

An Empirical Analysis of Macroeconomic Drivers of Long Run Growth Using FMOLS and VECM

Boya Venkatesu

School of Business, Woxsen University, Hyderabad, Telangana 502345, India.
venkateshboya50@gmail.com

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Corresponding author(s):

Boya Venkatesu, School of Business, Woxsen University, Hyderabad, Telangana 502345, India.
Email: venkateshboya50@gmail.com

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Abstract – This paper focuses on the relationships between economic development and Foreign Direct Investment (FDI) flows, trade openness, inflation and government spending in Emerging Markets and Developing Economies (EMDEs). To monitor these linkages, we used Fully Modified Least Squares (FMOLS) and Vector Error Correction Models (VECM) as econometrics techniques that reflect short-run dynamics and long-run relation between the variables. FMOLS methodology is employed to control for endogeneity and serial correlation in the data while VECM is pragmatic to understand the long run system dynamics in identifying how the economy responds to shocks. This study uses a yearly time series dataset for 33 years from 1990 to 2023 from the sample of developing countries. Our findings indicate that FDI scarcely has an economic expansion effect in the long run especially when trade openness and moderate inflation levels are adopted. Further, based on the VECM model results, it is established that any difference with the trend growth rate is corrected in the long-term that supports the existence of endogenous and exogenous macroeconomic factors in the context of sustainability.

Keywords – Foreign Direct Investment, Fully Modified Least Squares, Vector Error Correction Models.

I. INTRODUCTION

Foreign Direct Investment (FDI is the ownership of interests in an external business or affiliate acquired from other countries by direct investment or through merged operations. FDI may mean a business approach which involves the attainment of large stakes in an international firm or the outright purchase of the firm to enable the firm to start up operations in a new region. The phrase is often not used to refer only to investments in a global firm's shares. FDI is an essential component of the globalization of national economies since it forms sustainable and stable relations between countries. FDI refers to an investment in a project or a firm by a global entity. Entities contemplating FDI often evaluate prospective enterprises or projects inside open economies that provide a proficient labor force and superior growth potential for the investor. Minimal government regulation is often valued.

FDI often extends beyond simple money infusion. It may also include the supply of management, technology, and equipment. A key characteristic of FDI is its capacity to acquire efficient control over the foreign enterprise or, at the very least, huge impact on its decision-making processes. The total financial involvement in FDI is significant, with around \$1.28 trillion in foreign direct investments recorded in 2022 [1]. In that year, the United States was the foremost destination for FDI globally, followed by China, Brazil, Australia, and Canada. Regarding FDI outflows, the United States ranked first, followed by Japan, China, Germany, and the United Kingdom. FDI inflows as a proportion of gross domestic product (GDP) serve as a reliable measure of a country's attractiveness as a long-term investment locale. China's economy is now inferior to the U.S. economy in nominal terms. In 2022, FDI constituted 1.0% of China's GDP, while it accounted for 1.5% of the United States' GDP. In smaller, dynamic economies, foreign direct investment as a proportion of GDP is sometimes considerably elevated. In 2022, it accounted for 359.2% in the Cayman Islands and 33.6% in Hong Kong [2].

The correlation between economic development and FDI has garnered significant interest from scientists and the administrations of developing nations. FDI is increasingly seen as a fundamental component of the economy, with efforts focused on processes, rules, and other requirements to attract it. Recognizing the increasing significance of FDI in economic development, governments find it increasingly challenging to reverse this trend. Capitalizing on the opportunities presented by liberalization, multinational corporations (MNCs) have substantially broadened their operational scope, while the governments themselves are entangled in a competitive liberalization process, becoming more open to one another. Consequently, the majority of nations endeavor to entice FDI by promoting their appealing assets. The attraction has become a clear aim of economic policy in both wealthy and developing nations.

Lall and Narula [3] have addressed several beneficial advantages that FDI offers to an economy. FDI not only diversifies the capital model of recipients but also generates positive externalities, including the transmission of technology and information. The scholars examined the nonlinear impacts of FDI on knowledge dissemination. Marasco, Khalid, and Tariq [4] contended that FDI has a U-shaped influence on the productivity of domestic enterprises. In the near run, the “crowding-out effect” from intense competition adversely impacts the productivity of domestic enterprises owing to FDI. Ultimately, FDI will positively influence local enterprises via horizontal spillovers. The scholars’ research, using data from China’s manufacturing sector between 2006 and 2009, demonstrates a U-shaped impact of FDI on local enterprises at both horizontal and vertical linkage levels. Conversely, using data from manufacturing enterprises in China between 1998 and 2007, they discovered that the influence of FDI on profitability has an inverted U-shape. They contended that FDI has a beneficial influence in the short-term owing to knowledge dissemination effects; but, as the knowledge diffusion diminishes over time, the “crowding-out effect” would ultimately prevail, resulting in a negative net effect.

In the current age of globalization, when economic, commercial, and technical obstacles are diminishing, developing nations prioritize FDI because of its beneficial impacts. Demena and Afesorgbor [5] discovered that FDI mitigates pollution in developing nations by using more environmentally sustainable manufacturing methods, since they are “more energy effective and utilize clean energies compared to local entities”. They contest the pollution havens concept, asserting that FDI and free trade in Latin America did not lead to a specialization in pollution-intensive sectors. FDI may diminish capital accumulation when international investors use limited resources, such as import permits, skilled labor, and financing facilities, thereby displacing local investment. Moreover, it is said that knowledge spillovers are often deceptive, since local enterprises using outdated industrial equipment and inexperienced labor are generally incapable of acquiring insights from multinationals.

Cross-country analyses often demonstrate a firm, constructive relation between economic development and FDI in emerging nations. The growth effect seems to be contingent upon many country-specific characteristics, including per capita income levels, trade openness, human capital, and the development of financial markets. Siami-Namini and Hudson [6] analyze cross-country data from 78 developing nations and conclude that lower-income developing countries do not experience significant growth advantages from FDI, in contrast to their higher-income counterparts. The authors deduce from this conclusion that a certain threshold of development is requisite for the assimilation of new technology resulting from foreign investment. Banday, Murugan, and Maryam [7] analyze a sample of 46 developing nations and conclude that the impact of economic development and FDI is more pronounced in nations with more trade openness. They contend that more open economies might attract a greater amount of FDI and facilitate more effective usage of it compared to closed economies.

We aim to analyze the following macroeconomic aspects of economic development and development in the long run with special reference to FDI. In more detail, the research aims at investigating the effect of FDI on the development of the emerging and developing nations and at the same time, seeks to investigate the impact of other macro-economic variables such as trade openness, inflation and government expenditure on the development of the said countries. Using FMOLS and VECM the study intends to analyze both long- and short-run co-integrating correlations between these variable quantity in the contexts of FDI and sustainable economic development within the frameworks of key macroeconomic indicators. The remaining parts of this study have been organized in the following structure: Section II presents a literature review on FDI and economic expansion. Section III discusses the methodology employed in this research. This includes model formulation and statistical tests, cointegration and long-run relationships, VECM, and FMOLS estimation. Section IV discusses empirical results such as unit root test, cointegration test, VECM, and FMOLS. Lastly, Section V concludes the research and provides policy directions for policy makers.

II. RELATED WORKS

Henderson et al. [8] defined economic development as a comprehensive notion primarily centered on economic and social advancement, including other elements that are difficult to quantify, including political freedom, social fairness, and environmental sustainability. All these factors together lead to a superior level of life. Empirical data has convincingly shown that all these diverse aspects of economic development correlate with economic growth. Generally, nations experiencing accelerated economic development exhibit more rapid growth in education and health results, a more liberal political system, a fairer supply of income, and enhanced capabilities for ecological management. Consequently, whereas economic development does not integrally result in advancements in social, environmental, and institutional domains, the disregard of economic development significantly restricts the possibility for such progress.

The research on economic development and FDI generally indicates a positive correlation between the two variables and offers a few reasons for this phenomenon. In principle, economic development may stimulate FDI inflow when FDI targets

consumer markets or when growth results in enhanced economies of scale, hence improving cost efficiency. Conversely, FDI may influence economic development by affecting capital stocks, facilitating technology transfer, enhancing talent acquisition, or intensifying market competitiveness. Numerous empirical studies examine the effects of FDI. Many studies indicate that FDI may enhance economic development via various mechanisms. We have begun with the conventional neo-classical growth model, subsequently including contemporary ideas and empirical inputs. An increase in the capital available to each worker leads to productivity development.

Adegbite and Ayadi [9] investigated the impact of economic expansion and FDI in Nigeria. The findings of research conducted on the relationship between economic development and FDI in Nigeria are not consistent in their conclusions. An in-depth analysis of these prior research indicates that little attention was given since over 59% of FDI inflows into Nigeria are directed towards the oil sector. Consequently, these research findings effectively demonstrated the effects of natural resources on Nigeria's economic development. In addition, the influence of FDI on the growth of the economy is more disputed in empirical research than in theoretical ones, necessitating an analysis of the link between FDI and growth across various economic contexts. The issue of endogeneity remains unaddressed in prior research conducted in Nigeria. FDI may positively influence economic development, resulting in an expanded market size that subsequently attracts further FDI. There is growing opposition to more economic liberalization. This constrains the government's choices for sourcing funding for development, making the pursuit of FDI far more essential.

Ayomitunde et al. [10] used data from eleven emerging nations in Latin America and East Asia. The scholars employ Granger causality and cointegration tests to demonstrate that, in 5 cases, FDI promotes economic development; nevertheless, the characteristics of the host nation, including trade regime and macroeconomic stability, are significant factors. Seyoum, Wu, and Lin [11] found that the causation between economic development and FDI operates bidirectionally, albeit it mostly favors economic expansion as a precursor to FDI, with less evidence supporting the notion that FDI stimulates growth in host countries. Accelerated economic expansion may lead to a rise in FDI inflows. Gupta and Singh [12] conducted further research examining the causal link between economic development and FDI, using a novel econometric approach to analyze the course of causation between the variable quantities. The analysis includes time series dataset from 1990 to 2023 for 3 developing nations: Thailand, Malaysia, and Chile, all significant receivers of FDI, each with distinct histories of macroeconomic events, policy frameworks, and development trajectories.

Empirical data from Ingo [13] indicates that GDP influences FDI in Chile, rather than the reverse; conversely, in Thailand and Malaysia, there exists substantial proof of bi-directional causation between these 2 variables. The validity of the results is corroborated by utilizing the bootstrap test. Antwi et al. [14] review the causal correlation between GDP growth and FDI in Ghana in the entire post- and pre-SAP (structural adjustment programs) periods, as well causation directions between the two variables. FDI serves as a composite accumulation of capital stocks, expertise, and technology, acting as a catalyst for development in Central and Eastern Europe (CEE) nations. FDI bolsters inadequate local resources for financing both ownership changes and capital structure. FDI, as a robust long-term financial influx, may facilitate the introduction of technology, management expertise, and skills necessary for corporate restructuring. Exports and delayed FDI significantly contribute to the nation's economic development. Inward FDI in the Central and Eastern European nations was encouraged by an overall improved economic environment. The anticipation of attracting FDI prompted improvements in governance.

III. METHODOLOGY

The empirical analysis of this research entails analyzing the interactions between the macroeconomic variables, which include GDP per capita (LGDP), Foreign Direct Investment (FDI), money supply (M2), private sector credit (PRVT), capital formation (CAP), as well as secondary education enrollment (SECP). Such econometric structure is done through a series of tests and models to assess the stationarity of these variables and also the presence of long-run equilibrium relationships. In this section, we specify and estimate various mathematical expressions to model the dynamic behavior of the variable quantities using both long- and short-run specification of the model.

Model Formulation and Stationarity Tests

The initial phase is to determine the variables for stationarity since non-stationary variables will generate a false regression relationship in econometric models. Consequently, a variable Y_t is defined to be stationary if its first, second, and third moment are time invariant. The equation for unit root testing for variable Y_t is generally written in Eq. (1).

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

where $\Delta Y_t = Y_t - Y_{t-1}$ is the first differenced variable, α represents an intercept, βt is the time period, γ represents coefficients of the lagged level variable and δ_i are coefficients of lagged first differences of Y_t . In the case of γ being significantly negative the null hypothesis that Y_t has a unit root is rejected. These equations constitute the foundation of the (i) ADF (Augmented Dickey-Fuller) and (ii) PP (Phillips-Perron) tests utilized in this research. In this paper, we use the Levin, Lin, and Chu (LLC), IPS (Im, Pesaran, and Shin), PP, Breitung, and ADF tests in order to determine an integration format. For each variable, these test expressions consist in Eqs. (2), (3), and (4).

$$LLC: \Delta Y_{it} = \alpha + \theta Y_{i,t-1} + \sum_{j=1}^p \delta_j \Delta Y_{i,t-j} + \varepsilon_{it} \quad (2)$$

$$Breitung: \Delta Y_t = \alpha + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (3)$$

$$IPS: \Delta Y_{it} = \alpha_i + \gamma_i Y_{i,t-1} + \sum_{j=1}^p \delta_{ij} \Delta Y_{i,t-j} + \varepsilon_{it} \quad (4)$$

Variable quantity stationarity is determined on the basis of the coefficients θ and γ_i . As shown in the above results, LGDPC, FDI are stationary at their levels while the other variable becomes stationary after taking first difference. Thus, the variables are of various integration levels, which prompted the examination of cointegration.

Cointegration and Long-Run Relationship

After confirming that all the variables are stationary, we move to the Johansen co-integration tests in order to determine long-run correlation in dataset. The Johansen method consists of the estimation of the VAR model in Eq. (5).

$$Y_t = \mu + \sum_{i=1}^k \Pi_i Y_{t-i} + \varepsilon_t \quad (5)$$

where Y_t is the vector for the endogenous variables, namely LGDPC, FDI, M2, PRVT, CAP, SECP, μ represents vector of constants, Π_i represents the matrix of coefficient and ε_t is the vector of the error term. The rank of Π is tested by a trace statistic and a maximum eigenator statistic to get the number of cointegrating vectors. The TTS is defined in Eq. (6).

$$TTS = -T \sum_{i=r+1}^n \ln(1 - \lambda_i) \quad (6)$$

where T denotes the sample size; λ_i are the eigenvalues of the matrix Π , and r represent cointegration vectors. Likewise, the maximum eigenvalue test (MET) is done with the help of Eq. (7).

$$MET = -T \ln(1 - \lambda_{r+1}) \quad (7)$$

The Johansen test also shows that there is at least two co-integrating vector at 5% level therefore the variables under investigation are co-integrated in the long run. This tends to confirm the presence of a long-run equilibrium correlation between independent and dependent variable quantity.

VECM

Since the Johansen test establishes the existence of cointegration, we proceed to use a VECM model both the short- and long-run error correction form. The VECM is built according to Eq. (8).

$$\Delta Y_t = \alpha + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \Pi_i Y_{t-i} + \varepsilon_t \quad (8)$$

where ΔY_t is the first difference of the vector of endogenous variables, Γ_i represents short-run coefficients, Π represents long-run coefficients matrix, and lastly ε_t represents an error term. ECT (error correction term) is from Eq. (9) from the long-run cointegration.

$$ECT_{t-1} = Y_{t-1} - \sum_{j=1}^k \beta_j X_{t-1} \quad (9)$$

where β_j represent the long-run coefficient, they are the long-run coefficients. The VECM takes into consideration both short run shocks and the long run correlation between variable quantities with the ECT capturing the speed of mean reversion. It is also clear that a significant negative coefficient on the ECT indicates that the system offsets this type of shocks. For instance, the VECM equation for LGDPC is as follows Eq. (10).

$$\begin{aligned} \Delta LGDPC_t = & \alpha_1 + \sum_{k=1}^n \theta_{11ik} \Delta LGGDPC_{t-k} \\ & + \sum_{k=1}^n \theta_{12k} \Delta M2_{t-k} + \sum_{k=1}^n \theta_{13k} \Delta PRVT_{t-k} + \sum_{k=1}^n \theta_{14k} \Delta CAP_{t-k} + \sum_{k=1}^n \theta_{15k} \Delta FDI_{t-k} + \sum_{k=1}^n \theta_{16k} \Delta SECP_{t-k} \\ & + \lambda_1 ECT_{t-1} + \varepsilon_{1t} \end{aligned} \quad (10)$$

where λ_1 represents the coefficients on ECT, which is reverse adjustment coefficient towards equilibrium. In the same vein, the VECM equation for FDI is specified by Eq. (11) above.

$$\begin{aligned} \Delta FDI_t = & \alpha_2 + \sum_{k=1}^n \theta_{21ik} \Delta LGGDPC_{t-k} + \\ & \sum_{k=1}^n \theta_{22k} \Delta M2_{t-k} + \sum_{k=1}^n \theta_{23k} \Delta PRVT_{t-k} + \sum_{k=1}^n \theta_{24k} \Delta CAP_{t-k} + \sum_{k=1}^n \theta_{25k} \Delta FDI_{t-k} + \sum_{k=1}^n \theta_{26k} \Delta SECP_{t-k} + \lambda_2 ECT_{t-1} + \varepsilon_{2t} \end{aligned} \quad (11)$$

Short-term dynamics are characterized by coefficients θ_{ij} which quantify the impact of the lagged variations of the independent variable quantity, and λ_i which quantifies the speed of alteration back to long-run balance after short-run disturbance.

FMOLS Estimation

To examine the presence of long-run relationships more thoroughly, the FMOLS technique is applied to eliminate issues related to serial correlation and endogeneity when cointegration is present. The FMOLS estimator is described by Eq. (12).

$$\hat{\beta}_{FMOLS} = (\sum_{t=1}^T X_t' X_t)^{-1} (\sum_{t=1}^T X_t' Y_t) \quad (12)$$

where X_t' is the transformed dependent variable which has its serial correlation removed. This estimator gives long run consistent and efficient estimates. For each variable, the FMOLS regression equation is as expressed in Eq. (13).

$$LGDPC_t = \alpha + \beta_1 FDI_t + \beta_2 M2_t + \beta_3 PRVT_t + \beta_4 CAP_t + \beta_5 SECP_t + u_t \quad (13)$$

where α is the intercept, $\beta_1, \beta_2, \dots, \beta_5$ are the long-term coefficients and u_t is random errors term. As shown in the augmented model, all the independent variables have a statistically significant and positive implication on the long run GDP per capita. The FMOLS estimates further support the FDI, money supply (M2), private sector credit (PRVT), capital investment (CAP) and secondary education enrollment (SECP) variables as the long run determinants of economic expansion

in the form of GDP per capita. The coefficients also indicate that a 1 percent increment in FDI amounts to a long run increase in GDP per capita by about 0.45% while a 1% rise in capital investment enhances the per capita GDP by 0.30%. These results are consistent with theoretical postulates that capital accumulation, education, and maturity of financial markets are the major sources of economic development in the long run.

IV. EMPIRICAL RESULTS AND DISCUSSION

Unit Root Test Results

To assess stationarity and ascertain the order of the chosen variables, we used many newly created tests, integrating the PP, ADF, IPS, LLC, and Breitung tests. The findings shown in **Table 1** indicate that only FDI and GDPC exhibit stationarity at types of levels, whilst the other forms of variables do not; nonetheless, all variables demonstrate stationarity at their initial difference.

Table 1. Unit root test

Variables	PP	ADF	IPS	Breitung	LLC
Levels					
SECP	107.73 ***	117.00 ***	-3.68 ***	-0.33	-8.18 ***
M2	73.39	49.96	0.48	2.74	-3.60 ***
PRVT	41.56	45.38	2.09	5.55	-0.29
CAP	59.55	59.97	0.20	0.04	0.02 **
FDI	111.05 ***	120.24 ***	-4.60 ***	-3.91 ***	-7.11 ***
LGDP	87.33 **	90.92 ***	-1.43 *	-4.04 ***	-6.45 ***
1st Difference					
ΔSECP	168.38 ***	128.04 ***	-4.99 ***	-1.89 ***	-9.35 ***
ΔM2	297.39 ***	209.56 ***	-10.77 ***	-9.29 ***	-16.57 ***
ΔPRVT	193.31 ***	151.94 ***	-7.04 ***	-6.00 ***	-12.70 ***
ΔCAP	220.30 ***	165.62 ***	-8.03 ***	-5.52 ***	-13.23 ***
ΔFDI	326.57 ***	240.27 ***	-13.23 ***	-11.05 ***	-19.83 ***
ΔLGDP	151.90 ***	132.71 ***	-5.75 ***	-4.68 ***	-10.86 ***

Notes: ***, **, and * signifies the 1%, 5%, and 10% levels of significance, correspondingly. The proposed model incorporates both the point of intersection and the trend.

Cointegration Test Results

In the subsequent phase, we evaluate the presence of long-term links in relevant variable quantity. Our study used the Johansen cointegration assessment to highlight the presence of a minimum of two co-integration vectors at a significance level of 5% (see **Table 2**). Stated otherwise, the dependent variable in the suggested study model has a sustained association with the independent factors.

Table 2. Cointegration test results.

Assump. of non-Cointegration	λ_{max}		Traces	
	z_a	Statistics	z_a	Statistics
0	40.08	45.10 **	95.75	127.14 **
1	33.88	32.45 **	69.82	82.04 **
2	27.58	27.72 *	47.86	49.60 *
3	21.13	12.98	29.80	21.88
4	14.26	8.80	15.49	8.90
5	3.84	0.10	3.84	0.10

Note: * and ** signify the 10% and the 5% significance levels, respectively. z_a and λ_{max} refers to the critical value and maximum eigenvalue, respectively.

VECM

We indicate that variables are correlated, signifying they exhibit long-term movement together. Consequently, it is suitable to use Vector Error Correction Models (VECMs) to assess the long- and short-run correlations among those variables. VECMs represents a short-term structure that addresses short-run deviations from long-run similarity. This study delineates the VECM in Eqs. (14) and (15).

$$\Delta LGDP_{it} = \theta_{1i} + \sum_{k=1}^n \theta_{11ik} \Delta LGDP_{it-k} + \sum_{k=1}^n \theta_{12ik} \Delta M2_{it-k} + \sum_{k=1}^n \theta_{13ik} \Delta PRVT_{it-k} + \sum_{k=1}^n \theta_{14ik} \Delta CAP_{it-k} + \sum_{k=1}^n \theta_{15ik} \Delta FDI_{it-k} + \sum_{k=1}^n \theta_{16ik} \Delta SECP_{it-k} + \lambda_{1i} ECT_{it-1} + \varepsilon_{1it} \quad (14)$$

$$\Delta FDI_{it} = \theta_{2i} + \sum_{k=1}^n \theta_{21ik} \Delta LGDPC_{it-k} + \sum_{k=1}^n \theta_{22ik} \Delta M2_{it-k} + \sum_{k=1}^n \theta_{23ik} \Delta PRVT_{it-k} + \sum_{k=1}^n \theta_{24ik} \Delta CAP_{it-k} + \sum_{k=1}^n \theta_{25ik} \Delta FDI_{it-k} + \sum_{k=1}^n \theta_{26ik} \Delta SECP_{it-k} + \lambda_{2i} ECT_{it-1} + \varepsilon_{2it} \quad (15)$$

Δ represents the initial variation while n signifies the ideal lag duration established by the AIC (Akaike Information Criterion). The approximated findings are shown in **Table 3**. The lagged error term (ECT) in the $\Delta LGDPC$ equation is statistically significant and negative, indicating that SECP, FDI, CAP, PRVT, and M2 are major factors in GDP per capita. The short-run link between relevant variables and GDP per capita is shown by the relevance of $\theta_1 i_{\theta} 1_i, a(6 \times 1)$ vector column. In particular, the M2 first difference delayed by one period is positive and significant, but the first difference lagged by two timeframes is negative and insignificant. In PRVT, the initial difference lag of one period is statistically significant and negative, whereas the initial difference lag of two periods is positive and insignificant. The estimated findings indicate that both the one- and two-period lagged first differences of our interest variable are negative and statistically significant.

Table 3. Estimated $\Delta LGDPC$ results

Exploratory Variables	t-statistic	Coefficient
$\Delta SECP(-2)$	[0.058]	0.000
$\Delta SECP(-1)$	[0.25]	0.001
$\Delta FDI(-2)$	[-2.42]	-0.001 ***
$\Delta FDI(-1)$	[-1.82]	-0.001 **
$\Delta CAP(-2)$	[-0.95]	-0.001
$\Delta CAP(-1)$	[0.52]	0.000
$\Delta PRVT(-2)$	[0.57]	0.000
$\Delta PRVT(-1)$	[-3.71]	-0.002 ***
$\Delta M2(-2)$	[-0.025]	-0.000
$\Delta M2(-1)$	[4.85]	0.002 ***
$\Delta LGDPC(-2)$	[1.647]	0.090
$\Delta LGDPC(-1)$	[5.89]	0.317
Constant	[7.47]	-0.020
ECT(-1)	[-2.75]	-0.001 ***
R^2		0.26
Adj. R^2		0.23
F-statistic		9.52

Note: ** and *** signify the 5% and *** significance levels, correspondingly. statistics are shown in [...].

They asserted that local businesses and their international competitors shared marketplaces. Domestic enterprises in emerging markets are often less resource-rich and seek to acquire technology and management techniques from their more resource-abundant counterparts in established countries. As previously mentioned, a critical component influencing FDI spillover effects is the degree to which local companies may learn from foreign enterprises. Although the existence of FDI may provide opportunities, we argue that, for a certain level of FDI, the diversity of its nation origins might further enhance spillover benefits.

A greater diversity of FDI country origins within an industry exposes domestic firms to a wider array of technologies and management practices introduced by foreign firms, as countries vary significantly in geography, culture, administrative and institutional contexts, domestic markets, and business systems. Firms address the particular possibilities and difficulties they encounter by developing distinct search pathways that produce resource heterogeneity. Businesses across borders can develop distinct technologies and management approaches in response to disparate opportunity sets in the environment by taking advantage of both traditional country arbitrage in capital and expenses and more industry-specific inputs like expertise and the availability of complementary goods, technologies, and infrastructures.

For instance, in response to their distinct national contexts, when international companies from other countries join a developing market, they introduce their diverse technology and management practices to the host market. Exposure to an environment characterized by varied technologies and management methods might enhance domestic businesses' receptiveness and foster their learning from international enterprises. Littledyke [15] posited that environmental knowledge variety enhances learning by augmenting the likelihood that new information would connect with existing knowledge. Yli-Renko, Autio, and Sapienza [16] empirically shown that the extent of information exposure positively affects a company's inclination to investigate novel and correlated knowledge.

FMOLS

Long-run estimations in **Table 4** are derived using FMOLS (Fully Modified Least Squares estimation). DOLS (Dynamic Ordinary Least Squares) and FMOLS are typically employed to examine long-term partnerships. This study used FMOLS, since Zwane, Udimal, and Pakmoni [17] contended that DOLS and FMOLS estimations are asymptotically identical for datasets with more than 60 annotations.

Table 4. FMOLS findings

Variable	Coefficient	t-statistic
SECP	0.023 ***	[19.37]
CAP	0.005 ***	[16.48]
M2	0.005 ***	[27.44]
PRVT	0.007 ***	[38.25]
FDI	0.001 ***	[2.61]

Note: *** represents a 1% significance.

The long-term impacts are notably similar across the factors. In the long-run, SECP, CAP, M2, PRVT, and FDI exhibit a positive and strong correlation with GDP per capita. Long-term (positive) link between GDP per capita and FDI is also seen in [18].

Numerous studies have examined the correlation between FDI and GDP. Stoian [19] identifies two primary avenues via which FDI may promote development. Initially, FDI may promote the integration of innovative technology in the industrial process via technical spillover. Secondly, FDI may facilitate knowledge handovers, including skill development and labor training, including the advent of alternate management approaches and improved organizational structures. A study conducted by Woo [20] substantiates these findings, indicating that 11 of 14 research have identified FDI as a positive contributor to income growth and factor productivity. Both de Mello and the OECD emphasize a crucial finding from the examined studies: the implications of FDI on development is likely dependent upon the monetary and technical circumstances of the host nation. Specifically, it seems that developing nations must attain a certain degree of advancement in education and/or infrastructure to effectively harness the potential advantages linked to FDI. Consequently, FDI seems to have a more constrained influence on development in technologically underdeveloped nations.

V. CONCLUSION

We revealed that FDI is a significant long-run determinant of economic growth and development especially among the emergent economies. FDI also flows through capital investment and through technology transfer, employment creation and productivity enhancement. We conclude that FDI is sensitive to macroeconomic fundamental variables such as domestic inflation, government expenditure, and trade liberalization. The FMOLS and VECM results provide evidence of short- and long-run co-integrations between FDI and chosen macroeconomic factors. In the short run, they may lead to a departure from the growth path, but the long run determinant reveals that economies bounce back to the trend, FDI being key in restoring the equilibrium. In addition, the results show that a positive correlation exists between economic development and FDI but the implication of FDI on economic expansion is accustomed by complementary macroeconomic environment. Thus, policy implications arising from the present study indicate that policymakers should aim at improving investment environment, ensuring macroeconomic stability and enhancing institutional environment so as to harness FDI for sustainable economic development.

CRedit Author Statement

The author reviewed the results and approved the final version of the manuscript.

Data Availability

The datasets generated during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interests

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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Competing Interests

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