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ORIGINAL ARTICLE

The effect of governance on capital flows in Sub-Saharan African countries

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ABSTRACT

This paper examines the effect of governance in Sub-Saharan African (SSA) countries. Specifically, this study investigates (i) the interacting impact of government efficiency, regulatory quality, and the rule of law alongside other socioeconomic variables to determine foreign capital inflow (FCI) based on each economic SSA bloc; and (ii) the characteristic drivers of FCI, impacting economic growth in the SSA countries. Descriptive statistics, static models, least square dummy variables (LSDVs) and the dynamic system general method of moment (GMM) were employed as the study's estimating techniques. Based on the result of the LSDV, food security and the rule of law significantly impact FCI in the sub-economic blocs in the region. Only six countries across the four economic blocs responded to food security and the rule of law in the model. The dynamic system-GMM provided evidence of five socioeconomic variables and three governance variables contributing to FCI. The findings revealed (i) regulatory quality and the rule of law are governance variables that significantly impacted FCI; and (ii) food security failed to significantly impact FCI in the SSA region. However, inflation, life expectancy, the human capital index, exchange rate and gross domestic product (GDP) growth impacted FCI significantly. In the aggregate, inflation, regulatory quality, exchange rate and the human capital index exhibited positive relationships, while other variables such as life expectancy, government effectiveness and the rule of law appeared significant but inversely impacted FCI in the SSA region. The key policy implication recommendation from this study is that a good legal framework could moderate the flow of foreign capital in favour of growth as it creates a strong foundation for sustainable economic development in the region.

KEYWORDS

foreign capital inflow; government efficiency; regulatory quality; rule of law; system-GMM

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1. Introduction

Significant attention has been drawn to factors determining capital inflow from the perspective of macroeconomic, institutional and policy variables in the literature. However, modern literature has paid little attention to governance's effect on attracting foreign capital into the economy. Governance's impact on the inflow of foreign capital is germane in any growing economy since government-designed activities that provide diverse public services to citizens, investors, and other agencies attract foreign capital inflow (FCI) to its economy (Al-Sadiq, 2021). Government efficiency, the rule of law and other governance functions can help improve a country's FCI by reducing cost and time in capital flight/formation, promoting greater transparency, efficiency gains, and accessibility to government regulatory qualities. The neo-classical investment model argues that functional investment within the framework of a friendly environment is expected to attract future interest rates, taxes and stabilise commodity prices.

Consequently, the increase in government stake should provide debt financing, moderate investment and growth (Clark et al., 1979; Stockhammer, 2008; Taghizadeh-Hesary and Yoshino, 2020). However, Onifade et al. (2020) find that a larger government stake reduces productivity growth and, in turn, decreases private investment, further reducing economic growth. Cooray (2009) and Asongu and Odhiambo (2020) state that increases in the government stake can impede growth due to taxes' negative impact on incentives, increased rent-seeking and withdrawal of private investment. It is therefore important to note that governance's impact on foreign direct investments is still unknown, and the debate to understand the nexus is ongoing as the main subject of many researchers of international economics.

Macroeconomic stability (growth, inflation, exchange rate) and transparency of legal regulations play a crucial role in attracting foreign investments (Ayomitunde et al., 2020; Makoni, 2020). Capital inflows may benefit underdeveloped economies, stimulating efficiency, enhancing financial sector competitiveness and promoting economic growth. At a macroeconomic level, capital inflows help Sub-Saharan African (SSA) countries fund welfare-enhancing account imbalances, resulting in more productive investment and consumption smoothing, thereby leading to economic growth. Despite all these positive impacts, an instability in capital inflows associated with financial openness is capable of causing financial and macroeconomic volatility by destroying domestic financial markets, with a general tendency of deteriorating the recipient nation's economic performance (Brafu-Insaidoo and Biekpe, 2014).

SSA countries have expanded with the global economy since the early 1990s, leading to a surge in FCIs with sudden downfalls in their growth rates leading to unstable macroeconomic indicators. Capital inflows are pertinent sources of investment finance, especially for low and middle-income nations as found in SSA. However, the arrangement and variation of foreign capital inflows are crucial to SSA countries' investment decisions and economic policy. These countries have experienced various degrees of international capital flows, especially in the 1990s (Akinlo, 2004), and foreign direct investment (FDI) inflows reached new heights during the period as a result of liberalising economies into global financial markets (Mcmillan et al., 2014).

The past few decades witnessed some fundamental problems associated with FDI in the SSA region. Apparently, investment in the region has been highly influenced by some macroeconomic

shocks with severe spillover effects on FDI inflow. For instance, $1388 billion, $817.6 billion, $678.8 billion and $559.6 billion were estimated as global FDIs in 2000, 2001, 2002 and 2003, respectively. As part of SSA, Africa received only $8.7 billion, $19.6 billion, $11.8 billion, and $15 billion in the listed years, indicating that only 0.6%, 2.4%, 1.7% and 2.7% of the total share entered the region (UNCTAD, 2022b). A total FDI inflow of $42 billion came into Africa in 2017, indicating a 21% reduction from 2016 inflows. Factors responsible for this sharp decline could be attributed to the continual fall in oil prices and unfavourable macroeconomic variables in the SSA nations, among others (Asuquo, 2021; UNCTAD, 2022b). In 2009, statistics revealed that the percentage of the total share of FDI inflow to SSA was less than 5.3%, with FDI still concentrated in only a few SSA nations for reasons related to poor infrastructure, corruption, and an unfriendly macroeconomic policy environment (Mohammed, 2022). FDI, as a percentage of GDP, increased from 2.906% in 2010 to 3.945% in 2017, while foreign portfolio investment (FPI) increased from 0.878% in 2010 to 1.694% in 2017 (Calderon et al., 2018).

Ultimately, the structure of capital inflow in the SSA region has also been influenced by some external shocks, notable among them the global financial crisis of 2008/2009, through which FCIs to SSA countries dropped from 7.5% of GDP in 2007 to 5.5% of GDP in 2008. The 2011/2012 European sovereign debt crisis also negatively impacted the region as the total output productivity slowed from an average of 5% before 2008 to less than 3.5% in 2009 (Aiyar, 2009). This debt crisis hit the SSA region harder than the global financial crisis, evidenced by the 4.6% decrease in gross capital inflows in the region—from 10.12% of GDP in 2011 to 5.5% in 2013 (Calderon et al., 2018). Lastly, the extreme oil price decline in 2014/2015 impacted the region.

Capital inflows' effect on growth has typically been viewed from two distinct schools of thought. For instance, the first school argues that components of FCIs differ significantly in terms of volatility (Prasad et al., 2007). Specifically, external borrowings and portfolio flows are substantially more unstable than FDI. Prasad et al. (2007) argued that the structure of FCIs can significantly influence a nation's susceptibility to financial crises. By implication, foreign capital flow may be detrimental to a region's growth because increased capital flows from foreign nations (as a result of financial integration) may expose the host country to crises that negatively impact growth (Karadam and Ocal, 2014). This occurs since the host nations, especially SSA and other developing countries, lack quality institutions, developed financial markets and consistent macroeconomic policies like their counterpart developed nations. In addition, capital inflows, such as FDIs, may also reduce the effectiveness of domestic investment since major foreign companies repatriate their profits back to their own countries.

The second school of thought views the nexus between FCI and growth from a positive perspective: according to proponents, FCIs' contribution to growth could come via at least two major channels. First, FDI inflows are generally thought to be accompanied by transfers of technology and managerial skills and could generate externalities in the form of positive productivity spillovers to host enterprises in recipient developing nations. Second, FDI inflows could enhance the recipient nations' access to international markets, thus helping to stimulate export orientation, which, in turn, could accelerate economic growth. Among the inconclusive studies on FCI and their determinants are: the pull factors of FCI vis-a-vis trade openness and economic growth (Braiton and Odhiambo, 2022); the effect of capital flows on economic growth (Nyang'oro, 2017); and governance and portfolio flows (Gossel and Beard, 2019). Moreover, studies from advanced economies (Ersoy and

Erol, 2016) argued that global financial crises significantly determine FCI inflows in the Eurozone. In emerging economies, Salem and Baum (2016) also recognised the value of stability in attracting FCI, and Bevan and Estrin (2004) showed that host country risks are not significant determinants of FCI.

This article was motivated by the ever-growing but inconclusive literature on the determinants of FCI arising from emerging economies, without adequate attention to developing economies. Most studies on the link between FCIs and economic growth focused on advanced economies, leaving developing ones (particularly SSA countries) without adequate empirical frameworks to ease the complexity of FCI. A few studies in the region observed capital inflow into SSA without adequate attention to comparative determinants of capital inflow based on the various economic blocs within the region. Where economic bloc studies were conducted, these were undertaken as a separate entity without recourse for comparative analyses, with little or no special attention to governance (Aromasodun, 2022). This study thus differs from existing research in that it views the role of governance as a determinant of capital inflow, with a special interest in the comparative effects across the economic blocs within the region. The adopted governance variables of interest were carefully selected as they truly reflect the state of governance in the SSA region. Hence, they act as representatives of other governance variables.

This approach mandated the need to examine the dynamics of determinants of FCIs in SSA countries, with governments' regulatory quality and the rule of law as a new line of thought for the purpose of policy implications. Governance's role as a strong determinant of effective FCI is indeed an addition to the body of knowledge. Consequently, this article differs remarkably from other extant studies, and focuses (i) on the interacting impact of regulatory quality and the rule of law alongside other socioeconomic variables to determine FCI in SSA countries; and (ii) on the characteristic drivers of FCIs, affecting the economic growth of SSA countries. Section two focuses mainly on a review of theoretical and empirical literature. Section three addresses model specifications and other methodological issues. Section four deals with the analysis and interpretation of data, while the last section presents a discussion of the findings.

2. Literature review

2.1. Conceptual approach

SSA countries are made up of 54 nations from various economic blocs. Each member nation has identifiable economic characteristics capable of influencing FCI. **Table 1** reflects the summary features of each SSA nation based on the income group. The columns express the outlook of oil-exporting and resource-intensive countries capable of attracting internal economies of scale from allied petrochemical industries.

Figure 1 shows the trend of portfolio investment inflow in the SSA countries. Results from the latest year (2022) indicated a negative index despite investment potentials in the region.

Table 1. Summary features of each SSA nation based on the income group.

Oil exporters	Other resource intensive countries	Non-resource intensive countries	Middle-income countries	Low-income countries
Angola	Botswana	Benin	Angola	Burkina Faso
Cameroon	Burkina Faso	Burundi	Benin	Burundi
Chad	Central Africa	Cabo verde	Botswana	Central Africa
Congo Republic	Republic	Comoros	Cabo verde	Republic
Equatorial	Congo Democratic	Cote d'Ivoire	Cameroon	Chad
Guinea	Republic	Eritrea	Comoros	Congo Democratic
Nigeria	Ghana	Eswatini	Congo Republic	Republic
South Sudan	Guinea	Ethiopia	Cote d'Ivoire	Eritrea
	Liberia	Gambia	Equatorial Guinea	Ethiopia
	Mali	Guinea Bissau	Eswatini	Gambia
	Namibia	Kenya	Gabon	Guinea
	Niger	Lesotho	Ghana	Guinea Bissau
	Sierra Leones	Madagascar	Kenya	Liberia
	South Africa	Malawi	Lesotho	Madagascar
	Tanzania	Mauritius	Mauritius	Malawi
	Zambia	Mozambique	Namibia	Mali
	Zimbabwe	Rwanda	Nigeria	Mozambique
		Sao Tome and Principe	Sao Tome and Principe	Niger
		Senegal	Senegal	Rwanda
		Seychelles	Seychelles	Sierra Leones
		Togo	South Africa	South Sudan
		Uganda	Zambia	Tanzania
				Togo
				Uganda
				Zimbabwe

Source: International Monetary Fund (2022).

Figure 1. Portfolio flow in the SSA countries (Billions of US dollars).
Source: International Monetary Fund (2022).

FCI in African countries where SSA nations are dominant hit a record $83 billion in 2021 (UNCTAD, 2022a). By this inflow, investment flows to Africa and SSA, in particular, accounted for an average of 5.2% of global FCI. The 2021 improvement in FCI was attributed to South Africa's intra-firm financial transactions, which amounted to 45% of the total investment inflow to SSA in 2021. More specifically, FCI in southern Africa increased almost tenfold to $42 billion in 2021. West Africa saw FCI increase by 48% to $14 billion. Investment flows to east Africa increased by 35% to $8.2 billion. Central African FCI remained unchanged at $9.4 billion, and FCI to north Africa declined by 5% to $9.3 billion in 2021. This remarkable increase in the FCI in SSA countries should impact the region's growth. **Figure 2** reflects the disaggregated flow of FCI based on the

economic blocs.

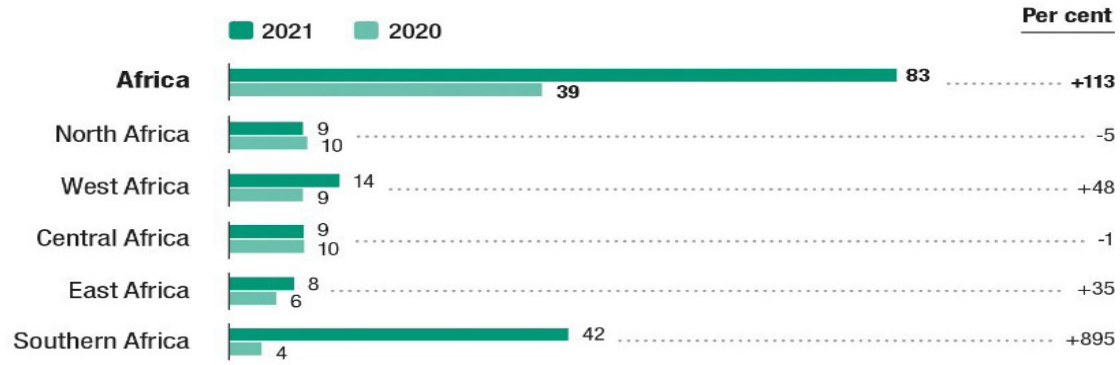

Figure 2. FCI inflow to various economic blocs across the SSA region and Africa in general.
Source: UNCTAD (2022b).

For 2022, the new growth projection for SSA represents a relatively modest downgrade of –0.2%, compared to the April 2022 regional economic outlook, substantially less than the –0.9% revision for advanced economies. Alongside the increase in FCI in the region is the corresponding increase in the consumer price index (**Figure 3**). **Figure 4** reflects that average inflationary trends rose above global composite averages, with a significant sharp increase in the first quarter of 2022.

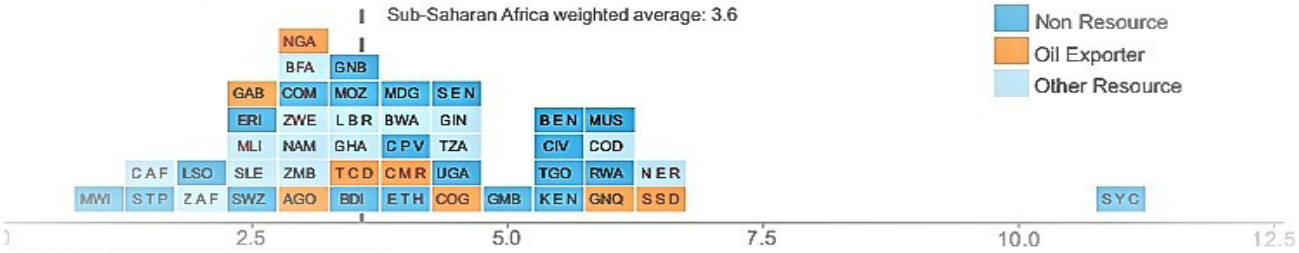

Figure 3. The GDP growth rate of the SSA countries.
Source: World Economic Outlook database (for codes of countries, see the Appendix).

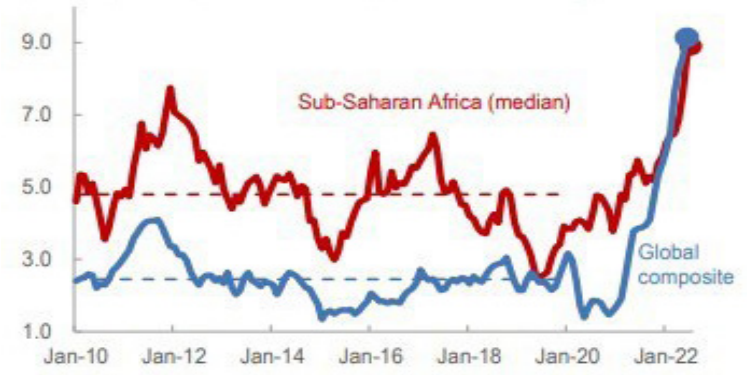

Figure 4. SSA: CPI inflation, 2010–2022.
Source: International Monetary Fund (2022).

2.2. Theoretical review

The capital market theory is a part of portfolio investment theory that explains the idea behind firms' expansion abroad. FCI is determined according to this approach, mainly by interest rate and

the value of the host country's currency. Firms are more likely to expand abroad when the currency value in their home country is strong. However, firms hosted by countries with weak currencies avoid investing abroad (Faeth, 2009; Moosa, 2002).

Moreover, higher currency fluctuations in host countries encourage foreign firms to borrow money at lower interest rates than domestic companies. According to Boddewyn (1985), the capital market theory explains the reasons behind firms' investments abroad, where he mentions three situations that encourage firms to expand their activities overseas. First, lower (undervalued) exchange rates in the host country allow lower production costs in the host countries. Second, the absence of organised securities markets in less-developed countries encourages FCI rather than securities purchases. Third, there is a lack of information about securities markets in these countries. Consequently, investments abroad favour FCI, which allows control of host country assets (Hennart and Hl Slangen, 2015). Factors identified as drivers of FCI mainly include macroeconomic factors, with little attention to efficient governance and the legal framework upon which activities of FCI can be protected.

The internationalisation theory sought to provide an explanation for FCI based on intermediation inputs and technology (Buckley and Casson, 1976). In this context, Buckley and Casson (1976) and Hennart (1982) developed the theory of internalisation that relied on the assumption of market imperfections, where firms expand their activities abroad to overcome market failure and enhance their monopolistic advantage (Kang and Jiang, 2012). The central assumption of this theory is that, in the presence of governance quality and an effective legal framework, established multinational enterprises are motivated to reduce transaction costs related to failures in the market for intermediate products, raising their profitability. Buckley and Casson (1976) classified several types of market failure that result in internalisation. For example, government interventions in markets create an incentive to transfer pricing, resulting in an inability to estimate the prices correctly.

According to Buckley and Casson (2009), internalisation occurs due to market failure in intermediate input markets, which leads to horizontally integrated multinational enterprises (horizontal FDI). Moreover, market failure in intermediate output markets leads to vertical-integrated multinational enterprises (vertical FDI). The industrial organisation theory of Hymer (1976) is therefore considered vital to provide sufficient explanations for the motivations of an active multinational corporation. Hymer was one of the most famous economists who established an organised approach towards understanding domestic firms' motives to extend their activities internationally. Hymer's theory is based on the idea that firms extend their operations abroad to compete with local companies and capitalise on specific capabilities and advantageous positions. These firms focus on consumers' preferences, the legal system, and cultures not shared by other competitors in foreign countries; this is called "monopolistic advantage". However, international expansion exposes foreign firms to various risks originating from market imperfection (market failure) (Rugman et al., 2011).

The international production theory (eclectic paradigm) was first introduced by John Dunning in 1976, and it motivates the relationship between earlier theories of FCI and international production. The international production theory provides a coherent framework and basic outline that helps economists understand the behaviour of multinational enterprises that invest abroad (Dunning, 2001). This theory's essence is based on integrating three main hypotheses, which represent the

factors that affect firms' decision to extend their operations abroad: "Ownership, Location, and Internalisation" (OLI). The OLI model combines earlier theories that attempted to explain the reasons behind the FCI phenomenon, such as the internalisation theory, the industrial organisation theory of Hymer, and the location theory (Moosa, 2002). According to the eclectic paradigm, three conditions must be satisfied before a firm engages in FDI. First, a firm needs to have an ownership advantage factor, giving it an edge over other firms. These advantages are, for example, the property rights of a particular technology, firm size, monopoly power, and access to raw materials or cheap finance (Moosa, 2002). Second, the firm must exploit these advantages internally instead of contracting, selling or leasing them to other firms. Third, the benefits of setting up production abroad must be higher than the benefits of depending on exports (Wadhwa and Reddy, 2011).

Hymer (as cited by Dunning and Rugman (1985)) explained the theories of FCI by comparing the difference between FDI and portfolio investment. Based on the portfolio investment theory, capital moves from a place where there are low interest rates to where there are high interest rates until the interest rate is equal everywhere. Here the theory assumes no barriers to capital movement, such as risks and uncertainties, exist. However, Hymer argued the theory of portfolio investment does not explain control (Dunning and Rugman, 1985). In portfolio investment, investors who invest in foreign countries do not have the right to control the enterprises in which they invest their money. Hymer stated that multinational companies are motivated to invest in foreign countries due to the advantages they gain from controlling the enterprises. Hymer analysed the advantage of foreign firms over host firms. These advantages include getting factors of production at a lower cost, know-how, patents, capital, etc. Where market imperfection exists (barrier of market entry, high transaction cost), multinational companies prefer to engage in direct investments.

2.3. Empirical review

This section reviews empirical works on the relationship between FCI and the factors that determine it. Findings reflected mixed findings, as some researchers reported negative relationships between capital flows and growth (Agbloyor et al., 2014; Coulibaly et al., 2018; Van Bon, 2019).

Contrary to most findings on the impact of institutions' FCI on growth, Van Bon (2019) adopted the GMM estimation data of Vietnam provinces from 2005–2012 and observed that the interaction of institutional quality and FDI's influence on growth are significantly negative.

Slesman et al. (2015) examined the impact of FCIs on economic growth, contingent on economies' institutional development. Using panel data for 1975–2005 based on 80 countries, consisting of advanced, emerging and developing economies, the authors employed threshold regression techniques with institutional quality as the threshold variable. Their findings indicated that FDI, portfolio debt and portfolio investment inflows positively influence growth in nations with high institutional development. Conversely, when institutional quality was below the estimated threshold level, either negative or insignificant effects were recorded. Other authors, such as Azman-Saini et al. (2010), used a panel of 91 countries over the same sample period, and threshold techniques conditioned the inflows' growth relationship with financial markets. A similar conclusion was reached, where FDI's positive effect on economic growth was only realised after the development of financial markets had exceeded the threshold level. Azman-Saini et al. (2010) recorded that property rights protection, legal systems, freedom of international trade and credit, labour and business regulations are crucial in capturing the benefits associated with FDI.

Liargovas and Skandalis (2012) examined the relationship between FDI and trade openness, exchange rate stability, nominal GDP, GDP per capita and political risk. They sampled 36 developing countries for their study (12 Latin American, 10 Asian, 4 African, 4 Commonwealth of independent states and 6 Eastern European countries) and reviewed data spanning 1990–2008. The fixed-effects model, a panel regression analysis method, was employed to analyse the data. The results disclosed that political stability, exchange rate stability, market size, and trade openness are factors that affect FDI inflow positively. More specifically, trade openness positively impacts the inflow of FDI in the long run.

Asogwa et al. (2014) investigated the impact of capital inflows on economic growth. Quarterly data were used to cover the period 1980 Q1–2009 Q4. An endogenous growth model was employed for the study, focusing on the impact of FDI inflows into the agriculture, manufacturing and telecommunication sectors of Nigeria. The study examined the direction of causality between FDI inflow into these sectors and economic growth, and the business environment's influence, mainly in terms of political instability, corruption, and the institution/legal framework. Their study drew suggestions from the work of Sala-I-Martin (1997) and Barro and Lee (1994) on macroeconomic indicators such as inflation (INF), real interest rate (RINTR) and real exchange rate (RER) on the inflow of FDI. The empirical evidence shows that FDI in the manufacturing and telecommunication sectors have a positive impact on economic growth in Nigeria, while FDI in the agricultural sector impacts economic growth negatively. The findings of the Granger causality suggest FDI in the agriculture, manufacturing and telecommunication sector have a unidirectional relationship with economic growth in Nigeria. Institutions or legal frameworks have positive and significant influences on the inflow of FDI.

Khachoo and Khan (2012) identified the main determinants of capital inflows to developing countries; 32 developing countries were sampled, and the data covered 1982–2008. The independent variables were GDP (market size), total reserves, electric power consumption, wage rate and openness (export plus import divided by GDP). The results show that large market size, more reserves, good infrastructure, and reduced labour cost positively impact FDI inflow to developing countries. The positive relationship between GDP and FDI inflow illustrates that countries with a large market size can attract more FDI. More reserves also have a positive impact on FDI inflow to host countries, along with good infrastructure. Low labour costs can also motivate multinational corporations to invest in a country with low wage rates.

Burger and Ianchovichina (2014) investigated the determinants of FDI inflow to Africa. The panel-data analysis method was employed to analyse data spanning 1980–2007. The factors that were included in the model are urban population, GDP per capita, openness (trade as a percentage of GDP), financial development (domestic credit to the private sector), inflation (annual inflation rate), exchange rate, government consumption (percentage of GDP), infrastructure (fixed and mobile subscriber per 1000), political right and regions. The results showed that a large market size, trade openness, high government consumption expenditure, natural resource endowment and remittance have a positive impact on FDI to Africa. Compared to other parts of Africa, east and southern African sub-regions attracted more FDI. However, Burger and Ianchovichina (2014) stated that higher financial development had a negative impact on FDI inflow.

Shafi (2014) investigated the empirical relationship between non-extractive FDI and economic

growth in Nigeria. Secondary data were sourced from the Central Bank of Nigeria, the International Monetary Fund, and the Federal Office of Statistics. The period of analysis was 1970–2002. An augmented growth model was estimated via the OLS and the two-stage least square method to ascertain the relationship between FDI, its components and economic growth. Results suggest that the determinants of FDI in Nigeria are market size, infrastructure development and stable macroeconomic policies. However, openness to trade and available human capital do not influence FDI. FDI in Nigeria contributes positively to economic growth. Although FDI's overall effect on economic growth may not be significant, the components of FDI do have a positive impact. FDI in the communication sector has the highest potential to grow the economy, with multiple impacts coming from the oil sector. The manufacturing sector FDI negatively affects the economy, reflecting the poor business environment in the country. The level of available human capital is also low, and there is a need for more emphasis on training to enhance its potential to contribute to economic growth.

Haile and Assefa (2006) conducted a time series analysis to assess determinants of capital inflows in Ethiopia over the period 1974–2001. The study focused on market size (real GDP per capita and real GDP growth rate was included as a measure of market attractiveness), export orientation (export as a percentage of GDP), macroeconomic stability (rate of inflation based on consumer price index), infrastructure (gross fixed capital formation and number of telephones), human capital (rate of adult illiteracy) and trade liberalisation. From the regression models, the results based on the sign and significance of the variables are as follows: GDP per capita (positive but not significant), growth rate of GDP (positive and significant in three models out of four), export orientation (positive and significant in all models), inflation (negative and significant), trade liberalisation dummy (positive and significant), telephone per 1000 (negative and significant), gross fixed capital formation (negative and insignificant) and illiteracy (negative but insignificant). The study's findings showed that the growth rate of real GDP, export orientation and trade liberalisation positively impact FDI inflow to Ethiopia. However, macroeconomic instability and poor infrastructure have a negative impact on FDI. The result suggests that in Ethiopia, trade liberalisation, stable macroeconomic and political environments and good infrastructure are essential to attract more FDI.

Bende-Nabende (2002) examined the factors that influence capital inflows in SSA countries. In that study, 19 SSA countries were sampled. The co-integration analysis method was adopted to analyse the data. The explanatory variables included real wage rates, interest rates, foreign exchange rates, openness, liberalisation, current market size (GDP), market growth, human capital, and export-oriented policy, with FDI as the dependent variable. Market growth, export orientation policy, and FDI liberalisations are the main factors suggested to be the dominant long-run determinants of FDI inflow in SSA.

In addition, Asiedu (2004) assessed the determinants of capital inflows in developing countries. The study's main objective was to determine whether the factors that affect FDI in developing countries affect African countries, specifically SSA. There were 71 countries selected for this study (32 were SSA countries and 39 were non-SSA countries), and cross-sectional data were used for the period 1988–1997. The OLS method was employed to analyse the data. FDI was used as the dependent variable, and return on investment, infrastructure development, the openness of the host country, political risk, financial depth, size of government, inflation rate, and GDP growth rate were adopted as explanatory variables. The results showed that trade openness has a positive impact on

both sub-Saharan and non-SSA countries. However, SSA received less FDI than non-SSA. This is because, as Asiedu (2004) argued, SSA countries are less open in terms of trade than other regions. While infrastructure development positively impacts FDI inflow in non-SSA, it has no significant effect on SSA.

In conclusion, in this section, the capital market theory, the industrial organisation theory, the international production theory and the portfolio investment theory were discussed to provide a coherent framework upon which the structure of this research was based. Past empirical works of authors who tested the various theories were reviewed within Africa and beyond. Evidence from the studies confirmed diverse outcomes of determinants of FCIs to the region but with no explanation of governance's role in determining how capital flows into the region, or how the capital flows differ according to economic blocs in the region.

3. Methodology

3.1. Model specification

Objective 1: To investigate which factors determine the inflow of foreign capital in SSA, this study followed the empirical study of Mohammed (2022) to develop the study's first functional model:

$$FCI = (GoveffE, RgQE, RULLE, Foodsec, INF, LEX, HCI, Rexcha) \quad (1)$$

Modelling the determinants of capital inflow in an implicit model leads to Equation (2) below:

$$FCI = \alpha_0 + \alpha_1 GoveffE + \alpha_2 RgQE + \alpha_3 RULLE + \alpha_4 Foodsec + \alpha_5 INF + \alpha_6 LEX + \alpha_7 HCI + \alpha_8 Rexcha \quad (2)$$

An econometric model in a dynamic panel form requires that the past should explain the present.

Consequently, Equation (2) assumes a dynamic model as follows:

$$\begin{aligned}\Delta FCI_{it} = {} & \alpha_0 + \alpha_1 \Delta FCI_{it-1} + \alpha_2 \Delta GoveffE_{it} + \alpha_2 \Delta RgQE_{it} + \alpha_3 \Delta RULLE_{it} \\ & + \alpha_4 \Delta Foodsec_{it} + \alpha_5 \Delta INF_{it} + \alpha_6 \Delta LEX_{it} + \alpha_7 \Delta HCI_{it} + \alpha_8 \Delta Rexcha_{it} \\ & + \mu_{it}\end{aligned} \quad (3)$$

In this study, α_0 is the intercept, and α_2–α_9 are the coefficients of elasticity. FCI indicates foreign capital inflow; GoveffE indicates government efficiency; RgQE indicates regulatory quality; RULLE indicates the rule of law; Foodsec indicates food security; INF indicates inflation; LEX indicates life expectancy; HCI indicates human capital index and Rexcha indicates real exchange rates.

Objective 2: FCI's impact on economic growth in SSA international or foreign capital enters the production model directly through capital stock. Consequently, a simple neoclassical growth theory is modelled from a given Cobb-Douglas production function as proposed by Mankiw and Romer (1991) and de la Fuente (2011) in the following form:

$$Y_{it} = A_{it}(K_{it}^{\alpha k} H_{it}^{\propto h} L_{it}^{\propto l}) \; 0 < a < 1 \quad (4)$$

where Y_{it} is total annual output at time t; A_{it} is total factor productivity that captures all variables not

captured by labour, capital and human capital at time *t*; L_{it} is labour input; K_{it} is capital input; and $\propto k$, $\propto h$, $\propto l$ are the output elasticity of capital and labour and human capital, respectively.

These values are constantly determined by available technology. Consequently, model 4 could be log-linearised to factor out capital as the study's dependent variable. This linearity is found in Equation (5) as follows:

$$logY_{it} = logA_{it} + \alpha klogK_{it} + \propto hlogH_{it} + \propto llogL_{it} \quad (5)$$

where $logA_{it}$ are the vectors of factors impacting economic growth but not captured by H_{it} and L_{it}, respectively. These factors include inflation, life expectancy, human capital investment, food security and others. Assuming the lower cases are adopted to assume the log of each factor from Equation (5), this leads to Equation (6):

$$\begin{aligned} GDPGrowth_{it} = {} & \alpha_0 + \alpha_1 FCI_{it} + \alpha_2 \mathrm{GoveffE}_{it} + \alpha_2 \mathrm{RgQE}_{it} + \alpha_3 \mathrm{RULLE}_{it} \\ & + \alpha_4 \mathrm{Foodsec}_{it} + \alpha_5 \mathrm{INF}_{it} + \alpha_6 \mathrm{LEX}_{it} + \alpha_7 \mathrm{HCI}_{it} + \alpha_8 \mathrm{Rexcha}_{it} \\ & + \alpha_9 GDPGrowth_{it-1} + \mu_{it} \end{aligned} \quad (6)$$

3.2. Variables of the study

The brief definitional terms are as follows:

Foreign capital inflow (FCI): This combines all income from abroad in the form of FPI and FDI. This is the dependent variable whose changes depend on the variations of the explanatory variable.

Human capital investment (HCI): Education level is represented by school enrolment at the tertiary level (SET). According to Hu and Wolniak (2010), level of education is positively related to income level or earnings and helps to reduce poverty levels in the economy. Therefore, education is expected to positively influence FCIs.

Food security (Foodsec): The inclusion of food security in the model assists in measuring the prevalence of undernourishment. To end hunger and poverty, food security is key to the attractiveness of the inflows of FCI. Food security is expected to positively attract FCIs.

Gross domestic product growth rate (GDPgrowth): This variable is adopted to examine how the growth of the economy attracts FCI. The role that GDP growth plays in stimulating capital inflows is further elaborated in the study conducted by Ehigiamusoe and Lean (2019). The GDP growth rate is expected to have a positive effect on FCIs.

Inflation (INF): The inclusion of this variable supports Sahoo and Sethi's (2017) argument of the determination of trade relationships and how prices attract capital flows and determine the level of investment in the economy.

Life expectancy: This variable is included to capture how the health status of workers stimulates FCI in SSA countries. Alsan et al. (2006) argued that poor health could result in a high rate of worker turnover, leading to increased production costs and reduced productivity, which negatively impacts foreign investment inflows. Therefore, a good health status among the population is expected to attract an inflow of foreign capital, while a population with poor health has a negative effect on FCIs.

3.3. Data sources

The study's data were obtained from the International Monetary Fund database, International Financial Statistics (IFS) and World Bank's WDI. All data were expressed in index and percentage. The annual data spanned from 1993–2018 due to scanty data availability. This data was calculated in three-year averages to reflect 10 (T) years and 31 (N) countries. The researchers limited the number of cross-sections to 31 countries to obtain strongly balanced data for the region due to insufficient data availability. The study adopted regulatory quality, the rule of law and government efficiency to proxy governance. The governance variables were sourced from the world development indicators. Although there are six variables to proxy governance, as specified in the world development indicators, the three selected variables reflect greater governance weaknesses in the developing economy. In fact, the other variables are subsumed into the three selected variables. Consequently, the researchers prioritised these in the model to help explain governance's role in FCI in the SSA region.

3.4. Estimation techniques: SYS-GMM

To control for the model's endogeneity problem and account for the dynamics of the study's model, SYS-GMM was considered the most appropriate estimation method. Literature identified dynamic panel models as an appropriate technique to improve estimators' performance in any panel model. The approach suitable for this estimation (SYS-GMM) was popularised by Arellano and Bond (1991). When a fixed-effects model with static specification interacts with autoregressive coefficients alongside the lagged value of the dependent variable, it enhances feedback from current or past shocks relative to the current value of the dependent variable. The approach for such a specification is otherwise known as system (SYS) GMM. The dynamic specification prevents a spurious regression from being run as it eliminates the temporal autocorrelation in the residuals that may result in inconsistent estimators. The SYS-GMM model is adequate to explain the relationship between FCI, and the variable factors that explain the inflow in SSA countries are hereby specified thus:

$$FCI_{it} = \alpha_0 + \alpha_1 FCI_{it-1} + \alpha_2 \mathrm{GoveffE}_{it} + \alpha_2 \mathrm{RgQE}_{it} + \alpha_3 \mathrm{RULLE}_{it} + \alpha_4 \mathrm{Foodsec}_{it} + \alpha_5 \mathrm{INF}_{it} + \alpha_6 \mathrm{LEX}_{it} + \alpha_7 \mathrm{HCI}_{it} + \alpha_8 \mathrm{Rexcha}_{it} + \mu_{it} \quad (7)$$

With the inclusion of the lagged value of the dependent variable, Equation (6) is a modification of Equation (7) in dynamic panel-data form.

Consequently, taking the first difference of Equation (7), Equation (8) is obtained as follows:

$$\Delta FCI_{it} = \alpha_0 + \alpha_1 \Delta FCI_{it-1} + \alpha_2 \Delta \mathrm{GoveffE}_{it} + \alpha_2 \Delta \mathrm{RgQE}_{it} + \alpha_3 \Delta \mathrm{RULLE}_{it} + \alpha_4 \Delta \mathrm{Foodsec}_{it} + \alpha_5 \Delta \mathrm{INF}_{it} + \alpha_6 \Delta \mathrm{LEX}_{it} + \alpha_7 \Delta \mathrm{HCI}_{it} + \alpha_8 \Delta \mathrm{Rexcha}_{it} + \mu_{it} \quad (8)$$

With a careful avoidance of possible correlation between π_{it} and δ_{it-1}, the study introduced Z as an instrumental variable. Consequently, any model that possibly correlates with both components may be achieved by transposing the matrix of the exogenous variable. The study obtained the new Equation (9) by multiplying the vector form of model 8:

by δ' leading to: $\delta \Delta y_{it} Z' \Delta \delta_{it} = \rho_1 + \delta'(\Delta \vartheta_{it-1})\gamma + \delta'(x_{it})\rho + \delta' \Delta \mu_{it}$ (9)

The regression of Equation (9), through the adoption of generalised least squares (GLS), leads

to one-step consistent GMM estimators. Further efforts to enhance the method of analysis, as developed by Arellano and Bond (1991) and Blundell et al. (2001), resulted in a new method of estimating technique known as SYS-GMM. The difference between the initial GMM and the current method is that SYS-GMM appears more cautious when applying the instrumental variables in the model. The method was developed to address any possible challenge resulting from weak instrumental variables that could appear in GMM. Hence, the SYS-GMM could yield a preferred, consistent and efficient parameter estimator, when longer periods are required in the model. Hence, the need to adopt the SYS-GMM estimator as the study's model.

Please conform if it is correct

YY_{iiii} is the vector of factors capturing endogeneity of FCIs; $\rho\rho_1$ is the vector of the constant term; ii proxy the SSA nations; Δ connotes the first differencing operator. FCIs are the endogenous variable for all countries. The independent variables for the study are government effectiveness (GoveffE), the rule of law (RULL), regulatory quality (RgQE), Foreign labour indicator (FLI), life expectancy (LEX), inflation (INF), real exchange rate (Rexcha), and food security (Foodsec). Based on a priori expectation, a positive relationship is expected between FCI and GoveffE, RULL, RgQE, LEX, Rexcha, Foodsec and INF.

3.5. Data analysis and model estimation

This section addresses the summary statistics obtained for this study from the pooled observations. All the variable attributes are shown at a glance through the series of interactions that determine the relationship between FCI and the explanatory variables in the SSA countries under investigation. The attributes of the descriptive statistic function around the maximum and minimum values, standard deviation, median and mean across variables in the panel data.

Table 2 showcases some specific characters associated with the member of the central tendency in the series. The entire mean in the series exhibited mixed values in relation to the maximum, except the governance variables that appeared closer to the minimum. More specifically, FCI has a very low dispersal since the standard deviation value is only 8.97 relative to 3.61, which is the mean value in the model. When comparing the outcome in relation to minimum/maximum value, the study confirmed that the mean value FCI is closer to the minimum value of –76.58 than the maximum value of 108.7575. The implication is that FCI is fairly low in the region relative to other explanatory variables. Further, governance variables of the rule of law, government efficiency and regulatory quality all have negative values, with low means closer to the minimum value that the maximum. It therefore implies these values' influence on other variables in the model to impact FCI is low. This result supports extant a priori expectations that FCI is low in the SSA region. While the value is generally low, it indicates that FCI could grow, given policy implementation in the right direction.

Table 3 reflects the outcome of the association between the series FCI and other variables, such as GoveffE, RULL, RgQE, LEX, INF, Rexcha, Foodsec, HCI, FLI, and GDPgrowth. All values in relation to FCI indicated a very low correlation. The outcome showed that, on average, there is no problem with multi-collinearity in the model.

Table 2. Summary of variables.

Variables	Observation	Mean	Standard dev	Minimum	Maximum
FCI	806	3.606	8.969	–76.575	108.7575
GoveffE	716	–0.506	1.062	–1.809	4
RgQE	716	–0.356	1.372	–2.202	8
RULLE	716	–0.328	1.548	1.880	9
Foodsec	806	2.389	2.593	0.171	18
INF	803	25.075	200.288	0.084	4800.532
LEX	803	56.624	7.684	37.083	74.515
GDPgrowth	803	3.926	4.577	–28.099	26.417
HCI	798	36.725	27.309	0.498	117.882
Rexcha	806	36.725	27.309	0.498	117.882

Source: Author's computation (2023).

Table 3. Results of the correlation analysis.

Variables	FCI	GoveffE	RgQE	RULLE	Foodsec	INF	EX	GDPgrowth	CI
FCI	1.0	–	–	–	–	–	–	–	–
GoveffE	0.0933	1.0000	–	–	–	–	–	–	–
RgQE	0.0672	0.9375	0.000	–	–	–	–	–	–
RULLE	0.0760	0.9311	0.9776	0.0000	–	–	–	–	–
Foodsec	0.1304	0.6958	0.7454	0.7511	0.0000	–	–	–	–
INF	0.0651	0.0520	0.065	0.0686	0.0074	0.0000	–	–	–
LEX	0.1538	0.3294	0.2044	0.2373	0.1170	0.1406	0.0000	–	–
GDPgrowth	0.0276	0.0728	0.0695	0.0657	0.004	0.0201	0.0308	1.0000	–
HCI	0.1524	0.5644	0.4464	0.4633	0.3859	0.1230	0.5917	0.0452	1.0000

Source: Author's computation (2023).

The study's hypothesis testing (see the Appendix for tables): H0 = A random-effects model is the preferred model for the study's analysis. HA = A fixed-effects model is the preferred model for the study's analysis. The result from the Hausman test indicated that researchers failed to accept the null hypothesis (H0); the study accepted the alternative hypothesis (HA) since the *p*-value of the Hausman test is significant at 0.0184, and consequently, the study failed to reject the fixed-effects model as most preferred for the study. The acceptance of the fixed-effect model was premised on the argument that it might control for the possible heterogeneity effect in the study's findings. In the fixed-effects model, only the rules of law and food security variables are significant statistically. With this outcome, the study proceeds further to engage a dynamic model for a more reliable and consistent result.

3.6. Determinants of FCI according to each economic bloc: LSDV approach

This section showcases the determinants of FCI according to economic blocs in SSA. There are four typical economic blocs represented in this table: Economic Community of West African States (ECOWAS), Southern African Development Community (SADC), East African Countries (EAC), and Economic Community of Central Africa (ECCA). The analysed variables indicated that only

the rule of law and food security significantly impacted FCI among the economic blocs. Evidence shows that while an increase in the level of food security increases FCI by 66.8%, the reverse is true for the rule of law, as it typically shows an 11% increase in the rule of law will decrease FCI by 2.7 units. By implication, strengthening the region's legal framework would further decrease FCI. More importantly, out of the 31 countries across the various economic blocs in the region, only six responded significantly to the determinants of food security and the rule of law, as seen in **Table 4**. In the SADC economic bloc, Mauritania, Namibia and Seychelles responded, and in ECOWAS, only Mauritius had a significant relationship with food security and the rule of law in the fight for FCI. While no country emerged in the ECCA bloc, Cameroon and Burundi are countries from the EAC that share common features explaining food security and the rule of law in relation to FCI.

Table 4. Determinants of FCI according to each economic bloc.

Variables	Coefficients	Std. Err	*t*	*p* > |*t*|
GoveffE	–3.046	1.993	–1.53	0.127
RgQE	2.739	1.747	1.57	0.117
RULLE	–2.721	1.642	–1.66	0.098
Foodsec	0.668	0.326	2.05	0.041
INF	0.008	0.005	1.65	0.100
LEX	–0.048	0.097	–0.50	0.618
GDPgrowth	–0.009	0.072	–0.14	0.891
HCI	0.129	0.079	1.64	0.102
Rexcha	0	(omitted)		
SADC FCI determinants				
Botswana	9.788	12.739	0.77	0.443
Comoros	–3.085	3.977	–0.78	0.438
Congo Rep	0.718	3.585	0.20	0.841
Eswatini	0.034	2.975	0.01	0.991
Madagascar	5.526	4.339	1.27	0.203
Malawi	3.920	4.382	0.89	0.371
Mauritania	8.134	4.303	1.89	0.059
Namibia	10.213	5.229	1.95	0.051
Seychelles	11.064	5.644	1.96	0.050
South Africa	–6.149	5.631	–1.09	0.275
Zambia	4.494	4.251	1.06	0.291
Zimbabwe	–1.107	4.413	–0.25	0.802
ECOWAS FCI determinants				
Benin	3.087	4.021	0.77	0.443
Cabo Verde	7.834	5.366	1.46	0.145
Ghana	4.446	4.476	0.99	0.321
Guinea-Bissau	2.010	3.753	0.54	0.592
Mali	3.336	4.136	0.81	0.420
Mauritius	9.841	5.805	1.70	0.090
Niger	7.336	4.474	1.64	0.102

Table 4. (*Continued*).

Variables	Coefficients	Std. Err	*t*	*P* > |*t*|
Nigeria	0.0139	4.184	0.00	0.997
Senegal	4.874	4.496	1.08	0.279
Sierra Leone	5.935	4.330	1.37	0.171
Togo	0.8706798	3.591222	0.24	0.809
EAC FCI determinants				
Burundi	–9.345	4.300	–2.17	0.030
Cameroon	–5.676	3.380	–1.68	0.094
Congo Rep	0.718	3.585	0.20	0.841
Kenya	–0.872	4.177	–0.21	0.835
Tanzania	6.867	4.548	1.51	0.132
Uganda	6.194	4.468	1.39	0.166
ECCA FCI determinants				
Gabon	0.3189	3.955	0.08	0.936
Constant	–5.738	6.997	–0.82	0.412

3.7. Dynamic panel-data analysis

To identify which factors impact FCI in the SSA region, **Table 5** reflects the study's dynamic SYS-GMM model. A total of six socioeconomic variables and three governance variables were regressed on the FCI. The findings revealed that regulatory quality and the rule of law are governance variables that significantly impact FCI. The study found that government efficiency (as a variable) and food security failed to significantly impact FCI in the SSA region. However, inflation, life expectancy, human capital index, exchange rate and GDP growth impact FCI in the SSA region. In the aggregate, inflation, regulatory quality, exchange rate and human capital index exhibited positive relationships. Other variables, such as life expectancy, government effectiveness and the rule of law appeared significant but inversely impacted FCI in the SSA region. This implies that increases in the variables in the model decrease FCI in the SSA region.

The model showed that government effectiveness does not impact FCI in the SSA region. This is critical and reflects that what determines government effectiveness may vary from country to country. Consequently, since the individual perception of the variables varies with the level of government performance, overlooking certain government weaknesses could cause the variable to be insignificant to FCI in the SSA region. From the results, while an increasing rule of law may decrease FCI in the SSA region by 16%, regulatory quality would increase by 16%. With respect to the six socioeconomic variables in the model, inflation rate, exchange rate, and the human capital index would cause FCI to increase by 2.8, 34.9 and 34.9 units, respectively, while GDP growth and life expectancy would decrease it by 3.2 and 44.7 units, respectively. This result may not be expected as a priori expectation. However, a closer look at the model reflects that regulatory quality and the government's right application of the rule of law may control the flow of investment in favour of healthy economic agents. These two variables may discourage or disallow dumping, importation of outdated equipment and illegal activities in the SSA region. The outcome may result in a decline in FCI in the SSA region. Again, an increase in life expectancy and GDP growth decreases FCI in the SSA region. Inflation and exchange rate increases the value of FCI, thereby

increasing FCI in the SSA region. An increase in life expectancy reduces the value of FCI; the implication is that as quality of life increases among older citizens, less attention is given to FCI in the SSA region, since investment struggle is more dominant at the active age of the economy.

Table 5. Dynamic panel-data estimation, two-step SYS-GMM.

Number of obs	589			
No. of instruments	=15		No. of groups	31
Wald chi2 (6)	159.98		Obs per group	min = 7
Prob > chi2	0.000		Avg	8.81
Time variable	year		Max	9
Variables	**Coeff**	**Standard error**	***Z*-statistics**	***p*-value**
L. FCI	0.107	0.608	0.18	0.861
INF	0.028	0.0112	2.49	0.019
LEX	–0.447	0.234	–1.90	0.066
GoveffE	–7.092	6.299	–1.13	0.269
Foodsec	–2.005	2.609	–0.77	0.448
RgQE	25.209	9.155	2.75	0.010
Rexcha	0.349	0.196	1.79	0.084
RULLE	–16.440	5.390	–3.05	0.005
GDPgrowth	–3.278	1.559	–2.10	0.044
HCI	0.349	0.196	1.79	0.084
Cons	32.732	14.394	2.27	0.030

Source: Authors' computation (2023).
Note: FCI denotes foreign capital inflow, HCI implies human capital investment; LEX implies life expectancy; INF implies inflation; Rexcha implies real exchange rate; GDPgrowth implies GDP growth rate; Foodsec implies food security; RULLE: Rule of law, RgQE implies regulatory quality; GoveffE implies government effectiveness.

3.8. The model diagnostic test

This section reports the models' diagnostic tests. **Tables 6** and **7** reflect Hansen and Sargan's test results indicated that the null hypothesis could be rejected; consequently, restrictions on over-identification are invalid. By implication, the adopted number of instruments in the SYS-GMM analysis does not negatively impact the SYS-GMM estimators. A better performance model is expected as the *p*-value is close to one. Consequently, the findings are sufficient to establish no restriction to over-identification. In addition, the number of instruments is less than the number of countries (group).

Table 6. Sargan test of over-identifying restrictions.

H0: Over-identifying restrictions are valid	
Chi2 (25)	1.57
Prob > chi2	0.904

Source: Authors' computation (2023).

Table 7. Hansen test of over-identifying restrictions.

H0: Over-identifying restrictions are valid	
Chi2 (25)	4.90
Prob > chi2	0.428

Source: Authors' computation (2023).

3.9. Results from serial correlation

Information from the model diagnostics indicated that the Arellano-Bond SYS-GMM estimator produced the most preferred estimates at AR (2). A degree of serial correlation could be expected at the initial level of AR (1) but must be corrected at the level of AR (2) estimate. Consequently, a significance level may be expected at AR (1), which must not be at AR (2). Finally, the overall *p*-value is significant.

To achieve the study's second objective of investigating the impact of FCI on economic growth in the SSA region, **Table 8** summarises the findings.

Table 8. Results of serial correlation.

Method	*Z*-statistics result	*p*-value
Arellano-Bond test for AR (1)	$z = -1.57$	Pr > $z = 0.116$
Arellano-Bond test for AR (2)	$z = 0.05$	Pr > $z = 0.958$

Source: Authors' computation (2023).

3.10. To investigate the impacts of capital inflow on economic growth in the SSA countries

The results in **Table 9** indicate government ineffectiveness means FCI will not impact the growth of the economy in the SSA region. However, regulatory quality, the rule of law and human capital index all significantly impact economic growth in the SSA region. While the increase in regulatory quality will increase the growth of the economy, the rule of law and the human capital index will decrease the economy's growth in the region. This is because the rule of law does not affect the economy directly but through certain transmission mechanisms. It is clear from the results that the human capital index in the region is not productive enough to impact growth. This could be attributed to too many youths or graduates not being employable in the economy.

Table 9. Dynamic panel-data estimation, two-step SYS-GMM.

Number of obs	589			
No. of instruments	=30		No. of groups	31
Wald chi2 (6)	4480.03		Obs per group	min = 17
Prob > chi2	0.000		Avg	19
Time variable	year		Max	21
Variables	**Coeff**	**Standard Error**	***Z*-statistics**	***p*-value**
GDPgrowth L1.	0.14	0.046	3.21	0.001
FCI	–0.007	0.013	–0.54	0.587
GoveffE	0.465	1.406	0.33	0.741
RgQE	2.119	1.230	1.72	0.085

Table 9. (*Continued*).

Variables	Coeff	Standard Error	*Z*-statistics	*p*-value
RULLE	–3.978	0.668	–5.95	0.000
Foodsec	–0.089	0.394	–0.23	0.820
INF	0.007	0.008	0.90	0.369
LEX	0.060	0.1007	0.60	0.548
HCI	–0.062	0.035	–1.76	0.078
Cons	–0.811	6.444	–0.13	0.900

Source: Authors' computation (2023).

The findings indicated that the null hypothesis could be rejected; consequently, restrictions on over-identification are invalid. By implication, the adopted number of instruments in the SYS-GMM analysis does not negatively impact the SYS-GMM estimators. A better-performing model is expected as the *p*-value is close to one. Consequently, the findings are sufficient to establish no restriction on over-identification. In addition, the number of instruments is less than the number of countries (group).

Table 10 showcases the result of Sargan test of over-identifying restrictions. Information from the model diagnostics indicated that the Arellano-Bond SYS-GMM estimator produced the most preferred estimates at AR (2). A degree of serial correlation could be expected at the initial level of AR (1) but must be corrected at the level of AR (2) estimate. Consequently, a significance level may be expected at AR (1), which must not be at AR (2). Finally, the overall *p*-value is significant.

Table 10. Sargan test of over-identifying restrictions.

H0: Over-identifying restrictions are valid	
Chi2 (25)	28.90
Prob > chi2	0.116

Source: Authors' computation (2023).

Table 11 shows the result of Arellano and Bond test of serial correlation. From the **Table 11**, AR (1) was significant. This shows the possible presence of serial correlation at AR (1). This is being corrected at AR (2). Consequently, the result in AR (2) is not significant. Indicating the absence of serial correlation at AR (2).

Table 11. Results of serial correlation.

Method	*Z*-statistics result	*p*-value
Arellano-Bond test for AR (1)	$z = -5.23$	$Pr > z = 0.000$
Arellano-Bond test for AR (2)	$z = 0.95$	$Pr > z = 0.343$

Source: Authors' computation (2023).

4. Discussion of findings

Table 4 reflects the study's comparative analysis of factors determining FCI in ECOWAS,

SADC, EAC and ECCA within the SSA region. The combined result from LSDV provided evidence that food security and the rule of law are strong determinants of FCI according to each economic bloc. The result shows that while an increase in the level of food security increases FCI by 66.8%, the reverse is the case with the rule of law, as it typically shows an 11% increase in the rule of law will decrease FCI by 2.7 units. By implication, the stricter legal framework in the region would further decrease FCI. It implies that unwanted foreign investment could be restricted to protect domestic and infant industries across the region. More importantly, out of the 31 countries across the various economic blocs in the region, only six responded significantly to the determinants of food security and the rule of law, as seen in the table. In the SADC economic bloc, Mauritania, Namibia and Seychelles responded, and in ECOWAS, only Mauritius had a significant relationship with food security and the rule of law in the fight for FCI. While no country emerged in the ECCA bloc, Cameroon and Burundi are countries from the EAC that share common features explaining food security and the rule of law in relation to FCI.

Table 5 showcases the dynamic relationships between FCI and the series of factors that determine it in the model. Findings revealed that regulatory quality and the rule of law are governance variables that significantly impact FCI. The study found that government efficiency as a variable failed to impact FCI in the SSA region. In the model, food security also failed to significantly impact FCI in the SSA region. However, inflation, life expectancy, human capital index, exchange rate and GDP growth impact FCI in the SSA region. In the aggregate, inflation, regulatory quality, exchange rate and the human capital index exhibited positive relationships, while other variables such as life expectancy, government effectiveness and the rule of law appeared significant but inversely impacted the FCI in the SSA region. This implies that increases in the variables decrease FCI in the SSA region.

Results from the model also showed that government effectiveness does not impact FCI in the SSA region. This is highly informative in the study's findings because what determines government effectiveness may vary from country to country and are mostly endogenous. Consequently, since the individual perception of the variables varies with the level of government performance, overlooking certain government weaknesses could cause the variable to be insignificant to FCI in the SSA region. From the results, while increasing the rule of law may decrease FCI in the SSA region by 16%, regulatory quality would increase by 16%. With respect to the six socioeconomic variables in the model, inflation rate, exchange rate, and human capital index would cause FCI to increase by 2.8, 34.9 and 34.9 units, respectively, while GDP growth and life expectancy would decrease by 3.2 and 44.7 units. The results negate Haile and Assefa's (2006) reports of a negative relationship between inflation and capital inflow. This study's results also negate the findings of Asogwa et al. (2014), who claim there is a positive and significant impact between capital inflow and legal frameworks. The findings support Alsan et al. (2006) and Mihalache-O'Keef and Li (2011), who found an inverse relationship between FCI and food security, as this study provided evidence of no statistical relationship.

The third model in **Table 9** also showcases results that confirm whether FCI impacts the economy of SSA. The model exhibited mixed relationships, as this study failed to observe significant relationships between growth and capital inflow. Shafi (2014) also did not find significant relationships between capital inflow and growth, thereby supporting the study's findings. This study's results also negated the findings of Khachoo and Khan (2012), who observed a positive

relationship between growth and FDI. Van Bon (2019), Agbloyor et al. (2014), and Coulibaly et al. (2018) observed a negative relationship between capital flows and growth to accent an agreement with the current study.

The study has numerous limitations, and future research could help improve the version of this manuscript. Only data from 31 countries could be collated for this study out of the 54 countries in the SSA. This is not a true reflection of the state of the region in terms of factors that determine the flow of foreign capital in the SSA region. The study was also constrained to only three variables to proxy governance. This is because governance as a variable is hardly found in literature; proxying governance is thus a limitation in itself.

5. Conclusion and policy recommendations

This study investigated the determinants of FCIs in the SSA countries using a panel-data analysis with annual data covering 1993–2018. To control for time (T) with respect to N countries, the study averaged time with three years. The study's hypotheses are stated as follows. H0: No factor determines FCIs in any of the four economic blocs in SSA countries. H0: No factor determines FCIs in the SSA countries. H0: Foreign capital inflow does not impact on GDP growth in the SSA region. In order to establish the functional relationship between FCIs and the factors that determine it, summary statistic and correlation matrix, the random effect model together with the LSDV dynamic model, namely SYS-GMM, were adopted as the study's model. The preliminary findings from the correlation matrix clearly showed no multi-collinearity problem in the model. The brief analysis from the summary statistics further showed that most series skewed toward the minimum when considering the cluster of variables around their mean and standard deviation. For instance, the study found that the entire mean in the series exhibited mixed values in relation to the maximum, except the governance variables that appeared closer to the minimum than the maximum. More specifically, FCI has a very low dispersal since the standard deviation value is only 8.97 relative to 3.61, which is the mean value in the model. When comparing the outcome in relation to minimum/maximum value, the study confirmed that the mean value FCI is closer to the minimum value of –76.58 than the maximum value of 108.7575. Results from the LSDV and dynamic SYS-GMM provide evidence of the five socioeconomic variables and three governance variables that regressed FCI. The findings revealed that while an increase in the level of food security increases FCI by 66.8%, the reverse is true with the rule of law, as it typically shows an 11% increase in the rule of law will decrease FCI by 2.7 units.

By implication, stricter legal frameworks in the region would further decrease FCI. More importantly, out of the 31 countries across the various economic blocs in the region, only six responded significantly to the determinants of food security and the rule of law, as seen in **Table 3**.

In the SADC economic bloc, Mauritania, Namibia and Seychelles responded, and in ECOWAS, only Mauritius had a significant relationship with food security and the rule of law in the fight for FCI. While no country emerged in the ECCA bloc, Cameroon and Burundi are countries from the EAC that share common features explaining food security and the rule of law in relation to FCI.

Results from the dynamic model also showed government effectiveness does not impact FCI in the SSA region. This is highly informative in the study's findings, as what determines government

effectiveness may vary from country to country. Consequently, the subjective nature of the variables was insignificant to FCI in the SSA region.

From the result, while increasing the rule of law may decrease FCI in the SSA region by 16%, regulatory quality would increase it by 16%. With respect to the six socioeconomic variables in the model, inflation rate, exchange rate, and the human capital index would cause FCI to increase by 2.8, 34.9 and 34.9 units, respectively. Meanwhile, GDP growth and life expectancy would decrease by 3.2 and 44.7 units, respectively. This result may not be expected as a priori. However, at a closer look into the model, the researchers noticed that regulatory quality and the government's appropriate application of the rule of law might control the flow of investment in favour of healthy economic agents. With these two variables, dumping, importation of outdated equipment and illegal activities may be discouraged or disallowed into the SSA region. The outcome may impact a decline in the FCI in the SSA region. Again, an increase in life expectancy and GDP growth decreases FCI in the SSA region. Inflation and exchange rate increases the value of FCI, thereby increasing FCI in the SSA region.

These results have serious policy implications:

(1) The LSDV results indicate that an increase in the level of food security could increase FCI by 66.8%. Government should formulate policies to mechanise farming by partnering with foreign multinational corporations to supply seedlings and agricultural equipment, as both would enhance food security and vice versa.

(2) The case with the rule of law shows that an 11% increase in the rule of law will decrease FCI by 2.7 units. Legal frameworks in the SSA region should be developed to moderate investment activities in favour of citizens. Dumping should be discouraged, and local and infant industries should be legally protected. Laws should govern foreign investors to encourage more investment in the region, particularly in the SADC economic bloc, where Mauritania, Namibia and Seychelles are at an advantaged. Only Mauritius is represented in ECOWAS; the country has a significant relationship with food security and the rule of law in the fight for FCI. This study noticed a similar result with Cameroon and Burundi in the EAC.

(3) From the dynamic results, while an increase in the rule of law may decrease FCI in the SSA region by 16%, regulatory quality would increase by 16%. The researchers noticed that dynamic results corroborate the LSDV results in some instances.

(4) With respect to the six socioeconomic variables in the model, inflation rate, exchange rate, and the human capital index would cause FCI to increase by 2.8, 34.9 and 34.9 units, respectively. Inflation and exchange rates have the tendency to influence/improve human capital, provided adequate policies complementing each other are established. Policies that target inflation and exchange rate should be enacted so that the flow of foreign capital builds our human capital through skill acquisition, training and development policies.

(5) GDP growth and life expectancy would decrease FCI by 3.2 and 44.7 units, respectively. Factors that grow the region's GDP and quality of (life expectancy) should be largely produced locally from within the region. Such products should not be allowed to be dependent on foreign capital except in cases where foreign assistance is required in technology and raw materials.

Author contributions

Conceptualization, AO and GWA; methodology, GWA; software, AO; validation, AO and GWA; formal analysis, GWA; investigation, GWA; resources, AO; data curation, AO; writing—original draft preparation, GWA; writing—review and editing, AO; visualization, AO; supervision, AO; project administration, AO; funding acquisition, AO. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

Sub-Saharan African countries' abbreviations

AGO	Angola	CPV	Cabo Verde	LSO	Lesotho	SLE	Sierra Leone
BDI	Burundi	ERI	Eritrea	MDG	Madagascar	SSD	South Sudan
BEN	Benin	ETH	Ethiopia	MLI	Mali	STP	Sao Tome Principe
BFA	Burkina Faso	GAB	Gabon	MOZ	Mazanbique	SWZ	Eswatini
BWA	Botswana	GHA	Ghana	MUS	Mauritius	SYC	Seychelles
CAF	Central African Republic	GIN	Guinea	NWI	Malawi	TCD	Chad
CIV	Cote D'ivoire	GMB	Gambia	NAM	Namibia	TGO	Togo
CMR	Cameroon	GHB	Guinea Bissau	NER	Niger	TZA	Tanzania
COD	Congo Democratic Republic	GNQ	Equatorial Guinea	NGA	Nigeria	UGA	Uganda
COG	Congo Republic	KEN	Kenya	RWA	Rwanda	ZAF	South Africa
COM	Comoros	LBR	Liberia	SEN	Senegal	ZMB	Zambia
ZWE	Zimbabwe						

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Appendix

Table A1. Fixed-effects (within) regression on the series.

Fixed-effects (within) regression				
Number of obs		708		
Number of groups		31		
within	0.0298		Min	18
between	0.0001		Avg	22.8
overall	0.0041		max	26
Prob > F	0.0160		Corr (u_i, Xb) =	–0.6912
F (9668)	2.28			
Variables	**Coefficients**	**Standard error**	***T*-statistics**	***p*-value**
GoveffE	–3.046456	1.993646	–1.53	0.127
RgQE	2.739926	1.747061	1.57	0.117
RULLE	–2.72163	1.642367	–1.66	0.098
Foodsec	0.6679892	0.32604	2.05	0.041
INF	0.0076094	0.0046153	1.65	0.100
LEX	–0.0486065	0.0973769	–0.50	0.618
GDPgrowth	0.0503399	0.0816282	0.62	0.538
HCI	–0.0099429	0.0723105	–0.14	0.891
Rexcha	0	(omitted)		
Cons	–2.754992	5.239981	–0.53	0.599

Source: Authors' computation (2023).

Table A2. Random-effects (within) regression on the series FCI, GoveffE, RULLE, RgQE, LEX, INF, Rexcha, Foodsec, HCI, FLI, and GDPgrowth.

Random-effects (within) regression				
Number of obs		1007		
Number of groups		31		
within	0.0176		Min	18
between	0.2754		Avg	32.5
overall	0.0483		max	34
Prob > F	0.0054			
Variables	**Coefficients**	**Standard error**	***T*-statistics**	***p*-value**
GoveffE	–0.7375694	1.292557	–0.57	0.568
RgQE	0.5372016	1.495341	0.36	0.719
RULLE	–0.8211068	1.281337	–0.64	0.522
Foodsec	0.5913179	0.2457098	2.41	0.016
INF	0.0091803	0.0044511	2.06	0.039
LEX	0.1006161	0.070933	1.42	0.156
GDPgrowth	0.0669164	0.0803893	0.83	0.405
HCI	0.0457921	0.0329464	1.39	0.165
Rexcha	0	(omitted)		
Cons	–5.852003	3.906766	–1.50	0.134

Source: Authors' computation (2023).

Table A3 reports the outcomes from the estimation through the Hausman test to ensure the most preferred model between fixed and random effects.

Table A3. Hausman test for fixed or random effects.

(b)	(B)	(b–B)	sqrt (diag (V_bV_B))
fe	**re**	**Difference**	**S.E.**
–3.046456	–0.7375694	–2.308886	1.517867
2.739926	0.5372016	2.202725	0.9034249
–2.72163	–0.8211068	–1.900523	1.027397
0.6679892	0.5913179	0.0766713	0.2143099
0.0076094	0.0091803	–0.0015709	0.0012199
–0.0486065	0.1006161	–0.1492226	0.0667141
0.0503399	0.0669164	–0.0165765	0.0141675
–0.0099429	0.0457921	–0.055735	0.0643688
0.1290597	–0.0005615	0.1296212	0.0738167

b = consistent under Ho and Ha; obtained from xtreg;
B = inconsistent under Ha, efficient under Ho; obtained from xtreg: Test: Ho: difference in coefficients not systematic
chi2 (9) = (b–B)' [(V_b — V_B)^(–1)] (b – B) = 19.92;
Prob > chi2 = 0.0184.
Source: Authors' computation (2023).

Tables 4 and **5** showcase the outcomes of the panel model result under investigation on the random and fixed effects. Through the Hausman test conducted, we hypothesise a clear variation between the two identified models.