DOI: https://doi.org/10.11113/ijibs.v19.147

International Journal of Innovation and Business Strategy (IJIBS)/ Vol. 19, No. 1, June 2024, 10-35

AN EMPIRICAL INVESTIGATION OF THE DYNAMIC LINKAGES AMONG FOREIGN DIRECT INVESTMENT, ECONOMIC GROWTH, AND GOVERNANCE IN CEMAC COUNTRIES: A PANEL VAR ANALYSIS

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Received: 03.01.2024 Accepted: 24.05.2024 Published: 30.06.2024

Abstract: Economic Growth and the inflow of investments in CEMAC countries have been frequently attributed to the quality of governance. Good governance might, in turn, be attributed to the level of investments flowing into these countries as well as being a source for inclusive and sustainable economic growth. The main purpose of this study is to empirically investigate (plausible) the interaction between FDI inflows and market and economic dynamics of host countries using panel VAR model and a more robust Bayesian VAR approach in CEMAC countries over the years 1990−2019. All preliminary statistics, the VAR estimates, as well as structural dynamics are presented using EViews software package. The results show that there is a significantly positive impact of FDI inflows on economic growth. Governance and economic growth do not influence the flow of FDI into CEMAC countries. Based on the Granger causality test, we found a unidirectional causality running from FDI to economic growth. This shows that FDI is important for the growth of CEMAC economies, but the growth of the economy and the quality of aggregate governance do not help investors in making a decision to invest. Also, FDI inflow and growth of the economy do not encourage better governance. This might point to the investigation of individual dimensions of governance to see which is peculiar in CEMAC countries. The results also show significant improvement in the estimates with the use of Bayesian method for the Minnesota prior.

Keywords: FDI inflow, heavily indebted poor countries, panel VAR, Bayesian VAR, CEMAC countries

Paper type: Empirical article

DOI: https://doi.org/10.11113/ijibs.v19.147

Introduction

Foreign direct investment (FDI) presents an interconnected global economy with the chance for international collaboration of countries and aiding the inflow of investments made by nonresidents. As such, FDI has emerged as a critical engine for economic growth (Ayanwale, 2007; Bouchoucha & Ali, 2019; Emamverdi & Boland-Ghamat, 2019; Hassan, 2020; Le et al., 2021; Ma et al., 2019; Mariska et al., 2021; Miao, 2021; Miao et al., 2021; Muhammad & Khan, 2019; Sirag et al., 2018; Toan & Huu, 2021;Van Bon, 2019; Yimer, 2022). It is, therefore, not uncommon for governments and researchers to pin the significance, impact, and factors that drive growth on the inflow of FDI.

The FDI-growth nexus has been transformed by the impact of a myriad of mediating or control variables. For instance, while Ketteni and Kottaridi (2019) explore the impact of labor market regulation, Jayachandran and Seilan (2010) highlights the effect of trade on the FDI-growth relationship, and Sapuan et al. (2020) delves into the roles of energy consumption and financial development on growth. In the link between FDI inflow and economic growth, the role of governance is increasingly recognized as a key concern in this relationship (see Beddim, 2023). As such, this relationship is more complex than just investigating the mediating role of other variables such as governance (Agyeman et al., 2022; Bouchoucha & Yahyaoui, 2019; Hamid et al., 2022; Raza et al., 2021; Saidi et al., 2023), household consumption (Petkova, 2019), as well as financial market development (Adeniyi et al., 2012; Alfaro, 2004) proving to be preconditions for the effectiveness of FDI. Hence, empirical results and conclusion in this relationship are ambiguous (Abbes et al., 2015; Alfaro, 2004; Chanegriha et al., 2020).

The role of growth in attracting FDI or the impact of FDI on economic growth is, according to Narula and Driffield (2012), ambiguous especially for developing countries. Despite this ambiguity, the link between these variables is still thought to be multifaceted, with both positive and negative externalities. Alfaro et al. (2004) attribute this to the contingent role of a third factor; financial markets. This thesis points to the effect of the host country's governance structure. Thus, effective governance, characterized by the six worldwide governance indicators (see Kaufmann et al., 2011) plays a crucial role in determining the extent to which FDI contributes to sustainable economic growth.

To date, what is not yet clear what constitutes governance and its impact on the FDI-growth nexus. Thus, this paper presents governance as an aggregate of six dimensions as defined by Kauffman et al. (2011) and delves into an additional research dimension of the nexus between FDI, economic growth, and governance while narrowing the research gap as highlighted by Giwa et al. (2020) through the lens of the sustainable development. Note that sustainable development goals (or SDGs) provide a comprehensive framework for addressing global challenges while ensuring sustainability (see Griggs et al., 2014; Leal Filho et al., 2019). The interplay between these variables is explored in the context of achieving SDGs, as Giwa et al. (2020) explain how FDI can serve as a catalyst for inclusive and sustainable industrial growth; and how this is achieved when coupled with sound governance practices. Conversely, poor governance may lead to less investment flow and slow growth, undermining the achievement of SDGs. Note that this does not extend to the inclusion of SDG scores into the analysis.

Instead, economic growth is seen as progress toward the path of sustainable growth in CEMAC countries.

Based on empirical evidence and theoretical frameworks, this study underscores the need for a holistic approach that considers the synergies and trade-offs between FDI, economic growth, governance, and the pursuit of SDGs. To this end, Suehrer (2019) remarks that while FDI plays a crucial role in fostering sustainable economic growth, there is a notable absence of policies and a comprehensive framework that effectively connect the CEMAC-2030 Agenda with tangible investment opportunities. Hence, emphasis on the importance of policy interventions that promote FDI, improve governance, and align economic growth with sustainability goals is an imperative. As CEMAC countries strive to navigate the complexities of the global economy, understanding the dynamic relationships among FDI, economic growth, and governance through SDGs becomes imperative for crafting policies that promote enduring and equitable development.

FDI itself is driven by a myriad of socio-economic, political factors as well as complex and strategic considerations. Key determinants of FDI include market size (Vijayakumar et al., 2010; Nunnenkamp, 2002), cost factors, human capital, openness to trade, globalization (Nunnenkamp, 2002), and labor cost, infrastructure, currency value and gross capital formation as the potential (Vijayakumar et al., 2010). FDI inflow into most developing countries has been a big challenge for both investors and host countries. Although this slow inflow of FDI into developing countries is simply attributed to the fact that these countries have slow growth, governance might be a block to FDI thriving. For instance, bad governance can undermine the good impact of FDI, resulting in concerns such as corruption, regulatory barriers, and a lack of transparency, which can dissuade both foreign and domestic investments and limit overall economic advancement.

Thus, governance is an important determinant and plays a central role in attracting FDI, and several studies including Niarachma et al. (2021), Drabek (2021), and Ofori and Asongu (2021) have linked empirical evidence to support this association. Regulatory quality, rule of law, corruption control, governance effectiveness, voice and accountability, and political stability are dimensions or indicators of governance, also known as aggregate governance have been recognized as essential governance dynamics that boost FDI inflows (Adeleke, 2014; Subasat & Bellos, 2013).

CEMAC is located in Central Africa with a small coastline along the Atlantic Ocean and portion of its territory made up of landlocked landmass. Its member countries (6), are Cameroon, Central African Republic, Chad, Congo (Rep.), Equatorial Guinea, and Gabon all clustered in the central and western parts of the African continent. The organization aims to foster economic cooperation, monetary stability, and sustainable development in the region. Six countries with countries classified under three income levels, HIPC and non-HIPC, and LDCs and non-LDCs, CEMAC countries are said to be extremely heterogeneous (see Dobdinga, 2015; Ranganathan et al., 2012).

This study journeys into the dynamic interactions between FDI, economic growth, and governance in CEMAC countries. However interrelated these relationships might be, this study narrows the dynamism of the interactions by investigating the role of economic growth and governance in attracting

FDI. In addition, the impact of FDI inflow and governance quality on the sustainable growth of CEMAC countries is assessed. Thus, this study is guided by the following questions:

RQ1: Does governance and economic growth affect the inflow of FDI in CEMAC countries?
RQ2: What's the impact of FDI inflow and governance quality on the sustainable growth of CEMAC countries?

In the face of currency devaluation shocks and shocks associated with the Global Financial Crisis (GFC), it is anticipated that FDI inflows will exhibit a negative dynamic response, leading to a short-term reduction in FDI inflows. Simultaneously, economic growth is hypothesized to experience a negative dynamic response due to the adverse impact of these shocks on investment and overall economic activity. Additionally, it is expected that governance indicators will show a deterioration in response to the increased economic uncertainties associated with currency devaluation and the aftermath of the GFC. The interplay among these variables is anticipated to highlight the complex and interconnected nature of their responses to economic shocks, providing valuable insights into the resilience and adaptability of economies in times of financial stress. Hence the research question:

RQ3: How do FDI, economic growth, and governance dynamically respond to the 1994 currency devaluation shocks and shocks associated with the 2008 GFC, and what are the interrelationships among these variables in the context of such economic disruptions?

Literature Review

According to Amal (2016), FDI is seen as a critical source of investment, knowledge transfer, and growth. Growth as a key predictor of FDI in seen in a myriad of studies with a positive relationship between growth and FDI (see Iamsiraroj, 2016; Iamsiraroj & Doucouliagos, 2015). Also, the importance of absorptive ability in influencing the impacts of FDI on economic growth cannot be overstated. Herzer (2012) points out the negative effect of FDI on growth in developing countries. Despite this mix results, classical economic theories highlight the importance of FDI as a driving force behind economic internationalization and integration, producing local wealth through specialization and comparative advantages.

Thus, Krajcsik (2015) argues that growth theory emphasizes major growth causes and their social and economic consequences, especially in market-based systems experiencing technological transition and global competition. Also, economic growth and development analysis has progressed from early models based on homogeneous elements of production to modern models that take into account human capital growth and development, as well as the influence of international commerce and labor distribution.

Over the years, FDI has been researched as the main driver behind growth. As such, FDI has become a critical component of economic development or growth in less developed countries. Based on Gudaro et al. (2012) assessment , FDI allows for the transfer of technologies, increases competition in the domestic input market, and leads to the growth of human resources. Profits generated by FDI

also add to the host country's corporate tax revenues. Tsatsaridis (2017) provides a theoretical and methodological investigation into how foreign direct investment influences the development of gross domestic product in Sub-Saharan African countries. In search for a difference in the effect of FDI between two groups of countries based on their educational attainment Tsatsaridis still holds that there is a lack of clarification in this field of research. The study's approach was focused on OLS regressions with country fixed effects and series cointegration checks. The empirical findings support a statistically significant effect of FDI inflows on GDP growth, as well as a negative relationship between education and FDI inflows.

FDI is thought to have a favorable influence on African development. Divergent empirical data have encouraged various scholars to seek reasons for these apparent discrepancies in observed results. Some preliminary findings support this viewpoint. For example, according to the primary regression finding of Borensztein et al. (1998), FDI has a positive overall effect on economic development, however the degree of this benefit is dependent on the stock of human capital available in the host nation. However, because of the way FDI interacts with human capital, the direct effect of FDI is negative for nations with very low levels of human capital.

The cross-country regressions also reveal that FDI has a beneficial, albeit not substantial, impact on domestic investment, owing to the attraction of complementing activities outweighing the displacement of local rivals. Because FDI functions by ‘pulling in' other sources of investment, this is an indirect effect of FDI on growth. The goal of the study was to look at the influence of FDI in the diffusion of technology and economic growth in developing nations. It was inspired by an endogenous growth model in which the pace of technical advancement is the primary predictor of long-term income growth rates.

The study used data on FDI flows from industrial nations to 69 developing countries over two decades to examine the influence of FDI on economic growth in a framework of cross-country regressions (1970–1989). All regressions were calculated using the seemingly unrelated regressions methodology and based on panel data for the two decades 1970–1979 and 1980–1989, respectively. However, while the number of nations under examination is sufficient, the number of years under examination may be expanded, if not made more recent, in order to accommodate the current global financial disaster and assess its effects on financial flows and economic growth.

Lumbila (2005) tried to investigate the influence of FDI on economic growth based on the limited empirical evidence available. In addition, it found elements that amplify the influence of FDI on growth in a way that varies from past research. This was accomplished by expanding Borensztein et al.’s (1998) model to incorporate infrastructure, risk, and corruption, in addition to education, as determinants of FDI's influence on African growth. The method used to estimate the influence of FDI on growth in Africa was cross country regression analysis using panel data, and the study encompassed 47 African nations from 1980 to 2000. The regression findings show that in the case of FDI, corruption is irrelevant. As a result, even nations with a high perception of corruption gain from the good impact of FDI on GDP. However, the Hausman test performed on the data used in the research was unable to detect a systematic difference, because the data tested had both heteroskedasticity and autocorrelation.

Asiedu (2002) investigated the variables that influence FDI in developing nations, with the goal of determining if these factors varied among nations in SSA. The research's reasoning was based on the findings of Jaspersen et al. (2000), as well as Hausmann and Fernandez Arias (2000) in which crosssectional data was employed for analysis, and cross-sectional regression and sub-period panel regression were employed as methods of analysis. Higher returns on investment and improved infrastructure have a beneficial influence on FDI to SSA nations, according to the regression results. There is no discernible effect on FDI to SSA. Because trade openness encourages FDI into SSA, Africa is unique. Different policies that have worked well in other places may not work as well in Africa. The empirical study's conceptual underpinning, on the other hand, was not described explicitly. For improved findings, the number of years and nations under study might be increased.

Following that, Asiedu (2006) conducted research to see how natural resources, market size, physical infrastructure, human capital, host country investment policies, legal system dependability, and political stability affected FDI flows. Panel data was used in the study, which was based on growth theories. The study used the fixed effect panel estimation technique of analysis. Large local markets, natural resource endowment, solid infrastructure, low inflation, an effective legal system, and a robust investment environment all encourage FDI, according to the findings. Corruption and political instability, on the other hand, have the opposite impact. The study concludes that an increase in FDI does not always imply economic development, but that policies that encourage FDI have a direct and long-term influence on economic growth. The empirical study's conceptual underpinning, on the other hand, was not described explicitly. For improved findings, the number of years and nations under study might be increased.

Similarly, Asiedu and Lien (2011) sought to determine the effects of democracy on FDI and if natural resources in host nations modify the connection. With the panel type of data, the linear dynamic panel data model was used. The GMM estimator and regression analysis were employed in the analysis. The results also demonstrate that democracy encourages FDI only when the percentage of minerals and oil in overall exports is less than a crucial level. According to their findings, the impact of democracy on FDI is determined by the number of natural resources rather than the type of natural resources. However, while the number of years and nations under observation are enough, the technique of analysis may be improved in order to produce a more exact conclusion and, as a consequence, better policy implementation.

FDI, economic growth, and Governance are almost inseparable in the real sense. Habibi (2018) argues that good governance, which is roughly equivalent to "economic freedom," has a beneficial influence on economic growth, which attracts more FDI. The quality of a host country's governance institutions and the amount of economic growth are important drivers of FDI inflows. Rule of law, property rights protection, openness, lack of corruption, and effective regulatory frameworks are all examples of institutional excellence. In other words, countries with well-developed legal systems, low levels of corruption, and strong property rights protection have effectively attracted FDI through a combination of solid governance and vigorous economic growth. Countries with poor governance

frameworks, on the other hand, frequently struggle to attract FDI despite their economic development potential, hence, the “governance-growth-FDI” or theory.

In like fashion, a hypothesis that emphasizes the relevance of governance quality in supporting economic growth, arguing that it improves the "helping hand" of authority while weakening the "grabbing hand," resulting in a beneficial influence on FDI. Furthermore, the influence of governance on FDI and economic growth differs depending on the country's stage of development. Entrepreneurship, for example, can boost economic growth in nations that value invention, but not in ones that value factors and efficiency (Khyareh & Amini, 2021). Furthermore, the interplay of governance and FDI can result in positive and improved growth, underlining the need for African countries to strengthen their governance structures in order to attract more FDI and improve growth (Adeleke, 2014). Overall, these theories underscore the complicated link between governance, economic growth, and FDI, with governance quality playing a critical role in recruiting and encouraging FDI.

Methodology

Data and summary statistics

The study on the dynamic relationship between FDI inflow, economic growth, and governance in six CEMAC countries from 1990 to 2019 involves a comprehensive data methodology to ensure robust analysis. In addition to FDI, economic growth, and governance indicators, the analysis includes several other variables such as household consumption, electricity consumption, labor force, and agricultural value added to provide understanding of the dynamics. These six CEMAC countries selected for this study are all developing countries with specific country differences based on HIPC status. This data methodology section briefs data collection, variables selection, data sources, and analytical techniques.

First, the primary data sources include the World Bank and the U.S. Energy Information Administration (EIA). These databases provided crucial information on FDI inflow, economic growth, and governance as well as the other seven indicators, ensuring a robust foundation for the analysis. Additionally, a specialized database known as the Global Economy offers reliable business and economic data on foreign countries produces definitions and insights into variables like household consumption, electricity consumption, labor force dynamics, and agricultural value added. These were tapped into to create a comprehensive dataset reflective of the diverse factors attracting FDI and influencing sustainable growth in the region.

Second, the analysis encompassed two sets of key variables to capture the multifaceted economic dynamics in CEMAC countries. In VAR terms, the endogenous variables included GDP per capita representing sustainable economic growth, FDI inflow, and aggregate governance representing six dimensions of governance; while the exogenous variables encompassed three control variables: trade openness, market size, and economic freedom. This extensive set of variables was chosen to offer a holistic perspective, recognizing that attracting FDI or sustainable economic growth is shaped by a confluence of factors, including governance quality and broader socio-economic variables.

Third, the data underwent necessary transformation such as log of all variables except governance and first difference, as well as other preprocessing steps, including handling missing data and consistency checks, to ensure the integrity of the dataset. Moreover, statistical techniques such as descriptive statistics and correlation analysis were initially employed to discern preliminary patterns, while more advanced econometric tools, including Granger causality, impulse responses, and variance decompositions, were utilized to explore causal relationships, effect of shocks and forecast error variances between variables.

The adoption of panel VAR analysis, accounted for simultaneous analysis of the dynamic interdependencies among multiple time series variables across both cross sections and time series for CEMAC countries, enhancing the robustness of the investigation. Bayesian and structural analyses were conducted to validate the reliability of results, ensuring that the findings contribute meaningfully to our understanding of the intricate dynamics between FDI inflow, economic growth, governance, and associated variables in the CEMAC region. Summary statistics for FDI, GDP per capita, and governance at level and first difference are shown in Table 1.

Table 1: Descriptive statistics for CEMAC sample

Variable	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Obs.
				Level				
FDI	6.002	161.824	-11.197	16.628	6.081	49.643	17426.551	180
GDPPC	3145.372	14222.549	338.166	3541.771	1.293	3.496	51.971	180
GOV	-1.077	-0.170	-1.710	0.305	0.890	3.397	24.938	180
TOP	79.053	156.860	26.160	33.862	0.281	1.812	12.948	180
EFREE	49.683	61.000	34.000	5.201	0.005	2.499	1.881	180
MSIZE	6.354	25.780	0.470	6.288	1.300	3.724	54.606	180
				First difference				
ΔFDI	0.027	72.616	-149.740	17.416	-2.698	36.805	8740.425	179
ΔGDPPC	0.678	6628.463	-6520.143	940.126	-1.243	37.354	8848.598	179
ΔGOV	0.000	0.740	-0.410	0.134	1.320	10.275	446.811	179
ΔTOP	0.177	62.030	-53.490	12.790	0.328	10.930	472.236	179
ΔEFREE	-0.006	17.000	-9.000	2.632	1.526	14.460	1048.949	179
ΔMSIZE	0.074	6.220	-23.390	1.895	-10.520	133.643	130597.209	179

Notes. Std dev. = standard deviation, Obs. = observations; FDI = foreign direct investment, GDPPC = GDP per capita, GOV = governance, TOP = trade openness, EFREE = economic freedom, MSIZE = market size, and Δ = variables at first difference.

Empirical Model

For the panel VAR model specification, suppose a panel VAR(1) model

$$y_{it} = Ay_{it-1} + \varepsilon_{it} \quad (1)$$

or a general panel VAR model

$$y_{it} = \mu_i + \sum_{j=1}^{p} A_j y_{it-j} + \varepsilon_{it}, \varepsilon_{it} \sim i.i.d.\ N(0,\Sigma) \quad (2)$$

is a panel VAR model with fixed effects, where j=1,2,…,p is the lag order of the VAR, y_{it} and y_{it-1} are (m×1) vectors of endogenous and lagged endogenous variables, respectively; and ε_{it} is a vector known as white noise or are disturbances that are independent and identically distributed with covariance matrix Σ. The reduced form in Equation (1) in its simplest (3) and matrix (4) forms are re-written for a three variable lag-1(first order) model as:

$$\begin{aligned} FDI_{it} &= A_{11}FDI_{it-1} + A_{12}LnGDPPC_{it-1} + A_{13}GOV_{it-1} + \varepsilon_{1it} \\ LnGDPPC_{it} &= A_{21}FDI_{it-1} + A_{22}LnGDPPC_{it-1} + A_{23}GOV_{it-1} + \varepsilon_{2it} \\ GOV_{it} &= A_{31}FDI_{it-1} + A_{32}LnGDPPC_{it-1} + A_{33}GOV_{it-1} + \varepsilon_{3it} \end{aligned} \quad (3)$$

where each equation for FDI, GDPPC, and GOV is a linear function of the lag-1 values for FDI, GDPPC, and GOV. In other words, each variable depends on the first lag of itself and the other variables.

$$\begin{pmatrix} FDI_{it} \\ LnGDPPC_{it} \\ GOV_{it} \end{pmatrix} = \begin{pmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{pmatrix} \begin{pmatrix} FDI_{it-1} \\ LnGDPPC_{it-1} \\ GOV_{it-1} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \\ \varepsilon_{3it} \end{pmatrix} \quad (4)$$

DOI: https://doi.org/10.11113/ijibs.v19.147

(1) through (4) show that y_{it} is a 2×1 vector and A_j is a 2×2 matrix. FDI is explained by past values of FDI, GDP per capita, and governance each with one lag. This model is then estimated using the model specified in (1). Suppose (1) is extended to include exogenous variables:

$$y_{it} = \mu_i + \sum_{j=1}^{p} A_j y_{it-j} + Bx_{it} + \varepsilon_{it} \quad (5)$$

x_{it} are (k×1) vectors of exogenous variables (or a set of exogenous variables, often including a constant, possibly with a time trend and seasonal dummies (see Cottrell & Lucchetti (2012)). Note that (5) could be written more compactly as

$$A(L)y_{it} = Bx_{it} + \varepsilon_{it} \quad (6)$$

for A(L) being a matrix polynomial in the lag operator. The Panel VAR(1) diagnostics such as impulse responses and variance decompositions are represented using the lag operator MA(∞) as follows:

$$y_{it} = \varepsilon_{it} + A\varepsilon_{it-1} + A^2\varepsilon_{it-2} + \cdots + A^j\varepsilon_{it-j} + \cdots \quad (7)$$

with the coefficient in (7), A^j, being a 3×3 matrix for the trivariate system measuring the impulse response.

$$A^j = \frac{dy_{it}}{d\varepsilon_{it-j}} \quad (8)$$

and transformed linearly as:

$$B^{-1}y_{it} = B^{-1}Ay_{it-1} + B^{-1}\varepsilon_{it} \quad (9)$$

such that

$$B^{-1}y_{it} = B^{-1}Ay_{it-1} + \tilde{\varepsilon}_{it} \qquad (10)$$

is the structural form of (1) and its error $\tilde{\varepsilon}_{it}$ is orthogonal because var($\tilde{\varepsilon}_{it}$)=I and note that the error vectors for the structural form and reduced form are related $B\tilde{\varepsilon}_{it}=\varepsilon_{it}$.

From forecasting to policy analysis and structural inference, VARs are known for their power in performing data description. Stock and Watson (2001) recalls Granger causality tests, impulse response functions, and variance decompositions as standard VAR summary statistics and are known to be frequently used approaches for depicting co-movements that cannot be handled by univariate or bivariate models. Despite their analytical power, VARs have been known to have a number of limitations including many parameters to estimate, and Triacca (2014) argues that VARs are a-theoretical in the sense that they make little use of economic theory. Thus, VARs cannot be utilized to generate economic policy prescriptions.

Since the introduction of Bayesian VARs in forecasting with macroeconomic variables (see Litterman, 1979; Doan et al.,1984), Miranda-Agrippino and Ricco (2018) remarks that VARs and BVARs have been a standard macroeconometric tool routinely used by scholars and policymakers for structural analysis, forecasting, and scenario analysis in an ever-growing number of applications.

The inclusion of BVAR in the VAR analysis, Kenny et al. (1998) argue, permits the estimated models to blend the evidence in the data with any prior information or existing knowledge. For the model specification of BAVRs, see Miranda-Agrippino and Ricco, 2018; Woźniak, 2016; Triacca, 2014; and Spencer, 1993. Note that all the estimates for panel VAR and its model extensions are valid only with the stationarity of Y_{it} with the assumption that the AR-coefficient A_j in (1) assumed to be strictly less than one. Assuming that $\emptyset_j=A_j-1$ for $\Pi_j>0$;

$$\Delta Y_{it} = \alpha_i + \emptyset_j Y_{i,t-1} + \varepsilon_{it} \qquad (11)$$

where $\emptyset_j<0$ or $0<A_j<1$ is stationary of the AR-process for individual j; and $\emptyset_j=0$ or $A_j=1$ for j=1,…, N is non-stationary for Y_{it} (see Biørn, 2017). Analyzing the effects of the 1994 CFA currency devaluation on the FDI, growth, and governance interaction is facilitated by a set of four hypotheses (see Appendix B).

Result and Discussions

This section estimates the panel VAR and Bayesian VAR models for FDI and five other market and economic variables. Preliminary analysis involves tests for unit root and cointegration, while the main analysis reports VAR estimates, Granger causality, and analysis for the impulse responses of FDI

inflows (FDI), economic growth (GDPPC), and governance. Afterwards, we present forecast error variance decomposition for the core.

Panel unit root tests

The panel unit root tests whether the variables exhibit a unit root over time. The presence of unit root implies that a variable has a stochastic trend and is non-stationary with random walk. Understanding the stationarity properties of these six variables is a precondition for VAR models and crucial for subsequent analyses. Table 2 reports two panel unit root tests (ADF and PP) for FDI, GDP per capita, and governance at level and first difference with the test statistic and associated p-values for the CEMAC sample. Going by both tests, all three variables are stationary in first difference.

Table 2: Panel unit root tests

	tests	ADF[a] test		PP[b] test	
	variable	drift	drift & trend	drift	drift & trend
Level	FDI	-3.041 (0.033)	-3.068 (0.117)	-8.382 (0.000)	-8.535 (0.000)
	GDPPC	-1.786 (0.387)	-1.636 (0.775)	-2.383 (0.148)	-2.340 (0.410)
	GOV	-1.819 (0.371)	-1.787 (0.707)	-2.655 (0.084)	-2.611 (0.276)
	TOP	-2.669 (0.082)	-2.777 (0.208)	-2.488 (0.120)	-2.553 (0.302)
	EFREE	-3.474 (0.010)	-3.497 (0.043)	-3.536 (0.008)	-3.565 (0.036)
	MSIZE	-1.766 (0.397)	-1.718 (0.740)	-1.8 (0.380)	-1.724 (0.724)
First-difference	ΔFDI	-11.343 (0.000)	-11.315 (0.000)	-61.800 (0.000)	-63.623 (0.000)
	ΔGDPPC	-11.620 (0.000)	-11.616 (0.000)	-11.926 (0.000)	-11.915 (0.000)
	ΔGOV	-22.061 (0.000)	-22.075 (0.000)	-21.380 (0.000)	-21.415 (0.000)
	ΔTOP	-15.611 (0.000)	-15.584 (0.000)	-15.676 (0.000)	-15.729 (0.000)
	ΔEFREE	-14.338 (0.000)	-14.298 (0.000)	-14.367 (0.000)	-14.326 (0.000)
	ΔMSIZE	-13.344 (0.000)	-13.321 (0.000)	-13.344 (0.000)	-13.321 (0.000)

Notes. [a, b]ADF and PP stand for Augmented Dickey-Fuller (Dickey & Fuller, 1979) and Phillips-Perron (Phillips & Perron, 1988) tests, respectively. P-values are in parentheses.

DOI: https://doi.org/10.11113/ijibs.v19.147

Panel cointegration tests

Here, cointegration analysis explores the long-term equilibrium relationships among the core variables, indicating whether they move together in the long run. The absence or cointegration or long-run relationship means the core variables are purely driven by short-term fluctuations and not share a common trend. Note that Bussière et al. (2009) opine that the selection of cointegration rank is an important stage in the empirical analysis since incorrect long-run relationship specification might destabilize the (general) VAR model and distort the findings and impulse response functions.

Table 3: Panel cointegration tests

Common AR coefs. (within-dimension)				
	Stat	Prob.	Weighted Stat	Prob.
Panel v-Statistic	1.4579	0.0724	0.6468	0.2589
Panel rho-Statistic	-0.4525	0.3254	-1.2841	0.9004
Panel PP-Statistic	-2.2394	0.0126	-0.1821	0.5722
Panel ADF-Statistic	-0.6370	0.7379	-1.3001 ion)	0.9032
Individual AR coefs. (between-dimension)				
	Stat	Prob.		
Group rho-Statistic	-1.5157	0.0648		
Group PP-Statistic	-2.0321	0.0811		
Group ADF-Statistic	-8.8284	0.2201		

The cointegration findings reveal that all four tests cannot reject the null hypothesis of no cointegration. Thus, there is no cointegration relationships between FDI, economic growth, and governance, all at levels. We then proceed to estimating the VAR models in first differences. Note that the precise lag length selection is critical for panel VAR; too short delays fail to capture the system's dynamics, resulting in omitted variable bias; too many lags result in a loss of degrees of freedom, resulting in overparameterization (see Coulibaly et al., 2013). To estimate the panel VAR models, optimal lags are determined. For the VAR lag selection, Ouliaris et al. (2018) argues that the most parsimonious model is preferred and it is not proper to estimate a large number of parameters with limited data. Hence, with the limited observations, this study chooses the SC criterion over the AIC and HQ criteria.

DOI: https://doi.org/10.11113/ijibs.v19.147

Panel VAR Analysis

The main and comprehensive analysis begins here by exploring the dynamic relationships among the three core variables, three weakly exogenous and two dummy variables. Estimates of the different models (1-3) for panel VAR(3) and Bayesian VAR(3) are used for subsequent analysis. Model 1 considers the three main endogenous variables (VARX(3)), Models 2 and 3 include three successive addition of three exogenous variables and the effect of the 1994 CFA currency devaluation and the 2008 GFC. In addition to the regular VAR models in 1-3, three additional parallel models are suggested for the robust panel Bayesian VAR. Impulse responses (IRFs) and variance decomposition (FEVD) are shown in Figures 1-2 and Table 5, respectively.

We explore the dynamic relationships among these variables by examining Granger causality between FDI inflows, economic growth, and aggregate governance. The Granger causality test is a statistical test used to determine if a variable can predict another. Table 4 reports Granger causality results for the three core variables. The table reports the Chi-square statistics, degrees of freedom, and p-values with robust results. The table shows that FDI Granger causes economic growth meaning FDI helps in predicting GDP per capita. In other words, past values of FDI improves the ability to predict growth in CEMAC countries. Also, both FDI and governance Granger cause economic growth. Economic growth or aggregate governance does not Granger cause FDI inflow. Hence, neither economic growth or aggregate governance does not have ability in predicting the inflow of FDI into CEMAC countries, and both variables are said to be exogenous to the inflow of FDI.

Actually, there should be 12 outcomes in the causal links between the three core variables. For instance, between FDI and governance, there are four: unidirectional causality and vice versa as shown in Table 4, bidirectional causality (none was realized from the data), and no functional causality. Despite all these options, we found a unidirectional causality running from FDI to economic growth. The other relationship was both FDI and governance jointly predicting growth. Note that these results are parallel or reconfirms those presented for IRFs and FEVD.

Table 4: VAR Granger Causality for CEMAC countries

Granger cause (→)	Chi-sq	df	P-values.
ΔGDPPC → ΔFDI	3.448	3	0.3276
ΔGOV → ΔFDI	0.379	3	0.9445
All → ΔFDI	3.825	6	0.7004
ΔFDI → ΔGDPPC	21.391	3	0.0001
ΔGOV → ΔGDPPC	1.699	3	0.6372
All → ΔGDPPC	23.123	6	0.0008
ΔFDI → ΔGOV	0.243	3	0.9704
ΔGDPPC → ΔGOV	0.770	3	0.8566
All → ΔGOV	0.926	6	0.9882

DOI: https://doi.org/10.11113/ijibs.v19.147

In addition to Granger causality, impulse responses and variance decomposition are essential components of VAR models. Here, dynamic interactions and contributions of shocks among the core variables are presented. Figure 1 shows impulse responses for panel VAR of the general model including FDI, growth, and governance. The graphs in Figure 1 show the variations (positive and negative) in the magnitude and direction of the responses of FDI and GDP to a shock in governance for the first seven years.

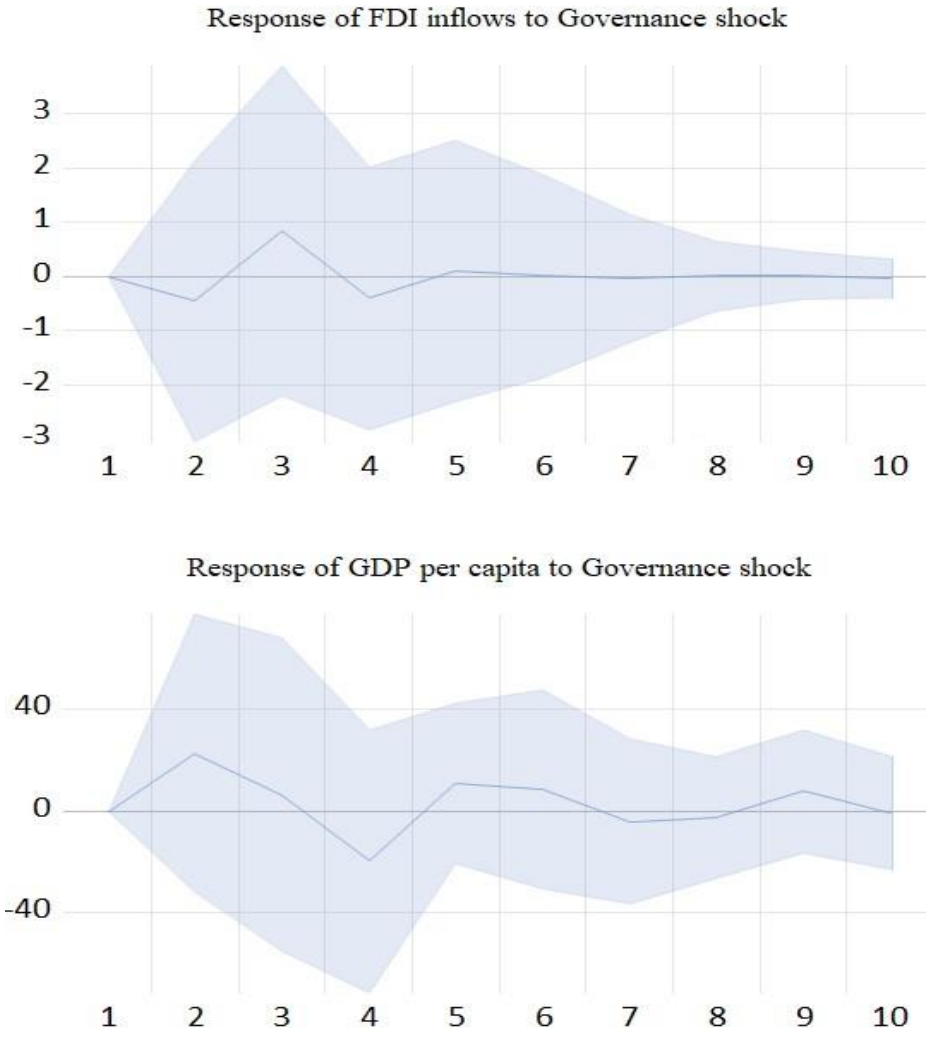


Figure 1: Panel VAR(3) IRF of FDI and GDP per capita to a shock in governance

Notes. Impact is in percentages; horizon is yearly; Cholesky Ordering: ΔFDI, ΔGDPPC, ΔGOV; 95% CI using analytic asymptotic S.E.s; IRF based on Panel VAR(3); The solid line in the middle shows the response of FDI inflow to shocks in GDPPC and GOV. The shaded area indicates one standard deviation (d.f. adjusted).

DOI: https://doi.org/10.11113/ijibs.v19.147

Figure 2 shows that FDI inflow negatively responds to a shock on GDP per capita for the first three years and then narrows to zero for the rest of the periods, and oscillates around zero to a shock in governance. In other words, the response of FDI inflows to a shock in GDP is significant until five years or 7 years for a shock in governance. The response of FDI inflows (and GDP) to a shock in governance (or GDP) in Figures 1 and 2 could almost be said to be insignificant.

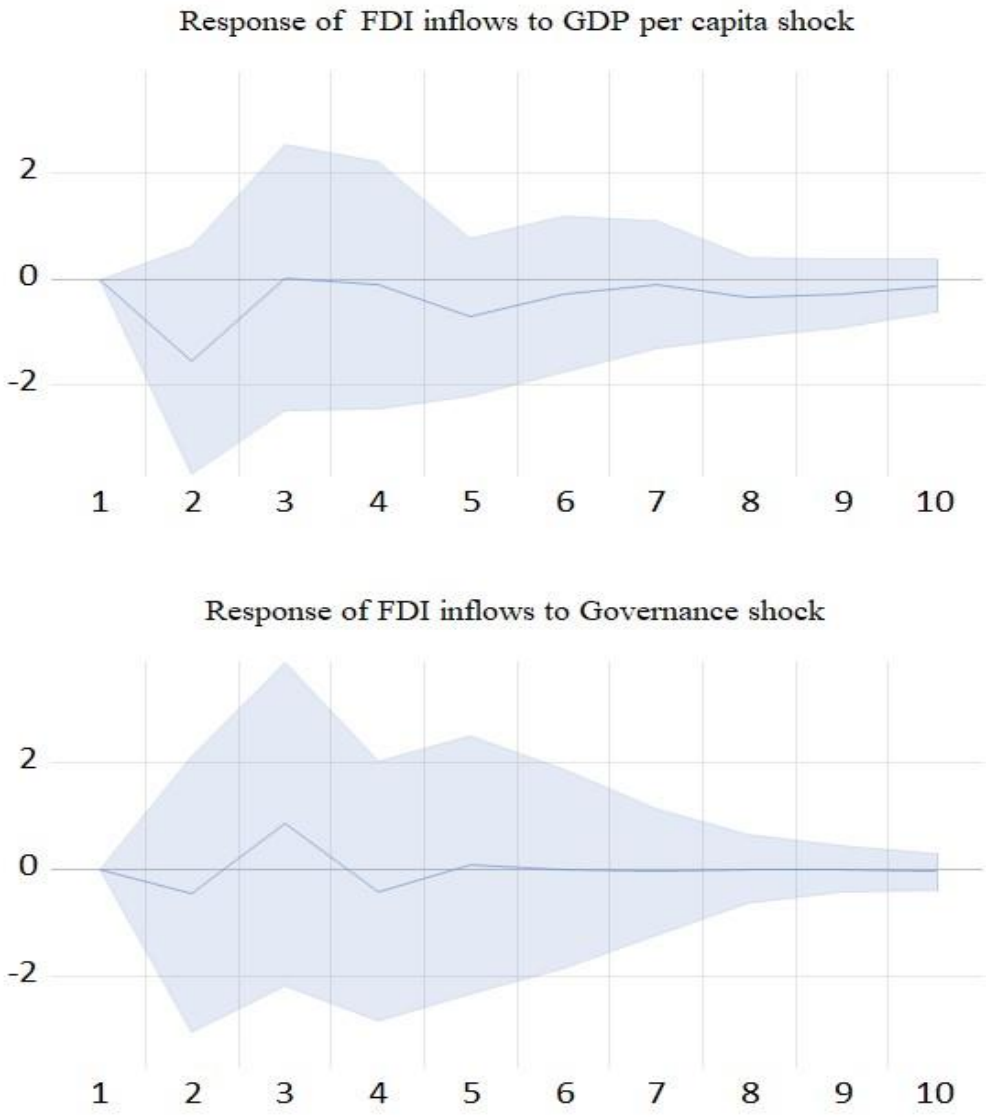


Figure 2: Panel VAR(3) IRF of FDI to shocks in GDP per capita and governance

Notes. Impact is in percentages; horizon is yearly; Cholesky Ordering: ΔFDI, ΔGDPPC, ΔGOV; 95% CI using analytic asymptotic S.E.s; IRF based on Panel VAR(1); The solid line in the middle shows the response of FDI inflow to shocks in GDPPC and GOV. The shaded area indicates one standard deviation (d.f. adjusted).

DOI: https://doi.org/10.11113/ijibs.v19.147

Impulse responses for panel VAR of the general model including FDI, growth, and governance. Impulse responses show (i) a decline (in the first 2 years) of FDI inflow, low but constant change of GDP per capita and governance in response to a positive shock in FDI, (ii) a negative response of FDI inflow, growth, and governance for the first two years to a positive GDP per capita shock, and (iii) low but constant change of FDI and GDP per capita, and a decline (in the first 2 years) of FDI inflow in response to a positive shock in governance.

Results for Granger causality and impulse responses are usually confirmed by the variability in the variables based on the other variables in the system. This is called variance decomposition, and Table 5 reports its findings. Results for FEVD in Table 5 show that GDP per capita and governance explain just about 1.05% and 0.06% (less than 2% combined) of the variability or fluctuations in FDI inflows after 10 years. This is almost insignificant as earlier seen in the impulse responses. Similar result is obtained for the variability in GDP per capita with almost insignificant contribution of FDI and governance to the change during the 10-year horizon. About 13% and 1.5% of the fluctuations in governance is explained by GDP and FDI, respectively, after 10 years. GDP per capita is, therefore, the closest and most significant effect in the variability of governance.

Table 5: FEVD for the panel VAR model 1

		% of the variation in FDI explained by:		
Horizon	*S.E.*	*ΔFDI*	*ΔGDPPC*	*ΔGOV*
2	18.710	99.26	0.68	0.06
5	18.966	98.89	0.81	0.31
10	18.986	98.81	0.89	0.31
		% of the variation in GDP per capita explained by:		
2	374.505	2.31	97.32	0.37
5	437.459	6.16	93.29	0.55
10	466.629	7.59	91.85	0.55
		% of the variation in governance explained by:		
2	0.104	0.98	1.02	98.00
5	0.118	0.81	1.52	97.68
10	0.121	0.79	1.52	97.69

Notes. Standard errors are generated by Monte Carlo with 100 repetitions; Cholesky decomposition ordering: ΔFDI, ΔGDPPC, ΔGOV.

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The results obtained so far can be further evaluated through robustness testing using restricted VAR models or the Bayesian VAR model or both. Bayesian VAR incorporates Bayesian principles to estimate the parameters of a VAR model. This approach is particularly useful when dealing with limited data (30 years across six countries), handling parameter uncertainty, and providing more robust measures of relationships between FDI inflow and market and economic variables. Figures 3 and 4 present graphs of impulse responses from Bayesian VAR models and are based robust estimates of FDI, GDP per capita, and aggregate governance showing relationships by incorporating the Litterman/Minnesota prior information.

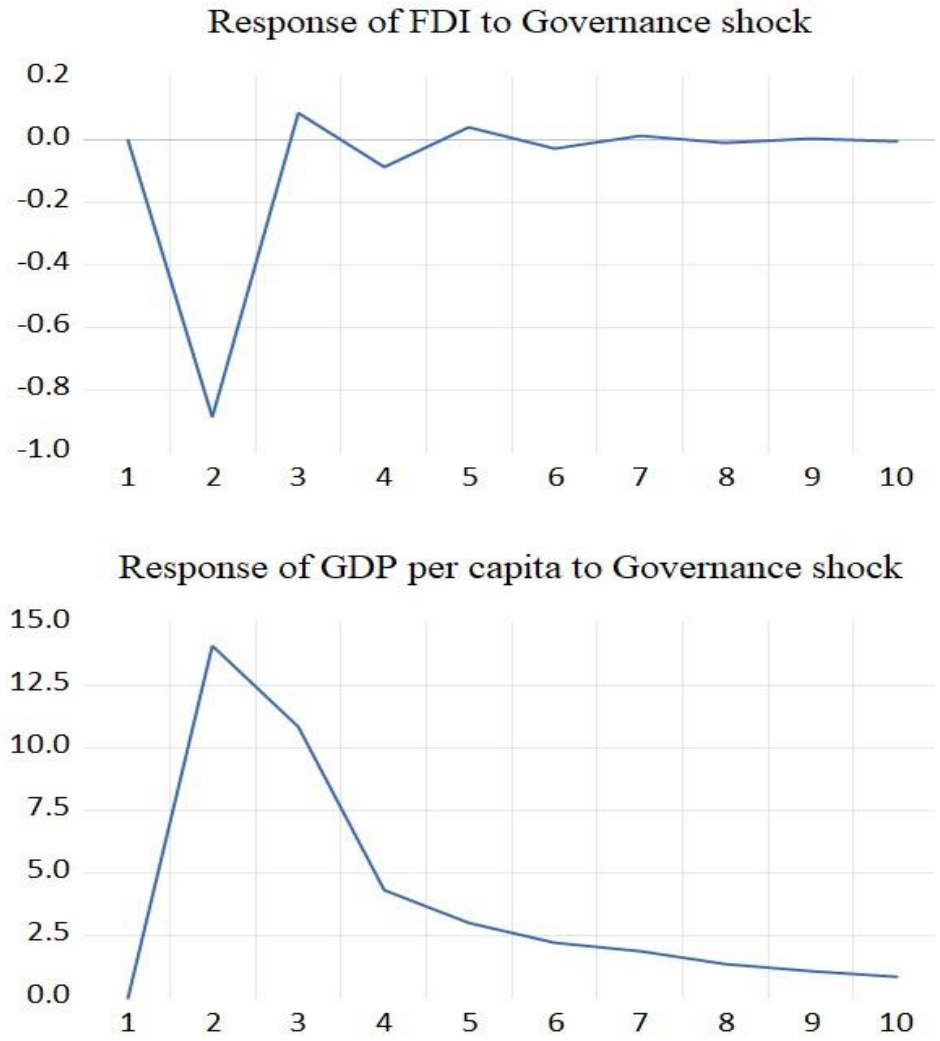


Figure 3: Panel Bayesian VAR(3) IRF of FDI and GDP per capita to a shock in governance

Notes. Impact is in percentages; horizon is yearly; Response to Cholesky One S.D. (d.f. adj.) shocks; IRF based on Panel BVAR(3).

DOI: https://doi.org/10.11113/ijibs.v19.147

Figure 3 shows initial negative response of FDI to shock in aggregate governance and significant positive response of GDP per capita to shock in governance which gradually decreases over the 10-year horizon, while graphs in Figure 4 show an initial negative response of FDI inflow to shocks in GDP per capita and governance.

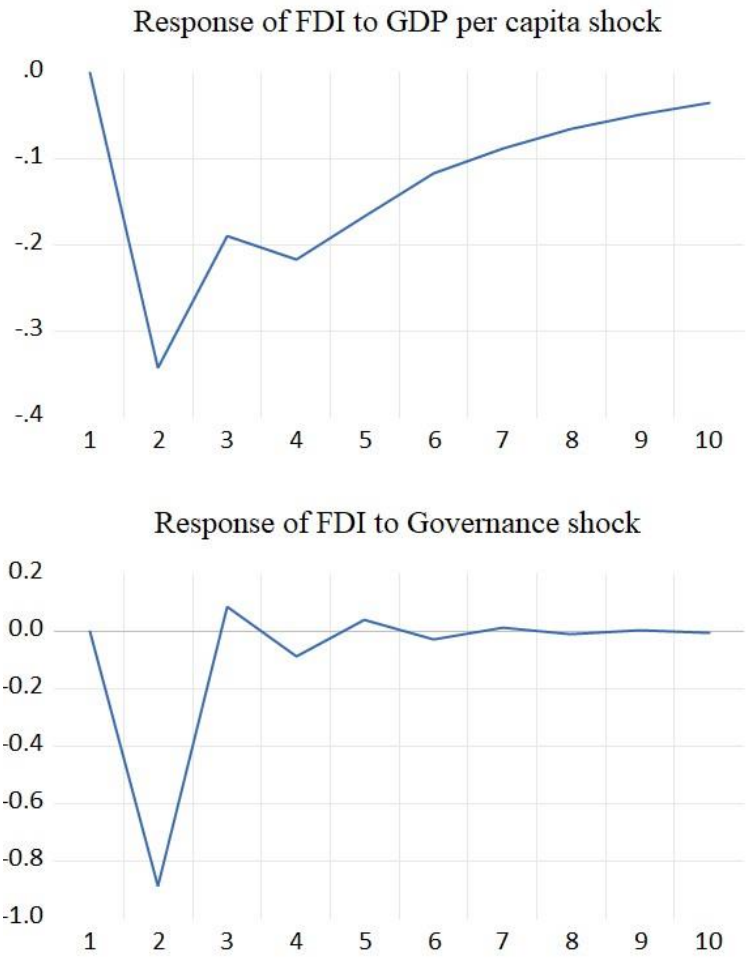


Figure 4: Panel Bayesian VAR(3) IRF of FDI to shocks in GDP per capita and governance
Notes. Impact is in percentages; horizon is yearly; Response to Cholesky One S.D. (d.f. adj.) shocks; IRF based on Panel BVAR(3).

A comparison of the two results reveals that effects of shocks in the system is more obvious in Bayesian models than the standard VAR models. Details of how this and other shocks affect variables in the system are seen in Figures 1 to 4.

In conclusion, the findings showed that an increase in FDI inflow and improvements in governance quality positively affect economic growth in CEMAC countries, and this is associated with the "virtuous cycle" also known as the positive feedback loop effect. Virtuous cycle effects have mostly

been seen in the FDI-growth nexus (see Yimer, 2022 for resource-scarce economies; Zhang, 2021; Shao et al., 2019), governance-growth (Gradstein, 2002), as well as in the FDI-growth-governance interaction (also see Adeleke, 2014; Alguacil et al., 2011; Kottaridi, 2005).

Conclusion

The main aim of this paper is to investigate the dynamic relationships between FDI, growth, and governance, taking into consideration the influence of three exogenous factors, viz: market size, economic freedom, and trade openness. By examining the impact of these exogenous variables on the VAR endogenous system, we seek to contribute valuable insights into the complex relationship between FDI, economic growth (or GDP per capita), and governance, while accounting for external economic and policyrelated factors. The findings are anticipated to provide policymakers, researchers, and practitioners with a more nuanced understanding of the interplay between international investment, economic performance, and governance across diverse national contexts.

In addition, we examine the heterogeneity across CEMAC countries to better understand how development paths intersect with governance and economic growth. By incorporating categorical variables for these different groups, we offer a comprehensive framework for studying FDI determinants, contributing to academic discourse, and guiding evidence-based policy formulation for inclusive economic growth and governance. These three groups were also the basis for subsamples created in the analysis. Aggregate governance (quality) measured in an index of -2.5─2.5 is assessed through metrics encompassing voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption, while GDP per capita represents a proxy for economic growth. The inclusion of FDI inflows sheds light on the role of international capital mobility in driving economic growth, as well as the role of economic growth and governance in FDI inflows.

We apply the panel VAR model which addresses both cross-sectional variations and time dynamics, facilitating a deeper understanding of the short and long-run interactions between governance, GDP per capita, and FDI inflows. Extensions of panel VAR analysis are introduced to ensure robust estimates; VAR models are presented with problems ranging from outliers to overfitting. Integrating panel Bayesian VAR models, this paper offers a comprehensive framework for estimating the models, thereby enriching academic discourse and informing evidence-based policy formulation for inclusive economic growth.

The results show that FDI inflows significantly affects economic growth while governance has no significant effect on growth in the CEMAC region. Granger causality analysis is introduced as part of the VAR process to examine the causal relationships between the core variables. We found a unidirectional causality running from FDI to economic growth. This shows that FDI is important for the growth of CEMAC economies, but the growth of the economy and the quality of aggregate governance do not help investors in making a decision to invest.

Also, FDI inflow and growth of the economy do not encourage better governance quality. This might point to the investigation of individual dimensions of governance to see which in peculiar in CEMAC countries. However, Granger-causality may not show the whole picture on how variables interact in a system. Impulse response analysis and variance decompositions are, therefore, included as they are frequently useful to know the reaction of one variable to an impulse in another variable in the FDI, growth, and governance system. Although impulse responses could be done for higher dimensional systems, we limit the analysis to the impulse response relationship between the three core variables for CEMAC.

Furthermore, we extend the analysis to incorporate two pivotal economic events: the 2008 global financial crisis and the 1994 CFA currency crisis, and assess whether both events caused impulses in governance and economic growth to FDI inflow. By assessing the impact of these crises on the relationship between FDI inflows, economic growth, and aggregate governance, the study provides insights into the underlying mechanisms and potential policy implications.

Finally, the three other macroeconomic variables classified as market and economic variables: trade openness, economic freedom, and market size do not significantly improve the core model. These not only advance our understanding of the FDI-growth governance nexus but also contributes to the literature on the resilience and adaptability of CEMAC economies in the presence of other weakly exogenous variables and external shocks.

Although FDI inflow affects the growth, the effect of governance and GDP growth fall short of determining the inflow of FDI into CEMAC countries. We suspect this could partly be tied to investigating different dimensions of governance in order to know which particular aspects of governance are peculiar to CEMAC countries. For example, the coups and political unrest in this region might affect investor protection and the absence of international investment agreements is of great concern (see Brada et al., 2021). Also, Cleeve (2008) reiterates this sentiment by emphasizing the role of governance dimensions such as property rights, investment-friendly regulations, political and macroeconomic stability. Other investment-friendly factors include fiscal incentives (Cleeve, 2008), fiscal and financial incentives and investment promotion agencies (IPAs) (Cass, 2007), and a host of incentives provided by local governments (Dorożyński et al., 2015). Anyway, these insights are invaluable for policymakers, local government units, and investors navigating the complexities of the FDI-growth-governance nexus, guiding evidence-based policy decisions to promote sustainable economic growth.

Acknowledgement

This paper does not receive financial assistance from any governmental, private, or non-profit organisations.

Conflict of interest

The authors declare no conflict of interest.

Data availability

Data supporting the findings of this study are available from the corresponding author upon request.

Ethics Declaration

The study used publicly accessible secondary data and did not involve the recruitment of or direct contact with human participants. As such, ethical approval was not applicable.

References

Abbes, S. M., Mostéfa, B., Seghir, G. M., & Zakarya, G. Y. (2015). Causal interactions between FDI and economic growth: Evidence from dynamic panel co-integration. *Procedia Economics and Finance, 23*, 276–290. https://doi.org/10.1016/S2212-5671(15)00541-9

Adeleke, A. I. (2014). FDI-growth nexus in Africa: Does governance matter? *Journal of Economic Development, 39*(1), 111–135. https://doi.org/10.35866/caujed.2014.39.1.005

Adeniyi, O., Egwaikhide, F. O., Oyinlola, A., & Omisakin, O. (2012). Foreign direct investment, economic growth and financial sector development in small open developing economies. *Economic Analysis and Policy, 42*(1), 105–127. https://doi.org/10.1016/S0313-5926(12)50008-1

Agyeman, F. O., Zhiqiang, M., Li, M., Sampene, A. K., Dapaah, M. F., Kedjanyi, E. A. G., Buabeng, P., Li, Y., Hakro, S., & Heydari, M. (2022). Probing the effect of governance of tourism development, economic growth, and foreign direct investment on carbon dioxide emissions in Africa: The African experience. *Energies, 15*(13), 4530. https://doi.org/10.3390/en15134530

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2004). FDI and economic growth: The role of local financial markets. *Journal of International Economics, 64*(1), 89–112. https://doi.org/10.1016/S0022-1996(03)00081-3

Alguacil, M., Cuadros, A., & Orts, V. (2011). Inward FDI and growth: The role of macroeconomic and institutional environment. *Journal of Policy Modeling, 33*(3), 481–496. https://doi.org/10.1016/j.jpolmod.2010.12.004

Amal, M. (2016). *Foreign direct investment in Brazil: Post-crisis economic development in emerging markets*. Academic Press.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: Is Africa different? *World Development, 30*(1), 107–119. https://doi.org/10.1016/S0305-750X(01)00100-0

Asiedu, E. (2006). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability. *The World Economy, 29*(1), 63–77. https://doi.org/10.1111/j.1467-9701.2006.00758.x

Asiedu, E., & Lien, D. (2011). Democracy, foreign direct investment and natural resources. *Journal of International Economics, 84*(1), 99–111. https://doi.org/10.1016/j.jinteco.2010.12.001

Ayanwale, A. B. (2007). *FDI and economic growth: Evidence from Nigeria* (AERC Research Paper No. 165). African Economic Research Consortium.

Beddim, S. B. (2023). *Foreign direct investments and economic growth in Sub-Saharan African countries: The role of governance* [Doctoral dissertation, University of Cape Coast].

Biørn, E. (2017). *Econometrics of panel data: Methods and applications*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198753445.001.0001

Borensztein, E., De Gregorio, J., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics, 45*(1), 115–135. https://doi.org/10.1016/S0022-1996(97)00033-0

Bouchoucha, N., & Ali, W. (2019). *The impact of FDI on economic growth in Tunisia: An estimate by the ARDL approach* (MPRA Paper No. 91465). University Library of Munich. https://mpra.ub.uni-muenchen.de/91465/

Bouchoucha, N., & Yahyaoui, I. (2019). Foreign direct investment and economic growth: The role of governance. *Economics Bulletin, 39*(4), 2711–2725.

Brada, J. C., Drabek, Z., & Iwasaki, I. (2021). Does investor protection increase foreign direct investment? A meta-analysis. *Journal of Economic Surveys, 35*(1), 34–70. https://doi.org/10.1111/joes.12392

Bussière, M., Chudik, A., & Sestieri, G. (2009). *Modelling global trade flows: Results from a GVAR model* (ECB Working Paper No. 1087). European Central Bank. https://doi.org/10.2139/ssrn.1456883

Cass, F. (2007). Attracting FDI to transition countries: The use of incentives and promotion agencies. *Transnational Corporations, 16*(2), 77–122.

Chanegriha, M., Stewart, C., & Tsoukis, C. (2020). Testing for causality between FDI and economic growth using heterogeneous panel data. *The Journal of International Trade & Economic Development, 29*(5), 546–565. https://doi.org/10.1080/09638199.2019.1704843

Cleeve, E. (2008). How effective are fiscal incentives to attract FDI to Sub-Saharan Africa? *The Journal of Developing Areas, 42*(1), 135–153. https://doi.org/10.1353/jda.0.0015

Cottrell, A., & Lucchetti, R. (2012). *Gretl user's guide*. Gretl.

Dobdinga, C. F. (2015). The export-diversifying effect of foreign direct investment in the CEMAC region. *Journal of Economics and International Finance, 7*(7), 157–166. https://doi.org/10.5897/JEIF2015.0678

Dorożyński, T., Świerkocki, J., & Urbaniak, W. (2015). Incentives for attracting FDI: The case of the Lodz region. *Gospodarka Narodowa. The Polish Journal of Economics, 275*(1), 147–169. https://doi.org/10.33119/GN/100846

Drabek, Z. (2021). Governance of FDI and the East Asian Economic Community. *Asia and the Global Economy, 1*(1), 100001. https://doi.org/10.1016/j.aglobe.2021.100001

Emamverdi, G., & Boland-Ghamat, Z. (2019). Threshold and asymmetric effect of foreign direct investment (FDI) on economic growth in selected countries of OPEC and OECD. *Planning and Budgeting, 23*(4), 113–135.

Fernández-Arias, E. (2000). *The new wave of capital inflows: Sea change or tide?* (Working Paper No. 415). Inter-American Development Bank. https://doi.org/10.18235/0010775

Giwa, B. A., George, E. O., Okodua, H., & Adediran, O. S. (2020). Empirical analysis of the effects of foreign direct investment inflows on Nigerian real economic growth: Implications for sustainable development goal-17. *Cogent Social Sciences, 6*(1), 1727621. https://doi.org/10.1080/23311886.2020.1727621

Griggs, D., Stafford Smith, M., Rockström, J., Öhman, M. C., Gaffney, O., Glaser, G., Kanie, N., Noble, I., Steffen, W., & Shyamsundar, P. (2014). An integrated framework for sustainable development goals. *Ecology and Society, 19*(4), 49. https://doi.org/10.5751/ES-07082-190449

Habibi, F. (2018). A panel analysis of good governance and FDI on economic growth in MENA region. *International Economics Studies, 46*(1), 37–48.

Hamid, I., Alam, M. S., Kanwal, A., Jena, P. K., Murshed, M., & Alam, R. (2022). Decarbonization pathways: The roles of foreign direct investments, governance, democracy, economic growth, and renewable energy transition. *Environmental Science and Pollution Research, 29*(33), 49816–49831. https://doi.org/10.1007/s11356-022-18935-3

Hassan, K. G. (2020). FDI & economic growth in selected country groups for (1989–2018). *Academic Journal of Nawroz University, 9*(3), 196–207. https://doi.org/10.25007/ajnu.v9n3a775

Herzer, D. (2012). How does foreign direct investment really affect developing countries' growth? *Review of International Economics, 20*(2), 396–414. https://doi.org/10.1111/j.1467-9396.2012.01029.x

Iamsiraroj, S. (2016). The foreign direct investment–economic growth nexus. *International Review of Economics & Finance, 42*, 116–133. https://doi.org/10.1016/j.iref.2015.10.044

Iamsiraroj, S., & Doucouliagos, H. (2015). Does growth attract FDI? *Economics, 9*(1), 20150019. https://doi.org/10.5018/economics-ejournal.ja.2015-19

Jaspersen, F. Z., Aylward, A. H., & Knox, A. D. (2000). Risk and private investment: Africa compared with other developing areas. In P. Collier & C. Pattillo (Eds.), *Investment and risk in Africa* (pp. 71–95). Palgrave Macmillan. https://doi.org/10.1007/978-1-349-15068-7_3

Jayachandran, G., & Seilan, A. (2010). A causal relationship between trade, foreign direct investment and economic growth for India. *International Research Journal of Finance and Economics, 42*, 74–88.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2011). The worldwide governance indicators: Methodology and analytical issues. *Hague Journal on the Rule of Law, 3*(2), 220–246. https://doi.org/10.1017/S1876404511200046

Kenny, G., Meyler, A., & Quinn, T. (1998). *Bayesian VAR models for forecasting Irish inflation* (Research Technical Paper No. 4/RT/98). Central Bank of Ireland.

Ketteni, E., & Kottaridi, C. (2019). The impact of regulations on the FDI-growth nexus within the institution-based view: A nonlinear specification with varying coefficients. *International Business Review, 28*(3), 415–427. https://doi.org/10.1016/j.ibusrev.2018.11.001

Korobilis, D. (2016). Prior selection for panel vector autoregressions. *Computational Statistics & Data Analysis, 101*, 110–120. https://doi.org/10.1016/j.csda.2016.02.011

Krajcsik, Z. (2015). A review of the economic growth and development theories. In *Challenges in economic and technological development* (p. 121). University of Miskolc.

Le, B., Ngo, T. T. T., Nguyen, N. T., & Nguyen, D. T. (2021). The relationship between foreign direct investment and local economic growth: A case study of Binh Dinh Province, Vietnam. *The Journal of Asian Finance, Economics and Business, 8*(4), 33–42.

Le, T. D., Nguyen, P. H., Ho, Y. T. P., & Nguyen, T. N. (2021). The influences of FDI, GFCF, OPEN on Vietnamese economic growth. *International Journal of Asian Business and Information Management, 12*(3), 1–13. https://doi.org/10.4018/IJABIM.20210701.oa26

Leal Filho, W., Shiel, C., Paço, A., Mifsud, M., Ávila, L. V., Brandli, L. L., Molthan-Hill, P., Pace, P., Azeiteiro, U. M., Vargas, V. R., & Caeiro, S. (2019). Sustainable Development Goals and sustainability teaching at universities: Falling behind or getting ahead of the pack? *Journal of Cleaner Production, 232*, 285–294. https://doi.org/10.1016/j.jclepro.2019.05.309

Lumbila, K. N. (2005). *Risk, FDI and economic growth: A dynamic panel data analysis of the determinants of FDI and its growth impact in Africa* [Doctoral dissertation, American University].

Ma, C. Q., Liu, J. L., Ren, Y. S., & Jiang, Y. (2019). The impact of economic growth, FDI and energy intensity on China's manufacturing industry's CO2 emissions: An empirical study based on the fixed-effect panel quantile regression model. *Energies, 12*(24), 4800. https://doi.org/10.3390/en12244800

Mariska, M., Hamzah, L. M., & Ratih, A. (2021). The effect of remittance, consumption, and FDI on economic growth in ASEAN countries. *Eko-Regional: Jurnal Pembangunan Ekonomi Wilayah, 16*(2), 136–143. https://doi.org/10.20884/1.erjpe.2021.16.2.1855

Mathurin, T. N., & Ablinkaye, A. B. (2015). Openness to international trade and income risk in CEMAC. *Journal of Economics and Development Studies, 3*(2), 97–107. https://doi.org/10.15640/jeds.v3n2a10

Miao, L. (2021). Financial development, FDI and economic growth—A research based on the mediation effect model. *E3S Web of Conferences, 251*, 01087. https://doi.org/10.1051/e3sconf/202125101087

Miao, M., Borojo, D. G., Yushi, J., & Desalegn, T. A. (2021). The impacts of Chinese FDI on domestic investment and economic growth for Africa. *Cogent Business & Management, 8*(1), 1886472. https://doi.org/10.1080/23311975.2021.1886472

Miranda-Agrippino, S., & Ricco, G. (2018). *Bayesian vector autoregressions* (Staff Working Paper No. 756). Bank of England.

Muhammad, B., & Khan, S. (2019). Effect of bilateral FDI, energy consumption, CO2 emission and capital on economic growth of Asia countries. *Energy Reports, 5*, 1305–1315. https://doi.org/10.1016/j.egyr.2019.09.004

Narula, R., & Driffield, N. (2012). Does FDI cause development? The ambiguity of the evidence and why it matters. *The European Journal of Development Research, 24*(1), 1–7. https://doi.org/10.1057/ejdr.2011.51

Niarachma, R., Effendi, N., & Ervani, E. (2021). The effect of governance on FDI inflows in ASEAN. *Optimum: Jurnal Ekonomi dan Pembangunan, 11*(1), 44–58. https://doi.org/10.12928/optimum.v11i1.3620

Nunnenkamp, P. (2002). *Determinants of FDI in developing countries: Has globalization changed the rules of the game?* (Kiel Working Paper No. 1122). Kiel Institute for World Economics.

Ofori, I. K., & Asongu, S. A. (2021). ICT diffusion, foreign direct investment and inclusive growth in Sub-Saharan Africa. *Telematics and Informatics, 65*, 101718. https://doi.org/10.1016/j.tele.2021.101718

Petkova, A. (2019). The role of household consumption in relationship between economic growth and foreign direct investment in Bulgaria. *Economic Alternatives*, (1), 33–43.

Ranganathan, R., Foster, V., & Briceño-Garmendia, C. (2012). CEMAC's infrastructure gap: Issues and policy options. In B. Akitoby & S. Coorey (Eds.), *Oil wealth in Central Africa: Policies for inclusive growth* (pp. 55–82). International Monetary Fund.

Raza, S. A., Shah, N., & Arif, I. (2021). Relationship between FDI and economic growth in the presence of good governance system: Evidence from OECD countries. *Global Business Review, 22*(6), 1471–1489. https://doi.org/10.1177/0972150919833484

Saidi, Y., Ochi, A., & Maktouf, S. (2023). FDI inflows, economic growth, and governance quality trilogy in developing countries: A panel VAR analysis. *Bulletin of Economic Research, 75*(2), 426–449. https://doi.org/10.1111/boer.12364

Sapuan, N. M., Mohamed, K. A. S., & Hassan, N. (2020). FDI and economic growth: Revisiting the role of energy consumption and financial development. *Global Business and Management Research, 12*(4), 631–646.

Shao, Q., Wang, X., Zhou, Q., & Balogh, L. (2019). Pollution haven hypothesis revisited: A comparison of the BRICS and MINT countries based on VECM approach. *Journal of Cleaner Production, 227*, 724–738. https://doi.org/10.1016/j.jclepro.2019.04.206

Sigmund, M., & Ferstl, R. (2021). Panel vector autoregression in R with the package panelvar. *The Quarterly Review of Economics and Finance, 80*, 693–720. https://doi.org/10.1016/j.qref.2019.01.001

Sirag, A., SidAhmed, S., & Ali, H. S. (2018). Financial development, FDI and economic growth: Evidence from Sudan. *International Journal of Social Economics, 45*(8), 1236–1249. https://doi.org/10.1108/IJSE-10-2017-0476

Spencer, D. E. (1993). Developing a Bayesian vector autoregression forecasting model. *International Journal of Forecasting, 9*(3), 407–421. https://doi.org/10.1016/0169-2070(93)90034-K

Stock, J. H., & Watson, M. W. (2001). Vector autoregressions. *Journal of Economic Perspectives, 15*(4), 101–115. https://doi.org/10.1257/jep.15.4.101

Subasat, T., & Bellos, S. (2013). Governance and foreign direct investment in Latin America: A panel gravity model approach. *Latin American Journal of Economics, 50*(1), 107–131. https://doi.org/10.7764/LAJE.50.1.107

Suehrer, J. (2019). The future of FDI: Achieving the Sustainable Development Goals 2030 through impact investment. *Global Policy, 10*(3), 413–415. https://doi.org/10.1111/1758-5899.12714

Triacca, U. (2014). *Lesson 17: Vector autoregressive models*. University of L'Aquila.

Tsatsaridis, T. (2017). *The impact of foreign direct investments on economic growth in Sub-Saharan Africa*.

Van Bon, N. (2019). The role of institutional quality in the relationship between FDI and economic growth in Vietnam: Empirical evidence from provincial data. *The Singapore Economic Review, 64*(3), 601–623. https://doi.org/10.1142/S0217590816500223

Vijayakumar, N., Sridharan, P., & Rao, K. C. S. (2010). Determinants of FDI in BRICS countries: A panel analysis. *International Journal of Business Science & Applied Management, 5*(3), 1–13.

Woźniak, T. (2016). Bayesian vector autoregressions. *Australian Economic Review, 49*(3), 365–380. https://doi.org/10.1111/1467-8462.12179

Yimer, A. (2022). *The FDI-growth nexus: A comparative analysis of resource-rich and resource-scarce African economies* (AERC Research Paper No. 510). African Economic Research Consortium. https://publication.aercafricalibrary.org/handle/123456789/3386

Zhang, K. H. (2021). How does South-South FDI affect host economies? Evidence from China-Africa in 2003–2018. *International Review of Economics & Finance, 75*, 690–703. https://doi.org/10.1016/j.iref.2021.04.015