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Effect of capital flight on domestic investment: **Evidence from Africa**

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FINANCIAL ECONOMICS | RESEARCH ARTICLE Effect of capital flight on domestic investment: Evidence from Africa

Fentaw Leykun Fisseha¹*

Abstract: Capital flight is a major issue in developing economies; the problem is more severe in Africa, where domestic investment has been affected. Much attention has been given to the effect of legal and foreign capital flows in the international capital movement, disregarding illicit capital outflows (capital flight) from developing countries including Africa. This study examines the effects of capital flight and financial liberalization on domestic investment using the dynamic system generalized method of moments (GMM) for 30 African nations between 2000 and 2019. The econometric analysis revealed that capital flight is one of the conditions that severely constrains domestic investment financing in Africa. However, the impact of financial liberalization on domestic investment is shown to be insignificant. The empirical evidence is used to draw some policy implications aimed at reducing capital flight and enhancing domestic investment.

Subjects: Economics; Finance; Business, Management and Accounting

Keywords: capital flight; financial liberalization; domestic investment; system GMM; savings

JEL code: E22; O16; P33; P45

1. Introduction

A stunning paradox is revealed by the African continent. On the one hand, there was a long-lasting and deepening investment-savings gap, and on the other, the continent became a source of huge

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PUBLIC INTEREST STATEMENT

The study's conclusions are crucial for the general public and non-specialist readers of this research in a number of ways: First, the issue is finance, which is the lifeblood of people, businesses, and governments. Second, because of illegal capital outflows that cannot be traced back to their source, which further restricts domestic investment, including the mobilization of savings, firms and the general public are badly harmed by the lack of finance in developing countries. Thus, despite the practical challenges that countries are facing, the notion of understanding the negative effects of illicit capital flight on individuals and businesses in a country is a straightforward idea that might rationally persuade general readers who are not experts in the field. As a result, the general public will pay attention and support governments in curbing the problem of illicit capital flows out of nations.

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and increasing volumes of unrecorded capital outflows and capital flight. Annual capital flight from Africa reached \$88.6 billion, on average, during 2013–2015 or around 3.7% of African GDP, according to the Economic Development in Africa Report 2020, Tackling illicit Financial Flows for Sustainable Development in Africa, primarily due to trade misinvoicing, transfer pricing manipulation, and domestic tax losses (defined as domestic tax gap) (UN, 2020). It was \$836 billion or 2.6% of GDP between 2000 and 2015. From 2013 to 2015, the largest positive absolute outliers in terms of capital flight were Nigeria (\$41 billion), Egypt (\$17.5 billion), and South Africa (\$14.1 billion). Previous research on the impact of capital flight on domestic investment showed that Africa suffered a 16% loss in output as a result of the resulting financial leakages (Collier et al., 2001), and the annual rate of productive capital accumulation in sub-Saharan Africa was reduced by about 1% (Ndikumana, 2014).

The total capital flight from 30 African countries reached \$2 trillion (in constant 2018 US dollars) over the period 1970–2018, which represents 94% of the total GDP of the 30 countries and 85% of total GDP of all African countries in 2018 (Ndikumana & Boyce, 2021). Over the recent decade (2010–2018), capital flight grew considerably, reaching \$858 billion. There is also a significant variation in capital flight among African countries, with some being more vulnerable than others. Nigeria, South Africa, Algeria, Angola, and Morocco, for example, are among the top five nations that saw capital flight of more than \$100 billion between 1970 and 2018. If such vast sums were not being shipped out from the developing world, many countries' foreign debt obligations would have been significantly reduced (Alam et al., 1995). According to UNCTAD's Economic Development in Africa Report 2020, stopping illicit capital flight could almost cut in half the annual financing gap of \$200 billion that the continent faces to achieve the Sustainable Development Goals. Africa could gain \$89 billion annually by curbing illicit financial flows (UNCTAD, 2020).

The issue of capital flight is receiving renewed attention because several developing countries are experiencing capital flight as they make the transition to market economies. For example, according to the Political Economy Research Institute (PERI) report on capital flight from Africa (2021), total capital flight from 1970 to 2018 (billion constant 2018 \$) as a percentage of GDP for Congo, Republic, Sierra Leone, and Seychelles was 709.8, 690.9, 315.8, 298.0, and 214.9, respectively. This made Africa a net creditor to the rest of the world because this illicit capital outflow exceeds the stock of debt, belongs to African countries as liabilities (Ndikumana & Boyce, 2021).

Capital flight from all over the world is facilitated by a number of causes. Natural resource export embezzlement, tax evasion, corruption, transfer pricing, and outright capital smuggling from Africa could all be causes (Ndikumana & Boyce, 2021). Furthermore, multiple incentives motivate traders in emerging nations, where foreign currency is in limited supply, to under-invoice and over-invoice imports and exports. One of the conceivable motivations for attempting to bring money back into the country that was unlawfully moved outside is for investment purposes through export over-invoicing, which is a method of laundering illegal money through a legal channel. From an economic growth perspective, the money coming back to African countries is good, it comes through illegal means and may be spent for activities not that much helpful for countries (Lemi, 2020).

Studies show that Africa has a much lower private capital stock than other regions, with 40% of Africa's private capital stock held abroad in the form of capital flight, and capital flight imposes a severe burden on these economies in terms of forgone and capital flight to GDP ratios (Collier et al., 2001; Salandy et al., 2013). Capital flight is also posing a serious threat to the continent's social development. The majority of countries trail behind key measures of social progress and are not on track to accomplish the MDGs' principal components (UN, 2013). Despite a minor decrease in the poverty headcount ratio, sub-Saharan Africa is regarded to have the greatest poverty rate and is the only region where the number of poor people is consistently increasing (from 205 million in 1981 to 414 million in 2010). In terms of health and access to basic social infrastructure, the continent trails behind both targets and other regions (Ndikumana & Boyce, 2021). All of this makes Africa's capital flight problem worse than the rest of the globe.

Academicians and policymakers wanted to investigate capital flight once it was identified as a persistent and growing development problem in Africa. New empirical investigations have piqued the academic community's interest (Ndikumana & Boyce, 2021; Ashman et al., 2021; Ndikumana & Boyce, 2010; Ndikumana, 2014; Yalta, 2021). The interest in the topic among policymakers is sparked by a severe limitation coming from large-scale financial flight to fund hunger, endemic illness, and other development challenges in underdeveloped nations.

Prior studies focus on measurement, determinants, and extent of capital flight (Khan & Haque, 1985; Ize & Ortiz, 1987; Kant et al., 1998; Schneider, 2002; Boyce, 2010; Economics & Archiv, 2011; Kar, 2012; Ashman et al., 2021; Ndikumana & Boyce, 2021). Most others, in Africa and Asia, focus on determinants of FDI, both at country and cross-country levels (Onyeiwu, 2021; Buckley et al., 2015; Lokesha et al., 2012; Moreira, 2008; Onyeiwu, 2021; Sichei & Kinyondo, 2012; Ade et al., 2018; Castro & Camarillo, 2014; Muse Sichei & Kinyondo, 2012; Hussain & Hussain, 2016). There are few studies on the effects of capital flight on country's capital formation (investment; Achu & Edet, 2020; Ndikumana, 2014; Tiruneh et al., 2022; Yalta, 2021).

This study significantly contributes to the existing literature about capital flight and domestic investment because of several reasons. First, very little study has been done in African countries on the association between capital flight and capital formation. Most prior studies on this link were primarily conducted in developed markets (Achu & Edet, 2020; Ade et al., 2018; Boyce, 2010, Ndiaye, 1996; Ndikumana, 2014; Ndikumana & Boyce, 2021; SODJI, 2020; Tiruneh et al., 2022), so this study would shed light on the impact of capital flight on total capital formation in the context of Africa, developing economies. Second, the study covers a wide range of countries (30) in Sub-Sahara Africa. Since prior research' findings have not always been consistent, investigations in varied situations will help to clarify variations between countries. Finally, unlike previous studies, the study investigates the impact of financial liberalization on domestic investment. Despite the fact that African countries are well known for favouring capital account liberalization, a study by African Development Bank (AfDB) researchers Bicaba and Coricelli (2015) shows that there is a large gap between policymakers' desire for capital openness and the degree observed. These countries are also well connected to global financial markets. The rate of liberalization varied by country, for instance, Mauritius and Zambia entirely liberalized their capital accounts in the early 1990s, whilst Angola, Tunisia, and Tanzania, for example, maintained major restrictions until 2005. As a result, accounting for financial liberalization in the study is innovative.

The study then continues with an examination of the impact of capital flight and financial liberalization on domestic investment in the case of 30 African countries from the period of 2000 to 2019. The rest of the paper is organized as follows: Section 2 presents the review of related literature; section 3 specifies research methodology and data; section 4 presents results and discussions; section 5 concludes the article.

2. Literature reviews and hypothesis development

2.1. The Solow growth model (1956)

In the assumption of Solow growth model, a contribution to the theory of economic growth, capital accumulation is a fundamental driver of long-run economic growth (Solow, 1956). According to this model, key components of economic growth are saving and investment. An increase in saving and investment raises the capital stock and thus raises the full-employment national income and product, and as the national income and product rises, the rate of growth of national income and product increases. Scientifically, any factor that hinders domestic investment is a constraint for economic growth, and, hence, it is worth to investigate the linkage between capital flight, financial liberalization, and domestic investment in African countries. In investigating the implications of capital flight and financial liberalization on economic development in Africa, a close attention should be paid to the linkage between capital flight, financial liberalization, and domestic investment in the region. In the economic literature,

domestic investment has been conferred as a key driver of long-run economic growth. This long-run economic growth was the focus of the Solow growth model.

The impact of capital flight on domestic investment can be explained in various ways. The first possible reason is that the flows of capital out of the country deplete the amount of both private and public savings, which in turn reduces domestic capital formation. Specifically, given the limited access to global capital markets by African countries, imperfect capital mobility can also motivate the link between domestic investment and savings (Ndikumana, 2014). The second possible reason in the literature as to the impact of capital flight on domestic investment is argued through macroeconomic uncertainty. From the perspective of private economic agents, high capital flight is seen as a sign of failure of macroeconomic policies and institutions to which economic regulation belongs. This condition would let the flow of private capital insecure with high sovereign risk at home.

Furthermore, capital flight increases government insolvency through both flight of private wealth (tax base erosion) and embezzlement of public resources as a result of corruption—also known as corruption-induced capital flight. Consequently, private agents worried about future tax burdens and let their capital to flight to abroad for safety. This would reduce the demand for domestic assets, leading to lower private domestic investment. Over all, the reduction in domestic assets from the private side together with depletion of public revenues (public side) would result in reduction of total domestic investment (Ashman et al., 2021; Boyce, 2010; Collier et al., 2001; Geda & Yimer, 2016; Kant et al., 1998; Kar, 2012; Ndiaye & Siri, 2016; Ndikumana, 2014; Ramiandrisoa & Rakotomanana, 2017).

Hypothesis 1: illicit capital flight reduces domestic investment in Africa.

Scanty of empirical studies investigated the impact of capital flight on domestic investment in emerging and African countries. A study by Yalta (2021) investigated the effect of capital flight on investment taking emerging economies as a case over the period 1975-2000. The result revealed the negative effect of capital flight on private investment and no effect on public investment, whereas the effect of financial liberalization on capital flight is found statistically insignificant. Ndikumana (2014) studied the impact of capital flight and tax havens on investment and growth in Africa. The result indicates a negative and robust effect of capital flight on domestic investment. Another empirical study by Salandy et al. (2013) on the impact of capital flight on domestic investment and growth taking the two Caribbean countries, Trinidad and Tobago, as case studies confirm the negative impact of capital flight on both domestic investment and growth. A comprehensive study by Ndiaye (1996) examined the Impact of Capital Flight on Domestic Investment in the Franc Zone. The study indicates contrasted capital movements within the Franc Zone: high magnitude of capital flight is registered in central Africa than West Africa, representing 81.2% or 84% of total capital outflows. The negative effect of capital flight is more evident on private investment than public investment. According to the Author, this is primarily due to capital outflows from the central Africa zone than from the Western Africa zone. Given these results, the author argued that capital flight repatriation can help raise the level of domestic investment. Effiom et al. (2020) analysed the impact of capital flight from Nigeria on domestic investment over the period of 1980-2017, and indicates the long-run negative effect of capital flight on investment in the country. Achu and Edet (2020) studied the impact of capital flight on domestic investment in Nigeria and found that capital flight severely affected domestic investment in the country. Considering a panel of emerging and advanced Europe, Tiruneh et al. (2022) investigated the effect of capital flight on domestic investment, and the result suggests that capital flight has an adverse impact on investment in the economies included in the sample.

The forgoing empirical reviews convey two relevant points: firstly, these studies underlined the negative impact of capital flight from emerging and African economies on domestic investment, more evident on private investment than public. Secondly, the role of capital flight repatriation towards raising the level of domestic investment. The objective of this study is to investigate the

impact of capital flight and financial liberalization on domestic investment covering African economies over the period of 2000-2019.

2.2. Financial liberalization and domestic investment

2.2.1. The McKinnon-Shaw hypothesis (1973)

Following the implementation of financial reforms by developing economies by the late 1980s and early 1990s, many countries in Africa undertook far-reaching economic reforms. Financial liberalization was a significant component of these reforms. Today financial reforms appear to have affected the sub-Saharan African economies very little given the existence of several versions of financial liberalization hypothesis (Reinhart & Tokatlidis, 2003).

McKinnon (1973) and Shaw (1973) claimed that when a developing country's interest rate is liberalized, the real interest rate rises, driving savings, investments, and eventually economic growth. McKinnon (1973) and Shaw (1973) focused their original framework on financial repression and the need to alleviate it by, among other things, allowing the market to determine real interest rates and removing credit limitations. Repression, according to McKinnon (1973) and Shaw (1973), will result in low savings, high consumption, low investments, and poor economic growth. The McKinnon-Shaw framework examines market inefficiencies caused by financial constraints (Hamdaoui & Maktouf, 2019).

Shaw (1973) proposed the "debt-intermediation hypothesis," which states that increased financial intermediation between savers and investors as a result of financial liberalization (higher real interest rate) and financial development increases the incentive to save and invest, stimulates investment due to increased credit supply, and improves average investment efficiency. He went on to say that growing financial intermediation directly fuelled growth. Liberalization would result in a more extended, enhanced, and integrated financial sector, resulting in higher savings rates, higher investment rates, and a direct boost to growth due to improved financial technologies.

As a result, McKinnon–Shaw (1973) had the following stance on financial liberalization: Reduced fiscal dependence of the state on credit from the banking system (to allow for greater expansion of credit to the private sector); the integration of formal and informal markets; a movement towards equilibrium exchange rates, and, eventually, flexible exchange rate regimes with open capital accounts (Serieux, 2008); market-determined interest rate; ease of entry into the banking sector to enhance competition.

Fry (1997), on the other hand, identified five preconditions for financial liberalization to be successful: A reasonable level of price stability; fiscal discipline in the form of a sustainable government borrowing requirement that avoids inflationary effects; profit-maximizing, competitive behaviour by commercial banks; a tax system that does not impose discriminatory explicit or implicit taxes on financial intermediation; and Adequate prudential and supervisory supervision of commercial banks, implying some minimal levels of accounting and legal infrastructure; and this indicates that perfect information and perfect competition are prerequisites for financial deregulation (Arestis & Demetriades, 1999).

The McKinnon and Shaw hypothesis found only mixed empirical support and could not explain sustained increases in the growth rate of an economy either (Eschenbach, 2004), indicating that financial liberalization alone is a necessary, but not a sufficient condition for improving the economic performance of developing countries. Most generally, financial liberalization seems to exert a significantly positive influence on the quality of investment rather than its quantity and the volume of savings. Financial liberalization can exert a positive effect on growth rates as interest rate levels rise towards their competitive market equilibrium, while resources are efficiently allocated. Accordingly, eliminating controls on interest rates and allowing them to increase could stimulate a higher level of savings. Moreover, with the assumption of a strong response of savings to the rate of interest, higher interest rates are expected to increase financial intermediation (the level of financial asset channelled by the financial system). Strictly under these strong assumptions, it is likely that financial liberalization produces higher savings which ultimately fosters economic development through changes in quality (by allowing efficient

allocation of resources) and quantity of investment (Reinhart & Tokatlidis, 2003). On top of that, macroeconomic stability and sound regulation of the banking sector seem to play a crucial role for the success of financial liberalization. On the other hand, sharp monetary restriction in the context of financial liberalization may furthermore lead to prohibitively high real interest rates. Eventually, the combined impact of several factors may lead to financial collapse.

Hypothesis 2: The more open the country is to cross-border capital transactions, the more enhanced its domestic investment.

Herme and Lensink (2005) studied the effect of Financial Liberalization on saving, investment and economic growth, and find no evidence that financial liberalization affects domestic saving and total investment, but positively associated with private investment and per capita GDP growth and finds that liberalization reduces domestic savings and is related negatively with public investment. Authors suggest that financial liberalization leads to a substitution from public to private investment, which may contribute to higher economic growth. Similar results are obtained by an empirical investigation of the relation between financial liberalization, on the one hand, and savings and investment, on the other hand, in Uruguay by Melo and Tybout (1986) where savings behaviour exhibited a clear shift with financial liberalization and the responsiveness of investment to interest rates and real exchange rates appear to increase.

Khan and Hasan (1998) investigated the influence of Financial Liberalization on Savings and Economic Development in Pakistan using annual time-series data for the period 1959–60 to 1994– 95. This result holds true when money demand and savings functions are estimated in static longrun cointegration regressions as well as in the dynamic formulation. Authors suggested that the financial liberalization policies currently being pursued in Pakistan are likely to result in financial deepening. An increase in the real interest rate (either by increasing the nominal interest rate or by reducing the inflation rate) would lead to the accumulation of money balances (financial assets), which would improve the availability of loanable funds for investment. Yalta (2021) studied the effect of capital flight on investment in the case of 22 emerging markets using dynamic panel data over the period of 1975–2000, and as a result the impact of financial liberalization on the marginal effect of capital flight on investment is found statistically insignificant. Generally, mixed empirical results are proved in the literature regarding the effect of financial liberalization on investment and savings, especially in emerging and developing countries.

2.3. Drivers of capital flight

Despite the renaissance of economic growth for the past two decades, Africa is still suffering with very high and persistent poverty rates with an often increasing level of inequality. Among the fundamental problems still African countries suffering from are their inability to sustain high growth rates to generate meaning full gains in poverty reduction and the low level of investment as one of the structural constraints. The shortage of long-term domestic financing is argued in the literature as one of the reasons for Africa's low level of domestic investment (Ndikumana & Boyce, 2021).

Capital flight in Africa is mainly caused by Trade misinvoicing, Transfer pricing manipulation, and Domestic tax losses (defined as domestic tax gap) (UN, 2020). It is often argued in the literature that capital flight is the outcome of actions by rational African savers or investors who move their capital out of their country looking for higher return or safety by justifying some claims that capital held domestically suffers from financial risk due to currency depreciation, devaluation, inflation and financial instability, political risks (risk of expropriation), tax policy uncertainty, and poor economic governance (Ndikumana, 2014). This argument suggests that the main determinant factor of capital flight is the risk adjusted rates of return to investment. However, the argument raised here above faces both conceptual and empirical problem based on the theory of portfolio selection-based on the assumption that investors allocate their wealth across the available assets in order to maximize their expected utility of final wealth (Ortobelli & Rachev, 2001). On the one hand, one can argue that honesty and healthy investors may go for the rational decision of risk adjusted rate of return from the invested capital. On the other hand, holders of stolen assets may be willing to accept low and even negative returns from their investment in exchange for the protection that banking secrecy jurisdiction and tax havens. Empirically, there is scanty of evidence to portfolio choice theory and no conclusive evidence for portfolio selection motive by considerations of risk-adjusted returns to investment; it is not possible to assert conclusively that capital flight from Africa is due to lower rates of risk-adjusted returns in Africa relative to the rest of the world (Boyce, 2010; Ndikumana, 2014, 2014).

Similar studies have been conducted on the determinants of capital flight (see, Ndikumana, 2014; Ramiandrisoa & Rakotomanana, 2017; Geda & Yimer, 2016; Kwaramba et al., 2016; Ndiaye and Siri 2016). Ndikumana (2014) conducted eight case studies on the causes and effects of capital flight from Africa that covers resource-rich countries (Cameroon, the Republic of Congo, and Zimbabwe), non-resource large economies (Kenya and Ethiopia), and low-income non-resource economics (Burkina Faso and Madagascar). The results confirm, especially in the case of natural resource-rich countries, that external borrowing, political instability, and trade misinvoicing drive capital flight. The study also underlines the role of good institutions in alleviating the risks of capital flight. Political cycles and crises are key determinants of both unrecorded outflows of capital from the country and smuggling into the country or capital flight reversal (Ramiandrisoa & Rakotomanana, 2017); Geda and Yimer (2016) shows that macroeconomic instability, the degree of financial market deepening, export, interest rate differentials, political instability, corruption, and debt-creating flows are the most important determinants of capital flight from Ethiopia; Kwaramba et al. (2016) shows that Trade misinvoicing occurs mostly in exports of diamonds, gold, and nickel and that macroeconomic and political instability as key driver of capital flight from Zimbabwe; Ayamena Mpenya et al. (2016) confirms that the natural resources sector, particularly the oil and timber industry, is an important channel of capital flight through trade misinvoicing in Cameroon, Ndiave and Siri (2016) concludes that capital flight is the result of ineffective regulation of foreign exchange operations, a permissive tax system, and collusion between a politico-administrative elite and the business sector in Burkina-Faso. The econometrics analysis reveals a negative impact of capital flight on tax revenue.

To sum up, capital flight in developing countries like Africa was fuelled by a need for capital funds from foreign loans, foreign equity, and domestic sources to service external debt and fund domestic investments at the time. A sudden or prolonged outflow of domestic capital was likely to affect a country's macroeconomic performance, so these surges were labelled capital flight rather than normal flows in the context of structural adjustment policies in most African countries (Khan et al., 2000). Slany et al. (2020) initially tested the link between capital formation and capital flight as established in the literature, providing evidence of a negative correlation. However, this relationship seems to be subject to other variables that affect both capital formation and capital flight. As a result, the relationship between capital flight and domestic investment in developing nations like Africa should be discussed alongside other factors proposed in the literature as predictors of domestic investment. For example, gross domestic savings (%GDP), bank private credit (%GDP), terms of trade index, trade openness (%GDP), financial liberalization, real GDP growth rate (% annual), external debt stock (%GNI), and inflation as measured by the GDP deflator, among other variables, have been suggested to be considered alongside capital flight as determinants of domestic investment (Geda & Yimer, 2016; Kwaramba et al., 2016; Ndiaye & Siri, 2016; Ndikumana, 2014; Ramiandrisoa & Rakotomanana, 2017).

It is better to align how a capital shortage induced by capital flight boosts local interest rates and adds to the strain on many African countries' high external debt payment levels to understand why some of the aforesaid variables were included. Foreign loans can also cause debt-fuelled capital flight, which compounds government debt. Because of their high levels of poverty and unsustainable debt burdens, these countries were categorized as "heavily indebted poor countries" in 1996, qualifying them for special IMF and World Bank support. Capital flight slows the accumulation of capital by lowering private investment, which could have been used to fund innovative manufacturing technologies, machines, and processes that would have enhanced worker productivity (Fofack & n.d.ikumana, 2010; Ndiaye, 1996; Ndiaye & Siri, 2016; Ndikumana, 2014). It's no surprise that past study has shown a negative correlation and impact of capital flight on economic performance, given the rising foreign debt as a result of capital flight (Achu & Edet, 2020; Tiruneh et al., 2022).

A saving gap, on the other hand, occurs when a country's domestic resources are significantly less than what is required to fund the investment necessary to achieve a targeted pace of growth. In this scenario, capital flight can widen the gap between saving and investment in a country by suffocating local savings and lowering investment in manufacturing facilities and other productive assets (Yalta, 2021). Likewise, a possible depreciation of the national currency as a result of capital outflows raises investment costs while lowering productive investment and productivity growth (Ampah & Kiss, 2019). In addition, an inflationary macro-environment created by expansionary policies creates conditions for expected devaluation, making agents less trustful of government measures aimed at resolving the problem. As a result, agents' assets are transferred to other countries, leaving domestic capital exposed and unable to promote domestic investment (Achu & Edet, 2020; Tiruneh et al., 2022).

3. Data and methodology

3.1. Definition and measures of capital flight and financial liberalization

The term "capital flight" has no universally agreed definition (Yalta, 2021; Alam et al., 1995; Jimoh, 1991). Capital flight has been defined in a variety of ways, resulting in a variety of measurements. It is defined as capital fleeing a domestic financial market that is at odds with the domestic society's interests, goals, and objectives (Jimoh, 1991); it is unrecorded capital outflows by residents of developing countries (Yalta, 2021). Arbitrary disparities between normal flows and capital flight are required in some cases (Alam et al., 1995). The former is related to economic and political uncertainty in the home nation, while the latter is due to an economic agent's presence for assets with greater returns overseas. All unlawful money flows are capital flights, while all legal capital outflows are normal (Lessard & Williamson, 1987).

However, Jimoh (1991) defined capital flight as a subset of international asset redeployment or portfolio adjustments that occur in the presence of conflict between asset holders' and domestic society's objectives, with the justification that not all illegal transactions are done solely for the purpose of avoiding the domestic financial market, and not all legal capital transactions are in line with social goals. This definition is supposed to be compatible in the context of Africa's least developed nations (LDCs), where the interests of the government and the interests of the people are diametrically opposed. Most position holders in these countries are primitive capital accumulators through smuggling, financial fraud, bribery, kickbacks, racketeering, corruption, looking the other way, supplier- and remover contracting, over-valued contracts, and other methods, some of which are immoral and some of which are criminal, and are likely to be among the reasons why these societies have not progressed despite their long history of political independence.

Different measures for capital flight have been adopted based on the varied definitions given to the issue. Some have defined capital flight as all private capital outflows from LDCs, whether short-term, long-term, portfolio, or equity investments, while others have defined it as all capital outflows that do not generate benefits to the domestic economy in the form of tax or investment income that could have alleviated debt servicing problems (Khan & Haque, 1985). However, due to changes made with trade misinvoicing, exchange rate fluctuations, loan forgiveness, and change in interest arrears, the measure presented by Ndikumana and Boyce (2021) is considered to be the latest measure of capital flight for African countries. More operationally, capital flight (*KF*) is

defined in the literature as the difference between total capital inflows and recorded foreign exchange outflows (Jimoh, 1991; Boyce, 2010; Ndikumana & Boyce, 2021, 2021, Yalta, 2021).

This study follows the methodology outlined by Ndikumana and Boyce (2010), which has been updated in recent publications such as Ndikumana, Boyce, and Ndiaye (Ndiaye, 1996) and Ndikumana and Boyce (Hamdaoui & Maktouf, 2019; Ndikumana, 2014; Ndikumana & Boyce, 2021, 2021). Two adjustments are made to the approach for calculating trade misinvoicing in the new edition of Ndikumana and Boyce (2021): The first change is to the cost of insurance and freight (CIF) factor, which is used to convert exports from freight-on-board (fob) to CIF values, and the second is to an improvement in the computation of aggregate trade misinvoicing, which is obtained by scaling up discrepancies between African countries' export and import data and the corresponding values reported by their trading partners in the group of advanced or industrialized countries (ICs). According to these authors, export misinvoicing (DXIC) and import misinvoicing (DMIC) for African countries *i* in a given year *t* are calculated as follows:

$$KF it = DEBTADJ it + DFI it - (CA it + RES it)$$
(1)

where DEBTADJ is the change in total external debt outstanding adjusted for exchange rate fluctuations, trade misinvoicing (see below), debt forgiveness, and change in interest arrears, DFI is net direct foreign investment, CA is the current account deficit, and RES is net additions to the stock of foreign reserves. Trade misinvoicing is significant for developing countries in general and African countries in particular that many African countries are losing huge amounts of US dollars due to trade misinvoicing with their trading partners (Lemi, 2020).

Export misinvoicing

$$\mathsf{DXIC}_{it} = \mathsf{M}_{IC,it} - \mathsf{cif} * \left(\mathsf{X}_{i, IC,t} + \mathsf{X}^{\mathsf{U}}_{i, IC,t} \right) \tag{1.1}$$

Import misinvoicing:

$$DMIC_{it} = (M_{i, IC, t} + M^{U}_{i, IC, t}) - cif * X_{IC, it} + X_{i, IC, t})$$
(1.2)

where the terms $X^{U}_{i, IC, t}$ and $M^{U}_{i, IC, t}$ represent the amounts of exports and imports recorded under "unspecified areas" that are allocated to ICs based on the latter's shares in the African country's total exports and imports. Then, the aggregated trade misinvoicing concerning all partners is calculated as:

$$\text{MISINV}_{it} = \text{DXIC}_{it}/\text{ICXS}_{it} + \text{DMIC}_{it}/\text{ICMS}_{it}$$

where ICXS represents IC's share in the sum of the country's exports to advanced economies and exports to emerging and developing countries. ICMS is the IC's share of the sum of the country's imports from advanced economies and imports to emerging and developing countries. Finally, the estimated trade misinvoicing is added to the balance of payment residual to obtain adjusted capital flight as follows:

$$ADJKF = CDEBTADJ + FDI + PI + OI - (CAD + CRES) + MISINV$$
(2)

where CDEBTADJ is the change in external debt stock adjusted for exchange rate fluctuations, debt forgiveness, and change in interest arrears; FDI is foreign direct investment; PI is portfolio investment; OI is other investments; CAD is the current account deficit; CRES is net additions to foreign exchange reserves; and MISINV is net trade misinvoicing. This is the methodology adapted from Ndikumana and Boyce (2021) to this paper to measure capital flight from African countries.

Financial liberalization, which, in the context of this study, refers to how many restrictions on cross-border transactions have been removed, is measured by the recently updated Chinn and Ito (2006) index (KAOPEN), an index measuring a country's degree of capital account openness. This index is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The index is computed based on four components: Restrictions on capital account transaction payments, current account transaction payments, surrender or repatriation requirements for export proceeds, and the presence of multiple exchange rates. The Chinn-Ito index is there for the principal component of these four components which ranges from –2.5 to 2.5; the more open the country is indicated the higher value of this index.

3.2. Econometric specification

To investigate the impact of capital flight and financial liberalization on domestic investment in African countries, the econometric model design takes into account the fundamental determinants of investment as established in the literature. The main variables of the study are capital flight and financial liberalization, and control variables accounted are domestic bank credit to the private sector (% GDP) to account for financial development, gross domestic saving (GDS), term of trade (TOT), and trade openness (%GDP) to capture the impact of global factor and market access, as well as the effect of shocks to import and export prices, inflation measured by GDP deflator (% annual), external debt stock (%GNI), and real GDP growth rate (Ndikumana, 2014, 2014; Salandy et al., 2013; Yalta, 2021). To account for the accelerator, the model considers lags in real GDP growth. High rates of GDP growth are linked to higher levels of investment and productivity. Investment should rise as a result of financial development as well, as measured by domestic bank loans to the private sector (%GDP). A change in trade terms is thought to have a detrimental impact on domestic investment in developing nations by raising the relative pricing of imported capital goods. The external debt stock is factored into the model to evaluate the revolving door hypothesis, implying that increased capital flight combined with increased external finance availability can boost investment (Yalta, 2021).

The empirical models are stated as follows (Ndikumana, 2014; Salandy et al., 2013; Yalta, 2021) taking into account such issues as outliers, multicollinearity, Heteroscedasticity, autocorrelation, endogeneity, and country-specific effects. The influence of capital flight on gross capital production is examined using the following independent models, both with and without financial liberalization.

$$Dinv_{it} = \alpha_1 Dinv_{it-1} + \alpha_2 KF_{it} + \alpha_3 pcred_{it} + \alpha_4 tot_{it} + \alpha_5 trade_{it} + \alpha_6 asaving_{it} + \omega_i + \mu_{it}$$
(1)

$$Dinv_{it} = \alpha_1 Dinv_{it-1} + \alpha_2 KF_{it} + \alpha_3 pcred_{it} + \alpha_4 tot_{it} + \alpha_5 trade_{it} + \alpha_6 liberal_{it} + \alpha_7 asaving_{it} + \omega_i$$

$$+ \mu_{it}$$
(2)

$$Dinv_{it} = \alpha_1 Dinv_{it-1} + \alpha_2 KF_{it} + \alpha_3 pcred_{it} + \alpha_4 tot_{it} + \alpha_5 trade_{it} + \alpha_6 liberal_{it} + \alpha_7 asaving_{it} + \alpha_8 inflation_{it} + \alpha_9 GDPG_{it} + \alpha_{10} debt_{it} + \omega_i + \mu_{it}$$
(3)

Dinv is gross domestic investment measured by total gross fixed capital formation scaled by GDP, *KF* is capital flight scaled by GDP, *pcredit* is domestic bank credit to the private sector as a percentage of GDP, *dsaving* is gross domestic saving scaled by GDP, *TOT* is the term of trade index, *trade* is to measure trade openness (imports + exports) as scaled by GDP, liberal is financial liberalization as measured by the chin-Ito index (2006), inflation, as measured by GDP deflator, debt as measured by external debt stock as a percentage of gross national income (GNI), ω_i , is a term used to capture country-specific factors which are omitted but important factors to affect investment in each country, and $+\mu_{it}$ is a random error term. Outliers were first treated with

a winsorizing method, then a fixed-effect estimating model was employed to account for countryspecific heterogeneities, and finally, the two-step system generalized method of moments (GMM) was estimated to capture the regressors' potential endogeneity. Due to data availability for specific variables in some sample countries of Angola, Ethiopia, Morocco, Tunisia, Uganda, and Zambia, unbalanced panel data is used in the model not to lose more degrees of freedom.

The dynamic generalized method of moments (GMM) works to eliminate serial correlation, Heteroscedasticity, and endogeneity, and can be used for time-series, panel, and cross-sectional data. The GMM dynamic panel estimation is capable to correct for unobserved country heterogeneity omitted variable biases, measurement error, and endogeneity problems. It is efficient while having fewer periods and more cross-sections. It is more advantageous than instrumental models such as two-stage least square (2sls) if Heteroscedasticity is present and addresses potential bias stemming from the use of country-specific fixed effects and lagged dependent variables as a repressor (Roodman, 2009). In the presence of high persistency among variables, the system GMM model does perform well as compared to the difference GMM (2008; Ndiaye, 2014; Tiruneh et al., 2021; Yalta, 2010).

As shown in Tables 3 and 4, when applying the fixed-effect model for the specification used in this paper, several econometric issues arise. To begin with, as previously stated, some of the explanatory variables may be endogenous. Second, explanatory factors and time-invariant country characteristics may be linked. Finally, autocorrelation can occur when the lagged dependent variable is included. In the context of these difficulties, using fixed effects might lead to skewed and inconsistent results (Roodman, 2009). To overcome these issues, the researcher used the system GMM technique described by Arellano and Bover (1995). The levels equation is used in this way to create a system of two equations, one in levels and one in differences. To compute the system estimator, variables in differences are instrumented with lags of their levels, while variables in levels are instrumented with lags of their levels, while variables in levels are instrumented with lags of their levels, while variables in levels of more instruments by instrumenting the variables in levels with their lagged first difference. Lagged values of all explanatory variables dated t-4 are utilized as instruments in levels for first difference equations in this study, while lagged first differences of endogenous variables are employed as instruments in the level equation.

4. Results and discussion

4.1. Univariate analysis

Table 1 shows the first 10 countries with the lowest capital flight, from Madagascar to Botswana, and the last 10 with the highest capital flight, from Nigeria to Sierra Leone, among the study's sample countries. Capital flight as a percentage of GDP is lowest in Madagascar (-0.027) and highest in Sierra Leone (.334). Positive values represent capital flight, while negative values represent unrecorded cash inflows—capital repatriation. During the study period, the majority of the study nations experienced capital flight. When we compare the average value of capital flight to financial liberalization, we find mixed results. That is, countries with high levels of financial liberalization and capital flight, such as Uganda, Zambia, and the Seychelles, exist alongside countries with high levels of financial restrictions and capital flight, such as Sierra Leone, the Democratic Republic of the Congo, Mauritania, Mozambique, and Ethiopia. As a result, the deterministic effect of financial liberalization on capital flight is unknown in the absence of additional empirical evidence.

There is still no clear link between gross capital formation (GCF) and financial liberalization (FIL). The relationship between GCF and FIL appears to be direct in Uganda and Zambia. In other countries, such as Sierra Leone, the Democratic Republic of the Congo, Mauritania, Mozambique, and Ethiopia, a large amount of GCF is recorded against a lower value of the chin-Ito index, indicating that gross capital formation is higher in countries with higher levels of capital account restrictions as well. All of this suggests that further empirical study is needed to assess the impact of capital flight and financial liberalization on GCF in the countries studied. See Table C in the

S.No.	Country	KF_GDP	GCF	FIL	Country	KF_GDP	GCF	FIL
1	Madagascar	-0.027	20.384	-0.467	Nigeria	.040	21.915	693
2	Burkina Faso	-0.006	19.244	-1.218	Uganda	.047	25.802	2.333
3	Algeria	-0.004	38.811	-1.218	Ethiopia	.058	36.970	-1.218
4	Zimbabwe	-0.004	9.129	-1.001	Rwanda	.076	19.518	225
5	Egypt	-0.003	17.409	0.974	Mozambique	.080	34.406	-1.218
6	Cote d'Ivoire	-0.003	14.440	-1.218	Mauritania	.109	33.944	-1.218
7	Angola	0.007	24.257	-1.920	Zambia	.137	36.330	2.333
8	Tunisia	0.010	23.406	-1.218	Seychelles	.185	30.844	1.561
6	Sudan	0.020	22.021	-0.556	Congo, Rep.	.254	39.874	-1.218
10	Botswana	0.028	31.548	2.084	Sierra Leone	.334	15.402	-1.579

Appendix for more details on the average annual statistics of capital flight, gross capital formation, and financial liberalization index for each of the 30 sample nations from 2000 to 2019.

It is better to describe the nature of panel data ahead of describing overall, between, and within variations. Such variables could be seen as varying regressors (vary with cross-sections (i) and over time (t)), time-invariant regressors (vary with cross-sections (i) but not over time (t)), and individual invariant regressors (vary over time (t) but not with cross-sections (i)). The overall mean, between, and within ranges of the data set are shown in Table 2. The descriptive summary reveals a significant discrepancy over time when we examine the entire sample means and standard deviations for gross capital formation (GCF_GDP), capital flight (KF_GDP), bank credit to the private sector (PC_GDP), term of trade index (TOT), and trade openness. On the other hand, the Chin-Ito index's overall mean score of -.643 shows that capital account restrictions are widespread among the study countries. The relatively low index within variation shows that sample nations have experienced a fairly gradual liberalization of their capital account rules, with the lowest and highest financial liberalization indices of -1.92 and 2.33, respectively.

On top of that, the average debt burden for sample countries over a decade was 48.63% of GNI, with standard deviations of 38.10, and minimum and maximum debt burdens of 2.55 and 244.78, respectively. The external debt to GNI ratio for sub-Saharan Africa was 38% in 2019. The indicator has continuously increased from a low of 28% in 2015, and the foreign debt stock in the region totalled \$625 billion in 2019 (Faria, 2021), while the share of external debt stocks to GNI in low-income countries increased slightly to 39% in 2020.

4.2. Multivariate analysis

For well-known econometric literature reasons, it is difficult to estimate the dynamic panel data model specified by Equations 1 to 3. First off, according to Roodman (2009), estimators are recommended for panels with small T or large N. The simple fixed-effects estimator performs well when T is large because it reduces the importance of dynamic panel bias and prevents the number of instruments in difference and system GMM from growing exponentially with T. Second, the cluster-robust standard errors and the Arellano–Bond autocorrelation test could not be accurate if N is small. Third, using traditional fixed effects approaches will result in inaccurate estimations of the coefficients since the lagged dependent variable is a predictor (Alvarez & Arellano, 2003). Fourth, traditional fixed effects approaches would produce biased estimates of the coefficients anytime T > 3 even if the lagged dependent variable is omitted since the xs are only predetermined and not strictly exogenous (Wooldridge, 2010). Fifth, the issue of possible endogeneity, autocorrelation, and Heteroscedasticity in the data is taken into account by GMM estimators.

Given these prerequisites, the interpretation in this study follows the two-step system GMM's estimation results. Assuming that changes in the instrumenting variables are unrelated to the fixed effects in this situation, further instruments may be valid. The system GMM, in particular, demands that individuals sampled throughout the study period are not too distant from stable states, in the sense that departures from long-run means are not systematically correlated with fixed effects (Roodman, 2009). Additionally, system GMM is the better option when dealing with an unbalanced panel, Heteroscedasticity, serial correlation, and persistent lag-dependent variables. Time dummies are used to support the autocorrelation test's underlying premise that there is no cross-individual correlation in the idiosyncratic disturbances, as well as the robust estimates of the coefficient standard errors.

Results of the two-step system GMM estimation for equations (1) and (2) are shown in Table 3, columns 1 and 4, respectively. Given that past investments are assumed to be an explanatory variable of current investments, there is a possibility that the model will have an endogeneity issue. Additionally, if investment rises, some independent variables, such as gross domestic saving, may rise as well. As a result, it appears that the gross domestic saving could be an endogenous variable in the model. The financial liberalization index is regarded as the other variable, which is a predetermined policy variable. The two variables are specified in the two-step system GMM model as endogenous, along with the lagged

Table 2. Specific su	mmary statistics					
Variable		Mean	Std. Dev.	Min	Max	Observations
GCF	overall	23.749	0.606	1.096	77.890	N = 541
	between		8.395	9.129	39.874	n = 30
	within		6.677	6513	61.764	T-bar = 18
KF_GDP	Overall	.0563	.1527	4673	1.700	N = 541
	between		.0791	0268	.3343 1.422	n = 30
	within		.1298	5968		T-bar = 18
Pc	Overall	23.508	27.852	.4913	160.124	N = 541
	Between		27.730	3.732	136.208	n = 30
	Within		6.703	-1.981	78.143	T-bar = 18
GDS	Overall	18.455	16.403	-21.460	64.927	N = 541
	Between		15.071	-6.530	52.298	n = 30
	Within		5.939	-1.292	49.698	T-bar = 18
TOT	Overall	127.094	40.890	47.892	290.930	N = 541
	Between		30.827	70.513	187.176	n = 30
	Within		26.788	39.918	230.848	T-bar = 18
Trade	Overall	67.827	33.991	16.668	225.023	N = 541
	Between		31.184	30.410	185.181	n = 30
	Within		12.452	31.002	113.297	T-bar = 18
FIL	Overall	643	1.230	-1.920	2.333	N = 541
	Between		1.251	-1.920	2.333	n = 30
	Within		.4810	-2.836	.9212	T-bar = 18
GDPG	Overall	4.259	4.327	-20.598	26.417	N = 541
	Between		2.049	-0.882	9.471	n = 30
	Within		3.943	-22.277	24.738	T-bar = 18
Inflation	Overall	14.846	114.833	-21.165	2630.123	N = 541
						(Continued)

l ablez. (continuea)						
Variable		Mean	Std. Dev.	Min	Μαχ	Observations
	Between		26.598	0.856	149.783	n = 30
	Within		111.508	-136.092	2495.186	T-bar = 18
Debt	Overall	48.626	38.091	2.551	244.775	N = 541
	Between		21.655	10.806	94.068	n = 30
	Within		31.313	-23.361	199.333	T-bar = 18

Source: Author's computation.

Table 3. Effect of capital flight and financial liberalization on gross domestic investment						
	Regression wi liberaliza	thout financial tion index	Regression v liberaliza	vith financial tion index		
Variables	SGMM	Fixed effect	Fixed effect	SGMM		
Lagged gross capital formation	0.644***(0.106)			0.613***(0.114)		
Gross domestic saving (% of GDP)	0.306*(0.162)	0.310***(0.058)	0.318***(0.058)	0.198(0.245)		
Capital flight (% of GDP)	-0.087***(2.519)	0.043**(1.702)	0.041**(1.710)	-0.077***(2.779)		
Bank Private credit (% GDP)	0.017(0.044)	0.157(0.096)	0.166*(0.097)	0.020(0.040)		
Term of trade index	-0.119**(0.047)	-0.047***(0.014)	-0.048***(0.014)	-0.112**(0.052)		
Trade openness (% of GDP)	0.351***(0.127)	0.035(0.024)	0.037(0.024)	0.306**(0.144)		
Financial liberalization index			-0.773(0.749)	-1.861(3.037)		
Constant	-1.216(8.072)		18.543***(4.045)	1.026(8.814)		
Within R ²		0.155	0.159			
Between R ²		0.244	0.214			
Overall R ²		0.234	0.207			
AR(1)	0.022			0.003		
AR(2)	0.949			0.877		
Hansen test	0.242			0.257		
Number of Instruments	26.000			26		
Observations	511			511		
Number of countries	30			30		

Note: Hansen test (null: instruments are valid). The dependent variable is gross capital formation as % of GDP. Standard errors in parentheses SGMM mean two-step system GMM; AR (1) First order autocorrelation test, AR (2) second order autocorrelation test. Significance values are: *** p < 0.01, ** p < 0.05, * p < 0.1.

dependent variable. The Hausman endogeneity test indicates that the lagged gross capital formation and gross domestic saving are indeed endogenous variables of the model, while the financial liberalization index is well specified as predetermined. These considerations, therefore, justify the choice of the GMM method to address these endogeneity problems.

The lag-dependent variable, lag of gross capital formation (GCF) has coefficients = 0.644 & 0.613 with p-value <0.01; 0.01, respectively, with and without the financial liberalization index (Table 3). The finding suggests that the total domestic investment is persistent over time. The results show that capital movements affect total domestic investment negatively and significantly (Table 3, columns 1 & 4). This negative influence of capital flight on investment remains valid even after verifying macroeconomic variables (gross domestic saving, credit to the private sector, term of trade and trade openness) or financial liberalization. These results are consistent with Ndiaye (Ndiaye, 2014), Mileva (2008), and Tiruneh et al. (2021). The autoregressive term is consistently statistically significant and positive in all specifications.

Capital flight have coefficients ranging from -0.087 to -0.077, which gives an average of -.082 (Table 3), and -0.131 (Table 4). Since capital flight and total domestic investment are measured in percentage of GDP, it means that for each dollar that exists in a sample country in the form of capital flight, 8.2% or 13.1% deprives the economy of resources that could have been used to finance domestic

Table 4. The effect of capit variables added to models	tal flight on domestic	: investment when add	itional macroeconomic
Variables	Fixed effect	Fixed effect	SGMM
Lagged gross capital formation	-	0.560***(0.053)	0.784***(0.023)
Gross domestic saving (% of GDP)	0.134***(0.047)	0.083***(0.024)	0.054***(0.010)
Capital flight (% of GDP)	0.442***(0.152)	0.122 (0.098)	-0.131***(0.030)
Bank Private credit (% GDP)	0.140**(0.056)	0.043(0.037)	0.018(0.005)
Term of trade index	-0.226*(0.120)	-0.152**(0.061)	-0.065**(0.028)
Trade openness (% of GDP)	0.363**(0.155)	0.216***(0.076)	0.108***(0.012)
Financial liberalization index	-0.030(0.032)	-0.031(0.020)	-0.005(0.005)
Lag of real GDP growth rate (%)	0.011*(0.006)	0.006*(0.003)	0.010***(0.001)
External debt stocks (% of GNI)	-0.202*(0.100)	-0.096*(0.053)	-0.010(0.021)
Inflation, GDP deflator (annual %)	-0.001(0.001)	-0.001(0.001)	-0.001*(0.001)
Constant	2.226**(0.818)	0.994**(0.426)	0.434***(0.151)
Within R ²	0.369	0.604	
Between R ²	0.243	0.834	
Overall R ²	0.271	0.734	
First order autocorrelation test (AR(1))			0.079
Second order autocorrelation test (AR(2))			0.849
Hansen test			0.322
Number of Instruments			21
Observations	432	432	425
Number of countries	30	30	30

In this table, the effect of capital flight is shown by incorporating additional macroeconomic variable to justify and augment the efficiency and consistency of results in Table 3 and to justify the value of R^2 computed from fixed effect regression following reviewers' comments. Note: Hansen test (HO: instruments are valid). The dependent variable is gross capital formation as % of GDP. Standard errors in parentheses SGMM means two-step system GMM, significance values are: *** p < 0.01, ** p < 0.05, * p < 0.1.

investment. These results are consistent with Ndiaye (2014), Mileva (2008), Yalta (2010), Salandy et al. (2013), and Ndikumana (2014), Effiom, Achu and Edet (2020), Ashman et al. (2021), and Tiruneh et al. (2021), but in contrary to Adesoye et al. (2012) who found a positive and insignificant relationship between capital flight and investment and Rahmon (2017) who found a positive and significant relationship between capital flight and investment. As a result, illicit financial movement out of the sampled countries damages available scarce resources for the financing of domestic investment. According to Buckley et al. (2015), two factors account for this result; one, capital flight stems from the transfer abroad of part of private savings intended to finance private investment, and two, capital flight can also be accounted for by an uncertain macroeconomic, political, and institutional environment.

The impact of capital flight has been to exacerbate declining domestic investment in productive activities, declining capital stock across nearly all productive sectors, macroeconomic austerity and vulnerability, and deindustrialization of the economy, further entrenching unemployment, poverty, and extreme inequality in the provision of basic services (Ashman et al., 2021); capital flight reduces private investment, but no statistically significant impact of financial liberalization (Yalta, 2021); lag of capital flight negatively and statistically significantly correlates with domestic

investment (Tiruneh et al., 2022). Capital flight jeopardizes domestic investment both in the short and long-run. Its long-term impact on domestic investment turns out to be more severe than its short-term impact, suggesting that a steady stream of persistent capital flight has a negative cumulative impact over time on domestic investment.

Furthermore, the results suggest that capital flight is one of the factors that has been contributing to the chronically low domestic investment in African countries over the past decades. In other words, this means that the flows of capital out of the country deplete the amount of both private and public savings, which in turn reduces domestic capital formation. Specifically, given the limited access to global capital markets by African countries, imperfect capital mobility can also motivate the link between domestic investment and savings. Macroeconomic uncertainty is another reason for the adverse effect of capital flight on domestic investment. Private agents view a high level of capital flight as a failure of macroeconomic policy and the institutions in charge of economic regulation. In that sense, private money would flee domestic instability and elevated sovereign risk. On top of that, substantial capital flight increases the likelihood of government insolvency due to the erosion of the tax base, due to private wealth flight, and the misappropriation of public funds, corruption-induced capital flight. Private agents might then be apprehensive about increased taxes in the future and flee to safety abroad as a result. So a decrease in the demand for domestic assets would result in a decrease in domestic private investment. Public investment would decrease as government revenue was depleted. An overall decrease in total domestic investment results from this (Effiom et al., 2020; Ndiaye, 1996; Ndikumana, 2014; Salandy et al., 2013; Yalta, 2021).

To sum up, the impact of capital flight on domestic investment is found congruent with theory and the current macroeconomic situation in Africa (Effiom et al., 2020). In the assumption of Solow growth model, a contribution to the theory of economic growth, capital accumulation is a fundamental driver of long-run economic growth (Solow, 1956). According to this model, key components of economic growth are saving and investment. An increase in saving and investment raises the capital stock and thus raises the full-employment national income and product, and as the national income and product rises, the rate of growth of national income and product increases. Scientifically, any factor that hinders domestic investment is a constraint for economic growth. In the economic literature, domestic investment has been conferred as a key driver of long-run economic growth. This long-run economic growth was the focus of the Solow growth model. Thus, the first hypothesis in this research that states illicit capital flight reduces domestic investment in Africa has been supported.

The impact of financial liberalization on domestic investment is the study's secondary issue. Even after the financial liberalization index was added to the model, the detrimental effect of capital flight persisted. Although the impact of financial liberalization is deemed to be insignificant, the negative sign could mean that increased capital flight has a negative influence on the level of investment in countries with more open capital accounts. The detailed summary statistics (Table 2) show that during the previous two decades, the index of financial liberalization has averaged -.643, with overall minimum and maximum values of -1.920 and 2.333, respectively. Financial liberalization was a crucial part of the extensive economic changes that many nations in Africa underwent in the aftermath of the financial reforms that developing economies had implemented by the late 1980s and early 1990s. The McKinnon and Shaw (1973) theory of financial liberalization is the one that developing nations, especially Africa, have mostly followed.

However, the empirical result (Table 3, column 4) shows negative and insignificant effect of financial liberalization on domestic investment in the studied countries. This highlights that a mere financial liberalization policy that fails to account the preconditions for liberalization results in adverse effect on these economies domestic investment. This result seems in line with the views of Fry (1997) who identified five preconditions ahead of liberalization policies. These were price stability, fiscal discipline, profit-maximizing, competitive behaviour by commercial banks, equitable tax system on financial intermediation, and adequate prudential and supervision of commercial banks, implying some minimal levels of accounting and legal infrastructure. All these reflects the

realities in Africa, indicating that perfect information and perfect competition are prerequisites for financial deregulation (Arestis & Demetriades, 1999). Hence, the second hypothesis of the study that states that the more open the country is to cross-border capital transactions, the more enhanced its domestic investment, is not supported in these economies. Similar results are found in Herme and Lensink (2005) & Yalta (2021).

The impact of control variables on domestic investment is another matter of concern (Tables 3 & 4). Table 3 shows that while the term of trade index has a negative impact on domestic investment in the sample nations, gross domestic saving (%GDP) and trade openness (%GDP) are found to have positive and statistically significant effects. Additional investment factors have been taken into account in the model, such as external debt stock (%GNI), real GDP growth, and inflation as defined by the GDP deflator, to better understand how capital flight affects domestic investment (Table 4). Results from Table 3 are kept in Table 4. The debt and inflation coefficients are both negative, although only the latter is significant at the 10% level. The consequences of debt are highlighted by the possibility that capital flight facilitated by debt, which increases government debt, may result from foreign loans. In 1996, SSA nations were labelled as deeply indebted poor nations due to their extreme poverty levels and unmanageable debt loads, making them eligible for specialized IMF and World Bank assistance (Ndiaye, 1996; Ndiaye & Siri, 2016). Additionally, as a result of the financing gap caused by capital flight, governments are forced to borrow more money, worsening their fiscal balance and adding to their debt load, might make capital flight easier (Fofack & n.d.ikumana, 2010; Ndikumana, 2014). In addition, expansionary policies produce a macro-environment that is prone to inflation, which makes agents less confident in government efforts to address the issue. Agents relocate their assets to other nations as a result, leaving domestic money exposed and unable to encourage domestic investment (Achu & Edet, 2020; Tiruneh et al., 2022).

In summary, these findings show that capital flight has a detrimental and statistically significant impact on domestic investment, and this impact persists even after other relevant determinants of investment are taken into account in the specification. The findings imply that one of the factors contributing to the historically low levels of domestic investment in African nations has been capital flight.

4.3. The issue of R^2 in pane models

As shown in Tables 3 and 4, in panel models with financial data, R² is always low as financial data is not normally distributed in most cases and is highly volatile. R² is not very informative and significant in explaining the fitness of the model in this case.

Panel data analysis relies more on individual significance and overall significance of the model instead of R^2 or adjusted R^2 . Generally, R^2 is low in cross-sectional data as compared to time series data. In panel data due to heterogeneity of cross sections, it is not too high. If your data is more time dominant, R^2 can be higher as compared to the case when panel data is more cross-section dominant. In general, more related included explanatory variables boost the value of R^2 . Yet, one has to focus more on objectives of the research to be fulfilled from individual significance and overall significance of the model making sure that there is no model specification bias and avoid spurious regressions (Roodman, 2009; Cameron & Trivedi, 2005). Another point to mention here is that a very high R^2 in the presence of very few significant t values indicates the presence of multicollinearity and spuriousness of the regression.

On top of that, R^2 can be magnified by the inclusion of additional explanatory variables and the lagged dependent variable as regressors. While limiting explanatory variable (see, Table 3, columns 3 & 4), the within, between, and overall R^2 values are relatively small. When additional variables such as inflation, real GDP growth rate (GDPG), and external debt stock (% GNI) are added in the model, the R^2 values have got increased (see Table 4, column 2). Furthermore, the inclusion of the lagged dependent variable as a repressor magnifies the within, between and overall R^2 values to 0.604, 0.834, and 0.34, respectively. Hence, R^2 is not significant in explaining the fitness of the model. The aforesaid discussion regarding R^2 is just to justify why R^2 is low in panel data following reviewers' comments, otherwise all of the

interpretations in this study are the results of system GMM estimation. Hence, it is better to look at the Wald chi2 and its corresponding probability value resulted from GMM estimations, which was 1166.45 (p-values of 0.000) in this study.

4.4. Diagnostic tests

This study employed the two-step system GMM estimation technique since it is more robust and efficient to one-step GMM in the presence of Heteroscedasticity and autocorrelation. The two important postestimation tests of the model are autocorrelation and instrument validity tests (Roodman, 2009). For the former, the Arellano–Bond test for first-order AR (1) and second-order AR (2) autocorrelation of the differenced residuals is reported. For the latter, the Hansen J-statistic is reported, which is robust to Heteroscedasticity and serial correlation issues but may be subject to potential instrument proliferation (Roodman, 2009). For AR (1), the null hypothesis of no autocorrelation should be rejected with Prob <0.05, while AR (2) accepts the null hypothesis of no autocorrelation when Prob.>0.05. In the case of the instrument validity test, we accept the null hypothesis that instruments are valid for both Hansen and Sargan tests (i.e., Prob. >0.05). The rule of thumb for avoiding over-identification of instruments is that the number of instruments is less than or equal to the number of groups in the regression (Barajas et al., 2013). All these tests fit the rules of thumb.

5. Conclusion

This study, which covers 30 African economies from 2000 to 2019, investigates the impact of capital flight on domestic investment. The findings imply that capital flight is one of the factors contributing to the historically low levels of domestic investment in Africa, a continent that faces difficulties in reducing poverty, developing infrastructure, calming political turmoil, and fulfilling national sustainable development goals. African nations have obviously been attempting to increase savings by developing their own unique mechanisms to finance domestic savings under the conventional belief that domestic investment funding is hampered by low savings.

However, in order to considerably increase the financing of domestic investment on the continent, initiatives to stop illegal capital flight should be added to those intended to mobilize domestic savings. Governments and policymakers at all levels, including national, regional, continental, and global ones, should have strategies that may include the following in order to reduce the significant opportunity costs that capital flight causes for African economies and to retain large amounts of capital and use it to finance local investments.

First and foremost, countries need to concentrate on the main drivers of capital flight, such as trade misinvoicing, transfer pricing manipulation, and domestic tax losses, and they need to set up robust, integrated control and monitoring systems that are supported by technologies. Second, legitimate capital outflows should abide by local regulations and recorded in compliance with international financial reporting standards (IFRS). Third, governments should design and apply transparent capital control policies for illegal financial flows that disappear from country's financial records and that have no chance to get back to countries. Building a more transparent global financial system will benefit not only African countries but also all developing and developed countries. However, care must be taken by establishing strong internal regulation and financial quality institutions while implementing such policies because capital control policies are one of the factors causing capital flight to occur. Concurrently, it could be better off if nations provide economic incentives for agents who are mobilizing huge amount of money in the black markets, may result in current account convertibility and bring more money to the legal financial system. Fourthly, establishment of well-functioning political and judicial institutions towards ensuring political stability within a country and taking steps to mitigate the level of systemic corruption and others that usually lead to illicit capital outflows are paramount important.

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Table A. Corr	elation matrix									
Variables	Lngcf	KF_GDP	FIL	Inflation	GDPG	lnpc	lngds	Intot	Intrade	Indebt
Ingcf	1.000									
KF_GDP	0.276	1.000								
FIL	0.070	-0.015	1.000							
Inflation	-0.074	-0.022	-0.016	1.000						
GDPG	0.194	0.070	0.061	-0.144	1.000					
lnpc	0.091	-0.092	0.167	-0.185	-0.137	1.000				
Ingds	0.488	0.027	0.063	-0.038	-0.104	0.022	1.000			
Intot	0.191	0.127	-0.155	-0.032	-0.018	-0.017	0.409	1.000		
Intrade	0.338	0.179	-0.067	-0.108	-0.129	0.201	0.224	-0.055	1.000	
Indebt	-0.180	0.116	-0.179	0.046	-0.138	-0.181	-0.191	-0.259	0.153	1.000
Source: Author's	computation.									

Table B. Definition of variables and sources of data		
Variables	Definitions	Sources
GCF	Total Gross fixed capital formation (%GDP)	World development indicator (WDI) (Online Edition)
PC	Ratio of domestic bank credit to Private credit as %GDP	International Monetary Fund, International Financial Statistics and data files.
GDS	Gross domestic savings as % of GDP	World Bank national accounts data.
TOT	Net barter terms of trade index (2000 = 100)	Handbook of Statistics and data files, International Monetary Fund, and International Financial Statistics.
Trade	[Import + export]/GDP+100	World Bank national accounts data.
L.GCF	Lagged value of the three capital formations (%GDP)	Author's computation based on data from WDI (Online Edition)
FIL	Financial liberalization	Chinn and ITO (2006) index (-2.5 to 2.5)
KF	Capital flight, in current US\$	New edition of Ndikumana and Boyce (2021)
KF_GDP	KF/GDP*100	Author's computation based on data from the new edition of Ndikumana and Boyce (2021) and author's update World Bank, WDI (Online Edition): https://peri.umass.edu/capital- flight-from-africa
Inflation	Inflation measured by GDP deflator annual percentage	WDI
Debt	External debt stock (%GNI)	WDI
Growth	Real GDP growth rate, annual	WDI
Source: Author's compilation		

Table C. Summary	statistics: capital f	light, gross capital	formation, and FIL	index
S.no.	Country	Capital flight (% GDP)	Gross capital formation (%GDP)	Financial liberalization index
1	Algeria	004	38.811	-1.218
2	Angola	.007	24.257	-1.920
3	Botswana	.028	31.548	2.084
4	Burkina Faso	007	19.244	-1.218
5	Burundi	.039	12.294	-1.709
6	Cameroon	.028	22.633	-1.218
7	Congo, Dem.Rep.	.031	16.587	-1.192
8	Congo, Rep.	.255	39.874	-1.218
9	Cote d'Ivoire	003	14.440	-1.218
10	Egypt	003	17.409	.974
11	Ethiopia	.059	36.970	-1.218
12	Gabon	.028	25.319	-1.218
13	Ghana	.039	22.595	-1.499
14	Kenya	.033	19.056	1.055
15	Madagascar	027	20.384	467
16	Malawi	.032	15.333	-1.464
17	Mauritania	.109	33.944	-1.218
18	Morocco	.031	33.349	-1.218
19	Mozambique	.081	34.406	-1.218
20	Nigeria	.040	21.915	693
21	Rwanda	.076	19.518	225
22	Seychelles	.186	30.844	1.561
23	Sierra Leone	.334	15.402	-1.579
24	South Africa	.036	19.128	-1.218
25	Sudan	.020	22.021	556
26	Tanzania	.032	30.365	-1.218
27	Tunisia	.010	23.406	-1.218
28	Uganda	.047	25.802	2.333
29	Zambia	.138	36.330	2.333
30	Zimbabwe	004	9.1293	-1.001

Source: Author's computation.



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