Resilience of Developing Economies to External Shocks: Empirical Evidence from CEMAC Countries

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Abstract: This study explores the effects of the 1994 CFA currency depreciation, the 2008 Global Financial Crisis (GFC), and instances of political coups on the relationships between FDI inflow, economic growth, and governance in the Central African Economic and Monetary Community (CEMAC) countries. By examining the impact of these events on FDI, growth, and governance, this paper provides important details of CEMAC economies in response to external shocks and internal political disruptions. We employ a panel VAR analysis with data from 1990 to 2019 to explore the dynamic relationships among these variables. The results show that growth and governance are not determining factors for attracting FDI in the CEMAC sub-region. Governance, on the other hand, stands as a determining factor for growth. Our findings also suggest that the 1994 CFA currency depreciation, 2008 GFC, and coups had no significantly impact on FDI inflows, growth, and governance in CEMAC countries. Although the effects of these events may expose the vulnerability of these countries to external shocks, influencing the dynamics of FDI, economic growth, and governance, their impact did not seem to be evident. However, political instability, evidenced by coups, emerges as a crucial factor shaping the interactions between FDI, economic growth, and governance in the region. Our analysis was conducted using the EViews software package.

Keywords: FDI inflow, governance, economic growth, panel VAR, Bayesian VAR, 1994 CFA currency devaluation, 2008 GFC, coups, CEMAC

Paper type: Empirical paper

Introduction

As countries seek sustainable avenues for growth and development, policymakers and researchers are increasingly recognizing the crucial role of investments. This focus aligns with trends observed in many developed countries, where a positive correlation between FDI inflows and economic growth has been established. Better still, most studies across developed, emerging, and developing countries argue that FDI inflows is the engine of the economy (Bénétrix, Pallan, & Panizza, 2023; Blomstrom, Lipsey, & Zejan, 1992; Borensztein, De Gregorio, & Lee, 1998; Lee, De Gregorio, & Borensztein, 1994; Munene, 2023; Pegkas, 2015; Yimer, 2023). China's impressive economic trajectory, for example, has frequently been attributed to its significant influx of investments (Chen, 2013; Gunby, Jin, & Robert Reed, 2017; Zhang, 2006). However, developing countries, especially those in sub-Saharan Africa (SSA), are lagging behind in the race to attract foreign investments.

Despite the evidence of FDI on growth across countries of varying wealth, many studies have echoed the ambiguity in such results (Letnes, 2002; Narula & Driffield, 2012b; Serbu, 2007). The story might just not be too simple as presented in academia. Some studies point to the introduction of other factors that facilitate the movement of capital across borders and how effective it is for hosting countries. While Bénétrix, Pallan and Panizza (2023) and Ibara (2020) introduce the presence of well-developed financial systems and high levels of human capital, Hobbs, Paparas and AboElsoud (2021) mention trade, and Saidi, Ochi and Maktouf (2023) and Jude and Levieuge (2017) stress the role of institutional factors or governance as important determinants in the FDI-growth nexus.

Using governance to predict FDI inflows presents challenges for various research objectives. Instead of using aggregate governance in predicting governance as in Dobrowolska, Dorożyński and Kuna-Marszałek (2023), the separate dimensions of governance, such as regulatory quality, rule of law, corruption control (Abdu, Selvasundaram, & Sagathevan, 2021), governance effectiveness, voice and accountability, and political stability, are assessed individually (also see Dobrowolska, Dorożyński and Kuna-Marszałek (2023)). Using the separate dimensions too can reveal aspects not seen in aggregate governance (see Raza, Shah and Arif (2021)). Generally, aggregate governance has been recognized as essential governance dynamics that boost FDI inflows (Adeleke, 2014; Subasat & Bellos, 2013).

A terse background of CEMAC is presented here. 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. According to Ranganathan, Foster and Briceño-garmendia (2012), CEMAC countries are extremely heterogeneous. Hence, sub samples are analyzed based income levels, HIPC status, and LDC stage of CEMAC countries.

Despite considerable research on the interactions between FDI, growth, and governance *[F-G-G]*, the economic impacts of currency devaluation, global financial crises, and coups within the CEMAC region is still not emphasized. So, there exists research gap regarding the specific effects of coups, the 1994 CFA currency devaluation and the subsequent global financial crisis on FDI, growth, and governance within CEMAC countries. While studies have explored the consequences of currency devaluation (Cooper, 2019; Javadov, Feyzullaev, & Jabbbarov, 2021; Saibene & Sicouri, 2012; Steinherr, 1980), financial crises (Anyanwu, 2011; Brambila-Macias & Massa, 2010; Dornean & Oanea, 2013; Fosu, 2013; Raz et al., 2012; Simionescu, 2016), and coups (Adetiloye & Duruji, 2013; Fosu & O'Connell, 2006; Tomashevskiy, 2017; Williams, 2017) in various regions, there is not much research focusing on the CEMAC countries, which face unique structural and institutional challenges. Furthermore, existing literature often overlooks the linkages among FDI, economic growth, and governance, particularly in the context of these three significant events.

Literature Review

The role or spillover effects FDI inflows in CEMAC countries has been emphasized in many studies (Emmanuel, 2014; Ongo Nkoa, 2014; Sindze, Nantharath, & Kang, 2021). Recently, this FDI-growth nexus has been linked to governance as a reinforcement factor. For example, Shittu et al. (2020) found that despite mixed findings regarding the relationship FDI and growth, FDI boosts growth in his analysis on West African countries from 1996-2016. Additionally, political governance is found to amplify the positive influence of FDI on economic growth. In a study in South Africa, Hlongwane (2011) examined the efficiency with which FDI inflows generate employment in developed versus developing countries using panel data. The study suggests that a host country's economic activity, as reflected in its GDP growth, influences its ability to attract FDI. More importantly, the study finds that developed economies are more efficient in creating employment from FDI inflows compared to developing countries. In addition, analysis of the relationship between economic activities of major industrial sectors and their capacity to attract foreign investments, observing a positive relationship between GDP, FDI, and employment. However, it notes declining growth in both employment and FDI inflow.

Numerous empirical studies have been conducted on the subject of FDI inflows and growth. The role of FDI inflow has been found to have a positive impact on economic growth, particularly in developing countries. Studies have shown that FDI inflows can contribute to GDP growth through technology transfer and human capital formation (). However, the relationship between FDI, growth, and governance quality has been recently explored with complex results attained. Overall, FDI can contribute to economic growth, but the impact is influenced by the level of governance quality in a country. Saidi, Ochi and Maktouf (2023) found a nonlinear relationship between the three variables with no significant relationship between FDI and economic growth below a certain threshold level of governance quality in his analysis of 102 developing countries from 2000-2018. Additionally, the quality of governance in developing countries does not seem to affect FDI and economic growth (Raza, Shah, & Arif, 2021). Fragile governance quality in SSA weakens the inclusive growth-inducing effects of FDI, but developing frameworks and structures for fighting corruption and improving regulatory quality and government effectiveness can yield positive long-term effects (Ofori & Asongu, 2022).

Recent studies show the significant role of governance in this FDI-growth nexus (Narayanan, Choong, & Lau, 2020; Raza, Shah, & Arif, 2021; Soltani & Ghandri, 2020; Van Bon, 2019). For OECD countries from 1996-2013, Raza, Shah and Arif (2021) found a significantly positive effect of governance and FDI on growth. For ASEAN countries from 2002-2015, Narayanan, Choong and Lau (2020) found that good governance acts as an important factor in harnessing the benefits of FDI on growth. Soltani and Ghandri (2020) found that governance quality has a positive impact on both foreign direct investment (FDI) and economic growth in 15 MENA countries from 2000-2017. Therefore, FDI has continued to emerge as a critical engine for economic growth (Bouchoucha & Yahyaoui, 2019; Hassan, 2020; Le et al., 2021; Mariska, Hamzah, & Ratih, 2021; Yimer, 2023). It is not uncommon for governments and researchers to pin the significance, impact, and factors that drive growth on the inflow of FDI, and recently on a third factor, such as governance, trade or financial system.

In the link between FDI inflow and economic growth, the role of governance is increasingly recognized as a key concern in this relationship. As such, this relationship is more complex than just investigating the mediating role of other variables such as governance (Bouchoucha, 2024; Bouchoucha & Yahyaoui, 2019; Raza, Shah, & Arif, 2021; Saidi, Ochi, & Maktouf, 2023), economic freedom and democracy (Ayub et al., 2019; Kazemi & Azman-Saini, 2017), household consumption (Petkova, 2017, 2019), as well as financial market development (Alfaro et al., 2010; Hsu & Wu, 2009; Nguyen, 2022) proving to be preconditions for the effectiveness of FDI. Note that many argue in favor of empirical results and conclusion in this relationship being ambiguous (Abbes et al., 2015; Alfaro et al., 2004; Chanegriha, Stewart, & Tsoukis, 2020). This aambiguity is argued in both the role of growth in attracting FDI as well as the impact of FDI on economic growth, especially for developing countries (Narula & Driffield, 2012a). 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 paper points to the effect of the host country's governance structure. Thus, effective governance, characterized by the six worldwide governance indicators (Kaufmann, Kraay, & Mastruzzi, 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 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 (SDGs) provide a comprehensive framework for addressing global challenges while ensuring sustainability (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) argue 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 (Aust, Morais, & Pinto, 2020). Instead, economic growth is seen as progress toward the path of sustainable growth in CEMAC countries.

Based on empirical evidence and theoretical frameworks, this thesis 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 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 inflows include market size (Khachoo & Khan, 2012; Nunnenkamp, 2002; Petrović-Ranđelović, Janković-Milić, & Kostadinović, 2017; Vijayakumar, Sridharan, & Rao, 2010), cost factors, human capital, openness to trade, globalization (Nunnenkamp, 2002), and labor cost (Vijayakumar, Sridharan, & Rao, 2010), infrastructure (Shah, 2014), currency value and gross capital formation as the potential (Vijayakumar, Sridharan, & Rao, 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.

According to (Amal, 2016), FDI inflow is seen as a critical source of investment, knowledge transfer, and growth. Economic growth is, therefore, a key predictor of FDI, and there is a positive relationship between growth and FDI (Iamsiraroj & Doucouliagos, 2015). Also, the importance of absorptive ability in influencing the impacts of FDI on economic growth cannot be overstated. Classical economic theories highlighted the importance of foreign commerce as a driving force behind economic internationalization and integration, producing local wealth through specialization and comparative advantages (Sengupta & Sen, 1961). 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. 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. According to Erum, Hussain and Yousaf (2016), FDI and domestic investment have a favorable impact on economic growth. This indicates that the contribution from domestic private investment is more reliable than that from foreign direct investment. Based on this finding, if the negative balance of payments impact of the subsequent profit repatriating is also included, FDI's allure as an economic engine diminishes. However, there is a strong and positive correlation between labor and GDP. Erum, Hussain and Yousaf (2016) argue that government spending has very little impact on economic expansion. Their results imply that growth strategies that disregard investments in human capital will not be able to reap long-term rewards.

For developing countries, FDI is generally thought to have a favorable influence on growth and development, especially in SSA countries. As such, divergent empirical data have encouraged 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, De Gregorio, & Lee, 1998), FDI has a positive overall effect on growth. Even though the degree of this benefit is dependent on the stock of human capital available in the host countries, the way FDI interacts with human capital, the direct effect of FDI is negative for countries with very low levels of human capital.

Sub components of governance point out the effect of the different dimensions of institutions on attracting FDI flows or improving growth in developing countries. (Asiedu & Lien, 2011) found that effects of democracy on FDI and highlighted that the presence of natural resources in host countries can strengthen the link. Using linear dynamic panel data model, GMM estimator and regression analysis, the results show that democracy attracts FDI inflow only when the percentage of minerals and oil in overall exports is less than a crucial level. These findings show that the impact of democracy on FDI is determined by the number of natural resources rather than the type of natural resources.

FDI, economic growth, and governance are almost inseparable in the real sense, especially in developing countries where governance is seen as the main hindrance to many things to be in place. Even for a region better than SSA countries, Habibi (2018) argues that good governance, which is roughly equivalent to economic freedom, has a beneficial influence on economic growth, and 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, while the link between governance and FDI can result in positive and improved growth, the need for African countries to strengthen their governance structures in order to attract more FDI and improve growth should be prioritized (Adeleke, 2014).

Methodology

Data and Sources

This study on the dynamic relationship between FDI inflow, economic growth, and governance in six CEMAC countries from 1990 to 2019 involves panel VAR (PVAR) and robust Bayesian PVAR analyses for three core (FDI, economic growth, and governance) and seven control (household consumption, electricity consumption, labor force, trade openness, inflation, economic freedom, and agricultural value added) variables. Based on the VAR methodology, this paper includes financial and political instability components to provide understanding of their effect on of the core variables, especially the inflow of FDI. These six CEMAC countries selected for this study are all developing countries in Central Africa.

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. The analysis encompassed three sets of variables as aforementioned to capture the multifaceted economic dynamics in CEMAC countries. In VAR terms, the endogenous variables are referred to as the core variables, while the two sets of exogenous variables encompass the control and the financial and political instability variables. This extensive set of variables was chosen to provide dynamic understanding, recognizing that attracting FDI or sustainable economic growth is shaped by a confluence of factors, including governance quality and the broader socio-economic variables. See more detail in Table 1A.

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.

The panel VAR model 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. One of such issues faced in this dissertation is that of the choice of lag length in the VAR models. By including both the SIC and AIC selection criteria in the analysis as part of the robustness measures. Integrating panel SVAR and Bayesian VAR models, this dissertation offers a comprehensive framework for estimating the models, thereby enriching academic discourse and informing evidence-based policy formulation for inclusive economic growth.

The data underwent necessary transformation such as log and first difference, as well as other VAR diagnostics steps 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.

Empirical Model and PVAR model specification

Suppose a panel VAR(1) model

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

or

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

is a panel VAR model with fixed effects, where $j = 1, 2, \ldots, p$ is the lag order of the VAR, y_{it} and y_{it-1} are $(m \times 1)$ 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 of Equation (1) in its simplest (3) and matrix (4) forms for the core variables are re-written for a three-variable lag-1(first order) model as:

$$FDI_{it} = A_{11}FDI_{it-1} + A_{12}lnGDPPC_{it-1} + A_{13}GOV_{it-1} + \varepsilon_{1it}$$
$$lnGDPPC_{it} = A_{21}FDI_{it-1} + A_{22}lnGDPPC_{it-1} + A_{23}GOV_{it-1} + \varepsilon_{2it}$$
$$GOV_{it} = A_{31}FDI_{it-1} + A_{32}lnGDPPC_{it-1} + A_{33}GOV_{it-1} + \varepsilon_{3it}$$
(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.

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

(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 Equation (1). Suppose Equation (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 $(k \times 1)$ vectors of exogenous variables (or a set of exogenous variables, often including a constant, possibly with a time trend and seasonal dummies (see Cottrell and 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:

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

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

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

and transformed linearly as:

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

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) hold that Granger causality tests, impulse response functions and variance decompositions are 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, Miranda-Agrippino and Ricco (2019, 2023) argue that VARs and BVARs have been a standard macro econometric 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, Meyler, Kenny and Quinn (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 Droumaguet, Warne and Woźniak (2017) and Spencer (1993) for more detail.

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 $\emptyset_j = \mathrm{A}_j - 1$ for $\Pi_j > 0$;

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

where $\emptyset_j < 0$ or $0 < \mathrm{A}_j < 1$ is stationary of the AR-process for individual j; and $\emptyset_j = 0$ or $\mathrm{A}_j = 1$ for $j = 1, \dots, N$ is non-stationary for Y_{it} (see Biørn (2017)).

Finally, Bayesian VAR (BVAR) models offer solution to the limitations of traditional VAR models (Equations 1-11) by integrating prior information and imposing additional structure through Bayesian inference. Unlike regular VAR models, BVAR models allow for the incorporation of prior beliefs about the relationships among variables, thereby enabling researchers to enhance forecast accuracy and parameter estimation. Recent developments in the formulation and estimate of BVARs are reviewed by Ciccarelli and Rebucci (2003). In their paper, they first outlined the Bayesian concept of estimation, then to possible priors and introduced the original methodology created by Litterman (1986) and Doan, Litterman and Sims (1984). Extending Equation 5 for BVAR gives:

$$y_{it} = \sum_{j=1}^{p} A_j y_{it-j} + B x_{it} + \varepsilon_{it} \quad (12)$$

where $t = 1, 2, \dots, T$; y_{it} is an $n \times 1$ vector of endogenous variables; x_{it} is a $b \times 1$vector of exogenous variables; ε_{it} is an $n \times 1$ vector of error terms i.i.d. with variance-covariance matrix Σ, $\varepsilon_{it} \sim i.i.d.N(0, \Sigma)$; A_j are $(n \times n)$ matrices for $j = 1, 2, \dots, p$; and B are $n \times b$ matrices of parameters.

By introducing priors, BVAR models address the issue of overfitting common in regular VAR models, especially when dealing with small sample sizes or a large number of variables. In addition, BVAR models facilitate the estimation of time-varying parameters, capturing evolving relationships among variables over time more effectively. BVAR models offer a flexible framework for handling missing data and model uncertainty, thereby providing more robust and reliable estimates. For more detail on BVAR, see Ciccarelli and Rebucci (2003).

Empirical Results and Discussion

This section reports and discusses diagnostic results and estimates of VAR models for six CEMAC countries from 1990-2019. The typical procedure in VAR analysis involves presenting findings from Granger-causality, impulse responses, and decompositions of forecast error variance (Stock & Watson, 2001). In addition, Stock and Watson (2001) argue that these structural tests for the VAR model offer greater insight compared to the usually unreported estimated VAR regression coefficients or R^2 statistics. Before presenting the process proposed by Stock and Watson (2001), conducting panel unit root tests is a prerequisite.

Panel Unit Root Tests

Panel unit root analysis was conducted to examine the stationarity of the variables across both six and 30-year time dimensions. Table 4A presents the panel unit root results for all 10 variables. Three panel unit root tests (LLC, IPS, and ADF) for all the variables are stationary, $I(1)$. This means that the 10 variables exhibit non-stationarity in their levels, except inflation. However, after taking the first difference, the panel data suggests strong evidence of stationarity, indicating that the variables possess a stable long-term equilibrium. Note that this finding ensures robustness in subsequent VAR analyses.

Panel Granger Causality

Granger-causality statistics investigate whether past values of a variable contribute to forecasting another variable (Stock & Watson, 2001). This subsection presents a panel Granger causality test to examine the dynamic causal relationship between the core variables. Considering the trivariate VAR model in Equations (3) and (4), *ln*GDPPC does not Granger cause FDI is represented by the null hypothesis $H_0 = A_{12} = 0$. Similarly, if GOV does not Granger cause FDI, the null hypothesis is $H_0 = A_{33} = 0$. Note that Granger causality test is typically run on first difference data rather than level data because it examines the predictive power of lagged values of one variable on another variable. When variables are non-stationary in their levels, spurious relationships may occur. Taking first differences often transforms the data into stationary series, making it more appropriate for the Granger causality test.

Table 1. VAR Panel Causality Tests

Panel A: Granger causality			
⇒ does not Granger cause (*H₀*)	Obs	F-Statistic	Causality
Δ*ln*GDPPC ⇒ ΔFDI	168	3.478**	⇒
ΔFDI ⇒ Δ*ln*GDPPC		0.246	⇏
ΔGOV ⇒ ΔFDI	168	0.607	⇏
ΔFDI ⇒ ΔGOV		1.228	⇏
ΔGOV ⇒ Δ*ln*GDPPC	168	0.428	⇏
Δ*ln*GDPPC ⇒ ΔGOV		0.133	⇏
Panel B: Dumitrescu Hurlin Panel Causality Tests			
⇒ does not homogeneously cause (*H₀*)	W-Stat.	Zbar-Stat.	Causality
Δ*ln*GDPPC ⇒ ΔFDI	1.195	-1.013	⇏
ΔFDI ⇒ Δ*ln*GDPPC	1.820	-0.382	⇏
ΔGOV ⇒ ΔFDI	0.908	-1.302	⇏
ΔFDI ⇒ ΔGOV	1.352	-0.854	⇏
ΔGOV ⇒ Δ*ln*GDPPC	1.618	-0.586	⇏
Δ*ln*GDPPC ⇒ ΔGOV	5.232***	3.054***	⇒

Notes. *, **, *** indicate 10%, 5%, 1% significance level, respectively

Table 1 shows the results of panel Granger causality analysis (Panels A and B for Granger and Dumitrescu Hurlin panel causality, respectively) exploring the relationships among FDI inflow, economic growth, and governance. Panel A shows F-statistics with *p*-values for in asterisks testing if coefficients are zero. Economic growth helps to predict inflation at the 5% level of significance ($p < 0.000$), but governance does not ($p = 0.607$). Governance and FDI do not help predict growth ($p = 0.428$; $p = 0.246$, respectively). FDI does not help to predict governance ($p = 1.228$), but economic growth does ($\overline{W} = 5.232$; $\bar{Z} = 3.054$).

Generally, the findings revealed a unidirectional causality running from economic growth to FDI and governance, suggesting that improvements in economic growth precede increases in FDI inflows and improve governance practices. This result implies that robust economic growth may attract more FDI, highlighting the significance of economic growth in driving FDI inflows. However, no significant causality was detected between governance and either FDI or economic growth, indicating that while economic growth may drive changes in FDI and governance, these factors do not exert a direct causal influence on growth in the CEMAC region.

Panel VAR Estimates

For the first panel VAR model (Model 1) comprising stationary variables for FDI, economic growth, and governance (ΔFDI, Δ*ln*GDPPC, and ΔGOV) with 2 lags, the analysis focuses on capturing the dynamic relationships among these variables. Including lagged values in the model for the potential delayed effects of growth and governance on FDI inflows, PVAR approach examines how changes in growth and aggregate governance affect FDI inflows in the short run.

In Model 2, six exogenous macroeconomic variables are integrated in the core model (Model 1), and examines how this set of determinants influence the dynamics of the core model. In other words, the inclusion of external macroeconomic conditions to interact with internal factors to assess the interrelationships with FDI inflows, growth, and governance across CEMAC countries. Model 3 introduces two exogenous dummy variables (the 1994 CFA currency devaluation and the 2008 GFC). The analysis examines the impact of significant external shocks on the dynamics of the core variables. Model 4 includes a second set of dummy variables (political coups and instability) to capture the effects of coups on the relationships among FDI, economic growth, and governance. Note that this approach introduces structural breaks or changes in the relationships between the variables following periods of economic instability or policy interventions. Models 5 and 6 are more robust Bayesian VAR models for panel data for CEMAC countries. Table 7A shows the panel VAR estimates for Models 1-3.

Structural Analyses of PVAR Model

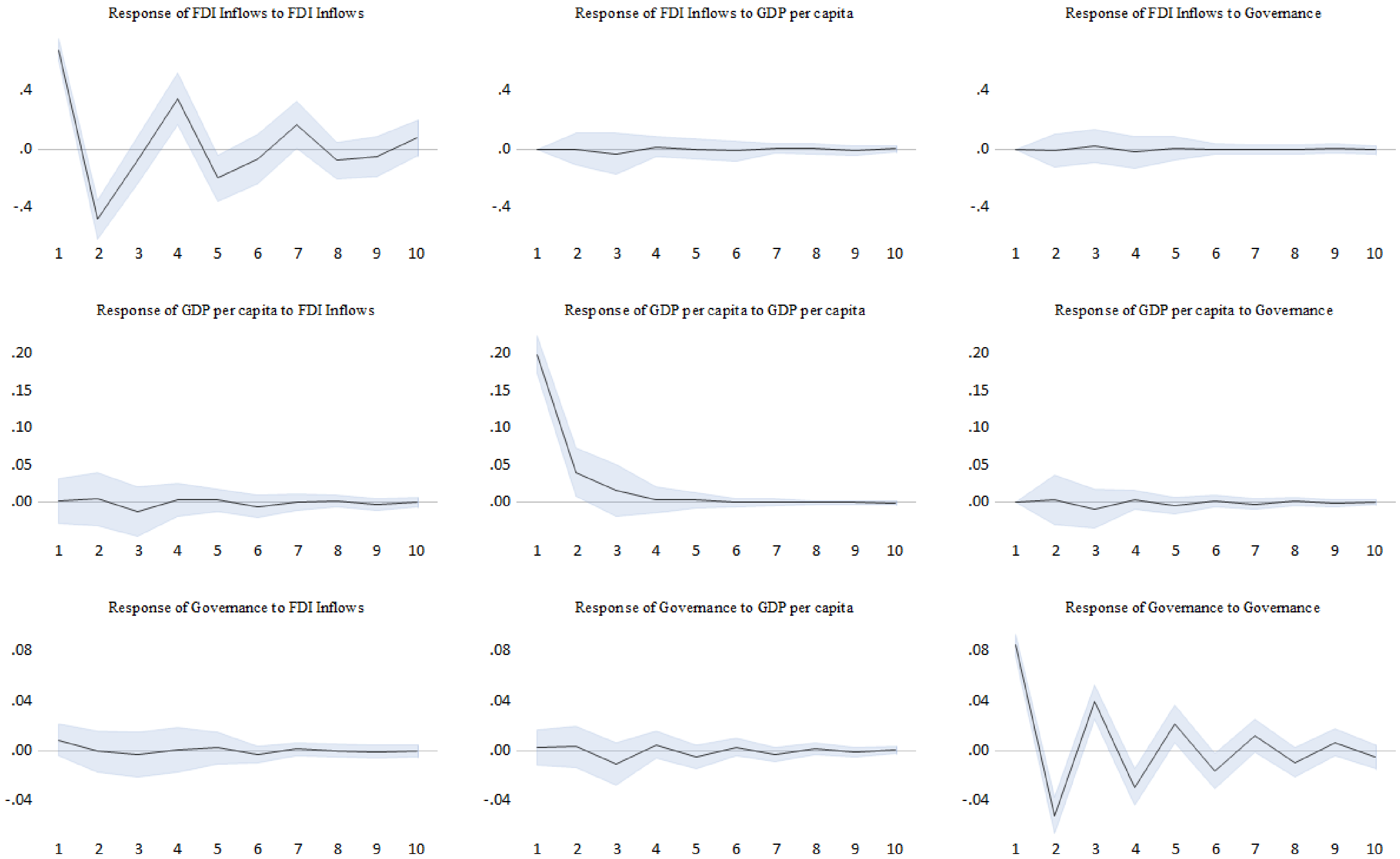
This subsection presents results of impulse response functions (IRFs) and the forecast error variance decompositions (FEVDs). Both IRFs and FEVDs are structural forms of VAR used to compliments the results in earlier tests such as the panel VAR estimates and results for panel causality. In these results, we analyze the dynamic responses of variables in the panel VAR model to specified shocks. Examining how shocks propagate through the system and affect each variable's response, IRFs show the short- and long-term effects of exogenous shocks on FDI, growth, and governance. For the FEVDs, we explore the relative importance of different shocks in explaining the forecast error variance of each variable with the key drivers of uncertainty and variability in the panel VAR model's predictions noted.

Impulse responses illustrate how the current and future values of each variable react to a one-unit increase in the current value of a particular error term in a VAR model. Stock and Watson (2001) posit that the error term returns to zero in the following periods and that all other error terms remain at zero. They hold that this thought experiment is most meaningful when the errors are uncorrelated across equations. Therefore, impulse responses are usually computed for recursive and structural VAR models, as changing one error while keeping the others constant allows for clearer interpretation (Stock & Watson, 2001).

The first column shows the effect of an unexpected 1 percentage point increase or shock in FDI inflows on all three variables, as it works through the recursive VAR system with the coefficients estimated from actual data. The second column shows the effect of an unexpected increase of 1 percentage point in the GDP per capita, and the third column shows the corresponding effect for governance. An unexpected rise in FDI fluctuates and slowly fades away over 10 years and is associated with no change in GDP per capita and governance. Again, unexpected rise in GDP per capita slowly fades away over 10 years and is associated with no change in GDP per capita and governance. Finally, an unexpected rise in governance fluctuates and slowly fades away over 10 years and is associated with no change in GDP per capita and FDI inflows.

The FEVD represents the proportion of error variance in predicting a variable attributable to a particular shock over a specified time frame, and it mirrors a partial R^2 for forecast errors, contingent upon the forecasting horizon (Stock & Watson, 2001). In Table 3, they propose no considerable or minimal interaction between the variables. To illustrate, over a 10-year period, less than 0.5 percent of the forecast error for FDI inflow is linked to growth and governance. Similarly, only 0.88 percent of the forecast error for economic growth is associated with FDI inflows and governance. Additionally, less than 2.5 percent of the forecast error for governance is attributed to growth and FDI inflow shocks in the recursive VAR model.

Figure 1. IRFs of Panel VAR(2) for FDI Inflows



Notes. Cholesky ordering: ΔFDI, ΔGDPPC, ΔGOV; Response to shocks are 95% CI using Monte Carlo S.E.s with 500 replications; shaded area represents confidence band around the estimate; solid lines represent the response FDI to shocks in growth-governance; horizon is 10 years.

Table 2. FEVDs of the Core Model

Variable	ΔFDI				ΔlnGDPPC				ΔGOV			
Horizon (*h*)	S.E.	ΔFDI	ΔlnGDPPC	ΔGOV	S.E.	ΔFDI	ΔlnGDPPC	ΔGOV	S.E.	ΔFDI	ΔlnGDPPC	ΔGOV
1	0.677	100.00	0.00	0.00	0.198	0.01	99.99	0.00	0.085	1.08	0.11	98.81
2	0.831	99.98	0.00	0.02	0.203	0.07	99.90	0.03	0.100	0.79	0.20	99.01
5	0.924	99.70	0.15	0.15	0.204	0.47	99.25	0.28	0.114	0.72	1.35	97.93
7	0.942	99.70	0.16	0.14	0.204	0.53	99.16	0.31	0.116	0.78	1.43	97.79
10	0.950	99.69	0.17	0.14	0.204	0.56	99.12	0.32	0.117	0.78	1.46	97.76

Notes. Cholesky ordering: ΔFDI, ΔGDPPC, and ΔGOV; response to Cholesky One S.D. (d.f. adjusted) Innovations 95% CI using Monte Carlo S.E.s with 500 replications; shaded area represents confidence band around the estimate; solid lines represent the response FDI inflows to shocks in growth and governance; FEVDs forecast horizons length (*h*) is 10 years.

Bayesian PVAR (or Panel BVAR)

A comparison of the two results (panel VAR and BVAR from Tables 2 and 4, along with the examination of Figures 1 and 2, respectively) reveals that there is a consistent trend indicating no substantial alterations in both panel VAR and BVAR results. Despite variations in methodologies and data representations, the findings across these tables and figures exhibit remarkable stability, affirming the robustness of the models employed. The absence of significant shifts underscores the reliability and consistency of the analytical framework utilized, reinforcing the validity of the conclusions drawn from the research.

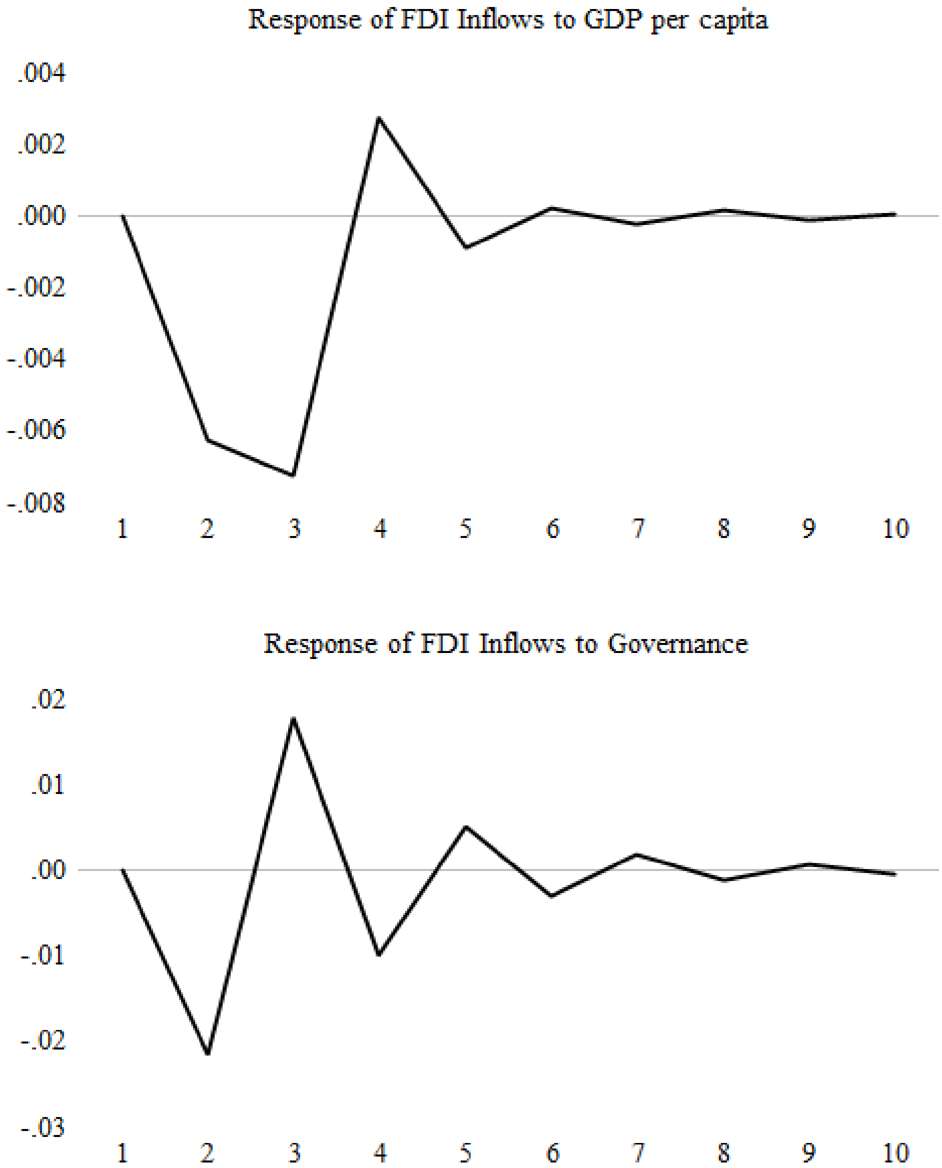
Table 3. Bayesian VAR Estimates

	Bayesian PVAR(2) with Minnesota Prior						Bayesian PVAR(2) with Normal-Wishart Prior					
	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV
$\Delta FDI_{(t-1)}$	-0.302	0.006	0.004	-0.300	0.004	0.004	-0.706	0.006	0.007	-0.706	0.002	0.007
	0.063	0.018	0.008	0.063	0.017	0.008	0.086	0.025	0.011	0.087	0.024	0.012
$\Delta FDI_{(t-2)}$	-0.122	-0.004	0.000	-0.121	-0.004	0.000	-0.607	-0.014	-0.001	-0.607	-0.015	-0.001
	0.043	0.013	0.005	0.043	0.011	0.005	0.086	0.026	0.012	0.087	0.024	0.012
$\Delta lnGDPPC_{(t-1)}$	-0.031	0.128	0.012	-0.033	0.096	0.013	0.000	0.202	0.025	-0.009	0.143	0.026
	0.211	0.062	0.027	0.220	0.059	0.028	0.267	0.079	0.036	0.272	0.074	0.036
$\Delta lnGDPPC_{(t-2)}$	-0.040	0.016	-0.014	-0.043	0.017	-0.016	-0.154	0.039	-0.049	-0.150	0.042	-0.050
	0.143	0.042	0.018	0.153	0.041	0.019	0.266	0.079	0.035	0.268	0.073	0.036
$\Delta GOV_{(t-1)}$	-0.248	0.056	-0.459	-0.246	0.061	-0.458	-0.145	0.042	-0.567	-0.144	0.063	-0.567
	0.435	0.127	0.055	0.437	0.117	0.055	0.590	0.174	0.078	0.593	0.161	0.079
$\Delta GOV_{(t-2)}$	0.017	-0.026	0.082	0.016	-0.019	0.082	0.088	-0.074	0.117	0.088	-0.045	0.118
	0.325	0.095	0.041	0.326	0.088	0.041	0.591	0.174	0.079	0.595	0.161	0.079
CDEV1994				-0.081	-0.391	0.010				-0.100	-0.379	0.012
				0.285	0.077	0.036				0.278	0.075	0.037
GFC2008				-0.102	0.148	0.014				-0.054	0.139	0.015
				0.285	0.077	0.036				0.277	0.075	0.037
Constant	0.033	0.030	-0.007	0.040	0.040	-0.008	0.076	0.026	-0.007	0.082	0.038	-0.008
	0.054	0.016	0.007	0.057	0.015	0.007	0.054	0.016	0.007	0.056	0.015	0.007
R^2	0.183	0.044	0.435	0.183	0.198	0.436	0.337	0.053	0.464	0.338	0.203	0.465
Adj. R^2	0.152	0.007	0.413	0.140	0.157	0.406	0.312	0.016	0.443	0.304	0.162	0.437

	Bayesian PVAR(2) with Minnesota Prior						Bayesian PVAR(2) with Normal-Wishart Prior					
	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV
F-statistic	5.794	1.191	19.884	4.283	4.737	14.770	13.156	1.435	22.323	9.770	4.879	16.593
Data MLL		-			-26.685			-			-24.691	

Notes. 162 observations after adjustments; Standard errors in parentheses; Hyper-parameters include $\mu 1 = 0$, L1 = 0.1, L2 = 0.99, L3 = 1, L4 = inf, and Diagonal VAR for the initial residual covariance for Minnesota Prior, Hyper-parameters include $\mu 1 = 0$, C1 = 0.1, C2 = 0.1, and C3 = 4 for Normal-Wishart Prior.

Figure 2. IRFs of Bayesian VAR(2) for FDI Inflows



Notes. Response to Cholesky One S.D. (d.f. adjusted) Shocks; Only responses of FDI inflows are shown from a Cholesky ordering: ΔFDI, ΔGDPPC, and ΔGOV; solid lines represent the response FDI inflows to shocks in growth and governance; horizon length is 10 years.

Conclusion

This study examines the resilience of CEMAC countries to external shocks such as currency depreciations and global financial crises, and analyze the role of governance in mitigating these effects. In other words, we investigate the effects of the 1994 CFA currency devaluation and the 2008 GFC on macroeconomic variables, and conclude that they have no significant influence on the dynamics of FDI inflows, economic growth, and governance within the CEMAC countries from 1990 to 2019 using panel VAR models and robust Bayesian VAR models. However, the 1994 CFA currency devaluation initiated structural adjustments that aimed to enhance export competitiveness and attract FDI inflows. So, the subsequent shocks from the 2008 GFC may have disrupted these efforts, leading to economic downturns and governance challenges across the CEMAC region. Both the panel VAR and Bayesian models have deepened our understanding of the dynamics of the FDI, growth, and governance of the CEMAC countries for the past three decades.

From recent empirical results, we extended the analysis to incorporate these two economic events: the 2008 global financial crisis and the 1994 CFA currency crisis as well as coups in CEMAC countries, and assessed whether those events caused impulses in governance and economic growth to FDI inflow. Finally, the six other weak endogenous macroeconomic variables (labor force, household consumption, electricity consumption, trade openness, agricultural value added, and economic freedom) generally measure a country's ability to attract FDI and how open and interconnected a country is to the rest of the world. These not only advances 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 external shocks.

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Appendix

Table 1A. Data Description and Sources

Variable	Description	Source
FDI	Foreign direct investment ((billion U.S. dollars)	The World Bank
GDPPC	GDP per capita (U.S. dollars, constant 2010)	The World Bank
GOV	Aggregate Governance (six dimensions, points)	The World Bank
ECON	Electricity consumption (billion kilowatthours)	The U.S. EIA
HCON	Household consumption (billion U.S. dollars)	The World Bank
LAB	Labor force (million people)	The World Bank
INF	Inflation (% of GDP)	The World Bank
TOP	Trade openness (percent)	The World Bank
AGRICVA	Agricultural value added (billion U.S. dollars)	The World Bank
EFREE	Economic freedom (overall index, 1-100)	The World Bank

Table 2A. Crises and Coups in CEMAC Countries (1990-2023)

Country	Regine change	Crises periods and instability (year)
Cameroon	None; Paul Biya (since 1982)	Anglophone crisis: NOSO (2016, 2017, 2018,2019)
Central African Rep.	Ange-Félix Patassé (1993)	President Ange-Félix Patassé came to power (1996)
	François Bozizé (2013)	A failed coup attempt against President Ange-Félix Patassé (2001)
	Faustin-Archange Touadéra (2016)	UFDR against President Patassé's government (2003)
		François Bozizé took control of the government (2003)
		Séléka coalition against President François Bozizé's government (2013)
		Michel Djotodia stepped down as president (2014)
		Catherine Samba-Panza was elected as interim president (2014)
Chad	None; Idriss Déby (1990 - 2021)	President Hissène Habré was ousted (1990)
		Idriss Déby's government claimed to have thwarted a coup attempt (2006)
		Rebels from various groups launched an offensive (2008)
Congo (Rep.)	Denis Sassou Nguesso (1979 - 1992; 1997-date)	Pascal Lissouba elected president (1992) -end of single-party rule
		Civil war (1997)
		Transitional government (2002)
		Denis Sassou Nguesso was re-elected as president (2009)
Equatorial Guinea	None; Teodoro O. N. Mbasogo (since 1979)	Mercenary Plot (2004)

Country	Regine change	Crises periods and instability (year)
		Coup Attempt (2009)
		Mercenary Plot (2017)
Gabon	Omar Bongo (1967 - 2009)	Attempted Coup (1990)
	Ali Bongo Ondimba (2009 - date)	Attempted Coup (2019)

Notes: NOSO stands for North West and South West (Anglophone) Regions of Cameroon; UFDR for the Union of Democratic Forces for Unity. None stands for regime change since 1990.

Source: Author

Table 3A. Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	J-Bera	Obs.
FDI	0.38	0.11	4.42	-1.43	0.75	2.95	14.89	1321.17	180
GDPPC	3134.75	1030.28	22942.60	166.18	4594.81	2.38	8.74	417.70	180
GOV	-1.08	-1.11	-0.17	-1.71	0.31	0.84	3.55	16.26	126
ECON	1.10	0.42	6.51	0.02	1.47	1.94	6.33	196.27	180
HCON	5.27	4.02	28.82	0.63	5.81	2.34	8.34	377.53	180
LAB	2.53	1.54	11.33	0.14	2.79	1.50	4.28	79.97	180
TOP	79.05	77.08	156.86	26.16	33.86	0.28	1.81	12.95	180
AGRICVA	1.44	0.66	7.06	0.15	1.84	1.67	4.40	98.36	180
INF	3.82	2.70	42.40	-11.70	7.35	2.86	14.54	1230.39	178
EFREE	49.68	50.00	61.00	34.00	5.20	0.00	2.50	1.88	180

Table 4A. Correlation Matrix

	FDI	**LnGDPPC**	**GOV**	**ECON**	**HCON**	**LnLAB**	**TOP**	**AGRICVA**	**INF**
LnGDPPC	0.208								
	(0.020)								
GOV	0.113	0.262							
	(0.208)	(0.003)							
ECON	0.115	-0.030	0.358						
	(0.200)	(0.743)	(0.001)						
HCON	0.066	-0.132	0.112	0.908					
	(0.464)	(0.142)	(0.213)	(0.000)					
LnLAB	-0.055	-0.428	-0.066	0.770	0.884				
	(0.544)	(0.000)	(0.467)	(0.000)	(0.000)				
TOP	0.331	0.447	0.109	-0.343	-0.359	-0.527			
	(0.000)	(0.000)	(0.226)	(0.000)	(0.000)	(0.000)			
AGRICVA	-0.084	-0.363	-0.167	0.513	0.773	0.818	-0.407		
	(0.354)	(0.000)	(0.062)	0.000	(0.000)	0.000	(0.000)		
INF	-0.002	0.062	-0.190	-0.169	-0.137	-0.141	0.066	-0.127	
	(0.983)	(0.489)	(0.034)	(0.059)	(0.127)	(0.117)	(0.462)	(0.159)	
EFREE	-0.184	0.039	0.548	0.256	0.132	0.088	-0.398	0.031	-0.142
	(0.040)	(0.664)	(0.000)	(0.004)	(0.141)	(0.329)	(0.000)	(0.729)	(0.115)

Note. Ordinary covariance analysis with correlation values and probability in parentheses.

Table 5A. Panel Unit Root Tests

	Test Type					
	LLC (*t)**		**IPS (*W-stat*)**		**ADF (*Chi-sq.*)**	
	Level	**First Difference**	**Level**	**First Difference**	**Level**	**First Difference**
FDI	-0.936	-7.011***	-0.737	-10.243***	18.656	104.004***
GDPPC	0.211	-3.676***	1.006	-5.590***	5.059	53.709***
GOV	0.794	-3.607***	0.542	-4.086***	9.805	39.126***
ECON	4.266	0.330***	6.194	-3.248	2.024	36.363***
HCON	2.407	-5.197***	3.814	-5.868***	1.366	56.138***
*Ln*LAB	-0.103	-1.164	3.006	-2.993***	5.580	30.370***
TOP	-1.064	-5.892***	-1.043	-7.553***	16.204	74.479***
INF	-8.349***	-10.972***	-6.819***	-11.110***	66.912***	113.777***
EFREE	-0.530	-5.648***	-0.952	-5.915***	14.794	56.706***
AGRICVA	2.572	-3.567***	2.807	-5.441***	6.254	51.922***

Note. *** indicates rejection at 5% level of significance.

Table 6A. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-25.441	-	0.000	0.451	0.519	0.479
1	28.755	104.951	0.000	-0.266	0.004*	-0.156
2	48.401	37.109	0.0001*	-0.435*	0.038	-0.243*
3	56.061	14.103	0.000	-0.414	0.262	-0.139
4	62.950	12.357	0.000	-0.380	0.498	-0.023
5	66.756	6.646	0.000	-0.298	0.783	0.141
6	84.049	29.370*	0.000	-0.429	0.854	0.092
7	91.824	12.835	0.000	-0.410	1.076	0.194
8	95.377	5.696	0.000	-0.323	1.365	0.362

Notes. * indicates lag order selection by the criterion; LR stands for sequential modified LR test statistic (each test at 5% level); FPE for final prediction error; AIC, SC, and HQ for Akaike information, Schwartz, and Hannan-Quinn information criteria, respectively.

Table 7A. Panel VAR Estimates

	Model 1: PVAR(2)			Model 2: PVARX(2)[a]			Model 3: PVARX(2)[b]		
	ΔFDI	Δ*ln*GDPPC)	ΔGOV	ΔFDI	Δ*ln*GDPPC)	ΔGOV	ΔFDI	Δ*ln*GDPPC)	ΔGOV
$\Delta FDI_{(t-1)}$	-0.707***	0.006	0.008	-0.707***	0.002	0.007	-0.735***	-0.004	0.008
	(0.088)	(0.026)	(0.011)	(0.089)	(0.024)	(0.011)	(0.091)	(0.025)	(0.011)
$\Delta FDI_{(t-2)}$	-0.608***	-0.014	0.000	-0.608***	-0.015	0.000	-0.629***	-0.019	0.001
	(0.088)	(0.026)	(0.011)	(0.089)	(0.024)	(0.011)	(0.091)	(0.025)	(0.011)
$\Delta lnGDPPC_{(t-1)}$	0.000	0.205***	0.026	-0.009	0.144***	0.027	-0.127	0.084*	0.011
	(0.275)	(0.081)	(0.035)	(0.280)	(0.075)	(0.035)	(0.289)	(0.078)	(0.036)
$\Delta lnGDPPC_{(t-2)}$	-0.156	0.039	-0.049**	-0.152	0.043	-0.050**	-0.271*	-0.074*	-0.064***
	(0.274)	(0.080)	(0.034)	(0.276)	(0.074)	(0.035)	(0.287)	(0.078)	(0.036)
$\Delta GOV_{(t-1)}$	-0.152	0.041	-0.610***	-0.150	0.066	-0.610	-0.211	-0.038	-0.634***
	(0.640)	(0.187)	(0.080)	(0.644)	(0.173)	(0.081)	(0.651)	(0.176)	(0.082)
$\Delta GOV_{(t-2)}$	0.087	-0.079	0.093*	0.088	-0.045	0.094*	-0.088	-0.223*	0.064
	(0.641)	(0.188)	(0.081)	(0.645)	(0.173)	(0.081)	(0.657)	(0.178)	(0.083)
CDEV1994				-0.102	-0.385***	0.012			
				(0.286)	(0.077)	(0.036)			
GFC2008				-0.055	0.141***	0.015			
				(0.286)	(0.077)	(0.036)			
ECON							-0.209***	-0.157***	-0.019*
							(0.132)	(0.036)	(0.017)
HCON							0.070**	0.037***	-0.001
							(0.048)	(0.013)	(0.006)
LAB							-0.015	0.038***	0.018***
							(0.093	(0.025)	(0.012)
*ln*LAB							0.167	0.003	-0.020

	Model 1: PVAR(2)			Model 2: PVARX(2)[a]			Model 3: PVARX(2)[b]		
	ΔFDI	Δ*ln*GDPPC)	ΔGOV	ΔFDI	Δ*ln*GDPPC)	ΔGOV	ΔFDI	Δ*ln*GDPPC)	ΔGOV
							(0.166)	(0.045)	(0.021)
TOP							0.004***	0.002***	0.000
							(0.002)	(0.001)	(0.000)
EFREE							0.028***	0.015***	0.001
							(0.015)	(0.004)	(0.002)
AGRICVA							-0.125***	-0.061***	-0.003
							(0.081)	(0.022)	(0.010)
Constant	0.077**	0.026***	-0.007	0.083**	0.038***	-0.008*	-1.581***	-0.919***	-0.082
	(0.055)	(0.016)	(0.007)	(0.058)	(0.016)	(0.007)	(0.852)	(0.231)	(0.107)
R^2	0.337	0.053	0.465	0.338	0.203	0.466	0.358	0.217	0.480
Adj. R^2	0.312	0.016	0.444	0.304	0.162	0.438	0.302	0.148	0.435
F-statistic	13.156	1.435	22.417	9.770	4.881	16.663	6.361	3.151	10.529
AIC		-0.309			-0.412			-0.304	
SC		0.091			0.102			0.497	
No. of coeff.		21			27			42	
No. of obs.		162			162			162	

Notes. *, **, *** indicate 10%, 5%, 1% significance level, respectively; standard errors in parentheses; [a, b] represent PVAR(2) for exogenous variables and dummies for both financial crises, respectively.

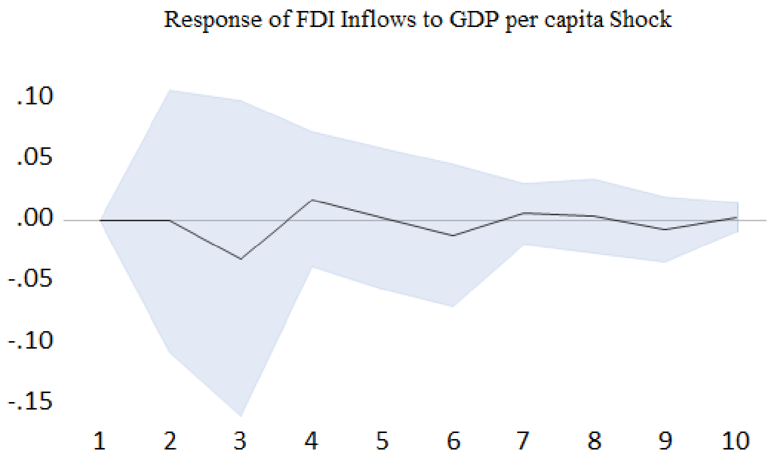
Table 8A. Panel VAR Estimates for Political Instability

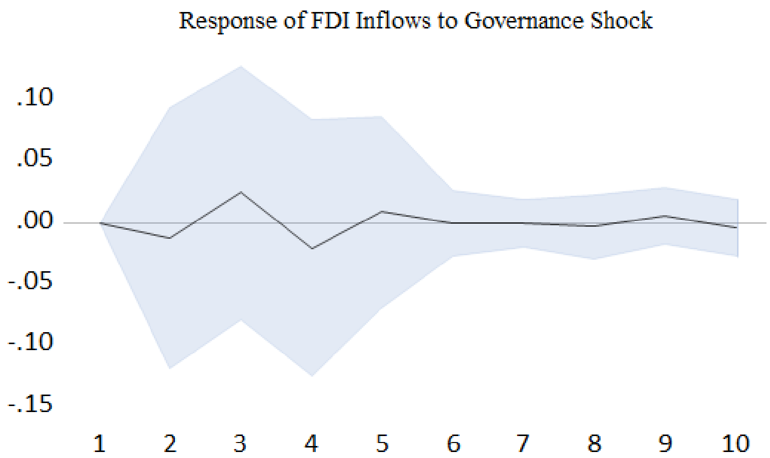
	PVAR(2) instability			BVAR(2) instability		
	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV
$\Delta FDI_{(t-1)}$	-0.7***	0.009	0.005	0.127	0.009	0.002
	(0.091)	(0.027)	(0.011)	(0.064)	(0.019)	(0.008)
$\Delta FDI_{(t-2)}$	-0.6***	-0.012	-0.002	-0.065	-0.005	-0.001
	(0.090)	(0.026)	(0.011)	(0.043)	(0.013)	(0.005)
$\Delta lnGDPPC_{(t-1)}$	-0.005	0.200***	0.029*	-0.027	0.519	0.012
	(0.282)	(0.082)	(0.035)	(0.215)	(0.063)	(0.027)
$\Delta lnGDPPC_{(t-2)}$	-0.137	0.045	-0.047*	-0.045	-0.005	-0.016
	(0.282)	(0.082)	(0.035)	(0.145)	(0.043)	(0.018)
$\Delta GOV_{(t-1)}$	-0.200	0.038	-0.6***	-0.317	0.061	-0.152
	(0.661)	(0.193)	(0.082)	(0.444)	(0.130)	(0.056)
$\Delta GOV_{(t-2)}$	0.030	-0.113	0.063	0.049	-0.048	0.159
	(0.670)	(0.195)	(0.083)	(0.331)	(0.097)	(0.042)
$INST^{CAM}$	0.052	-0.003	-0.054*	0.089	0.009	-0.045
	(0.350)	(0.102)	(0.044)	(0.350)	(0.102)	(0.044)
$INST^{CAR}$	-0.071	-0.075	-0.023	0.025	-0.042	-0.042
	(0.295)	(0.086)	(0.037)	(0.291)	(0.085)	(0.036)
$INST^{CHD}$	-0.087	0.025	-0.10**	0.329	-0.025	-0.059
	(0.503)	(0.147)	(0.063)	(0.496)	(0.145)	(0.062)
$INST^{COG}$	-0.234	-0.177**	0.025	-0.449	-0.180	0.004
	(0.420)	(0.122)	(0.052)	(0.419)	(0.122)	(0.052)
$INST^{GAB}$	0.195	-0.084	-0.028	0.181	-0.097	-0.018
	(0.693)	(0.202)	(0.086)	(0.692)	(0.202)	(0.087)
$INST^{GNQ}$	0.367*	0.080*	-0.006	0.867	0.071	-0.024
	(0.368)	(0.107)	(0.046)	(0.365)	(0.107)	(0.046)
Constant	0.071*	0.03***	-0.004	-0.010	0.019	-0.001
	(0.060)	(0.017)	(0.007)	(0.059)	(0.017)	(0.007)
R^2	0.343	0.072	0.481	-0.037	-0.026	0.299
Adj. R^2	0.290	-0.002	0.439	-0.120	-0.109	0.243
F-statistic	6.485	0.968	11.495	-0.437	-0.316	5.308
AIC		-0.148			-	

	PVAR(2) instability			BVAR(2) instability		
	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV
SC		0.595			-	
No. of coeff.		39			-	
No. of obs.		162			162	

Notes. *, **, *** indicate 10%, 5%, 1% significance level, respectively; and standard errors in parentheses.

Figure 1A. IRFs of Panel VAR(2) for FDI inflows





Notes. Only responses of FDI inflows are shown from a Cholesky ordering: ΔFDI, ΔGDPPC, and ΔGOV; Response to Cholesky One S.D. (d.f. adjusted) Innovations 95% CI using Monte Carlo S.E.s with 500 replications; shaded area represents confidence band around the estimate; solid lines represent the response FDI inflows to shocks in growth and governance; horizon length is 10 years.

Table 9A. Bayesian PVAR estimates

	Model 4: Panel BVAR(2)			Model 5: Panel BVARX(2)[c]			Model 6: Panel BVARX(2)[d]		
	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV
$\Delta FDI_{(t-1)}$	0.097	0.008	0.003	0.102	0.006	0.003	0.107	0.004	0.002
	(0.063)	(0.018)	(0.008)	(0.063)	(0.017)	(0.008)	(0.064)	(0.017)	(0.008)
$\Delta FDI_{(t-2)}$	-0.070	-0.005	-0.001	-0.069	-0.005	-0.001	-0.065	-0.006	-0.001
	(0.043)	(0.013)	(0.005)	(0.043)	(0.012)	(0.005)	(0.043)	(0.012)	(0.005)
$\Delta lnGDPPC_{(t-1)}$	-0.011	0.515	0.012	-0.007	0.451	0.013	-0.056	0.436	0.007
	(0.211)	(0.062)	(0.027)	(0.221)	(0.060)	(0.028)	(0.224)	(0.062)	(0.029)
$\Delta lnGDPPC_{(t-2)}$	-0.048	-0.008	-0.016	-0.052	-0.007	-0.018	-0.069	-0.030	-0.020
	(0.143)	(0.042)	(0.018)	(0.153)	(0.041)	(0.019)	(0.153)	(0.042)	(0.019)
$\Delta GOV_{(t-1)}$	-0.304	0.056	-0.152	-0.304	0.061	-0.149	-0.314	0.055	-0.145
	(0.434)	(0.127)	(0.055)	(0.436)	(0.117)	(0.055)	(0.435)	(0.119)	(0.056)
$\Delta GOV_{(t-2)}$	0.049	-0.041	0.166	0.047	-0.033	0.166	0.033	-0.064	0.162
	(0.324)	(0.095)	(0.041)	(0.325)	(0.087)	(0.041)	(0.324)	(0.089)	(0.042)
CDEV1994				-0.064	-0.344	0.008			
				(0.286)	(0.077)	(0.036)			
GFC2008				-0.164	0.117	0.014			
				(0.285)	(0.077)	(0.036)			
ECON							-0.169	-0.115	-0.015
							(0.129)	(0.035)	(0.016)

	Model 4: Panel BVAR(2)			Model 5: Panel BVARX(2)[c]			Model 6: Panel BVARX(2)[d]		
	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV	ΔFDI	Δ*ln*GDPPC	ΔGOV
HCON							0.049	0.034	0.003
							(0.041)	(0.011)	(0.005)
*ln*LAB							0.007	0.047	0.007
							(0.094)	(0.026)	(0.012)
TOP							-0.001	0.001	0.000
							(0.002)	(0.001)	(0.000)
EFREE							0.013	0.012	0.001
							(0.014)	(0.004)	(0.002)
AGRICVA							-0.061	-0.051	-0.005
							(0.080)	(0.022)	(0.010)
Constant	0.012	0.015	-0.006	0.020	0.026	-0.006	-0.520	-0.677	-0.081
	(0.054)	(0.016)	(0.007)	(0.057)	(0.015)	(0.007)	(0.831)	(0.228)	(0.106)
R2	-0.040	-0.041	0.291	-0.043	0.114	0.290	-0.034	0.093	0.289
Adj. R2	-0.080	-0.081	0.264	-0.097	0.068	0.253	-0.117	0.020	0.232
F-statistic	-0.987	-1.011	10.627	-0.782	2.461	7.810	-0.406	1.271	5.058
No. of obs.		162			162			162	

Notes. [c, d] represent Panel Bayesian VAR(2) for dummies for both financial crises and standard exogenous variables, respectively.