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Reducing Capital Flight in Africa: Does Regional Financial Integration Matter?

Celestin Balla Mekongo[1+], Henri Atangana Ondoa[1], and Guy Albert Kenkouo[2]

[1]*University of Yaounde II, Cameroon*
[2]*Bank of Central African States, Cameroon*

Abstract Capital flight continues to be an issue of paramount importance for developing economies, as it deprives them of the funds required for economic takeoff. Hence, this paper aims to analyze the effect of regional financial integration (RFI) on capital flight in Africa. Based on a sample of 23 countries, we specify and estimate an asset demand model of capital flight using a portfolio choice analysis by the system-generalized method of moments for the period 1996-2015. We find two important results. First, the RFI reduces capital flight. This result becomes even more interesting when the quality of governance is considered. Second, structural breaks in the RFI-capital flight relationship explain why the RFI has had a mixed effect on the capital flight over the study period. We recommend that the attractiveness of regional financial services be enhanced concurrently with the standardization of banking and financial regulation in Africa.

Keywords: Africa, capital flight, regional financial integration, System-GMM, structural breaks

JEL Classifications: F36, E23, G01, C33

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I. Introduction

Academics and international financial practitioners are increasingly seeing capital flight as illicit financial flows from developing countries as a result of financial globalization (Ajayi and Ndikumana, 2014). Indeed, the capital trajectory defined by international capital allocation theory is being hijacked today because of numerous distortions observed in global financial

+Corresponding Author: Celestin Balla Mekongo
Assistant, University of Yaounde II - Soa. Department of International and Development Economics, Yaounde II - Soa, Cameroon and Member of the ECA young economist network, United Nations Economic Commission for Africa. E-mail: juniorjordan.balla95@gmail.com
Co-Author: Henri Atangana Ondoa
Professor, University of Yaounde II - Soa. Department of Economic Analysis and Policy, Centre for Studies and Research in Economics and Management, Yaounde II - Soa, Cameroon. E-mail: atanganaondoa@yahoo.fr
Co-Author: Guy Albert Kenkouo
Economist, Head of Banking Liquidity Management Division, Bank of Central African States, Yaounde, Cameroon. E-mail: kenkouo_guy@yahoo.fr
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markets between countries worldwide (Ndikumana and Sarr, 2019). Long before the 1980s debt crisis, capital flight had reached alarming proportions in Africa, particularly in the Franc zone (Ndikumana and Boyce, 2011). For example, according to Ndikumana (2014), the African continent has lost up to $1.4 trillion (including interest) in capital flight over four decades, or approximately $35 billion per year (1970-2015). More interestingly, this amount is greater than the outstanding debt of thirty African countries ($496.9 billion). Nonetheless, Africa's financing gap is estimated to be $50 billion per year for its infrastructure needs (AfDB, 2018). These massive capital outflows have a high cost for African economies. One can note a significant decrease in private investment marked by a substantial drop in domestic savings and *de facto* credit granted to the private sector, a phenomenon that is more pronounced in resource-rich economies (Ndiaye, 2012; Ayamena Mpenya et al., 2016). Moreover, capital flight is fueled by external indebtedness because, as Ndikumana and Boyce (2008) demonstrate, for every dollar lent to Africa, approximately 60% (i.e., 60%) actually comes out in the same year.

Several arguments are commonly advanced to explain the importance of this phenomenon, including a lack of capital security within the African continent and a lack of profitability. The first argument contends that the proliferation of jurisdictions that practice excessive banking secrecy, such as tax havens and offshore financial centers (OFCs), ensures the concealment of capital derived from natural resources rents, tax evasion, corruption, and smuggling (Ndikumana, 2014). According to this argument, capital flight is practiced by individuals or companies who seek to hide their income in appropriate jurisdictions rather than make it profitable. To this extent, models based on portfolio choice theory lose their relevance. According to the profitability argument, high inflation, capital movement restrictions, fiscal pressure, poor development of financial services, and political instability do not provide adequate opportunities for investment diversification, resulting in low profitability (Pattillo et al., 1999, Collier et al., 2004). Both arguments appear to point an accusing finger at the financial system's shallowness (Brada et al., 2013) and the poor quality of institutions (Le and Zak, 2006; Gankou et al., 2016; Ramiandrisoa and Rakotomanana, 2016). Therefore, capital flight poses a major challenge to African economies. First, achieving the Sustainable Development Goals necessitates internal resource mobilization to ensure the sustainability of African economies. Second, the African Union's Agenda 2063 calls for structural transformation,[1] which must include the development of African financial systems. Finally, the COVID-19 pandemic has weakened African economies, necessitating significant capital mobilization.

However, rather than focusing on institutional factors, which undoubtedly provide relevant answers to the extent of capital flight from the African continent, the focus here is on financial factors that can reduce the level of capital flight in Africa. For this purpose, we consider regional

1) New estimates from the African Development Bank (AfDB, 2018) suggest that US$130-170 billion is needed for infrastructure development on the continent, with a financing requirement of between US$67.6-107.5 billion.

financial integration (RFI). RFI has characteristics that can reduce capital flight, such as increased macroeconomic discipline, technological development, informational requirements for openness and financial transactions, and increased financial system efficiency (Agénor, 2001). This aspect is particularly important for this study and even for the economic literature, as to our knowledge, no study has focused on the relationship between financial integration and capital flight.

Indeed, most seminal research has focused on the relationship between financial liberalization and capital flight along two major lines. First, consider the various capital flight indicators. In this regard, the literature emphasizes four methods of measuring capital flight: Dooley's (1986), Ndikumana and Boyce's (2010) trade mis-invoicing, Cuddington's (1986) "hot money," and the World Bank's (1985) "residual" method. The "residual" method has received more attention in the literature and is used more frequently because of the various drawbacks of the other three methods. Second, studies that attempted to explain the importance of financial openness as a factor influencing capital flight (Schneider, 2003; Epstein, 2005). This is done by examining the need for national policies to increasingly open up the capital account in a portfolio model. For example, Lensink et al. (1998) demonstrated using simultaneous equations and simulations that increasing the nominal interest rate on bank deposits, lowering reserve requirements, and changing exchange rate policy significantly reduce capital flight in least developed countries. Furthermore, Yalta and Yalta (2012) used a dynamic panel model and discovered no apparent causality between the lifting of capital controls and capital flight. As relevant as the first two, Hermes and Lensink (2014) found that policies focusing on bank privatization and lowering barriers to entry into the banking market reduce capital flight, whereas liberalization of international capital controls may actually increase capital flight. However, this study does not sufficiently consider the full importance of African financial market development and *de facto* financial integration as a determinant of reducing capital flight.

The development of regional financial markets in Africa and the resulting financial integration process provide critical elements for optimal harmonization and coordination of regulatory frameworks for financial activities.[2] Over the years, the African banking sector has grown dramatically, fueled by banks of African origin. In 2017, over 16 African-owned banks were present in four or more countries. Standard Bank (South Africa), Ecobank (Togo), and United Bank of Africa (Nigeria) are among the major pan-African players that have grown significantly between 1990 and 2017. This banking expansion has significantly accelerated the pace of RFI, not least because the majority of these banks are part of conglomerates with activities in sectors

2) The various regional bodies involved in the fight against money laundering and terrorist financing, notably the Middle East and North Africa Financial Action Task Force (MENAFATF), the Intergovernmental Action Group against Money Laundering and Terrorist Financing in West Africa (IAGMLTF), the Eastern and Southern Africa Anti-Money Laundering Group (ESAAMLG), and the Central Africa Anti-Money Laundering Group (CAAMLG), are part of this effort.

other than banking[3] (Ekpo and Chuku, 2017). The goal is to reduce the attractiveness of informal financial channels, which are the primary conduits for capital flight (Massa, 2014). Furthermore, an integrated and developed financial system provides more incentives to secure capital by providing adequate visibility and traceability of financial flows between financial centers (Senbet, 2009; Jacquet and Pollin, 2012). In the same perspective, a deep RFI stimulates capital accumulation and increases investment profitability through the variety of innovative financial services it provides (Levine, 2005; Kpodar, 2005; Ibrahim and Alagidede, 2018). Ultimately, a successful RFI increases the attractiveness of financial securities by raising the real interest rate and decreasing arbitrage in favor of international financial markets, which typically results in massive capital outflows (De Brouwer, 1999; Wakeman-Linn and Wagh, 2008; De Nicolò and Juvenal, 2014).

Given the literature's limitations presented above, this paper aims to examine the role of RFI in reducing capital flight in Africa. Achieving this goal adds to the economic literature in three ways. First, the existence of an integrated financial system reduces capital flight by increasing profitability, securing capital, and increasing the unit cost of transferring capital to international financial centers. Second, by demonstrating that portfolio choice is at the root of capital flight as agents make trade-offs based on regional institutions' low degree of financial integration with the rest of the world. Finally, there are periods of slack in the RFI deepening process marked by significant capital flight.

The empirical analysis is based on a sample of 23 African countries for which adequate capital flight data are available from 1996 to 2015. The econometric results are generated using a dynamic panel data estimation strategy called the system-generalized method of moments (System-GMM), which allows us to resolve potential bias related to the correlation between the error term and country fixed effects to provide robust results (Holtz-Eakin et al., 1988; Blundell and Bond, 2000). The results indicate that the RFI reduces capital flight. We also find that the interest rate differential is significant, implying that in the context of RFI, capital profitability trade-offs explain capital flight. Furthermore, the presence of structural breaks indicates that the RFI had mixed effects on capital flight.

The rest of the paper is structured as follows. Section II provides a literature review that summarizes the evidence on the various links between RFI and capital flight. Section III describes the empirical model specification and estimation method. Section IV contains the data and some stylized facts. Section V presents and discusses the econometric results and robustness. Finally, Section VI concludes.

3) These include securities investments, insurance, microfinance and many other non-financial activities.

II. Literature Review

This section presents the theoretical understanding and empirical evidence of the link between RFI and capital flight.

A. Theoretical considerations

The theory of financial liberalization is primarily the theoretical anchor on the link between RFI and capital flight (McKinnon, 1973; Shaw, 1973). This theory posits that internal and external financial liberalization increases the flow of financial movements between countries, facilitating the financing of investment projects for developing countries in need of funds. However, empirical analysis of capital flows suggests that financial liberalization causes inefficiencies in international capital allocation, resulting in capital flight in developing countries. Two theoretical underpinnings explain this conclusion. The first is portfolio choice theory, which focuses on the rational decisions of residents who own national wealth (Lensink et al., 1998; Pattillo et al., 1999; Hermes and Lensink, 2014). It is regarded as an optimistic capital flight theory because it explains the phenomenon using observable and formal criteria. The second is the economic crime theory (Becker, 1968; Ehrlich, 1973; Ndikumana, 2014). It considers that capital flight is caused by the existence of adequate institutions that provide a safe haven for capital derived from illegal activities in their home countries, on the one hand, and the inefficiency of the national tax system on the other. It is the pessimistic capital flight theory.

Portfolio choice theory considers that private agents have complete information about the assets they wish to hold at all times, including their risk-adjusted returns, allowing them to trade-off between markets that offer better investment opportunities. According to this viewpoint, rational savers/investors transfer capital to financial centers that offer higher returns and a safer environment for assets (Ndikumana, 2014; Dinar, 2015). Two major arguments provide a relevant justification for capital flight from this standpoint. These are the arguments centered on the risk and return of private investment and the argument focusing on international capital flow restrictions. First, individuals may be incentivized to move their wealth abroad, such as when the net rate of return on holding foreign assets is higher, or when they want to diversify their portfolio by including foreign assets (Lensink et al., 1998; Hermes and Lensink, 2014). Moreover, they expect that taxes, tariffs, laws, domestic economic policies, and political insecurity will not reduce their net rate of return and, as a result, their domestically held wealth (Khan and Haque, 1985; Pattillo et al., 1999; Kant, 2002).

As a result, while risk-adjusted returns on private investment are higher for foreign assets than for domestic assets, residents choose to keep their wealth in their country of residence[4)]

4) Economic residence refers to natural and legal persons, irrespective of their nationality, who carry out an economic

(Hermes et Lensink, 2014). Therefore, financial liberalization may impact the risk-adjusted returns on private investment (Ndikumana and Sarr, 2019). Second, the importance of restrictions on international capital flows adds to understanding the first argument's analyses. Indeed, without capital controls, it is easier for residents to transfer money abroad, reducing the incentives to transfer money illegally to foreign assets (Mody and Murshid, 2005; Yalta and Yalta, 2012). However, tightening capital controls in conjunction with low institutional quality may incentivize money to be transferred abroad through informal channels. This last explanation opens the door to an analysis that is no longer based on considerations of portfolio choice criteria based on the rationality of the private agent, but on acts of economic and financial crime, resulting in an examination of capital flight through the lens of economic crime theory.

The rise of banking secrecy jurisdictions (offshore financial centers and tax havens) and the deterioration of institutional quality in many developing countries, particularly those rich in natural resources, has resulted in the emergence of a new theoretical framework to explain capital flight from a criminal standpoint. Economic crime theory sheds new light on private agents' true motivations for illegally transferring capital abroad (Becker, 1968; Ehrlich, 1973). It is based on the argument that private agents living in institutionally unstable countries can secure capital (Herkenrath, 2014). Indeed, the existence of tax havens, tax refuges, banking secrecy jurisdictions, or OFCs provides capital owners with insurance when deciding to transfer or hide their wealth (Palan et al., 2009). From this perspective, capital flight is a morally legitimate response to corruption and oppression. Capital flight is also observed as a result of the inefficiency of the domestic tax system (Alesina and Tabellini, 1989). Indeed, a private agent willing to transfer funds illegally to tax havens has an agenda to maximize the gains related to its securitization goal while limiting the costs generated by tax control or governance quality (Epstein and Schor, 1992; Epstein, 2005). The lower this cost, the more likely the private agent is to transfer capital to tax havens. The permeable institutional environment fosters the development of illicit activities, the diversion of public funds, and the transfer of income to OFCs (Ndikumana, 2014). This theory demonstrates the importance of an RFI-based analysis in explaining capital flight. Indeed, the lack of integration of African financial systems with those of the rest of the world contributes to the development of informal capital outflow channels. Finally, the RFI has a two-sided effect on capital flight.

B. Empirical assessments

The analysis of the empirical literature on capital flight is organized around three main points. The first point explores the effects of capital flight on macroeconomic and mesoeconomic variables. Indeed, several studies have shown the impact of capital flight on economic growth

activity in a country for at least one year.

(Beja Jr., 2007; Ajayi, 2012; Ndikumana, 2014), private investment (Ndiaye, 2011b), financial development (Hermes et al., 2004; Ndiaye, 2012), political stability (Alesina and Tabellini, 1989; Hermes and Lensink, 2001) and monetary policy (Fofack and Ndikumana, 2015). According to the latter study, capital flight has two effects on monetary policy. First, capital flight creates uncertainty and risk because it reflects a lack of confidence in the domestic economy. It sends out negative signals to private investors, especially when perpetrated by the political elite (Ndikumana and Boyce, 2011). Second, capital flight depletes the domestic financial system's resources. It is a leakage of the aggregate money supply and outstanding reserves to the outside world. The relationship between capital flight and monetary policy is important because one of the important roles of monetary policy is price stability through control of the money supply.

The second point explores the empirical determinants of capital flight. Thus, the literature provides several explanations, ranging from structural factors[5] (Ndiaye, 2011a; Ndikumana, 2016; Kwaramba et al., 2016), to the macroeconomic environment[6] ((Ajayi, 2012; Brada et al., 2013), the importance of external borrowing (Ndikumana and Boyce, 2011; Agyeman et al., 2022), policy environment (Le and Zak, 2006; Ramiandrisoa and Rakotomanana, 2016; Geda and Yimer, 2016), terrorism (Asongu et al., 2022), and hysteresis and habit formation (Schineller, 1994; Ndikumana and Boyce, 2008), factors related to the portfolio choice decisions of home country wealth holders.[7] This study's latter category of work merits special consideration because it empirically analyzes the RFI-capital flight relationship. It is organized around two axes: direct and indirect effects.

Following the first, three major studies highlighting the importance of financial liberalization stand out substantially. Indeed, Lensink et al.'s (1998) study appears to be regarded as a pioneer in the empirical examination of the relationship between financial liberalization and capital flight. Indeed, the authors regard capital flight as one asset that enters the composition of economic agents' portfolios (Collier et al., 2004). To reconcile the two concepts, they used a portfolio model as a theoretical framework. The study spans nine African economies from 1971 to 1990. Based on the estimation of simultaneous equation models, the authors show that low domestic deposit rates, high domestic inflation rates, and overvalued national currencies drive capital flight from the African continent. Furthermore, the authors' simulations show that interest rate deregulation, lower reserve requirements, and changes in exchange rate policy reduce capital flight. However, the authors have not fully established all aspects of causality.

Following Lensink et al. (1998), Yalta and Yalta (2012) investigated the role of financial liberalization policies in reducing capital flight. Thus, the authors examined the causal relationship between these two concepts using dynamic panel data regressions of 21 emerging economies

5) An abundance of natural resources combined with poor regulation and governance in the country of origin.
6) The economic performance, inflation and fiscal/monetary policies of the home country.
7) Risk and return on private investment.

from 1980 to 2004. While Lensink et al. (1998) examined the impact of domestic banking reforms (internal financial liberalization), Yalta and Yalta (2012) focused on policies aimed at removing capital movement restrictions (external financial liberalization). The authors find that there is no causal relationship between financial liberalization and capital flight. This result is in contrast with that of Lensink et al. (1998). The use of different variables and econometric techniques justifies the contrast in results.

A third study differs from the first two by complementing their analyses. Hermes and Lensink (2014) conducted this study, with the main hypothesis being that financial liberalization and capital flight are linked. According to the authors, the results of the literature on the financial liberalization-capital flight link are relatively mixed because the literature has not considered the full range of measures that capture the importance of financial liberalization. Therefore, the authors use a fixed effects model to examine this relationship using a variety of financial liberalization measures across a sample of 91 developed and developing countries, including 18 African countries, from 1973 to 2005. They use several dimensions of financial liberalization policies: (i) credit controls and reserve requirements, (ii) interest rate controls, (iii) entry barriers, (iv) government ownership of the banking sector, (v) restrictions on international financial transactions, (vi) stock exchange policies, and (vii) prudential regulation and supervision of the banking sector. Thus, although policies focusing on bank privatization and lowering entry barriers to banking reduce capital flight, the liberalization of international capital controls may actually increase capital flight. However, this study does not appear to take into account the economic agent's behavior in the face of capital flight, specifically the debate over the rationality hypothesis that leads to a portfolio choice logic, as posed by Ndikumana (2014).

Finally, Ndikumana and Sarr (2019) developed a theoretical model that conceptualizes the links between FDI and capital flight, as well as the role of natural resource endowment in the FDI-capital flight relationship and institutional quality in the natural resource-capital flight relationship. The authors found that FDI flows are positively related to capital flight in a sample of 30 African countries over 1970-2015, implying a capital flight phenomenon driven by them. High resource rents are linked to high capital flight, and institutional quality has no effect on this. This study is important for this research because it demonstrates that portfolio choice analysis does not explain capital flight. The authors reach this conclusion because the interest rate differential coefficient (the difference between the African rate of return and US Treasury bill rates) is insignificant. However, this does not fully explain the obsolescence of the portfolio choice model in explaining capital flight. The result of Steinkamp et Westermann (2022) on the application of the portfolio choice model contradicts that of Ndikumana and Sarr (2019) slightly by showing that the interest rate differential (difference between the lending rate of the Nepalese credit market and that of India) is negatively and significantly associated with capital flight. Thus, regardless of the quality of the institutional environment, interest rates

continue to be a determinant of capital flight. However, the debate remains.

The second axis highlights the importance of conducting an indirect analysis of the RFI-capital flight relationship. To do so, a set of transmission channels through which RFI will significantly affect capital flight must be considered. Most capital flight studies that include transmission channels in their analysis agree on the need to clean up the institutional environment. They emphasize the importance of improving governance quality, as capital flight is generally not well perceived in developing countries due to a porous institutional environment that undermines any form of regulation (Ndikumana and Sarr, 2019; MacCarthy et al., 2022). However, two important points emerge from the work presented below. The first is the scarcity or absence of work directly or indirectly linking RFI to capital flight. The second point suggests that there is no agreement on how to explain the level of capital flight using portfolio choice theory. As a result, our methodological strategy and results are consistent with this viewpoint.

III. Methodology

This section presents the methodological strategy in two parts. First, the main specification which spreads the econometric model to be estimated and second, the estimation technique used.

A. Main specification

We consider a context characterized by regional credit market integration in this paper. Thus, the trade-off will no longer be between the interest rates of African country securities and those of US Treasury bills, as in Ndikumana and Sarr's (2019) study, but between the rate of return of an asset on the integrated credit market and those of US Treasury bills. Furthermore, the cost of capital transfer for the private agent is determined by two factors: the level of development of the financial system and the quality of the legal and regulatory environment.

Our analysis focuses on the role of RFI in reducing capital flight. To do so, we use the capital flight asset demand equation rewritten by Lensink et al. (1998), Ndikumana and Sarr (2019):

$$CF_{it} = \beta_0 + \beta_1 RFIN_{it} + \beta_2 Kaopen_{it} + \beta_3 Findev_{it} + \beta_4 Dif\text{-}Interest_{it} + \beta_5 Polity2_{it} + \delta X_{it} + \epsilon_{it} \quad (1)$$

where *CF* denotes capital flight, *RFIN* is the RFI index, *KAOPEN* denotes the financial liberalization index, *FINDEV* is the financial development proxy that captures domestic credit

to the private sector as a percentage of *GDP*, *Dif-Interest* denotes the interest rate differential (interest rate on deposits in the integrated credit market and that on the three-month US Treasury bill market), and *Polity2* denotes institutional quality. X is the vector that includes other explanatory variables for capital flight, such as total external debt stock, real *GDP* per capita growth rate, and inflation. ϵ is the error term.

To test the effect of the RFI on capital flight, we estimate our demand model of asset capital flight using the dynamic panel data estimator, namely the method of generalized moments in system developed by Holtz-Eakin et al. (1988), Arellano and Bover (1995), and Blundell and Bond (1998). The basic regression of our System-GMM specification is:

$$CF_{i,t} = \beta_0 + \beta_1 CF_{i,t-1} + \beta_2 RFIN_{i,t} + \beta_3 Kaopen_{it} + \beta_4 Findev_{i,t} + \beta_5 Dif\text{-}Interest_{i,t} + \beta_6 Polity2_{i,t} + \delta X_{i,t} + \lambda_i + \mu_t + \epsilon_{it} \quad (2)$$

where λ_i is a country-specific unobserved effect, μ_t is time-specific. $FC_{i,t-1}$ is the capital flight of the previous period, which shows the existence of memory or persistence effects. The presence of the lag variable causes both endogeneity and asymptotic bias in the results of a fixed effects estimator (Nickell, 1981). As a result, the System-GMM estimator is particularly robust.

B. Estimation technique

To capture the first trends in our model's results. The ordinary least squares (OLS) method (Eq.(1)) is used. We do, however, acknowledge its failure to account for simultaneity and omitted variable bias. We prefer the dynamic System-GMM technique, which overcomes these shortcomings (Eq.(2)). The System-GMM estimator employs lagged differences of explanatory variables as level equation instruments, as well as lagged levels of explanatory variables as first difference equation instruments. This model addresses the endogeneity issue that arises in regression estimation due to the lagged dependent variable of one period (Arellano and Bover, 1995; Blundell and Bond, 1998; Yalta and Yalta, 2012). It also takes into account the biases caused by country-specific effects. Finally, the System-GMM avoids problems with concurrent or reverse causality. To check the consistency of the System-GMM estimator, two diagnostic tests were performed: the Hansen test for over-identification of restrictions, in which the null hypothesis considers the instruments that are not correlated with the residuals, and the Arellano-Bond test for second-order correlation in the first lagged residuals.

Because it is impossible to consider all of the factors that may influence the RFI-capital flight relationship, the robustness of the results obtained from the basic empirical model will be assessed in three ways. First, in addition to the Polity2 indicator, we consider the following six governance indicators developed by Kaufman et al. (2011) and made available in WGI

(2020): control of corruption, government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability. These governance indicators assess various aspects of the quality of arrangements and, as such, play a role in reducing capital flight. They can also be viewed as indicators of the government's ability to control, supervise, and regulate financial transactions in order to raise the unit cost of the illicit capital transfer.

Second, we include interaction variables derived from the intersection of the RFI variable and the institutional quality variables in the baseline regressions. This additional robustness component enables us to capture the effect of an RFI on capital flight in a context of higher institutional quality. Third, we look at whether there are structural breaks in the RFI-capital flight relationship. The goal is to demonstrate that periods of RFI loosening/deepening may have increased/decreased capital flight.

IV. Data

The data used in the analysis span the years 1996-2015 for a sample of 23 African countries (see Table A1) for which we have sufficient information for the study.

A. Variables

1. Dependent variable

Capital flight (constant value in 2015 dollars) as a percentage of GDP is our dependent variable. It is derived from the residual method of capital flight calculation. In this view, Boyce and Ndikumana estimate that for a country i in year t, capital flight is measured:

$$FC_{it} = \Delta AJUSTDEBT_{it} + FDI_{it} + PI_{it} - (CA_{it} + CRES_{it}) + MFC_{it} \quad (3)$$

where $\Delta AJUSTDEBT$ is the change in the stock of external debt adjusted for exchange rate fluctuations, *FDI* is the net inflow of foreign direct investment, *PI* is net portfolio investment, *CA* is the current account deficit, and *CRES* is the net addition to the stock of foreign reserves, and *MFC* is trade mis-invoicing. Our designated dependent variable *CF* is derived from the formula presented in equation (3) except that we take a constant value in 2015 dollars and relate it to nominal *GDP*. This formula comes from the algorithm developed by Ndikumana and Boyce (2008, 2010). The capital flight series is obtained from the Political Economy Research Institute at the University of Massachusetts Amherst.[8)]

8) The capital flight series is available on the PERI website at: https: //www.peri.umass.edu/capital-flight-from-africa.

2. Construction of the regional financial integration index

Although there are numerous ways to capture RFI, as demonstrated by Baele et al. (2004) and Bhattacharya et al. (2018), this paper focuses solely on the convergence of banking intermediation activities at the regional level. This selection emphasizes the regional credit market's importance in profitability and capital security.

Financial integration occurs when the law of one price is respected in financial markets. The cost of capital for assets with comparable risks should converge (De Nicolò and Juvenal, 2014). Unlike other financial markets, we focus our attention in this study on credit markets, which have a broader perception of risk and expected returns on assets across the economy (Ekpo and Chuku, 2017). Our index-building strategy is based on a comparison of the price and return disparities of assets with the same risk profile across countries in the region. To justify our methodology, we use the approach used by De Nicolò and Juvenal (2014); Ekpo and Chuku (2017), which is a generalization of a variant of the Bekaert and Harvey (1995) financial asset pricing model.

Indeed, assume that there are N countries in the region and $E_t R_{t+1}^g$ is the conditional excess return expected from the market in country $g \in N$. Assuming also that there is no exchange rate risk, then with full regional integration for all economies, $E_t R_{t+1}^g$ satisfies:

$$E_t R_{t+1}^g = \lambda_t cov(R_{t+1}^g, R_{t+1}^N), \tag{3}$$

where λ_t is the expected regional price of risk (covariance) and R_{t+1}^N is the return on a value-weighted regional portfolio. Similarly, if there is financial autarky and all countries are fully financially segmented,

$$E_t R_{t+1}^g = \lambda_t^g var(R_{t+1}^g), \tag{4}$$

where λ_t^g is the expected price of risk in the domestic market. Following De Nicolò and Juvenal (2014); Ekpo and Chuku (2017), the expected returns for a partially integrated country are given by the following expression:

$$E_t R_{t+1}^g = \alpha_t^g \lambda_t cov(R_{t+1}^g + R_{t+1}^N) + (1 - \alpha_t^g)\lambda_t^g var(R_{t+1}^g) \tag{5}$$

where α_t^g is the perceived probability that an economy is integrated, and $\alpha \in [0,1]$ if α_t^g converges to unity, then The convergence of expected excess returns as a result of higher RFI (Adjaouté and Danthine, 2003; De Nicolò and Juvenal, 2014). We therefore conclude that the degree of RFI is measured by the difference between a country's excess market return and

a measure of the central tendency of the distribution of excess market returns across all countries in the region (Ekpo and Chuku, 2017).

Explicitly, for country g at time t and a population of N countries in the region, this measure, denoted by *RFIN*, is given:

$$RFIN_{gt} = \left(R_t^g - \frac{1}{N} \sum_{i=1}^{N} R_t^g \right)^2 \tag{6}$$

RFIN measures the position of a country's excess market return relative to an equally weighted excess market return on the distribution of countries. The lower the RFIN, the higher the RFI level. As previously stated, this is about credit market integration. Therefore, interest rates can be used to assess performance. We use interest rate spreads (the difference between lending and deposit rates) in equation (6) to calculate the degree of RFI in African countries (for a more in-depth discussion, see Ekpo and Chuku [2017]).

3. Control variables

We also consider a set of variables that are equally relevant for this study as control variables. The first variable is the capital account openness index, denoted as *Kaopen* as a measure of financial liberalization by Chinn and Ito (2008). This variable should show the extent to which removing restrictions on the movement of financial flows contributes to a reduction in illegal channels of capital transfer, thereby reducing capital flight (Yalta and Yalta, 2012). Second, as a percentage of GDP, domestic credit to the private sector captures financial development (*Findev*). This is because increased domestic credit to the private sector represents an alternative use of income generated by economic activity, crowding out capital flight (Hermes and Lensink, 2014; Ndikumana and Boyce, 2011). This variable can be found in the World Development Indicator (2020). The third variable is the interest rate differential between the rate on African credit market bank deposits and the rate on three-month US Treasury bills (*Dif-interest*). This variable picks up on the debate over the applicability of portfolio choice theory to explaining the extent of capital flight in Africa (Ndikumana, 2014). Capital flight occurs when the rate of return on financial assets traded in international financial markets exceeds the rate of return on financial assets traded in African capital markets, for example. However, only the significance of this variable would revive this debate. The data for constructing this variable is taken from the IMF's International Financial Statistics (2018).

Fourth, the consumer price index is used to track inflation. This variable indicates how much an inflation-induced depreciation of assets in the domestic capital market relative to those in international financial markets contributes to increased capital flight. It is available through the WDI (2020). Fifth, the total external debt stock as a percentage of GDP is denoted by

External-Debt. This variable highlights the "revolving door" phenomenon in explaining the level of capital flight. Indeed, high levels of external debt increase capital flight in Africa. This is based on World Bank data on international debt. Sixth, *GDP Growth* was noted as the rate of growth of real GDP per capita. According to supply side logic, an increase in economic activity increases the income of private agents who can transfer it out of the country, resulting in increased capital flight (Ndikumana, 2008; Ndiaye, 2011a). It was obtained from the Penn World Table (PWT) 9.1 database (Feenstra et al., 2015). Seventh, *Polity2* captures the institutional environment's quality. Indeed, sound public financial management, high-quality banking regulation, political stability, and coercion in the event of wrongdoing are all characteristics of a democratic political regime that discourages capital flight (Gankou et al., 2016; Le and Zak, 2006). This variable can be found in the POLITY IV database (Marshall et al., 2018). We use six governance variables to go deeper into the analysis: corruption control, government effectiveness, political stability and absence of violence, regulatory quality, rule of law, and voice and accountability. Table A2 contains a brief definition and source for all variables used.

B. Preliminary tests

Table 1 presents the descriptive statistics of the variables used in this study. When compared to the other variables, *RFIN* and *External-Debt* have higher means (23.689 and 75.833) and

Table 1. *Descriptive Statistics*

	Obs.	Period	Mean	SD	Min	Max
CF	709	1985 - 2015	6.797	18.747	-106.281	135.479
RFIN	713	1985 - 2015	23.689	50.658	0.001	615.008
Kaopen	713	1985 - 2015	0.272	0.260	0.000	1.000
Findev	713	1985 - 2015	19.374	17.063	1.474	78.294
Dif-interest	713	1985 - 2015	7.942	17.783	-303.174	85.925
Inflation	711	1985 - 2015	13.362	22.524	-11.686	200.026
GDP Growth	713	1985 - 2015	4.242	10.875	-115.924	49.786
External-Debt	713	1985 - 2015	75.833	66.019	2.556	489.297
Polity2	713	1985 - 2015	75.833	66.019	2.556	489.297
Corruption	460	1996 - 2015	-0.529	0.520	-1.431	1.217
Polstab	460	1996 - 2015	2.000	3.000	5.000	4.000
Goveffect	460	1996 - 2015	-0.499	0.510	-1.463	1.020
Qualreg	460	1996 - 2015	-0.432	0.482	-1.529	0.804
Etatdr	460	1996 - 2015	-0.545	0.505	-1.650	0.731
Voixacc	460	1996 - 2015	-0.555	0.564	-1.579	0.863

Notes. Corruption = control of corruption, Goveffect = government effectiveness, Stabpolit = political stability, Qualreg = quality of regulation, Etatdr = rule of law, Voixacc = Voice and accountability.
SD = standard deviation.

standard deviations (50.658 and 66.02). In this regard, we can conclude that the countries in our sample have disparities in debt levels as well as a relative segmentation of their credit markets.

Table A3 presents the correlation matrix of the variables in this study. We did not consider the variables related to governance because they use the same calculation scheme and are thus correlated. The analysis of this table reveals that all of the variables are only weakly correlated with one another. The RFI is unrelated to the variable capturing capital flight, reducing the likelihood of endogeneity.

In addition, we run the cross-sectional dependence tests on the data shown in Table A4. There are two of them: the Pesaran (2004) strong cross-sectional dependence test and the Pesaran (2015) weak cross-sectional dependence test. Based on the decision criteria for each test presented in the previous chapters, we can conclude that the data in our sample has a strong cross-sectional dependence. The above results in terms of cross-sectional data dependence tests render first generation panel unit root tests obsolete. Therefore, we employ the second-generation unit root tests developed by Pesaran (2003) and Pesaran (2007). The results show that the variables are globally stationary in levels for both tests used, with the exception of the *Findev* and *Dif-Interest* variables, which are stationary and integrated of order 1 (see Table A5).

C. Some stylized facts

Two important elements are called upon in this sub-section to highlight several important facts divided into two. First, financial integration as a region has been demonstrated in our sample. Indeed, using data on credit market interest rate spreads, in the credit market, we estimated convergence (beta and sigma) using the Phillips and Sul (2007) method.[9] Using data got after extracting the predicted values, Figure 1 shows a downward trend over the period. The decline in these values (Beta and Sigma) suggests a strong convergence of interest rate spreads in other African countries' credit markets toward those in South Africa's credit market. This result backs up the findings of Ekpo and Chuku (2017) in the African equity market.

Figure 2 shows that the RFI index has been decreasing since 2001. This demonstrates an improvement in RFI. This confirms the facts depicted in Figure 1.

9) The authors test the transition model and econometric convergence. They develop a model to capture the evolution of a variable and to establish the convergence of this variable by considering the countries in the sample.

Figure 1. Convergence of interest rate spreads in the African credit market

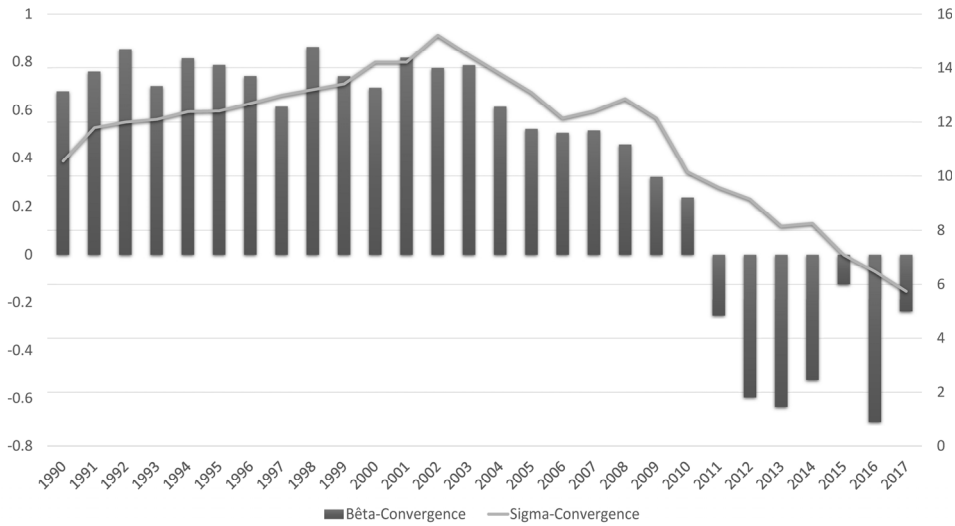
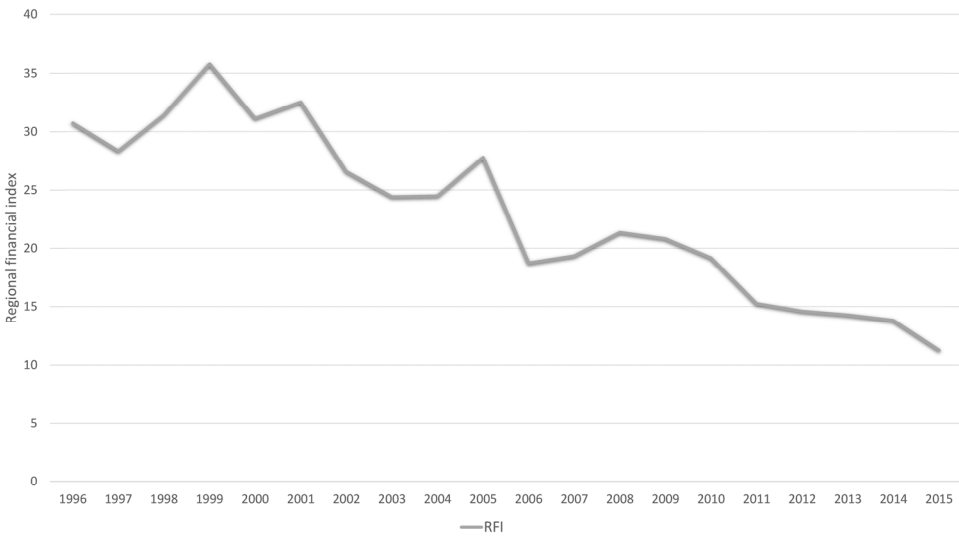
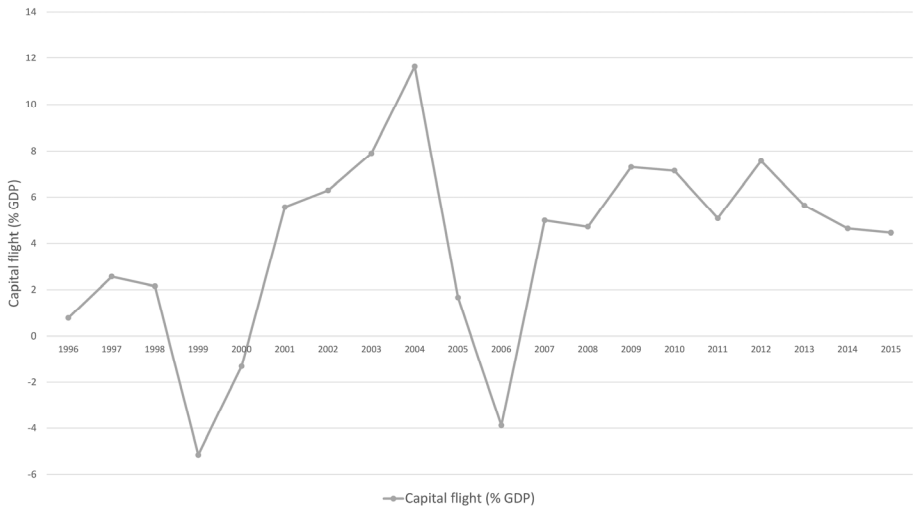


Figure 2. Evolution of regional financial integration in Africa (1996-2015)



Second, consider the magnitude of capital flight in Africa. The average evolution of capital flight in our sample is depicted in Figure 3. One important finding could be that capital flight decreases over the course of the study. We also see that capital flight increased slightly during the period associated with the Heavily Indebted Poor Countries Initiative and the Multilateral Debt Cancellation Initiative (2006-2010). Thus, debt relief and cancellation for some completion point countries has started a new phase marked by an increase in capital flight.

Figure 3. Evolution of capital flight (% GDP) in Africa (1996-2015)



V. Empirical Findings

A. Baseline results

Preliminary results from the OLS method show that RFI, Inflation, and the total external debt stock (% GDP) are all positively associated with capital flight (Table 2). Thus, an increase in the variable RFIN that results in an improvement in the RFI reduces capital flight. Inflation and the total stock of external debt continue to be important determinants of capital flight. Capital flight is reduced by financial liberalization as measured by the capital account openness index, the interest rate differential, and financial development. However, the biases associated with the OLS estimator warrant focusing on the System-GMM estimator results.

Overall, the model appears significant because, according to GMM principles, the AR2 and Hansen OIR are insignificant, validating the hypothesis of second-order non-correlation of residuals between instruments and the absence of restriction over-identification. The results indicate that the coefficient on the lagged variable of capital flight is both positive and significant. This means that the previous period's capital flight explains its current level by 0.0657 percentage point. Thus, this result is evidence of a memory effect in the dynamics of capital flight in Africa (Fofack and Ndikumana, 2015).

The coefficients on the RFI variable are positive and significant. This result indicates that an increase in RFI, as measured by a decrease in the *RFIN* variable, is associated with low levels of capital flight (*CF*). However, because statistical and economic significance do not always coincide, we check the economic and quantitative extent of RFI's negative effect on

capital flight by multiplying the coefficients of *RFIN* by their standard deviation, which is 50.658 (Table 1).[10] We do this for all three System-GMM specifications' results, and we get mostly 0.78, 0.897, and 0.846. In more practical terms, these results imply that lowering the standard deviation of the *RFIN* will result in a 0.78, 0.897, or 0.846 percentage point (pp) decrease in capital flight. Indeed, a deep RFI provides many alternatives to the use of private agents' capital by allowing them to take advantage of multiple financial services that offer

Table 2. *Baseline Results*

VARIABLES	Dependent variable: capital flight (% of GDP)					
	OLS			System-GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
L.CF				0.0657*	0.0434	0.0388
				(0.0370)	(0.0444)	(0.0441)
RFIN	0.00465	0.0155*	0.0176*	0.0154***	0.0177*	0.0167*
	(0.0213)	(0.0211)	(0.0212)	(0.00499)	(0.00914)	(0.00957)
Kaopen	-10.15***	-9.208**	-7.871**	-2.124	-1.739	-1.088
	(3.793)	(3.712)	(3.743)	(3.072)	(4.044)	(4.037)
GDP Growth	-0.0171	0.0302	0.107	0.0122	-0.0169	-0.0284
	(0.130)	(0.128)	(0.130)	(0.0333)	(0.0360)	(0.0356)
Dif-Interest	-0.172**	-0.217**	-0.206**	-0.190***	-0.216***	-0.224***
	(0.0872)	(0.0865)	(0.0860)	(0.0572)	(0.0760)	(0.0746)
Inflation		0.118**	0.0835*	0.0562*	0.00366	0.00353
		(0.0495)	(0.0504)	(0.0311)	(0.0355)	(0.0344)
Findev		-0.121**	-0.0934	-0.247***	-0.245***	-0.254***
		(0.0565)	(0.0567)	(0.0549)	(0.0708)	(0.0731)
External-Debt			0.0483***		0.0212***	0.0271***
			(0.0166)		(0.00553)	(0.00440)
polity2			0.122			0.142
			(0.190)			(0.130)
Constant	11.06***	12.04***	7.689***	11.29***	10.54***	10.22***
	(1.707)	(2.150)	(2.667)	(1.472)	(1.856)	(2.106)
Observations	230	230	230	230	230	230
R^2	0.051	0.104	0.137			
Countries				23	23	23
Instruments				21	20	21
AR1 (*p-value*)				0.00909	0.0160	0.0177
AR2 (*p-value*)				0.533	0.447	0.454
Hansen OIR				0.351	0.186	0.130

Note. Standard deviations in brackets are corrected for heteroscedasticity. ***, **, * represent the statistical significance of the coefficients at 1, 5 and 10%.

10) We follow the framework established by De Nicolo and Juvenal (2014) and taken up by Ekpo and Chuku (2017) for the relationship between RFI and real economic activity in Africa.

high returns in the continent's various credit markets, allowing them to better manage their asset portfolio (Fama, 1980; Wakeman-Linn and Wagh, 2008). The RFI reduces moral hazard while increasing the unit cost of capital flight by imposing information requirements on remittance transactions through financial institutions (monetary or non-monetary), declaring the origin of funds, and publishing financial statements of banking institutions. This result supports arguments that criticize the role of financial globalization in developing economies, as a significant portion of capital flight is driven by certain liabilities in African countries' balance of payments financial accounts (Ndikumana, 2014; Gaies et al., 2019).

The *Dif-Interest* variable is the cornerstone of the justification of capital flight following the portfolio choice analysis. Its coefficient is negative and significant in all three specifications (4, 5, and 6). Thus, as suggested by portfolio choice theory, an increase in the yield on bank deposits in the embedded credit market relative to the yield on US Treasuries keeps capital on the continent and thus reduces capital flight (Pattillo et al., 1999; Brada et al., 2013). This result appears to validate the theoretical model's analyses. An integrated credit market, in fact, provides a higher return on bank deposits than on three-month US Treasury bills. Thus, all else being equal, private agents will invest their income in bank deposits or any other asset on the integrated credit market, reducing capital flight. As for inflation, it is positively and significantly related to capital flight by 0.0562 points. Thus, an increase in prices reduces the discounted return on assets held by private agents, who will want to move them to more profitable and secure markets, resulting in *de facto* capital flight. This result supports Hermes and Lensink's (2014) contention that ensuring macroeconomic stability, particularly price stability, would reduce capital flight.

We observe a positive and significant relationship between total external debt stock and capital flight, estimated at 0.0212 and 0.0271 pp, respectively (specifications 5 and 7). This result suggests that the total external debt stock increases capital flight over the study period. A plausible explanation for this result is that private agents can expect that the debt servicing associated with a large stock of external debt will force the government to raise taxes, lowering the expected net return on domestic investment and leading to increased capital flight (Lensink et al., 1998). This result supports the revolving door hypothesis, which is commonly used to explain capital flight from external debt (Ndikumana, 2008; Ndikumana and Sarr, 2019). Domestic credit to the private sector (*Findev*) has a negative and significant sign in specifications 5, 6, and 7. Thus, financial development reduces capital flight by 0.247, 0.245, and 0.254 points, respectively. This result is central to the issue of African economies' internal financing. Indeed, financing the economy or transferring funds to OFCs is an alternative to using economic growth or natural resource rents. A focus on financing income-generating activities with high potential for growth can only help to reduce capital flight (Brada et al., 2013; Ndikumana, 2014).

B. Robustness checks

Our estimates of the relationship between RFI and capital flight may be insufficiently robust in several ways. Three points will be the focus of our results' robustness checks. First, governance variables are introduced to capture the quality of institutional arrangements. Second, we include the variables that interact with the RFI and the governance variables. Third, we estimate the RFI-capital flight relationship while taking structural breaks into account.

1. Alternative measures of the quality of institutions

Table 3 presents various estimates of the RFI-capital flight relationship by introducing governance

Table 3. *Adding the Quality Variables of Institutions*

VARIABLES	Dependent variable: Capital flight (% of GDP)					
	Corruption	Goveffectiveness	Political stability	Regulatory Quality	Rule of law	Voice and Accountability
L.CF	0.402***	0.393***	0.400***	0.390***	0.404***	0.394***
	(0.0158)	(0.0148)	(0.0179)	(0.0168)	(0.0142)	(0.0216)
RFIN	0.00965*	0.0111***	0.0123***	0.00571*	0.0210***	0.0159***
	(0.00495)	(0.00388)	(0.00376)	(0.00289)	(0.00462)	(0.00424)
Kaopen	-1.253	-0.693	-2.449*	-2.500	0.877	-1.288
	(4.330)	(2.419)	(1.264)	(1.511)	(3.206)	(2.418)
GDP Growth	0.111***	0.130***	0.0813***	0.137***	0.0838**	0.102**
	(0.0350)	(0.0319)	(0.0221)	(0.0280)	(0.0359)	(0.0397)
Dif-Interest	0.217	0.261*	0.177**	0.175	0.384**	0.394*
	(0.172)	(0.134)	(0.0769)	(0.114)	(0.156)	(0.195)
Inflation	-0.175	-0.133*	-0.247***	-0.135**	-0.191*	-0.251**
	(0.107)	(0.0708)	(0.0587)	(0.0549)	(0.110)	(0.0977)
Findev	-0.0241	-0.00598	-0.115***	-0.0743	0.0153	-0.0666
	(0.0782)	(0.0705)	(0.0376)	(0.0601)	(0.0706)	(0.0698)
External-Debt	-0.027***	-0.0213***	-0.0275***	-0.03***	-0.0393***	-0.0427***
	(0.00714)	(0.00645)	(0.00794)	(0.00518)	(0.00484)	(0.0108)
Governance indicators	-4.840	-5.056**	-0.0841	-2.738	-7.636***	-4.621*
	(3.094)	(2.391)	(0.644)	(2.212)	(2.679)	(2.285)
Constant	0.0235	-1.320	6.067***	3.900	-3.541	0.755
	(3.737)	(2.758)	(1.777)	(2.542)	(3.666)	(3.106)
Observations	433	433	433	433	433	433
Countries	23	23	23	23	23	23
Instruments	21	21	21	21	21	21
AR1 (*p-value*)	0.0203	0.0208	0.0199	0.0213	0.0214	0.0208
AR2 (*p-value*)	0.742	0.719	0.765	0.708	0.750	0.711
Hansen OIR	0.565	0.536	0.317	0.322	0.488	0.587

Note. Standard deviations in brackets are corrected for heteroscedasticity. ***, **, * represent the statistical significance of the coefficients at 1, 5 and 10%.

quality variables such as corruption control, government effectiveness, political stability and lack of violence, regulatory quality, rule of law, and voice and accountability. These estimates show that the coefficient on the variable capturing RFI in all specifications is positive and significant. This is consistent with the results in Table 3, which show that the RFI reduces capital flight. The coefficients are quite close. The RFI reduces capital flight in this way. As measured by its proxy Kaopen, financial liberalization is negative and significant in the specification, including the governance variable, which measures political stability and the absence of violence. This result is consistent with the previous one and supports the notion that financial liberalization reduces capital flight (Hermes and Lensink, 2014).

However, the addition of these governance variables is defined by five key facts. First, the *Dif-Interest* variable's coefficient is positive and significant on five specifications. More importantly, the coefficient's significance validates portfolio choice theory as a predictor of capital flight. The greater the difference between the interest rates on bank deposits in the integrated credit market and the rates of return on US Treasury bills (an increase in the return on US Treasury bills), the greater the capital flight. The higher the yield on US Treasury bills is compared to the yield on deposits in the integrated credit market, the more capital will flow to the US Treasury bill market.

Second, the sign of the variable inflation coefficient becomes negative and significant. Thus, the introduction of governance variables demonstrates that inflation reduces capital flight. This is true when inflation is accompanied by measures to protect and compensate private agents for losses, to ensure the quality of regulation, and to maintain political stability in order to keep capital in the country and investor confidence.

Third, in all specifications, the coefficient on the Debt variable is negative and significant, indicating that the stock of total external debt reduces capital flight in the presence of better governance quality. This result suggests that the revolving door hypothesis holds true when institutional quality is low (Ndikumana and Boyce, 2012). Fourth, in all specifications, the coefficient associated with the variable *GDP Growth* becomes positive and significant. Thus, higher incomes and profits generate more assets that can be placed abroad to offset the positive impact of *GDP* growth on investor confidence in domestic assets, according to supply side logic (Agyeman et al., 2022). This result has been widely reported in the literature. Fifth, some governance quality variables reduce capital flight, demonstrating that improved institutional quality raises the opportunity cost of capital flight. The effects of a rule of law (-7.636), government effectiveness (-5.056), and voice and accountability (-4.621) on capital flight are significantly stronger.

2. Consideration of the interactions between RFI and the quality of institutions

The results of the System-GMM estimator of the RFI-capital flight relationship with the addition of the interaction variables resulting from the multiplication of the *RFIN* variable and

the governance quality variables are presented in Table 4. Indeed, the results show that the signs of the variable coefficients obtained in Table 4 are still valid. Indeed, the results show that RFI reduces capital flight in Africa even further. Capital flight, the lag variable, remains positively related to its current period level.

Table 4. *Consideration of Interactions between RFI and Institutional Quality*

	Dependent variable: Capital flight (% of GDP)					
	Corruption	Goveffectiveness	Political stability	Regulatory Quality	Rule of law	Voice and Accountability
L.*CF*	0.397***	0.437***	0.416***	0.421***	0.409***	0.395***
	(0.0155)	(0.0176)	(0.0134)	(0.0153)	(0.0170)	(0.0156)
RFIN	0.0104***	0.0166***	0.0124***	0.00441*	0.00826***	0.00714***
	(0.00310)	(0.00439)	(0.00353)	(0.00240)	(0.00190)	(0.00211)
Fin-Lib	-3.981***	-3.930***	-2.415	-2.381	-2.444*	-2.744*
	(1.040)	(0.987)	(1.500)	(1.654)	(1.261)	(1.394)
Findev	-0.0925**	-0.102***	-0.0558	-0.0532	-0.0686	-0.0808*
	(0.0403)	(0.0357)	(0.0377)	(0.0412)	(0.0405)	(0.0409)
Dif-Interest	0.0831	0.242***	0.207**	0.201**	0.284***	0.332***
	(0.0837)	(0.0822)	(0.0816)	(0.0775)	(0.0948)	(0.112)
Inflation	-0.183**	-0.261***	-0.199**	-0.120*	-0.211***	-0.110*
	(0.0690)	(0.0593)	(0.0747)	(0.0603)	(0.0612)	(0.0576)
GDP Growth	0.128***	0.144***	0.114***	0.129***	0.103***	0.105***
	(0.0287)	(0.0226)	(0.0284)	(0.0344)	(0.0278)	(0.0296)
External-Debt	-0.0250*	-0.0588***	-0.0612***	-0.0668***	-0.0563***	-0.0740***
	(0.0140)	(0.00734)	(0.0131)	(0.0117)	(0.0110)	(0.0204)
RFIN×institutions	0.00248	-0.0380***	-0.0464***	-0.0718***	-0.0414***	-0.0463***
	(0.0118)	(0.00378)	(0.00929)	(0.00897)	(0.00826)	(0.0143)
Constant	6.701***	6.003***	4.262**	3.630*	4.534**	4.142**
	(1.645)	(1.709)	(2.045)	(1.825)	(1.899)	(1.932)
Observations	433	433	433	433	433	433
Countries	23	23	23	23	23	23
Instruments	21	21	21	21	21	21
AR1 (*p-value*)	0.0204	0.0190	0.0230	0.0206	0.0215	0.0214
AR2 (*p-value*)	0.718	0.667	0.709	0.643	0.726	0.726
Hansen OIR	0.253	0.186	0.386	0.370	0.279	0.488

Note. Standard deviations in brackets are corrected for heteroscedasticity. ***, **, * represent the statistical significance of the coefficients at 1, 5 and 10%.

The relationship between financial liberalization and capital flight remains skewed. External financial liberalization through capital account opening reduces capital flight. This is also true for financial development, inflation, and the total external debt stock (negative sign of the coefficients). The major results in this table suggest that the interaction variables reduce overall capital flight. Indeed, improvements in democracy, government effectiveness, political stability

and absence of violence, regulatory quality, the rule of law, and voice and accountability reduce capital flight via RFI. In this view, an improvement in governance improves capital flight control by reducing informal channels of capital outflow and the unit cost of capital transfers. Financial integration becomes a critical factor in reducing capital flight in this environment.

3. Consideration of structural breaks

The financial reforms implemented by the countries in our sample to reduce capital flight were not uniform, and it is difficult to say that the reform process occurred concurrently. Because there are structural breaks over the period, the effect of RFI on capital flight highlighted in Tables 2, 3, and 4 may be irrelevant. To overcome this limitation, we use the structural breaks test, which Ditzen et al. (2021a) recently developed, to determine and test the break dates in our sample. The goal is to estimate the RFI's effect on capital flight over time intervals that include a break date. The results show that simple endogenous breaks exist in the intercepts and trends (Table A6). Explicitly, structural changes can be seen in these countries in 2003, 2006, and 2012, which we assume are the result of financial reforms observed at different but close periods. Based on the knowledge of the structural breaks, we can estimate the coefficients of the variables over period intervals.[11)]

Table 5 suggests the existence of two regimes in Africa between RFI and capital flight during the study period. The first regime lasted from 1996 to 2003, and from 2013 to 2015. In this regime, increasing the RFI and decreasing the standard deviation of the *RFIN* reduces capital flight by 2.133 and 2.026 pp, respectively. This result is due to two factors. First, several anti-money laundering initiatives in Africa have been launched under the auspices of the Financial Action Task Force. These initiatives are based on a set of financial reforms implemented by the central banks of some developing regions, particularly those in Africa, to reduce smuggling and illicit capital transfers through the financial system. Thus, the RFI enabled the harmonization of information requirements (primarily in the banking sector) in foreign exchange regulation and capital transfers on the one hand, and the improvement and diversification of many financial services on the other. Second, with the encouragement of international financial institutions, some African countries have transitioned from a means-tested budgeting system to a program budgeting system, which provides greater control over public finances. This new system is primarily concerned with budgetary discipline and improved financial control over some public and parastatal enterprises. The RFI causes an increase in capital flight in the second regime, which lasts from 2004 to 2012. Thus, increasing the RFI results in a decrease in the standard deviation of the *RFIN*, which increases

11) Indeed, after performing the test and estimating the dates of structural breaks, we create a new variable for each interval (break). Note that implementing the structural break test on Stata generates variables according to selected intervals, which differ from the intervals resulting from the test (Table A6) as shown by Ditzen et al. (2021b). In addition, a last interval is generated to consider the upper bound of the period.

capital flight by 1.596 and 4.265 pp. This result's plausible explanation can be reduced to two arguments. The first argument suggests that Africa's economic growth during this period generated enormous capital gains, which were placed in Western financial centers under pressure from the governments of some African countries (Hugon, 2013). The second argument contends that the fact that some African countries are eligible for the Heavily Indebted Poor Countries Initiative and the Multilateral Debt Cancellation Initiative, combined with rising commodity prices (e.g., oil), has allowed them to maintain weak exchange rate controls and, paradoxically, fiscal indiscipline while capturing the regional financial system. Overall, the real GDP per capita growth rate remains a determinant of capital flight, while capital account opening remains a factor in reducing capital flight.

Table 5. *Consideration of Structural Breaks*

VARIABLES	Dependent variable: Capital flight (% of GDP)			
	(1)	(2)	(3)	(4)
	1996-2003	2004-2006	2007-2012	2013-2015
L.CF	0.413***	0.356***	0.354***	0.412***
	(0.0182)	(0.0324)	(0.0349)	(0.0178)
RFIN	0.0421***	-0.0315*	-0.0842***	0.0400***
	(0.00936)	(0.0176)	(0.0172)	(0.00718)
Kaopen	-3.024**	-8.104*	-7.104*	-2.254
	(1.458)	(4.661)	(4.089)	(1.342)
GDP Growth	0.0913**	0.0673	0.0985*	0.0786**
	(0.0328)	(0.0501)	(0.0500)	(0.0368)
Dif-Int	0.245	0.152	0.111	0.326*
	(0.171)	(0.278)	(0.221)	(0.172)
Inflation	-0.139*	-0.0186	-0.0238	-0.190**
	(0.0763)	(0.152)	(0.126)	(0.0781)
FINDEV	-0.0963**	-0.133**	-0.118**	-0.0901**
	(0.0410)	(0.0548)	(0.0468)	(0.0409)
External Debt	-0.0460***	-0.0346	-0.0352**	-0.0373***
	(0.00999)	(0.0218)	(0.0146)	(0.0115)
polity2	-0.250	0.588	0.723	-0.351
	(0.224)	(0.570)	(0.422)	(0.244)
Constant	5.722***	7.983***	7.566**	5.019**
	(1.925)	(2.603)	(2.754)	(1.893)
Observations	437	437	437	437
Countries	23	23	23	23
Instruments	21	16	16	21
AR1 (*p-value*)	0.0185	0.0161	0.0190	0.0188
AR2 (*p-value*)	0.732	0.924	0.884	0.733
Hansen OIR	0.316	0.183	0.181	0.371

Note. The standard deviations in brackets are corrected for heteroscedasticity. The ***, **, *, represent the statistical significance of the coefficients at 1, 5 and 10%.

VI. Conclusion

This study used a dynamic panel model of 23 African countries forming a region over the period 1996-2015 to examine the effect of RFI on capital flight using a portfolio choice model. The SGMM estimator was used to highlight this relationship, which validates the long-run structure between RFI and capital flight in Africa. Thus, various econometric analyses conducted suggested that RFI reduces capital flight in Africa. RFI and total external debt reduce capital flight, according to the addition of institutional variables. Furthermore, considering the interest rate differential revealed that trade-offs between two markets can also explain the level of capital flight in RFI. Finally, the examination of structural breaks revealed that there is one regime in which RFI reduces capital flight and another in which it has the opposite effect.

Based on these results, we can derive a set of economic implications for three important points. The first point entails deepening RFI, specifically by improving the system of control and supervision of fund transfer operations by requiring the origin of funds and the identity of operators involved in cross-border transactions. Develop regional financial systems by improving financial services to diversify the uses of private agents' savings, particularly long-term services such as passbook credits in the credit market. The second point focuses on reducing African countries' external debt. Indeed, the "revolving door" phenomenon described in the literature on capital flight results from a high level of external debt that is poorly prepared and subject to factors related to leaders' clientelism. As a result, it would be interesting to associate the process of African countries' external indebtedness with an institutional character through parliamentary and community authorizations and missions to control the use of loan funds, which are prerequisites for reducing managerial laxity among leaders, which can stymie RFI progress. The third and final point is the importance of higher-quality institutions. Aside from improving the institutional environment, it makes sense to implement incentives to improve governance quality to facilitate monitoring and even sanctions against illegal remittance operations.

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Appendix

Table A1. *Country List*

Algeria, Botswana, Egypt, Burkina Faso, Cameroon, Congo Republic, Ivory Coast, South Africa, Ethiopia, Gabon, Ghana, Kenya, Malawi, Mauritania, Mozambique, Morocco, Nigeria, Rwanda, Uganda, Sierra Leone, Tanzania, Tunisia, Uganda, Zambia,

Table A2. *Correlation Matrix*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CF (1)	1,000								
RFIN(2)	0.0075	1,000							
Kaopen (3)	-0.1269*	-0.1098*	1,000						
Findev (4)	-0.1683*	-0.0606	0.0438	1,000					
Dif-Interest (5)	-0.0409	0.1264*	0.1636*	-0.1590*	1,000				
Inflation (6)	0.0019	0.2577*	0.1197*	-0.1950*	0.5359*	1,000			
GDP Growth (7)	0.0106	-0.0392	0.0765	-0.1035*	0.0615	-0.0127	1,000		
External-Debt (8)	0.0494	0.1006*	-0.1495*	-0.2021*	0.2230*	0.1893*	-0.0565	1,000	
Polity2 (9)	0.0524	0.1420*	0.1163*	0.0876	0.2262*	0.3028*	0.0042	-0.2344*	1,000

Note. The * on the coefficients represents the significance at 5% after Bonferroni adjustment.

Table A3. *Cross-sectional Dependency Tests*

Variables	CD-Test Pesaran (2004)		CD-test Pesaran (2015)	
	CD-Test	P-value	CD-Test	P-value
CF	6.3	0.000	6.147	0.000
RFIN	14.51	0.000	45.621	0.000
Kaopen	42.21	0.022	37.546	0.022
GDP Growth	8.99	0.000	36.338	0.000
Inflation	12.93	0.000	53.206	0.000
Dif-interest	11.88	0.000	65.799	0.000
Findev	27.41	0.000	66.96	0.000
External-Debt	44.14	0.000	64.795	0.000
Polity2	36.45	0.020	43.21	0.020

Notes. Significance of the p-value for the Pesaran (2004) CD-Test implies acceptance of the strong cross-sectional dependence hypothesis while for the Pesaran (2015) CD-Test means rejection of the weak cross-sectional dependence hypothesis.

Table A4. *Unit Root Tests*

	Pesaran - CADF			Pesaran - CIPS		
	Constance	Constance with trend	Decision	Constance	Constance with trend	Decision
CF	-7.030***	-4.213***	I(1)	-	-	-
RFIN	-2.47***	-2.903***	I(0)	-2.203**	-2.771	I(0)
Findev	-4.210***	-3.266***	I(1)	-3.796***	-4.021***	I(1)
Dif-Interest	-5.717***	-4.472***	I(1)	-3.738***	-3.876***	I(1)
GDP Growth	-5.237***	-3.457***	I(0)	-3.738***	-4,086***	I(0)
Inflation	-3.09***	-2.072**	I(0)	-3.674***	-4.209***	I(0)
External-Debt	-3.110***	-2.469***	I(0)	-2.402***	-2.746***	I(0)
Polity2	-4.479**	-3.40**	I(0)	-2.569**	-3.345**	I(0)

Notes. The sign (*), (**) and (***), which are found in the CIPS statistics, indicate that the variables are stationary at a significance level of 10%, 5% and 1% respectively. The optimal lag lengths of Schwarz.

Table A5. *Testing and Estimation of Structural Breaks*

Bai & Perron Critical Values				
	Statistical test	critical value (1%)	critical value (5%)	critical value (10%)
supW(tau)	1.29	8.42	6.84	8.05
Estimated break points:	2003	2006	2012	
Estimation of break points				
	Index	Date	[95% Conf. Interval]	
1	8	2003	2000	2006
2	10	2006	1999	2013
3	15	2012	2011	2013

Table A6. *Definitions and Sources of Variables*

Variables	Définitions	Sources
CF	Capital flight (constant 2015 value) as a percentage of GDP.	The Political Economy Research Institute (PERI), University of Massachusetts Amherst(https://www.peri.umass.edu/capitalflight-from-africa)
RFIN	Quadratic difference between a country's credit market interest rate spreads and those of the regional average	IMF (2018)
Kaopen	A measure of the level of restrictions on international capital movements. It ranges from 0 to 1.	Chinn et Ito (2008)
FINDEV	Domestic credit to the private sector (percentage of GDP)	WDI (2020)
Dif-Interest	The difference between the interest rate on bank deposits in the integrated credit market and that on 3-month US Treasury bills.	WDI (2020)
Polity2	Score of political regimes. It ranges from -10 to 10. From -10 to -6 (autocracy), from -5 to 5 (anocracy) and 6 to 10 (democracy).	Polity IV
Inflation	First logarithmic difference in the consumer price index.	WDI (2020)
External-Debt	Total external debt stock as a percentage of GDP.	World Bank, International Debt Statistics
GDP Growth	Growth rate of real GDP per capita in PPP according to the production approach (logarithmic difference over the period).	Feenstra et al. (2015)
Corruption	Estimates of public perception of corruption, expressed in units of a standard normal distribution, i.e. ranging from about -2.5 to 2.5.	WGI (2020)
Goveffect	Estimates of perceptions of the quality of public services, the quality of the civil service and its degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to these policies. Range = -2.5 to 2.5.	