.125***	0.111***	0.125***	0.085**	0.058	0.087**
	(0.000)	(0.006)	(0.005)	(0.000)	(0.001)	(0.000)	(0.025)	(0.183)	(0.023)
Total debt / GDP	-0.021***	-0.022***	-0.022***	-0.022***	-0.019***	-0.021***	-0.016***		
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)		
Agriculture / GDP				0.021					
				(0.564)					
Manufacturing / GDP					-0.157***		-0.176***	-0.240***	-0.194***
					(0.006)		(0.007)	(0.000)	(0.003)
Services / GDP						-0.007			
						(0.829)			
Exchange rate variability							0.003	-0.003	-0.005
							(0.817)	(0.842)	(0.717)
Terms of trade							0.004	0.010*	0.008
							(0.425)	(0.078)	(0.124)
Total trade / GDP							0.009	-0.000	0.006
							(0.491)	(0.985)	(0.651)
Total reserve / Total debt							-0.002*	-0.002*	-0.002
							(0.086)	(0.058)	(0.167)
Debt service / Exports								-0.027	
								(0.160)	
Short term debt / Total debt									0.007

									(0.860)
Constant	-0.027	0.484	0.453	-0.486	2.007**	0.306	1.628	2.277	0.619
	(0.962)	(0.423)	(0.452)	(0.635)	(0.032)	(0.846)	(0.302)	(0.199)	(0.691)
Overall R-squared	0.407	0.390	0.390	0.416	0.413	0.409	0.415	0.402	0.404
Within R-squared	0.477	0.467	0.457	0.482	0.487	0.482	0.488	0.495	0.483
Between R-squared	0.137	0.033	0.032	0.131	0.133	0.126	0.243	0.196	0.228
Observations	895	876	908	861	843	861	758	682	755
Countries	37	37	37	37	36	37	35	35	35

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the change in growth rate (current minus last previous year's growth rate).

Table 8: Growth gap, capital flight, and monetary policy: Fixed effects regression results with five-year panel data

VARIABLES	Baseline: monetary policy indicators			Including structure of the economy			Including trade and external debt		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Growth gap	1.107***	1.116***	1.136***	1.114***	1.137***	1.112***	1.221***	1.218***	1.224***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Discount rate	-0.006			-0.006	-0.009*	-0.006	-0.083***	-0.046*	-0.081***
	(0.261)			(0.242)	(0.095)	(0.246)	(0.000)	(0.075)	(0.000)
Interest rate differential		0.000							
		(0.352)							
Covered interest rate differential			0.005**						
			(0.027)						
Capital flight / GDP	0.006	-0.004	-0.002	0.002	0.002	0.002	0.007	-0.006	0.007
	(0.817)	(0.886)	(0.951)	(0.942)	(0.949)	(0.932)	(0.792)	(0.817)	(0.764)
Private investment	0.197***	0.165***	0.191***	0.199***	0.175***	0.200***	0.100*	0.041	0.101*
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.063)	(0.488)	(0.060)
Total debt / GDP	-0.018**	-0.019**	-0.016**	-0.017**	-0.015**	-0.018**	0.002		
	(0.010)	(0.010)	(0.030)	(0.015)	(0.035)	(0.011)	(0.770)		
Agriculture / GDP				-0.012					
				(0.793)					
Manufacturing / GDP					-0.172**		-0.183**	-0.203**	-0.179**
					(0.024)		(0.019)	(0.010)	(0.021)
Services / GDP						0.004			
						(0.917)			
Exchange rate variability							-0.068***	-0.061***	-0.067***
							(0.000)	(0.002)	(0.001)
Terms of trade							0.017**	0.020***	0.016**
							(0.014)	(0.005)	(0.014)
Total trade / GDP							0.018	0.022	0.018
							(0.274)	(0.224)	(0.271)
Total reserve / Total debt							-0.003**	-0.004**	-0.003**
							(0.030)	(0.014)	(0.036)
Debt service / Exports								-0.019	
								(0.489)	

Short term debt / Total debt									-0.004
									(0.928)
Constant	-1.433*	-0.873	-1.400	-1.087	0.909	-1.591	-0.239	-0.192	-0.124
	(0.087)	(0.340)	(0.124)	(0.445)	(0.484)	(0.458)	(0.899)	(0.931)	(0.947)
Overall R-squared	0.483	0.474	0.459	0.469	0.498	0.480	0.409	0.443	0.415
Within R-squared	0.645	0.624	0.630	0.655	0.666	0.655	0.731	0.727	0.731
Between R-squared	0.001	0.001	0.046	0.000	0.037	0.001	0.004	0.002	0.003
Observations	189	190	195	184	182	184	166	154	166
Countries	37	37	37	37	36	37	35	35	35

Robust p-values in parentheses; significance levels: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is the change in growth rate.

Table A.1: Regression variables: definition and sources

Variable name	Definition and measurement	Data source
Capital flight	Capital flight, as a ratio of GDP	http://www.peri.umass.edu/300/#c2324.(Boyce and Ndikumana, 2012; Ndikumana and Boyce, 2010, 2012a)
GDP growth	Growth rate of real GDP	World Development Indicators (WDI)
Covered interest rate differential	Interest rate differential minus the % change of the exchange rate (measured as amount of local currency per unit of US dollar)	WDI
Interest rate differential	African country's real deposit interest rate (deposit rate) minus real US 3-month Treasury bill rate	WDI
Private sector credit	Bank credit to the private sector, as a ratio of GDP	WDI
Regime durability	The number of years with the same president in power. This is a modified version of the "durable" indicator in Polity IV.	Polity IV database: http://www.systemicpeace.org/polity/polity4.htm
Private investment	Gross private fixed capital formation	WDI and African Development Bank
Discount rate	The discount rate or central bank policy rate or repo rate	International Financial Statistics (IFS)
Foreign exchange reserves	Total reserves excluding gold, as percentage of total debt or GDP	WDI
Total debt	Total debt as % of GDP	WDI
Debt service	Total debt service as % of exports	WDI
Short term debt	Short-term debt as % of total debt	WDI
Terms of trade	Terms of trade index, base 2000=100	WDI