

# Assessing the Influence of Foreign Direct Investment on Economic Growth: An Analysis Within the Endogenous Growth Framework

<sup>1</sup>Anandakumar Haldorai and <sup>2</sup>Arulmurugan Ramu

<sup>1</sup>Sri Eshwar College of Engineering, Coimbatore, Tamil Nadu, India.

<sup>2</sup>Mattu University, Ethiopia.

<sup>1</sup>anandakumar.psgtech@gmail.com, <sup>2</sup>arul.murugan@meu.edu.et

Correspondence should be addressed to Anandakumar Haldorai: anandakumar.psgtech@gmail.com

## Article Info

Journal of Enterprise and Business Intelligence (<https://anapub.co.ke/journals/jebi/jebi.html>)

Doi: <https://doi.org/10.53759/5181/JEBI202404002>

Received 20 March 2023; Revised from 15 May 2023; Accepted 10 July 2023.

Available online 05 January 2024.

©2024 The Authors. Published by AnaPub Publications.

This is an open access article under the CC BY-NC-ND license. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

**Abstract** – We examined the interaction between Foreign Direct Investment (FDI) and Economic Growth (EG), which has been an area of interest for both academics and policy makers since the early 1990s, with most scholars concluding that FDI has a positive impact on EG through the enhancement of capital, technology and human capital. However, the ability of FDI to catalyze growth varies with the policies and institutions of the host economy. In pursuing this objective, this study seeks to assess the long-run effectiveness of FDI in the growth of EG, using a dynamic panel econometric model predicated on the endogenous growth model. Some of the independent variables tested in the analysis are FDI to GDP ratio, institutional quality indices and the macroeconomic variables in order to give a broader view on the issue. The findings reveal that the effect of FDI on EG is positively improved by enhanced institutional quality in reference to better governmental and business liberalization. There is a positive and statistically significant impact of governmental freedom on the relationship between FDI and EG where a 1% improvement in governmental freedom raises the effect of FDI on EG by 0.36%. However, the same improvement in business freedom raises this effect by only 0.08%. On the other hand, FDI inflows uncertainty, which is likely to erode these positive growth advantages, is negatively related with, and signifies by 0.028% points less impact in EG for every 1% increase in FDI volatility.

**Keywords** – Foreign Direct Investment, Economic Growth, Social and Economic Frameworks, FDI Volatility, Institutional Policy, FDI-Growth Relationship.

## I. INTRODUCTION

Investments serve as the catalyst for Economic Growth (EG) and human development, as they effectively enhance wealth within the national economy and human society. Foreign Direct Investment (FDI) significantly impacts a country's Economic Growth (EG), serving as a prerequisite to attract investors for the development and enhancement of the economy and human resources. The World Trade Organization (WTO) defines FDI as the acquisition of an asset in one nation by an investor from another nation, with the aim of controlling the asset [1]. FDI encompasses several management components, such as portfolio investments and bonds in global equities. FDI is seen as a crucial component of economic development and financial globalization process, as it provides important foreign money, superior technology, and enhanced management abilities.

FDI may serve as a critical determinant for EG at both microeconomic and macroeconomic levels in certain sectors. EG may generally be assessed by the increase in gross domestic product and the enhancement of the living standard and quality of life. Foreign Direct Investment was the primary source of inflow to underdeveloped nations in 1990 [2]. FDI has a lower degree of volatility and demonstrates uneven pro-cyclical behaviors. Beginning the late 1980s and 90s, foreign direct investment flows have increased globally, playing a crucial role in fostering development and EG in less developed nations. This issue requires the elucidation of the link between FDI and EG (FDI-EG). Consequently, it is essential for nations or organizations to examine the FDI-EG research within the realm of international economics. A bibliometric evaluation of FDI-EG is essential for comprehending its features and assessing the study landscape from several viewpoints, particularly since researchers often encounter significant economic challenges.

An empirical evaluation of the effect of FDI on the economic growth of host nations is undeniably significant. There is a prevalent consensus that FDI enhances the growth of host countries by (1) augmenting domestic savings and investment,

(2) facilitating the transfer of technology from industry leaders, (3) intensifying competition within the domestic market, (4) boosting exports and generating foreign exchange, and (5) providing various positive externalities (spillovers) to the broader economy. Conversely, it is occasionally posited that FDI may (1) repatriate funds nearly equivalent to the amount it introduces; (2) transfer technologies ill-suited to the host country's factor endowments; (3) undermine local enterprises through fierce competition, particularly due to the substantial economic influence of multinational corporations that provide FDI; (4) primarily focus on the host country's domestic market, thereby failing to enhance exports; (5) induce distortions in the host country's policies to favor foreign investors; and (6) disrupt the host country's social and economic frameworks by introducing inappropriate social and cultural norms and behaviors.

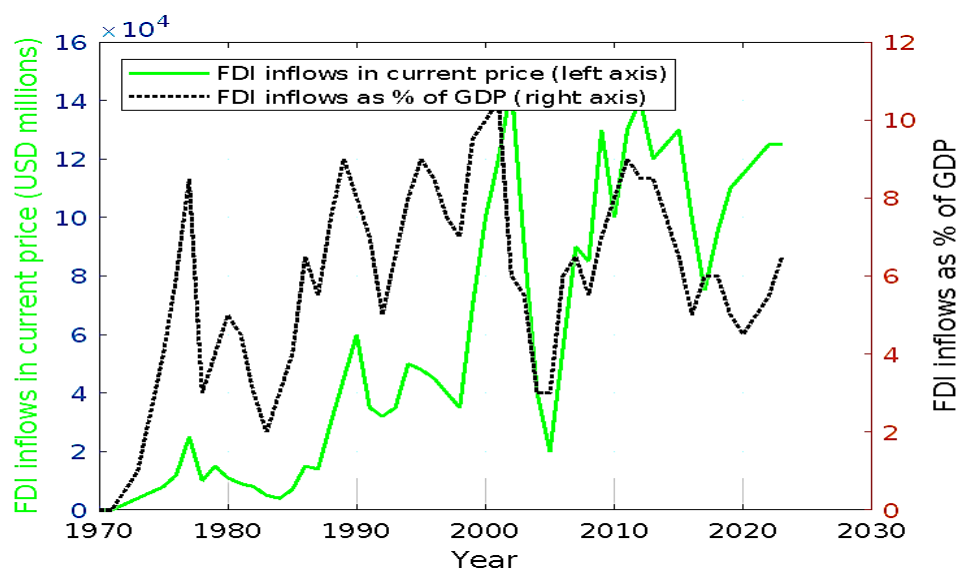


Fig 1. FDI Inflows in Egypt [3]

While single-country studies are beneficial, cross-country research, despite its limitations, provides a more accurate representation of the broader global picture. In this perspective, it is pertinent to observe that three recent cross-country studies, mostly using data from the 1970s and 1980s, arrived at markedly varied outcomes. **Fig 1** displays the patterns of Egypt's FDI flows in both present prices and as GDP percentage from 1975 to 2023. Prior to 2003, foreign direct investment inflows at current prices were minimal and reasonably consistent. Conversely, post-2003, foreign direct investment inflows increased but exhibited more volatility. The little influx of FDI prior to 2003 indicates that, while the implementation of many investments legislation aimed at attracting FDI, macroeconomic and political instability seems to hinder such efforts. This instability encompasses elevated inflation rates exceeding 20% and unemployment rates surpassing 11% in the 80s, President Anwar Sadat assassination in 1981, a declining proportion of Arab nations in attracting FDI due to strained political relations post-Camp David in 1979, as well as recession at the onset of economic reforms in Egypt. Low levels of foreign direct investment inflows are attributable to the occurrences in the Middle East during the early 1990s (Kuwait invasion by Iraq) and the decline in global FDI inflows resulting from the economic downturn and the September 11, 2001 attacks [4].

This research is important since it examines the dynamic link between FDI and EG in order to offer crucial information to planners in developing nations. Being a theoretical paper, it points out that FDI is not always beneficial and this depends on aspects such as institutional environment, economic diversification and polity volatility. The results highlight the importance of strong and efficient institutions to get the most out of FDI for the growth, while providing some recommendations for specific policy adjustments. This work therefore provides vital information needed in the formulation of strategies on how FDI can be utilized in the achievement of sustainable economic development. The rest of the sections in this study have been structured as follows: Section II discusses a conceptual framework, which integrates a theoretical basis for the relationship between FDI and growth; Interaction of Variables; and General-to-Specific model. A review of previous literature works has been done in Section III. Section IV identifies the data and variables used to compose this research. Section V presents a discussion of the empirical findings of this research. Lastly, Section VI concludes the paper and highlight the significance of FDI for firms and investors.

## II. CONCEPTUAL FRAMEWORK

### *Theoretical Basis for FDI-Growth Relationship*

The correlation between FDI and economic development has inspired much empirical research concerning both industrialized and developing nations. Neoclassical growth models and endogenous growth models underpin the majority of empirical research on the link between economic development and FDI. The link has been analyzed via four primary channels: (i) FDI determinants, (ii) growth drivers, (iii) the engagement of global firms in host countries, and (iv) the causal direction between the two variables. Numerous empirical studies indicate that FDI serves as a significant capital sources

counterpart domestic private investments, normally correlates with the creation of novel employment opportunities and technology transfer advancements, and stimulates overall EG in host countries. Several firm-level research, however, do not substantiate the assertion that FDI fosters economic development.

Ultimately, economic progress requires investments in both physical and human capital. These investments will mostly be supported from local resources, however money from foreign nations may also contribute to a country's investment. It is likewise accurate to assert that savings devoid of productive investments and their effective management cannot ensure economic development. Therefore, technically speaking, domestic savings are not a necessary nor a sufficient condition for development; nonetheless, they are anticipated to facilitate growth. Elevated savings and investment rates are crucial due to their robust and favorable correlation with GDP growth, as shown by endogenous growth theory.

From a modern perspective, growth theory may be seen as the branch of economics that aims to analyze EG as outlined above. Endogenous growth theory is a specific subset of this endeavor and may be delineated in two distinct ways. Endogenous growth theory is defined as either:

- A framework where the growth rate is determined by the equilibrium solution of the model itself, rather than being externally imposed; or
- A framework where technical progress is explicitly incorporated into the model, rather than being considered as an exogenous phenomenon.

#### *Interaction of Variables: Moderators and Mediators*

The roles of moderators and mediators can be deciphered from the various activities of the framework involving FDI and EG. Moderators either intensify or alter the relationship between FDI and growth. Others include human capital, which is a primary moderator; institutional quality; and macroeconomic stability. For example, while FDI has a positive effect on EG, human capital in the form of education mitigates the extent of this impact because better educated labour force is better equipped to assimilate and exploit foreign firms' transferred technology and knowledge. Likewise on institutional framework, if the country has well established property rights and lower level of corruption then it becomes favorable environment for FDI to enhance the EG otherwise the adverse effects of these characteristics overpower the positive impact of FDI on EG. The stability of FDI flows also mitigates the effect, high and continuous flow of FDI also leads to continuous growth whereas fluctuating FDI affects the economy and reduces the impact of FDI.

On the other hand, mediators describe how FDI affects growth, therefore enlightening the society on how this relationship works. Technological transfers are another intervening factor; it is often postulated that while FDI can stimulate EG, the extent of the effect depends on the capacity of the receiving country to utilise the superior technology which the foreign investors introduce. This absorption capacity is dependent on infrastructure and human capital. The other significant moderator is resource allocation efficiency defined by institutions such as financial and business operations freedoms. In countries where market competition and government interference with markets are low, FDI is channelled to productive sectors thus promoting growth. Also, trade openness moderates FDI impact by providing F firms access to other markets thus boosting their operations, thereby, enhancing the impact of FDI to EG.

#### *Justification for the General-to-Specific Model*

The use of the general-to-specific model used in this analysis can be justified on several grounds, including the systematic reduction of the model ultimately to the most parsimonious formulation by recourse to diagnostic checking procedures. General-to-specific modelling has superior attributes for model selection, as shown by Monte Carlo investigations of automated general-to-specific modelling methods. Bardsen et al. [5] were the pioneers in assessing the efficacy of general-to-specific modelling as a universal methodology for econometric model construction. The scholars extensively analysed the general-to-specific method by encoding the judgments in general-to-specific modelling into a computer program. They achieved significant progress in practical modelling. They contend that the results of general-to-specific modelling may be contingent upon the chosen simplification approach, namely the sequence of variable elimination and the data transformations used, leading to variability in the selected model based on the investigator.

Numerous reduction pathways might be contemplated from an initial generic model. Mayer and Rhile [6] transformed this potential disadvantage into an advantage by investigating several viable pathways and determining the resulting models. When searches result in many model choices, comprehensive tests may be used to differentiate between these models, retaining just the surviving (potentially non-nested) requirements. Should many models be identified that are both congruent and encompassing, a new general model may be constructed from their union, followed by the reapplication of the simplification procedure. Should that union model re-emerge, a definitive selection among the competing models may be conducted using information criteria. A distinctive, coherent, comprehensive reduction has been identified.

In our study, this approach starts with a model that contains all the variables that may have an influence on the influence of FDI toward growth and subsequently eliminate the variables that do not significantly contribute. In this way, the model establishes the true parameters that determine the connection between FDI and EG and exclude the insignificant ones that might mislead researchers. Moreover, the general-to-specific model provides a way of establishing model stability and solidity since the estimation undergoes a number of diagnostic tests. Jarque-Bera test for normality, Breusch-Pagan-Godfrey test for heteroscedasticity and the Ramsey's RESET test for checking functional form misspecification check the final model. This process makes the model simple as well as statistically well-specified, a condition that is very important in order to get

reliable results. The model also has flexibility as a strength; hence it is able to factor in unique country characteristics by including dummies for countries such as Pakistan and Kenya. This flexibility allows for a more accurate evaluation of the tendencies as well as the role of the deviations in the FDI-growth connection in the context of the given country. As a result, the general-to-specific model offers a sound and practical approach to exploring the role of FDI in enhancing EG where and when needed.

### III. LITERATURE REVIEW

Pavel and Moldovan [7] deemed economic development as exogenous. Their groundbreaking research led to the development of endogenous growth models. They believed that economic progress is propelled by technical advancements stemming from the research and development efforts of profit-maximizing entities. The anticipated innovations will allow enterprises to manufacture new intermediate goods and consumer items at reduced costs, hence enhancing efficiency and profitability. Furthermore, ideas possess a non-rivalrous characteristic, allowing simultaneous use by several individuals. Consequently, the manufacturing process is linked to growing returns to scale concerning new ideas or information.

Nupehewa et al. [8] assert that FDI may serve as a stimulant for development in contrast to local investment. FDI facilitates the adoption of general-purpose technology with a widespread economic user base, such as computers, the Internet, and mobile phones. FDI incorporates novel technology, expertise, and skills unfamiliar to the host countries. The technological spillovers associated with FDI allow the host country to produce more production with the same resources as previously used. Foreign Direct Investment enhances the production frontier of the host economy. The impetus for multinational firms to invest in host nations is to optimize earnings by securing comparatively greater potential returns on capital, attributed to the low capital-to-labor ratio in these countries. Due to their knowledge, experience, advanced technical proficiency, and improved management and operational procedures, the performance of global enterprises surpasses that of local firms. Heightened rivalry necessitates that local enterprises adopt the finest practices of multinational corporations to survive.

Qamruzzaman and Jianguo [9] contend that the effects of financial openness are often examined via FDI flows. The research does not provide a consensus about the effect of FDI on growth. Foreign Direct Investment promotes beneficial externalities by disseminating innovative technology and expertise. This diffusion has substantial spillover effects; FDI influences productivity in the sectors receiving FDI and indirectly enhances productivity throughout the whole economy. FDI boosts competitiveness and facilitates economies of scale for domestic firms. Conversely, other scholars propose that under conditions of prevailing trade, pricing, financial, and other distortions, FDI adversely affects resource allocation and impedes economic progress. The Solow growth framework posits that FDI stimulates development by enhancing capital accumulation and integrating novel inputs and global technology into the manufacturing processes of beneficiary countries. The neoclassical growth theory posits that FDI may direct necessary capital to worthy sectors in a capital-deficient nation, therefore enhancing the marginal productivity of capital and fostering economic development. The neoclassical development hypothesis posits that an economy necessitates a long-run capital investment to thrive consistently. FDI serves as a source of sustainable and dependable capital for emerging countries, prompting economists to highlight its effectiveness in enhancing economic progress.

For almost a period, economic scholars have contested the relationship between economic success and trade policy. Modernization researches, stemming from Max Weber's concepts and further advanced by Beck and Lau [10], posits that trade openness enables the transition of emerging economies from the pre-modern phase to a civilized and a modern one via commerce with industrialized countries. They proposed the competitive advantage hypothesis, which asserts that an economy ought to concentrate in the export and production of products with lower opportunity costs while importing those with relatively high opportunity costs. Heckscher–Ohlin framework of global commerce posits that a capital-rich nation has to concentrate on the export and manufacture of capital-based goods, whereas a labor-abundant country should focus on labor-intensive items. The neoclassical approach posits that trade development is a primary catalyst for economic development.

Vernon [11] argue that a robust economy characterized by sustainable growth and high employment rates draws international investment. Crises may diminish FDI flows by affecting many macroeconomic metrics, including productivity and economic performance. The fiscal contagion hypothesis posits that economic disasters may spread across different nations via financial networks, particularly FDI. Crises compel foreign stockholders to reevaluate their multinational ventures. Crisis-affected nations encounter financial shocks and volatility, leading to a loss of confidence among foreign investors, who may subsequently remove their investments and operations, a phenomenon referred to as “escaping behavior”. The withdrawal of foreign direct investment may exacerbate a nation's catastrophe by disrupting the economy and impacting the availability of investable capital.

### IV. DATA AND VARIABLES

The theoretical advancement of endogenous growth theory triggered research on the long-run effect of FDI on EG. In order to predict the influence of FDI on EG, the work employs a dynamic econometric model. This model is built on the basis of the endogenous growth theory model, where FDI is an agent of long-term development, while exogenous factors are taken into consideration. Since the relationships between these variables in **Table 1** are logarithmic, each of them was taken in natural logarithmic form. The general econometric specification is represented by Eq. (1).

$$\log(GDP_{it}) = \alpha_0 + \beta_1 \log\left(\frac{FDI}{GDP_{it}}\right) + \beta_2 \log(roads_{it}) + \beta_3 \log(price_{it}) + \beta_5 \log(taxes_{it} + \dots + \epsilon_{it}) \quad (1)$$

where  $\epsilon_{it}$  is the error term and  $i, t$  is country and time dimension respectively.

**Table 1. Sources and Variables**

Variables	Definition (based on Logs) – Data from Data from 1990 to 2023
<b>Log(roads)</b>	Roads per square kilometer (km <sup>2</sup> of land mass).
<b>Log(price)</b>	Rate of changes in the pricing of consumers.
<b>Log(taxes)</b>	Total tax revenue as a percentage of GDP.
<b>Log(freedom)</b>	Freedom from government.
<b>Log(property)</b>	Property rights.
<b>Log(corruption)</b>	Freedom from corruption.
<b>Log(financial)</b>	Financial freedom.
<b>Log(business)</b>	Business freedom.
<b>Log(legal)</b>	Legal system rights.
<b>Log(volatility)</b>	FDI volatility. Volatility is determined based on GARCH (1, 1) model in accordance with FDI-to-GDP ratio.
<b>Log(FDI/GDP)</b>	FDI-to-GDP ratio
<b>Log(exports)</b>	Primary exports-to-GDP ratio.
<b>Log(school)</b>	Enrolment rate in secondary school.
<b>Log(credit)</b>	Loans-to-GDP ratio of private sector banks.
<b>Log(openness)</b>	Ratio of total trade (imports + exports) to GDP.
<b>Log(GDP)</b>	Real per capita GDP (in USD 2000).
<b>Dependent variable</b>	Growth effect of FDI, individual DOLS estimations of FDI/GDP coefficients from 1990s to 2023.

In this study, the level of FDI volatility is adopted from the GARCH (1,1) model of the variables of interest. The following equation in Eq. (2) shows the specification for the volatility equation.

$$\sigma_t^2 = \omega + \alpha_1 \epsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad (2)$$

where  $\sigma_t^2$  refers to volatility (conditional variance) at time  $t$ ,  $\omega$  is a constant and  $\epsilon_{t-1}^2$  is the lagged squared residuals and  $\sigma_{t-1}^2$  is the lagged conditional variance. When considering the relevance of the institutional factors we employ such variables as freedom of institutions from government intervention, the quality of property rights and corruption. The basic version of the model that takes into account these institutional factors is in Eq. (3).

$$\log(GDP_{it}) = \alpha_0 + \beta_1 \log\left(\frac{FDI}{GDP_{it}}\right) + \beta_2 \log(freedom_{it}) + \beta_3 \log(corruption_{it}) + \beta_5 \log(property_{it} + \dots + \epsilon_{it}) \quad (3)$$

To analyze the effect of resource dependence and primary exports for the model extension, Eq. (4) is added.

$$\log(GDP_{it}) = \alpha_0 + \beta_1 \log\left(\frac{FDI}{GDP_{it}}\right) + \beta_2 \log(exports_{it}) + \beta_3 \log(volatility_{it}) + \epsilon_{it} \quad (4)$$

Subsequently, the specific country dummy variables are added to countries that deviate significantly from the mean, Nigeria, Kenya, and Pakistan as shown in the Eq. (5). We implement a further simplification to the general model by applying a procedure of eliminating insignificant variables determined by t-statistic to arrive at the final specification.

$$\log(GDP_{it}) = \alpha_0 + \beta_1 \log\left(\frac{FDI}{GDP_{it}}\right) + \beta_2 \log(freedom_{it}) + \beta_3 \log(volatility_{it}) + \gamma_1 Dummy_{Nigeria} + \epsilon_{it} \quad (5)$$

Using this system of equations, we are able to estimate the impact of FDI on EG with regard to institutional, economic and country conditions. The final specification satisfies most diagnostic tests and is in conformity with theoretical reasoning that both institutional quality, resource dependence, and FDI volatility provide mediating values for the FDI effect on growth.

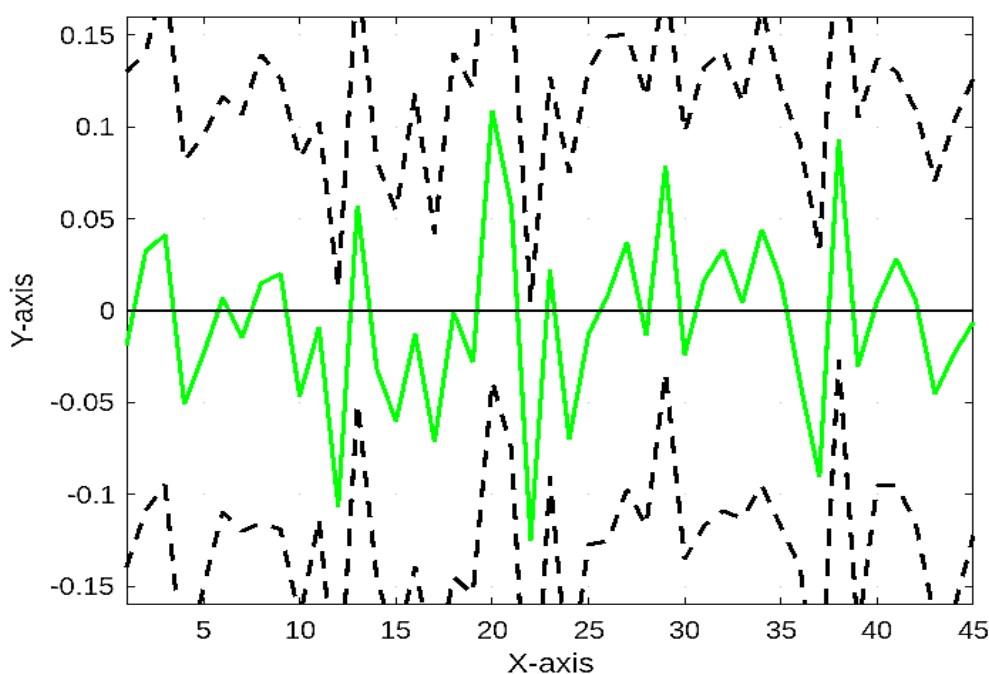
## V. EMPIRICAL RESULTS AND DISCUSSION

To identify the significant factors elucidating the multinational disparities in the impact of Foreign Direct Investment (FDI) on economic development, we employ the general-to-specific selection model proposed by Krolzig [12]. They demonstrate through Monte Carlo simulation that this methodology is highly efficient in identifying the real parameters of the process used for data collection, thereby surpassing other variable selection techniques, including the extreme bounds methods

proposed by Wang et al. [13]. In accordance with the methodology of Anselin [14], we begin by approximating a comprehensive specification that incorporates variables in **Table 1**, thereafter subjecting the approximation framework to a collection of specifications tests. Test battery consists of the following: a JP test (Jarque-Bera) to ensure that the residues are normal, a RESET test (Ramsey) to check for functional form misspecification and general nonlinearity, a HET test (Breusch-Pagan-Godfrey) to detect heteroscedasticity, and a STABILITY test (sub-sample stability) to ensure that the variances of the initial 3 quarters and the final quarter of the samples are equal.

**Table 2.** General Specifications for Diagnostic Tests

		STABILITY	HET	RESET (X <sup>2</sup> )	STABILITY (X <sup>2</sup> )
<b>With dummies</b>	<b>country</b>	F(10, 32) = 1.06 [0.84]	F(21, 22) = [0.93]	0.52 0.48 [0.92]	1.31 [0.52]
<b>Without dummies</b>	<b>country</b>	F(10, 32) = 3.74 [0.00]	F(16, 27) = [0.92]	0.50 7.14 [0.01]	60.20 [0.00]

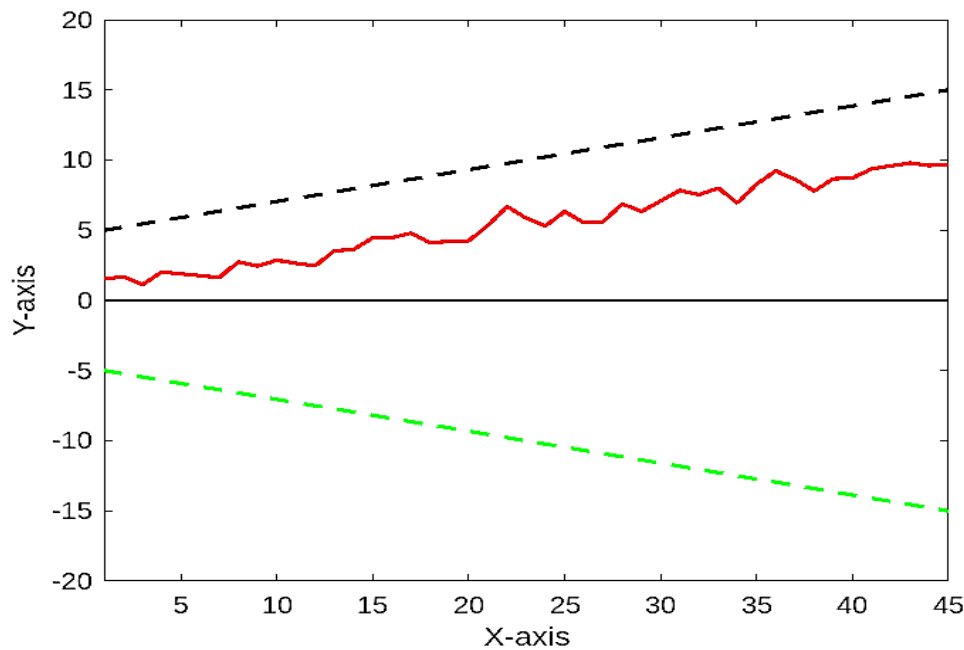


**Fig 2.** Recursive Residuals: Recursive Residuals (—) And  $\pm 2$  Standard Errors (---)

The outcomes of the tests are shown in the upper section of **Table 2**. They provide unequivocal proof of parameter instability, misspecification, and non-normality. Nonetheless, we discover that the residuals show significant outliers from Nigeria, Ghana, Kenya, Pakistan, and Cameroon. Consequently, we include dummy variable quantity for these nations to get a properly stated equivalence. Diagnostic tests data are included at the top of **Table 2**. This model is currently deemed adequately defined. The hypothesis of regularly distributed residuals remains valid, and RESET test does not indicate model misspecification or nonlinearity. Additionally, the model exceeds both the F-test for parameter stability and the Breusch-Pagan-Godfrey test for heteroscedasticity.

Subsequently, our study employs the generic model using dummies and streamline them by eliminating irrelevant variables. These variables are first ordered based on t-statistics. Subsequently, we implement 5 simplification pathways, whereby every variable exhibiting the least t-statistics is prioritized for removal. Consequently, we possess five equations. Insignificant coefficient variables are successively removed based on the lowest t-values until only those significant at the five-percent threshold remain. Subsequent to the elimination of every variable, the aforementioned assessments of model suitability are conducted. Additionally, an F-test is used to assess the assumption that the present requirement constitutes an effective limitation of the generic specification after every phase.

Consequently, all tests are successful, indicating five precisely defined parsimonious equations, each serving as a legitimate constraint of the overall framework. Ultimately, we develop the non-redundant joint framework from these calculations by including all requirements and doing the F-test to incorporate the additional requirements. This approach produces the conclusive requirement in **Table 3**. The completed model successfully passes all diagnostic testing. Furthermore, **Fig 2** to **Fig 4** illustrate **Fig 2** recursive residual, **Fig 3** CUSUM, and **Fig 4** Squares tests CUSUM, all of which together affirm a stable framework for the nations in question. Furthermore, **Fig 5** illustrates that the final requirement aligns well with the real dataset (adjusted  $R^2 = 0.80$ ). Consequently, statistically significant conclusions may be derived from regression findings shown in **Table 3**.



**Fig 3.** CUSUMS: CUSUMs (—) and 5% Significance Bounds (---)

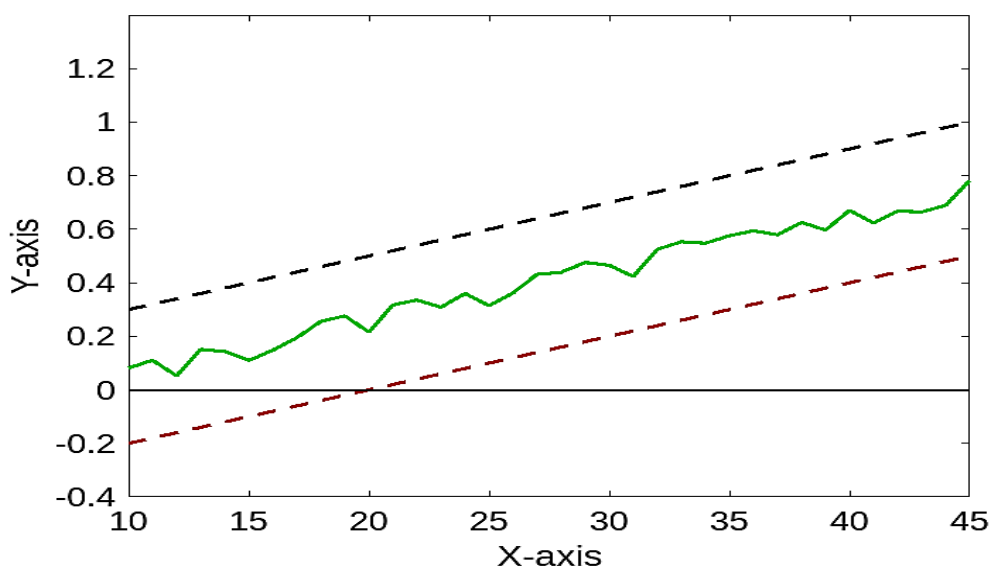
Our results show that the disparities in the development impacts FDI across countries can be predominantly attributed to variations in governmental and business freedoms, FDI volatility, and reliance on natural resources, quantified as the proportion of principal GDP exports. The calculated coefficients indicate that a one percent increase in governmental freedom enhances the long-term economic effect of FDI by 0.369% points annually, whereas a 1% rise in corporate freedom correlates with a 0.079%-point rise in the development impact of FDI. Conversely, each additional percentage of FDI volatility is projected to diminish the effect of FDI on EG by 0.028% points annually.

**Table 3.** Final Specification of The General-To-Specific Approach

Independent Variable	t-statistic (in brackets)	Coefficient
Nigeria dummy	(3.02)	0.240***
Kenya dummy	(-3.55)	-0.440***
Ghana dummy	(2.18)	0.369**
Cameroon dummy	(3.52)	0.637***
Pakistan dummy	(6.11)	4.706***
Log(primary)	(-2.08)	-0.012**
Log(volatility)	(2.37)	0.084**
Log(business)	(2.05)	0.049**
Log(government)	(-3.39)	-0.360***
Constant	(-4.21)	-1.352***
STABILITY: $F(11, 22) = 0.66$ [0.76]		
HET: $F(10, 32) = 1.55$ [0.33]		
RESET ( $\chi^2$ ): $F(9, 32) = 1.06$ [0.37]		
JB ( $\chi^2$ ): 6.53 [0.77]		
Adj. $R^2$ : 0.80		

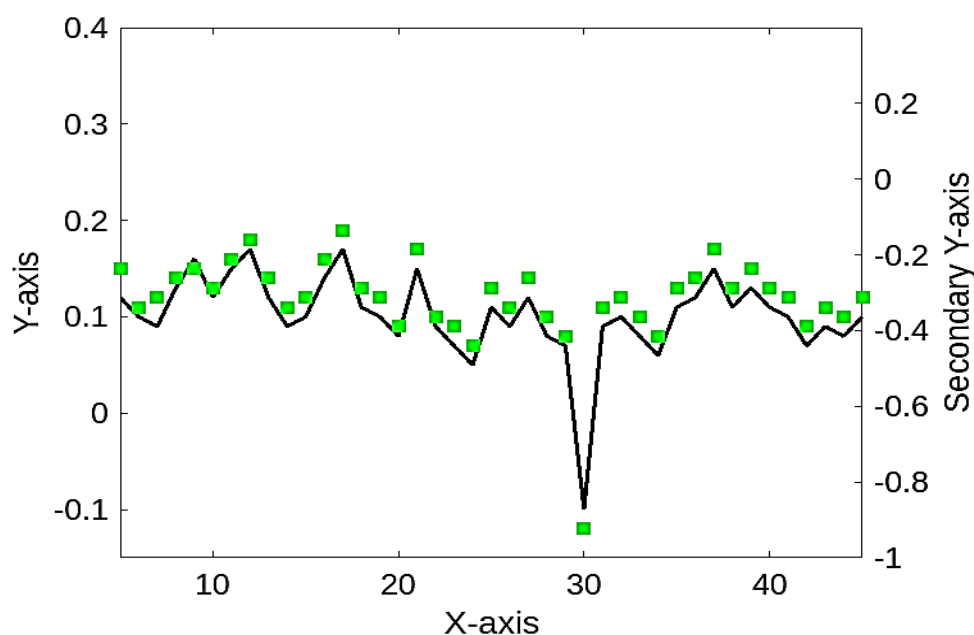
Notes: t-statistics are shown in brackets. \*\*\* (\*\*) denote statistical significance at the 1% and 5% levels.

Approximately 1% rise in the proportion of major GDP exports correlates with a 0.019%-point reduction in the development impact of FDI. Kenya's and Pakistan's Dummy variables have negative values, whilst those for Nigeria, Ghana, and Cameroon show a positive correlation with the long-term economic benefit of FDI. Considering that a dummy variable represents nation-specific attributes not accounted for by an existing variable, we acknowledge that the approximated models failed to produce a comprehensive understanding of the possible factors influencing the multi-national disparities in the growth impact of FDI. The second most significant discovery is that the influence of FDI on EG is not directly contingent upon the per capita income levels in host nations, the foundation of human capital, the extent of economic honesty, or the development of financial markets. All these factors proved to be negligible and were hence eliminated from the overall model. Our findings therefore corroborate those of Rehman and Islam [15], who likewise conclude that the degree of trade openness, human capital, per capita income, and financial market development does not significantly affect the effect of FDI on growth.



**Fig 4.** CUSUM-of-Squares: CUSUM Of Squares (—) and 5% Significance Bounds (---)

Our findings align with the conclusions of Busse and Groizard [16] that the development impact of FDI is inversely correlated with the degree of regulation. They contended that a nation with lenient departure restrictions is more likely to attract more FDI, which is evidently advantageous for the economic development of that nation compared to those with stringent regulations. They contended that the efficiency of ports and infrastructure, together with trade rules between nations, are pivotal elements in the selection of a country for FDI. The simplicity of cross-border trade legislation has been examined as a crucial factor influencing FDI choices and the growth rate of nations receiving FDI. The scholars explain that robust property rights protection facilitates the influx of foreign direct investment and promotes economic progress. Dunning [17] contended that fluctuations in economic rules concerning product, quantity, pricing, or market structure might significantly affect the investment decisions of international enterprises. All these studies demonstrate that alterations in the regulatory conditions of a host nation might greatly impact FDI inflows and subsequently their economic development. Consequently, we assert that the volume and growth effects of FDI in a host nation might differ markedly, contingent upon the host's regulatory framework.



**Fig 5.** Actual and Fitted Values: Actual Values (—), Fitted Values (---)

**Table 4** presents information on the effectiveness of variables excluded from the last specifications. It also presents the t-statistic for every missing variable once included separately into the model in **Table 3**. The final 5 columns indicate the degree of collinearity between the omitted regressors and variables of the last model, presenting the pairwise correlation coefficients (along with t-statistics) and the F-test's p-value for model suitability when the omitted variables are regressed on 4 integrated variables.



**Table 4.** Impact of Incrementally Integrating Regressors to The Regression in **Table 3** and Corresponding Constants

Regressor	Log(primary)	Log(government)	Log(volatility)	Log(business)	F-test's p-value	t-statistic of added variable
<b>Log(investment)</b>	-0.17 (-1.40)	0.19 (1.25)	0.18 (2.14)	0.55 (4.34)	0.003	-0.63
<b>Log(trade)</b>	-0.04 (-2.14)	0.07 (2.32)	0.05 (3.06)	0.33 (1.21)	0.005	0.44
<b>Log(financial)</b>	0.01 (2.35)	0.24 (0.47)	0.35 (3.02)	0.33 (2.11)	0.001	-0.56
<b>Log(FDI/GDP)</b>	-0.17 (-1.21)	-0.10 (-1.12)	0.20 (0.16)	0.21 (3.30)	0.011	-0.05
<b>Log(inflation)</b>	-0.04 (-3.02)	-0.13 (-0.16)	0.01 (3.10)	0.20 (0.11)	0.344	-0.31
<b>Log(corruption)</b>	-0.11 (-2.07)	0.00 (0.19)	-0.10 (-2.67)	0.01 (3.22)	0.254	-1.29
<b>Log(rights)</b>	-0.22 (-1.67)	-0.12 (-1.01)	-0.07 (-2.02)	0.35 (1.11)	0.344	1.29
<b>Log(school)</b>	0.25 (2.65)	0.01 (0.89)	0.38 (2.15)	0.03 (6.91)	0.000	0.06
<b>Log(GDP)</b>	-0.06 (-2.15)	0.17 (1.40)	-0.18 (-2.47)	0.06 (7.64)	0.000	-0.31
<b>Log(credit)</b>	0.13 (2.07)	1.48 (1.98)	0.02 (2.16)	0.40 (2.49)	0.000	1.43
<b>Log(openness)</b>	-0.07 (-1.23)	0.12 (0.81)	0.39 (2.74)	0.94 (2.77)	0.000	-0.01

Notes: The final column pertains to regression analysis of every variable against independent variables presented in **Table 3**.

Incase they are included separately into the last model, honesty is markedly negligible and has an unanticipated negative effect, but domestic credits to privatized domain is marginally insignificant (where p-value is 0.161) and possesses the anticipated positive coefficients. Likewise, GDP per capita is considered inconsequential with an incorrect symbol, aligning with the findings of Dankyi et al. [18], who report that the engagement aspect between per capita income and FDI is both negligible and negative across all specifications.

Nonetheless, the majority of the removed factors have strong correlations with those in the final model, indicating that these omitted variables may exert an indirect influence on the FDI-development connection by impacting or engaging with certain integrating variables. Business freedom has a strong positive link with GDP per capita, education levels, road density per square kilometre, absence of financial autonomy, property rights, corruption, and investments liberty (with coefficients surpassing 0.500). Investment volatility exhibits a strong positive correlation with FDI-to-GDP ratio (0.809), and honesty (0.601), indicating that the two variables may exert an indirect negative influence on the FDI-development correlation via heightened investment volatility, despite the overall positive association of the FDI-to-GDP ratio with the growth effect of FDI(refer to **Table 4**).

Conversely, the absence of governmental influence and the proportion of principal GDP exports have weak associations with any of the omitted factors. Collectively, these data indicate that disparities in the growth impacts of FDI among countries may primarily be attributed to variances in governmental non-interference, corporate autonomy, FDI instability, and resource reliance. Nonetheless, this does not suggest that other factors are inconsequential in leveraging the potential of FDI to influence development. Multiple factors, including human capital, per capita income, the absence of corruption, and property rights, correlate with governmental freedom, FDI volatility, resource dependence, and business autonomy, thereby probably exerting a significant indirect influence on the relationship between FDI and EG.

## VI. CONCLUSION

Our results depend on host country institutions, economic policies and business environment to establish a complex relationship between Foreign Direct Investment (FDI) and Economic Growth (EG). FDI can positively affect the economy, such as through inflows of capital, new employment, and technology import. Nevertheless, this instrument will only be efficient if local governance is stable and efficient. FDI inflows are found more beneficial to countries with institutional structures, sound legal environment, and sound economic policies as compared to the overall growth rate of their economy. On the other hand, in countries with institutional or policy vulnerability, FDI may be small or negative because of the misallocation of resources or policy uncertainty. The outcome of this study emphasizes the need for directed efforts to make sure that institutional capabilities are enhanced, and policies are made more transparent to enhance the probability of FDI. Only thus, can the developing states carry out sound structural changes and commitments that utilize FDI for the long-term expansion of the domestic institution. Furthermore, this study highlights the contribution of policymakers in the diversification of the economy that failed to diversify in certain sectors that overly rely on FDI.

### Data Availability

No data was used to support this study.

### Conflicts of Interests

The author(s) declare(s) that they have no conflicts of interest.

### Funding

No funding was received to assist with the preparation of this manuscript.

**Competing Interests**

There are no competing interests.

**References**

- [1]. F. R. Root, “Empirical determinants of manufacturing direct foreign investment in developing countries,” *Economic Development and Cultural Change*, vol. 27, no. 4, pp. 751–767, Jul. 1979, doi: 10.1086/451139.
- [2]. J. O. Adelegan, “Foreign Direct Investment and Economic Growth in Nigeria: A Seemingly Unrelated Model,” *African Review of Money Finance and Banking*, pp. 5–25, Jan. 2000, [Online]. Available: <https://www.jstor.org/stable/pdfplus/23026281.pdf>
- [3]. J. of A. Transportation, “Retracted: forecasting foreign direct investment inflow to Egypt and determinates: using machine learning algorithms and ARIMA model,” *Journal of Advanced Transportation*, vol. 2023, p. 1, Aug. 2023, doi: 10.1155/2023/9796236.
- [4]. S. M. N. Sakib, “The 2003 US Intervention of Iraq: Objectives, Implications, and Global Security Dynamics,” in *Handbook of Migration, International Relations and Security in Asia*, 2024, pp. 1–20. doi: 10.1007/978-981-99-8001-7\_10-1.
- [5]. G. Bardsen, Ø. Eitrheim, E. S. Jansen, and R. Nymoen, *The econometrics of macroeconomic modelling*. 2005. doi: 10.1093/oso/9780199246496.001.0001.
- [6]. J. M. Mayer and I. J. Rhile, “Thermodynamics and kinetics of proton-coupled electron transfer: stepwise vs. concerted pathways,” *Biochimica Et Biophysica Acta (BBA) - Bioenergetics*, vol. 1655, pp. 51–58, Jan. 2004, doi: 10.1016/j.bbabo.2003.07.002.
- [7]. A. Pavel and O. Moldovan, “Determining local economic development in the rural areas of Romania. Exploring the role of exogenous factors,” *Sustainability*, vol. 11, no. 1, p. 282, Jan. 2019, doi: 10.3390/su11010282.
- [8]. S. Nupehewa, S. Liyanage, D. Polkotuwa, M. Thiyagarajah, R. Jayathilaka, and A. Lokeshwara, “More than just investment: Causality analysis between foreign direct investment and economic growth,” *PLoS ONE*, vol. 17, no. 11, p. e0276621, Nov. 2022, doi: 10.1371/journal.pone.0276621.
- [9]. M. Qamruzzaman and W. Jianguo, “The asymmetric relationship between financial development, trade openness, foreign capital flows, and renewable energy consumption: Fresh evidence from panel NARDL investigation,” *Renewable Energy*, vol. 159, pp. 827–842, Jun. 2020, doi: 10.1016/j.renene.2020.06.069.
- [10]. U. Beck and C. Lau, “Second modernity as a research agenda: theoretical and empirical explorations in the ‘meta-change’ of modern society,” *British Journal of Sociology*, vol. 56, no. 4, pp. 525–557, Nov. 2005, doi: 10.1111/j.1468-4446.2005.00082.x.
- [11]. R. Vernon, “International investment and international trade in the product cycle,” *The Quarterly Journal of Economics*, vol. 80, no. 2, p. 190, May 1966, doi: 10.2307/1880689.
- [12]. H. Krolzig, “General-to-Specific model selection procedures for structural vector autoregressions\*,” *Oxford Bulletin of Economics and Statistics*, vol. 65, no. s1, pp. 769–801, Dec. 2003, doi: 10.1046/j.0305-9049.2003.00088.x.
- [13]. G. Wang, A. Sarkar, P. Carbonetto, and M. Stephens, “A Simple New Approach to Variable Selection in Regression, with Application to Genetic Fine Mapping,” *Journal of the Royal Statistical Society Series B (Statistical Methodology)*, vol. 82, no. 5, pp. 1273–1300, Jul. 2020, doi: 10.1111/rssb.12388.
- [14]. L. Anselin, “Under the hood Issues in the specification and interpretation of spatial regression models,” *Agricultural Economics*, vol. 27, no. 3, pp. 247–267, Nov. 2002, doi: 10.1016/s0169-5150(02)00077-4.
- [15]. F. U. Rehman and M. M. Islam, “Financial infrastructure—total factor productivity (TFP) nexus within the purview of FDI outflow, trade openness, innovation, human capital and institutional quality: Evidence from BRICS economies,” *Applied Economics*, vol. 55, no. 7, pp. 783–801, Jul. 2022, doi: 10.1080/00036846.2022.2094333.
- [16]. M. Busse and J. L. Groizard, “Foreign Direct Investment, regulations and growth,” *World Economy*, vol. 31, no. 7, pp. 861–886, Jul. 2008, doi: 10.1111/j.1467-9701.2008.01106.x.
- [17]. J. Dunning, *International Production and the Multinational Enterprise (RLE International Business)*. 2013. doi: 10.4324/9780203077818.
- [18]. A. B. Dankyi, O. J. Abban, K. Yusheng, and T. P. Coulibaly, “Human capital, foreign direct investment, and economic growth: Evidence from ECOWAS in a decomposed income level panel,” *Environmental Challenges*, vol. 9, p. 100602, Aug. 2022, doi: 10.1016/j.envc.2022.100602.