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Assessing the Global Drivers of Sustained Economic Development: The Role of Trade Openness, Financial Development, and FDI

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Abstract: Achieving economic development is one of the most important economic goals of every country. Identifying the determinants of economic growth, is a useful tool for adopting appropriate economic policies. This study, therefore, empirically examines the impact of trade openness, foreign direct investment, and financial development on economic growth, across 62 countries over the period 1995–2016. These countries are divided into two groups: low-income and high-income countries. We employ the pooled mean group (PMG), mean group (MG), and dynamic fixed effect (DFE) estimation techniques on the cross-country panel data. The findings show a positive long run association between trade openness, foreign direct investment (FDI), financial development, labor, government expenditure, and economic growth in low-income countries, with a positive and negative short run effect from capital and government expenditures, respectively. For high-income countries, a positive long run association between trade openness, FDI, capital, and economic growth exist. The short run estimates indicate a positive effect on trade openness and capital as well as a negative effect on government expenditure. Our study shows that the adoption of policies that improves access to skilled labor and international trade, affect the attainment of a sustainable economic development.

Keywords: FDI; trade liberalization; financial development; economic growth

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1. Introduction

Globalization can be characterized as a major economic factor that relates to imports and exports [1]. Broadly speaking, globalization or economic freedom, can be considered as the opposite of the isolation of a country, economically. In this study, we focus on two main components of globalization, namely trade openness and foreign direct investment (FDI). Undoubtedly, trade openness and FDI in the context of international economic theory and policy, enable the promotion of economic growth [2,3]. Trade openness and FDI exposes countries to new and innovative ideas which allow complete and efficient resource exploitation for optimum returns in the form of economic development [4].

Trade openness plays enormous role in economic development, by boosting a country's capital formation, market expansion, development of advanced production methods, creation of employment opportunities, and by extension poverty alleviation. The role of trade openness has been categorized under two broad hypotheses, namely trade-induced growth and growth-induced trade [5]. Thus, the trade-induced growth hypothesis enforces the modern growth theory which argues that trade openness stimulates economic development via the growth of technical progress and the factor of productivity [2,6–8].

In other words, the hypothesis implies the existence of causality from trade openness to economic growth. However, the neoclassical trade theory underpins the growth-induced-trade hypothesis, which argues that economic growth stimulates productivity which then increases the competitiveness of exported goods in the international market. This, therefore, implies a causality that flows from economic growth to trade openness. A different school of thought has it that trade openness positively influences the attraction of FDI in developing economies [9], thus, trade openness has both direct and indirect impacts on economic growth, via investment channels. Empirically, several studies posit both positive and negative impacts of trade openness on economic growth [10,11] and a negative impact of FDI on growth in high- and low-income countries [12,13]. Such reasons as investments in labor-intensive sectors, which are characterized by under-utilized labor or highly unskilled labor, and investments in new business ventures that require a longer time to make any significant positive influence, account for the negative influence of FDI on economic growth [12].

Financial development (FD), moreover, is one of the most essential drivers of the modern economy as it enables countries to develop their financial markets by efficiently transforming economic systems and banking intermediates [3,14]. This notwithstanding, the constraints to financial development are rife in low and developing economies. For example, a slow capital allocation and misallocation of capital among producers are among the most pressing constraints of financial development in low- and middle-income countries [15]. This was evident in 2008–2009, where although the ramifications of the global financial crisis were felt worldwide, the impact was more pronounced among low- and middle-income countries, due to non-functional financial systems that resulted in resource wastage, decreased savings and investment, and misappropriation of scarce resources [3].

To expatiate further the nexus between financial development and economic growth, it is imperative to consider the mechanism and differences between high- and low-income economies. While financial development boosts productivity growth through innovation in high-income countries, it contributes mainly to capital accumulation in low-income countries [16,17]. The differences between the types of strategies undertaken by each of these two income groups are two folds. First, among the developing countries with technological restrictions, there is a higher incentive to connect financial development to investment-based strategies, meaning funding capital accumulation activities. Second, among the industrial countries with no technological restrictions, the focus is to allocate funds to the innovation-based activities which lead to productivity enhancement. This implies that an innovation-based growth strategy is undertaken in developed economies [17].

From an empirical perspective, some studies either support the argument of a negative effect of financial development on economic growth or are indifferent: mainly for reasons attributed to a surge in the financial crisis or the existence of a non-linear interaction [3,18]. Other researchers posit financial development to spur economic growth [19,20]. Empirical evidence holds that financial development can only positively drive economic growth to a certain limit beyond which a negative effect sets in (i.e., the relationship takes an inverted U-shape) [21]. Hence, this is an ongoing debate among researchers. This study argues that the critical consideration point is the income status of countries, as well as the difference between transition and long term growth.

Against this backdrop, we define the main goal of this research to investigate the economic growth nexus in the long and short runs for a group of low- and high-income countries. More specifically, the study examines the effect of trade openness, financial development, and FDI on economic growth in high- and low-income economies. The empirical evidence is based on a dataset spanning 22 years from 62 countries (18 low-income and 46 high-income countries). Although, in the growth literature, the impact of each of these factors is widely discussed, separately, still far less has been achieved in modeling the impact of these factors together. The finding, of this study would provide sufficient insight for policymakers to set appropriate development strategies for the future, as well as evaluate current trade policies.

The rest of this paper is as follows: Section 2 reviews the growth literature that addresses the relationship between the variable of interest and economic growth, Section 3 discusses the data and methods used, Section 4 presents and discusses the results, and Section 5 concludes with policy implications.

2. Literature Review

In this section, we provide an empirical insight into the different threads of studies that have examined the various linkages between the main variables under consideration in this study: trade openness, FDI, financial development, and economic growth.

2.1. Empirical Insights between Trade Openness and Economic Growth

The inception of the trade openness-economic growth nexus could be traced back to the era of the classical economists [22], neoclassical economists [23], and new endogenous growth models [24,25]. Several empirical studies have been conducted to either validate or invalidate these concepts for different countries, cross-countries, and periods. While some studies validate the growth-led hypothesis [26–29], others support the trade-led hypothesis [30]. In recent studies, Kong, et al. [2] examined the trade openness and economic growth nexus in China for the period from 1994 to 2018, and found trade openness to promote economic growth in both the long and short terms. Ali, et al. [31] examined the trade openness-growth nexus in 20 of the Organization of Islamic Cooperation (OIC) countries, from 1991 to 2018, and validated the trade openness-led-growth hypothesis in 17 out of the 20 countries. Duodu and Baidoo [32], in their study to explore the nexus between trade openness and growth in Ghana for the period from 1984 to 2018, reported a positive effect for both the long and short run nexus between the variables. Amna Intisar, et al. [33] analyzed the effect of trade openness on economic growth in 19 Asian economies, from 1985 to 2017. They found a positive impact of the former on the latter. Likewise, Keho [34] investigated the interaction between trade openness and economic growth in Cote d'Ivoire, between 1965 and 2014, and reported a positive effect between the two variables. On the contrary, Fatima, et al. [35] investigated the relationship between trade openness and economic growth in 34 countries, between 1980 and 2014. They observed that trade openness decreases economic growth, however, trade openness indirectly boots economic growth. Malefane and Odhiambo [36] studied the nexus between trade openness and economic growth in Lesotho, from 1979 to 2013, and reported that trade openness does not statistically influence economic growth. Similarly, Oloyede, et al. [37] found no statistical nexus between trade openness and economic growth in 31 African countries, from 2006 to 2017.

2.2. Empirical Insights between the FDI and Economic Growth Nexus

Faisal et al. [38] investigated the FDI-economic growth nexus in Turkey, from 1995 to 2017, using the Fourier autoregressive distributed lag model (FADL). Their study validated the FDI-growth hypothesis in both symmetric and asymmetric components. Olorogun [39] confirmed the result by assessing the nexus between FDI and economic growth in Ghana, from 1984 to 2018. The study applied the autoregressive distributed lags (ARDL) estimator and found a positive effect of FDI on economic growth in the long run. Raza, et al. [40] applied the fixed effects models and the generalized method of moments (GMM) estimator to a dataset, from 1996 to 2013, in OECD countries. Their study observed that FDI exerts both direct and indirect positive effects on economic growth. LE, et al. [41] applied provincial data, from 1997 to 2019 in Vietnam, using the vector autoregression (VAR) and ARDL estimators and found that economic growth positively influences economic growth, but FDI does not influence economic growth. On the contrary, Joshua [42] applied the ARDL approach to examine the nexus between FDI and economic growth in Nigeria, from 1981 to 2016, and found that FDI exerts a positive but insignificant effect on economic growth in both the long and short runs. Sindze, et al. [43] examined the FDI and economic growth nexus in selected African countries, from 2007 to 2017. Their findings indicate a negative

effect of FDI on economic growth in some countries while others found evidence of positive effects from the former to the latter.

2.3. Empirical Insights between the Financial Development and Economic Growth Nexus

Studies on the nexus between financial development and economic growth have received mixed reactions from researchers, with some arguing that for economic development to be achieved, financial development must be on the front foot. That is financial development drives economic growth (i.e., supply-leading hypothesis). Supporters of this hypothesis argue that economic growth is boosted by growth in asset development, as a result of financial indicators which lead to capital formation [44]. Empirically, Calderón and Liu [45] investigated the nexus between financial development and economic growth, from 1960 to 1994, and found a positive effect of financial development on economic growth, as well as a bidirectional causality between the two variables. Abeka, et al. [46] assessed the relationship between financial development and economic growth in 44 economies in Africa, from 1996 to 2017. They applied the system GMM estimation technique and found that financial development promotes economic growth. Golder, et al. [47] applied the ARDL method to estimate the nexus between financial development and economic growth in Bangladesh, from 1987 to 2019, and found a positive impact of the former on the latter. Shahbaz, et al. [48] applied a series of econometric techniques to investigate the nexus between financial development and economic growth in Bangladesh, from 1976 to 2012. They observed that economic growth is influenced by financial development. On the contrary, the second thread of studies argues in favor of the demand-following hypothesis. This argument holds that financial development is only an end product of economic growth. In simple terms, economic growth impacts financial development [14,49]. Ono [50] examined the nexus between financial development and economic growth in Russia, from 1999 to 2014, and found financial development influences economic growth. Gazdar and Cherif [51] examined the role of financial development in promoting economic development in MENA countries, from 1984 to 2007. By applying the GMM estimator they found that financial development has a negative effect on economic growth in most countries in the absence of an improved institutional quality. Kutan, et al. [52] validated this finding by examining the financial development and economic growth nexus in 21 MENA countries, from 1980 to 2012.

3. Materials and Methods

3.1. Data Description

This current paper deployed a panel dataset on 62 (18 low-income and 46 high-income) countries, from 1995 to 2016. We utilized the ARDL as the main framework for our data analysis. The data on the gross domestic product (measured as constant 2010 USD is proxied as economic growth), capital stock (constant 2010 USD), the labor force (percentage of the total population), general government financial expenditure (percentage of the GDP) is sourced from the World Bank database. Moreover, trade openness, foreign direct investment (percentage of gross import and export values to the GDP), and domestic credit to the private sector (measured as the percentage of the GDP proxied as financial development) are sourced from the International Monetary Fund database. Table 1 presents a summary of all of the study variables. The study further examined the distribution of the data for both sets of countries using the scatter plot (See Figures 1 and 2).

Table 1. Variables measurement and source.

Variables	Unit	Source of Data
Per capita GDP (GDP)	Constant 2010 USD	World Bank
Trade openness (TO)	% of gross import and export value to GDP	World Bank
Foreign direct investment, net inflows (FDI)	% of GDP	International Monetary Fund (IMF)
Domestic credit to private sector (FD)	% of GDP	IMF
Capital stock (K)	Constant 2010 USD	World Bank
Labor force (L)	% of the total population	World Bank
General government final consumption expenditure (GE)	% of GDP	World Bank

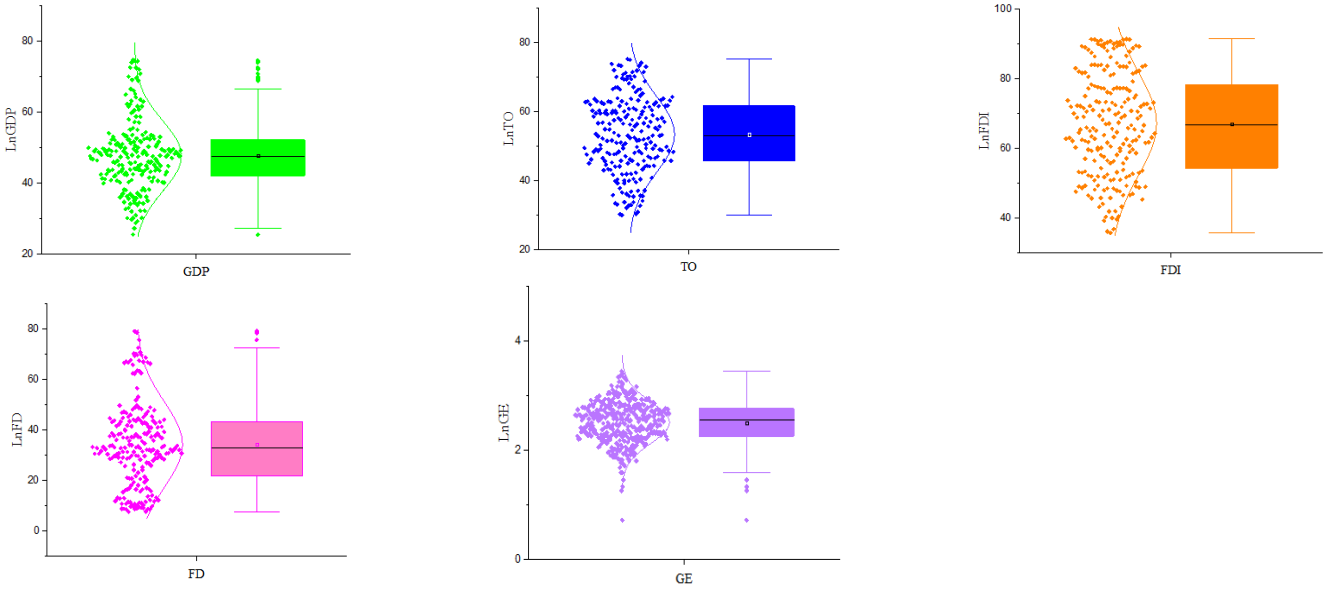

Figure 1. Box plot of the main variables in low-income countries with the scatter plot and distribution overlay. Note: GDP, TO, FDI, FD, GE denote economic growth, trade openness, foreign direct investment, financial development, and government final consumption expenditure, respectively.

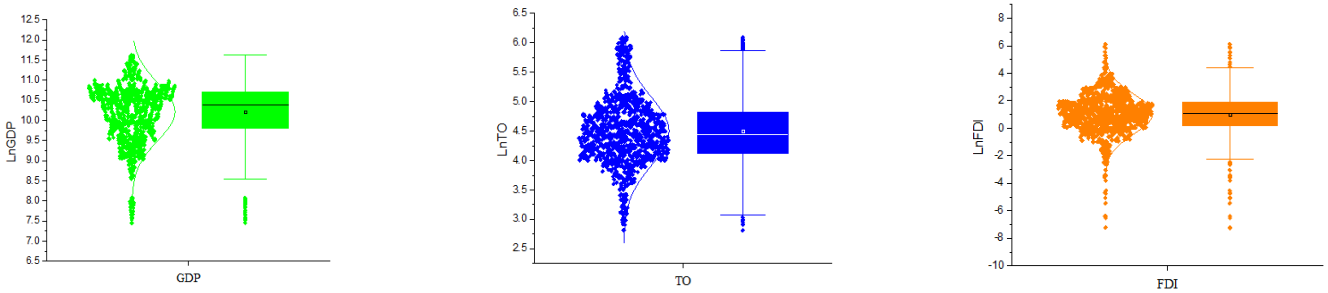

Figure 2. *Cont.*

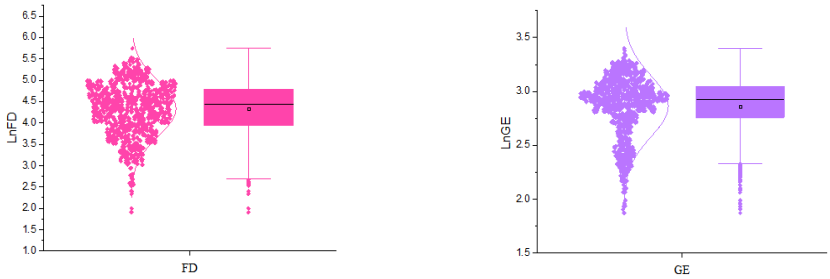

Figure 2. Box plot of the main variables in high-income countries with the scatter plot and distribution overlay. Note: GDP, TO, FDI, FD, GE denote economic growth, trade openness, foreign direct investment, financial development, and government final consumption expenditure, respectively.

Prior to proceeding with the unit roots tests, the correlation analysis was performed to investigate the correlative association among variables. Table 2 presents the results from the Pearson correlation analysis. The results indicate that economic growth has a significant positive relationship with trade openness, FDI, financial development, and capital stock, in both sets of countries. Although not significant, economic growth maintains a positive nexus with labor in both low- and high-income countries. However, there is a negative association between economic growth and government expenditure in low-income countries. Trade openness has a significant positive correlation with FDI (in both sets of countries) and financial development (in low-income countries), a significant negative relationship with capital stock, government expenditure (in high-income countries), and labor (in both sets of countries). Further, FDI has a significant negative relationship with capital stock, labor, and government expenditure in high-income countries. The results also reveal a significant positive correlation with capital stock (in both sets of countries), labor (in high-income countries). However, financial development produces a significant positive nexus with government expenditure in low-income countries but negative for high-income countries. We find a positive correlation between capital stock and labor (in both sets of countries) and government expenditure in high-income countries. Labor exerts a significant positive correlation with government expenditure in high-income countries.

Table 2. Pearson correlation (PC) analysis.

Low-Income Countries							
Variables	**LnGDP**	**LnTO**	**LnFDI**	**lnFD**	**lnK**	**lnL**	**LnGE**
LnGDP	1						
LnTO	0.120 **	1					
LnFDI	0.090 *	0.397 ***	1				
lnFD	0.448 ***	0.200 ***	−0.056	1			
lnK	0.419 ***	−0.001	0.061	0.266 ***	1		
lnL	0.074	−0.208 ***	−0.030	0.011	0.638 ***	1	
LnGE	−0.075	0.021	−0.026	0.387 ***	0.076	0.051	1
High-income countries							
LnGDP	1						
LnTO	0.054 *	1					
LnFDI	0.061 **	0.516 ***	1				
lnFD	0.539 ***	−0.053 *	0.021	1			
lnK	0.392 ***	−0.488 ***	−0.217 ***	0.417 ***	1		
lnL	0.047	−0.573 ***	−0.266 ***	0.245 ***	0.929 ***	1	
lnGE	0.024	−0.240 ***	−0.126 ***	−0.061 **	0.110 ***	0.102 ***	1

Note: *, **, and ***, respectively, significance at the 10%, 5%, and 1% levels.

3.2. Estimation Procedure

The study deployed a series of estimation procedures, as shown in Figure 3. The activities are performed at each stage of the estimation process, in chronological order.

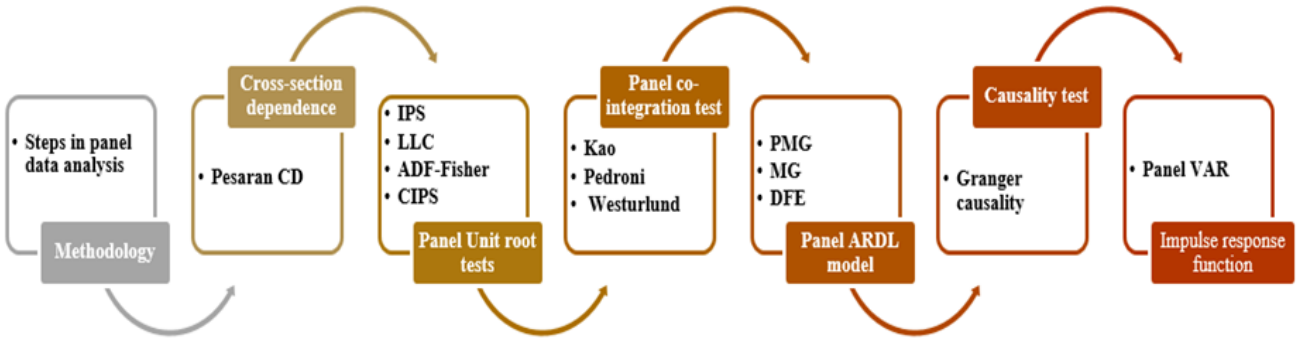

Figure 3. Steps of the research methodology.

3.3. The Cross-Sectional Dependence Test

The stationarity of time series variables is preconditioned on the assumption that the autocorrelation of the series is time-independent (i.e., cross-sectional dependence). Nevertheless, regressing the series without time dependence on those with time dependence may produce spurious results [53]. To address this limitation, we employed the cross-sectional dependence (CSD) test by Pesaran [54]. The test makes use of the sum of the correlation coefficient between the squares of the residuals from the cross-section obtained by the augmented Dickey–Fuller regression for each panel. Regardless of the geographical differences and distance the between countries, their response to external shocks may be similar, possibly because of the cross-section dependence. We present the test results from the CSD which reveal a strong rejection of the null hypothesis, in favor of the alternate hypothesis for both low- and high-income countries (Table 3). The results confirm that the cross-sectional dependence exists among the series. Moreover, the magnitude of the cross-sectional dependence, which is measured by the correlation coefficients, is high. This result indicates the variables share similar external shocks, over time.

Table 3. Tests for the cross-section dependence.

Low-Income Countries				
Variable	**CSD-Test**	***p*-Value**	**Corr**	**Abs(corr)**
LnGDP	22.31	0.000	0.384	0.557
LnTO	20.26	0.000	0.349	0.459
LnFDI	15.30	0.000	0.264	0.316
lnFD	39.50	0.000	0.681	0.682
lnK	42.59	0.000	0.734	0.749
lnL	57.15	0.000	0.985	0.985
lnGE	6.58	0.000	0.113	0.374
High-income countries				
LnGDP	102.60	0.000	0.680	0.805
LnTO	62.84	0.000	0.416	0.594
LnFDI	24.53	0.000	0.163	0.256
lnFD	40.42	0.000	0.268	0.557
lnK	83.04	0.000	0.550	0.650
lnL	97.36	0.000	0.645	0.846
lnGE	26.79	0.000	0.178	0.424

3.4. Test of the Unit Root and Panel Cointegration

The short and long term interactions of the variables of interest in this study were examined to determine the existence of the unit root in the data. For this purpose, the study deployed two types of unit roots: the first-generation tests (i.e., Im, et al. [55]; Levin, et al. [56]; and the Fisher–ADF unit root tests) and the second-generation test (i.e., Pesaran [57]; by Choi [58]; and by Hurd, et al. [59]). The Im, Pesaran and Shin (IPS), Levin Lin Chu (LLC), and the Fisher–ADF tests show that most of the variables are stationary at level, with a few of them showing stationarity when they are tested at the first difference. This means that the majority of the variables are I(0), while a few are stationary at I(1). Whereas, these results are a sufficient condition to proceed with the pooled mean group (PMG) and mean group (MG) estimators, they may be affected by some limitations. The limitation of the first-generation tests sterns from the existence of the transversal dependence signaling biased results at the panel level [60,61]. This limitation is classified under two categories: the first account for the intervals between panels, whereas the second responds to the shocks within the panel [62]. To address this challenge, the second-generation test was used to robustly solve the limitations of the model series which were undetected by the first-generation tests. Regardless of the limitations of the first-generation unit root tests, the second-generation unit root test in Table 4 confirms the assertion that the variables are of I(0) and I(1). That is the GDP, TO, FDI, FD, L, and GE are of order I(0), while K is of order I(1) for low-income countries. In the case of the high-income countries, FDI, K, and L are of order I(0), while the GDP, TO, FD, and GE are of order I(1).

Table 4. Unit Root Tests Results.

	Low-Income Countries							
	1st Generation Test						**2nd Generation Test**	
	IPS		**LLC**		**ADF-Fisher**		**CIPS (zt-Bar)**	
Variables	**Level**	**Δ**	**Level**	**Δ**	**Level**	**Δ**	**Level**	**Δ**
LnGDP	−3.768 ***	-	−1.403 *	-	86.393 ***	-	−2.283 **	-
LnTO	−0.952 ***	-	−1.859 **	-	63.843 ***	-	−2.551 ***	-
LnFDI	−4.457 ***	-	−5.113 ***	-	109.261 ***	-	−2.818 ***	-
lnFD	−4.497 ***		−1.562 *	-	18.973	59.828 ***	−2.701 ***	-
lnK	−0.964	−2.462 ***	−0.9452	−4.419 ***	33.118	53.246 **	−1.753	−4.037 ***
lnL	−0.646	−12.398 ***	−26.370 ***	-	101.107 ***	-	−2.337 **	-
lnGE	−1.290 *	-	−2.281 **	-	63.982	-	−2.805 ***	-
High-income countries								
LnGDP	−1.871 **	-	−7.1630 ***	-	157.506 ***	-	−1.811	−2.948 ***
LnTO	−4.476 ***	-	−5.198 ***	-	95.525	153.573 ***	−1.599	−3.402 ***
LnFDI	−9.213 ***	-	−6.740 ***	-	376.590 ***	-	−3.094 ***	-
lnFD	−1.384	−1.876 **	−5.784 ***	-	104.048	119.686 **	−1.585	−3.324 ***
lnK	−0.655	−1.326 *	−5.984 ***	-	108.056	151.472 ***	−2.103 *	-
lnL	−4.280 ***	-	−4.314 ***	-	190.670 ***	-	−2.428 ***	-
lnGE	−0.917	−1.848 **	−4.089 ***	-	106.195	112.815 ***	−1.561	−3.736 ***

Note: Δ: First difference, *, **, and *** implies a significance at 10%, 5%, and 1% levels. The CIPS test was calculated with two lags and the results stemmed from the multipurt Stata command.

Subsequently, we executed several panel cointegration tests, as the variables are integrated into order one and order two. The results from the panel cointegration test, based on the Kao, Pedroni, and Westland tests, are presented in Table 5. The result supports the rejection of the null hypothesis of no cointegration for all of the explanatory variables for both the low- and high-income countries. This conforms with [63–65], who reported the presence of co-integration among the variables. The presence of co-integration between study variables justifies the need to proceed with the investigation of the long run association among the variables in the two regions.

Table 5. Results of the panel co-integration test.

	Low-Income Countries		High-Income Countries	
Tests	**Statistic**	***p*-Value**	**Statistic**	***p*-Value**
Kao test				
Modified Dickey–Fuller t	−2.068	0.019 **	−2.018	0.021 **
Dickey–Fuller t	−3.474	0.000 ***	−2.745	0.003 ***
Augmented Dickey–Fuller t	−1.431	0.076 *	−1.687	0.045 **
Unadjusted modified Dickey–Fuller t	−1.619	0.052 *	−1.341	0.089 *
Unadjusted Dickey–Fuller t	−3.273	0.000 ***	−2.368	0.008 ***
Pedroni test				
Modified Phillips–Perron t	3.453	0.000 ***	7.383	0.000 ***
Phillips–Perron t	−2.198	0.014 **	−1.532	0.062 *
Augmented Dickey–Fuller t	−1.619	0.052 *	−1.390	0.082 *
Westurlund test				
Variance ratio	3.212	0.000 ***	5.046	0.000 ***

Note: *, **, and *** implies a significance at 10%, 5%, and 1% levels.

3.5. Model Estimation and Choice

To examine the dynamic nexus among our variables of interest, we engaged the panel dynamic framework for our data estimation, using a variety of econometric models. Based on the characteristics of our data, we employed the ARDL model, based on three estimation procedures. This study applied the MG [66], PMG [67], and dynamic fixed effect (DFE) estimators. The PMG, MG, and DFE estimators are suitable for estimating large-N and large-T dynamic panel data models of the form expressed as:

$$\Delta g_{s,t} = \sum_{j=1}^{p-1} \gamma j, s \Delta g_{s,t-j} + \sum_{j=0}^{q-1} \delta'_{j,s} \Delta x_{s,t-j} + \varphi_s \left[g_{s,t-1} - \theta_{0,s} - \theta'_{1,s} x_{s,t} \right] + \varepsilon_{st} \quad (1)$$

where $\gamma j_{,s}$ and $\delta j_{,s}$ denote the short run coefficients, $\theta_{0,s}$ and $\theta_{1,s}$ denote the long run coefficients, and φ_s is the speed of adjustment (error-correction term) to the long run equilibrium, g denotes the economic growth, x denotes the covariates, and s and t denote the country and time, respectively. It is imperative to note that Equation (1) can be estimated using similar Panel ARDL methods employed by the three estimators earlier mentioned. The advantages of using the ARDL method, in the form of error correction, are highlighted by Pesaran and Smith [66], Johansen [68], and Pesaran, et al. [67]. Nonetheless, the choice between the PMG and MG models requires a tradeoff between efficiency and consistency [69].

3.6. The PMG, MG, and DFE Estimators

In the PMG estimation, the short term variations are allowed to differ across panels [67]. The PMG estimator restricts the long term slope coefficients to remain homogeneous across panels (that is $\theta_{1,s} = \theta_0$ for all s) [67], while the intercepts, short run coefficients, and error variances are allowed to vary across groups ($\gamma j_{,s} \neq \delta j_{,s}$ for all s) [67]. Additionally, the conditions for consistency and efficiency are met when there is proof of a long run association between covariates, yet, the covariates must be exogenous (i.e., they must not be serially correlated) [69]. To satisfy these conditions, lags are incorporated into both the dependent and independent variables [8,69,70].

The MG estimator allows for the estimation of country-specific regressions and hence accounts for each country coefficient as an unweighted mean of the individually estimated coefficient [69]. It has a more flexible estimation procedure as it does not impose limitations. It allows for variations in the coefficients in both periods, however, the s must be large to satisfy the validity and consistency requirements [67] cited in [69].

The DFE estimator operates in the same way as the PMG. Similar to the PMG, the DFE imposes some restrictions on the estimation procedure. That is, it restricts the long run

coefficient of the cointegration vector to be homogeneous for all countries while limiting the coefficient of the error correction term and the short run coefficient to be equal [69]. For additional benefits and limitations of the DFE estimator, please refer to [67,71].

3.7. The Hausman Test

Given the strengths and weaknesses of the three models, the Hausman test is deployed to examine the significant differences among the three models. The test hypothesizes that there are no significant differences between the PMG and MG. The absence of a significant difference indicates a justification of the null hypothesis and thus, the PMG is employed. However, the alternative indicates the presence of a significant difference between the PMG and MG, and hence the MG is preferred. This process is used to test the differences between the MG and PMG as well as the MG and DFE.

4. Results

In this study, the authors applied different econometric techniques to investigate the complex relationship between the variables of interest with economic growth employed as the dependent variable of the study. Following the performance of the various diagnostic tests, as earlier shown, we then proceeded to estimate the main results of the study. Table 6 displays the results from the PM, PMG, and DFE models, and the Hausman test on low-income countries. The comparison between the PMG and MG estimators produces a *p*-value of 0.273, signifying that the PMG is preferred to the MG. In the case of the choice between the MG and DFE, the *p*-value is 1.000, indicating a preference for the DFE over the MG. Because the PMG estimator allows heterogeneous effects in the short term, the results of this estimator are assessed. Although, we present results from all three estimators for comparison. Additionally, the error correction was calculated to determine whether the equilibrium is restored.

Table 6. PMG, MG, and DFE results for low-income countries.

	PMG		**MG**		**DFE**	
	L R	**S R**	**L R**	**S R**	**L R**	**S R**
LnTO	0.588 *** (0.087)	-	0.212 (0.143)	-	0.007 (0.094)	-
LnFDI	0.021 * (0.011)	-	0.002 (0.014)	-	0.012 (0.013)	-
lnFD	0.099 ** (0.043)	-	−0.206 (0.1999)	-	0.125 * (0.067)	-
lnK	0.026 (0.029)	-	0.332 ** (0.154)	-	0.066 *** (0.024)	-
lnL	0.526 ***(0.124)	-	0.893 ***(0.268)	-	0.752 *** (0.153)	-
lnGE	0.245 *** (0.076)	-	0.317 * (0.182)	-	0.198 * (0.112)	-
ECT	−0.089 *** (0.027)		−0.513 *** (0.101)		−0.150 *** (0.020)	
ΔLnTO	-	−0.021 (0.026)	-	−0.042 (0.034)	-	0.038 *** (0.016)
ΔLnFDI	-	−0.001 (0.002)	-	0.001 (0.003)	-	−0.001 (0.001)
ΔLnFD	-	−0.013 (0.012)	-	−0.017 (0.015)	-	−0.043 *** (0.075)
ΔLnK	-	0.053 *** (0.016)	-	0.001 (0.017)	-	−0.003 (0.002)
ΔLnL	-	0.462 (0.940)	-	−0.465 (1.055)	-	1.278 *** (0.263)
ΔLnGE	-	−0.051 ** (0.020)	-	−0.042 (0.026)	-	−0.034 * (0.017)
Constant	-	0.896 *** (0.269)	-	2.869 (1.482)	-	1.29 *** (0.322)
Hausman test		7.54 #		0.000 @		
p-value		0.273		1.000		

Note: L R = Long-run, S R = Short-run, *, ** and *** implies a significance at 10%, 5% and 1% levels. Standard errors in parentheses. # compares the MG with the PMG. @ compares the MG with the DFE.

In the case of the low-income countries, the long run results show that trade openness positively affects economic growth at a 1% significance level. However, the short term effect is statistically insignificant. This implies that trade openness only influences economic growth in the long term. This is consistent with studies, such as Banday, et al. [72]. Foreign direct investment has positive long term impacts on economic growth. This implies that a 10% increase in FDI improves economic growth by ~0.021%, in the long term, but is statistically insignificant in the short term. This finding is supported by Udeagha and Ngepah [19]; Banday, et al. [72], who also reported a long run effect in other countries.

Similarly, FD is positive at a 5% significance level under the PMG, implying that a percentage increase in FD increases economic growth by ~0.099%, in the long term. However, the short run coefficient indicates no statistical influence. This positive result

concords with the studies of Udeagha and Ngepah [19] and Hassan, et al. [73], who argue that FD, via the reduction in transaction costs, improves the efficiency of intermediation and hence promotes economic growth. They further posit that an efficient financial system ensures that savings are effectively mobilized and the chances of creating investment opportunities are increased, thus, creating a conducive financial environment for the support of viable investments and risk diversification. Furthermore, the DFE estimator indicates that FD has a positive impact on economic growth in the long term but poses a negative influence in the short term. Thus, a percentage increase in FD decreases economic growth by −0.043%, in the short term, whereas a similar change in FD, in the long term, increases economic growth by 0.124%.

Capital stock has positive short run impacts on growth under the PMG, however, the long run effect is insignificant. This implies that a percentage change in capital stock will result in a corresponding change of about 0.053% in economic growth, only in the short term. Our finding conforms with Acheampong, et al. [74] but contradicts [75], and Shahbaz, et al. [48], who both found a negative impact on economic growth in the long run. On the contrary, the MG and DFE show evidence of a significant positive influence of capital stock on economic growth in the long run but find no statistical significance in the short run. This finding shows that capital stock promotes economic growth. Findings from all three models show the coefficient of the labor force is positive at a 1% significance level in the long run, indicating that a percentage change in labor force will correspond to a 0.526%, 0.893%, and 0.752% change in economic growth under the PMG, MG, and DFE, respectively. On the contrary, there is no significant short term effect under the PMG and MG estimators, however, a significant short term effect is recorded under the DFE estimator. The positive effect of labor on economic growth is supported by Shahbaz [30] and Shahbaz, et al. [48], however, it contradicts Acheampong, et al. [74]. Finally, GE is positive for all three models, albeit at a 1% significance level for the PMG and at a 10% significance level for both the MG and DFE estimators. This implies that GE promotes economic growth in the long term. However, the short term effect provides evidence of negative effects under the PMG and DFE estimators. Thus, a percentage change in GE declines economic growth by 0.051% (p-value < 0.05) and 0.034% (p-value < 0.1), in the short term. This implies that GE retard economic growth in the short term while encouraging economic growth in the long term. Our finding contradicts Udeagha and Ngepah [19], who noted that GE promotes economic growth in the short run, but decreases in the long run.

Table 7 presents the findings on high-income countries. Similar to the findings on the low-income countries, the appropriate choice of model per the Hausman test for the high-income countries, is the PMG estimator, however, we further present the results from the MG and DFE, for comparison. Trade openness is positive in both the short and long runs for the PMG estimator. This implies that economic growth increases by 0.106% with a percentage change in trade openness at a p-value < 0.01. This finding is consistent with Kong, et al. [2]. However, under the DFE, trade openness only positively influences economic growth in the long run but found no statistical significance in the short run. Similarly, FDI has positive effects in both the PMG and DFE (p-value < 0.01) models in the long run—signifying FDI instigates economic growth. Moreover, FDI does not have a significant impact on economic growth in the short run. Regarding the effect on FD, the coefficients of the long term effect are negative for both the MG and DFE at a p-value < 0.01. This indicates that FD retards economic growth in high-income economies in the long term. Furthermore, the results show that FD only supports economic growth in the short term under the DFE model with no effect found in the PMG and MG estimators.

Table 7. PMG, MG, and DFE results for high-income countries.

	PMG		MG		DFE	
	L R	**S R**	**L R**	**S R**	**L R**	**S R**
LnTO	0.106 *** (0.036)	-	0.570 (0.479)	-	0.366 *** (0.069)	-
LnFDI	0.009 *** (0.004)	-	−0.049 (0.045)	-	0.033 **** (0.011)	-
lnFD	−0.135 *** (0.026)	-	−0.164 (0.291)	-	−0.181 **** (0.040)	-
lnK	0.703 *** (0.037)	-	0.440 ** (0.185)	-	0.510 *** (0.050)	-
lnL	0.041 (0.081)	-	−0.139 *** (0.689)	-	0.202 *** (0.096)	-
lnGE	−0.544 *** (0.096)	-	1.435 * (0.182)	-	−0.410 *** (0.121)	-
ECT	−0.073 ***(0.010)		−0.513 *** (0.101)		−0.086 *** (0.008)	
ΔLnTO	-	0.032 ** (0.026)	-	0.024 (0.018)	-	0.006 (0.012)
ΔLnFDI	-	0.001 (0.001)	-	0.001 (0.002)	-	0.0001 (0.0008)
ΔLnFD	-	−0.020 (0.012)	-	−0.012 (0.014)	-	0.007 ** (0.003)
ΔLnK	-	0.110 *** (0.017)	-	0.051 *** (0.017)	-	0.067 *** (0.008)
ΔLnL	-	0.050 (0.077)	-	−0.305 ** (0.134)	-	0.116 ** (0.060)
ΔLnGE	-	−0.171 ***(0.031)	-	−0.154 *** (0.030)	-	−0.209 *** (0.015)
Constant	-	0.737 *** (0.096)	-	2.210 (1.401)	-	0.952 *** (0.130)
Hausman test		7.54 #		0.000 @		
p-value		0.273		1.000		

Note: L R = Long-run, S R = Short-run, *, ** and *** implies a significance at 10%, 5% and 1% levels. Standard errors in parentheses. # compares the MG with the PMG. @ compares the MG with the DFE.

In the case of the control variables, capital stock has a positive impact on economic growth both in the short and long runs for all three estimators. This shows that capital stock promotes economic growth in high-income countries both in the short and long terms. However, labor force has no effect in the short and long terms for the PMG estimator, rather, the MG and DFE provide evidence of long and short term effects. Specifically, whereas labor force is estimated to decrease economic growth in the long and short terms, under the MG, the DFE produces evidence of a positive impact in both long and short terms. Finally, the coefficient of GE is negative for both the short and long runs under the PMG estimator—-implying that GE reduces economic growth in high-income countries. Similar to the PMG, the DFE also shows the negative effects of GE on economic growth in both long and short runs. On the contrary, the MG estimator shows a positive effect in the long run but a negative impact in the short run. The summary of the long and short run associations for both low- and high-income countries is shown in Tables 6 and 7 and depicted in Figure 4.

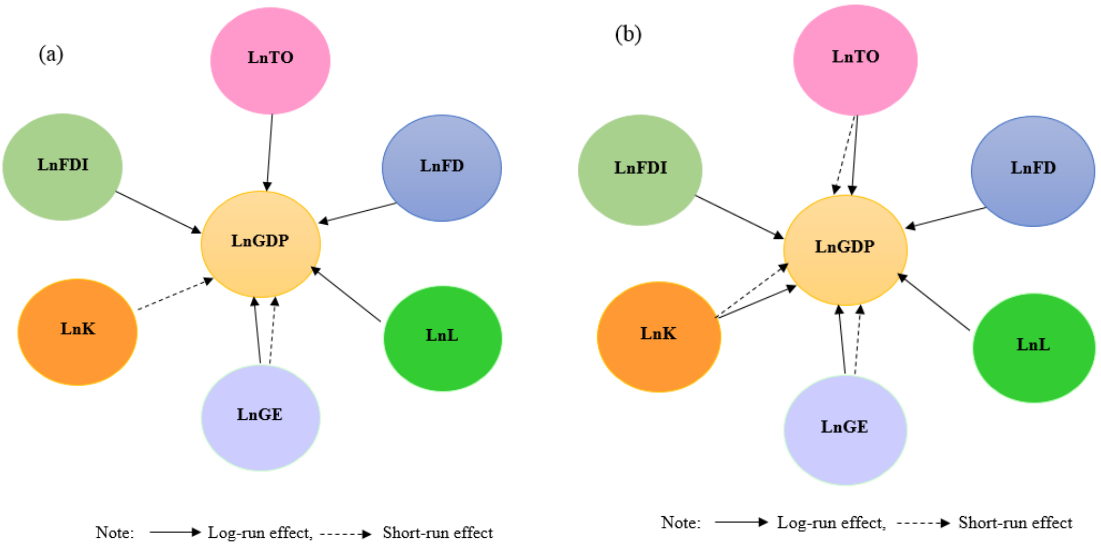

Figure 4. Relationship between the variable of interest and economic growth in (**a**) low-income and (**b**) high-income countries. Note: GDP, TO, FDI, FD, GE, K, and L denote economic growth, trade openness, foreign direct investment, financial development, government final consumption expenditure, capital stock, and labor force, respectively.

4.1. Test Result from the Granger Causality

The Granger causality test results for the low- and high-income economies are presented in Tables 8 and 9. The presence of the Granger causality between variables is indicated by the significance of the Wald statistic, whereas an insignificant Wald statistic implies the absence of the Granger causality between the variables. From Tables 7 and 8, it can be observed that the Wald statistic is significant at a p-value < 0.01 for almost all of the variables, providing evidence of the Granger causality between all variables. Specifically, a bidirectional causality is reported for the nexus between trade openness and economic growth, FDI and economic growth [40,72], FD and economic growth, capital stock and economic growth, labor force and economic growth, and GE and economic growth both in low- and high-income countries. Furthermore, we observe the bidirectional causality between trade openness and FDI, trade openness and FD, and FDI and FD, in both low- and high-income countries.

Table 8. Granger causality Wald test for the low-income countries.

Null Hypothesis	W-Stat	*p*-Value	Causality	Decision
LnTO → LnGDP	0.841 ***	0.004	√	⇔
LnGDP → LnTO	13.262 ***	0.000	√	
LnFDI → LnGDP	7.065 ***	0.000	√	⇔
LnGDP → LnFDI	4.838 ***	0.003	√	
LnFD → LnGDP	2.239 **	0.000	√	⇔
LnGDP → LnFD	7.543 ***	0.000	√	
LnK → LnGDP	12.307 ***	0.000	√	⇔
LnGDP → LnK	7.083 ***	0.000	√	
LnL → LnGDP	13.094 ***	0.000	√	⇔
LnGDP → LnL	29.622 ***	0.000	√	
LnGE → LnGDP	3.709 ***	0.000	√	⇔
LnGDP → LnGE	3.278 ***	0.000	√	
LnTO → LnFDI	3.738 ***	0.000	√	⇔
LnFDI → LnTO	4.762 ***	0.000	√	
LnTO → LnFD	3.973 ***	0.000	√	⇔
LnFD → LnTO	5.159 ***	0.000	√	
LnFDI → LnFD	3.314 ***	0.000	√	⇔
LnFD → LnFDI	274.782 ***	0.000	√	

Note: √ = Yes, ⇔ denotes the bidirectional causality, **, and *** implies a significance at 5% and 1% levels.

Table 9. Granger causality Wald test for the high-income countries.

Null Hypothesis	W-Stat	*p*-Value	Causality	Diction
LnTO → LnGDP	4.621 ***	0.000	√	⇔
LnGDP → LnTO	6.172 ***	0.000	√	
LnFDI → LnGDP	2.059 **	0.039	√	⇔
LnGDP → LnFDI	2.894 ***	0.003	√	
LnFD → LnGDP	8.931 ***	0.000	√	⇔
LnGDP → LnFD	22.035 ***	0.000	√	
LnK → LnGDP	4.208 ***	0.000	√	⇔
LnGDP → LnK	8.077 ***	0.000	√	
LnL → LnGDP	7.268 ***	0.000	√	⇔
LnGDP → LnL	43.532 ***	0.000	√	
LnGE → LnGDP	8.648 ***	0.000	√	⇔
LnGDP → LnGE	12.252 ***	0.000	√	
LnTO → LnFDI	3.353 ***	0.000	√	⇔
LnFDI → LnTO	3.491 ***	0.000	√	
LnTO → LnFD	13.067 ***	0.000	√	⇔
LnFD → LnTO	2.221 ***	0.026	√	
LnFDI → LnFD	8.946 ***	0.000	√	⇔
LnFD → LnFDI	208.173 ***	0.000	√	

Note: √ = Yes, ⇔ denotes bidirectional causality, **, and *** implies a significance at 5% and 1% levels.

4.2. The Impulse Response Function (IRF) and the Variance Decomposition

This study has thus far provided evidence suggesting that the variables are associated with one another in both the short and long runs. Regardless, it is important to further establish the economic growth response to the dynamic shocks in trade openness, financial development, FDI, and other control variables. The 95% confidence intervals of the IRF were calculated by Monte Carlo estimated standard errors, with 500 repetitions. The separate IRFs for the low- and high-income countries are presented in Figures 5 and 6. For the low-income countries (Figure 5), except for trade openness and FDI, whose initial response to the dynamic shock produces a negative effect on economic growth, financial development, labor, capital, and government expenditure, solicits a positive response from economic growth. The results show that the response of economic growth to the dynamic shock of each of the variables varies significantly over time. The IRFs for the high-income countries (Figure 6) show an entirely different view regarding the response of economic growth to the dynamic shocks in each of the variables. Contrary to the scenario in the low-income countries, shocks in trade openness in high-income countries generates a sharp positive response from economic growth in the first two years, but steadily declines in the long term, albeit remaining positive. The positive response of economic growth to FDI is short-lived as it declines to the negative, between the 4th and 7th periods, before recording some gains beyond the 8th period. The negative long run effects of financial development is confirmed by the IRF. Furthermore, the dynamic shocks in capital and labor solicit a positive response from economic growth, whereas government expenditure generates a negative response in the short term but a positive response beyond the 6th year.

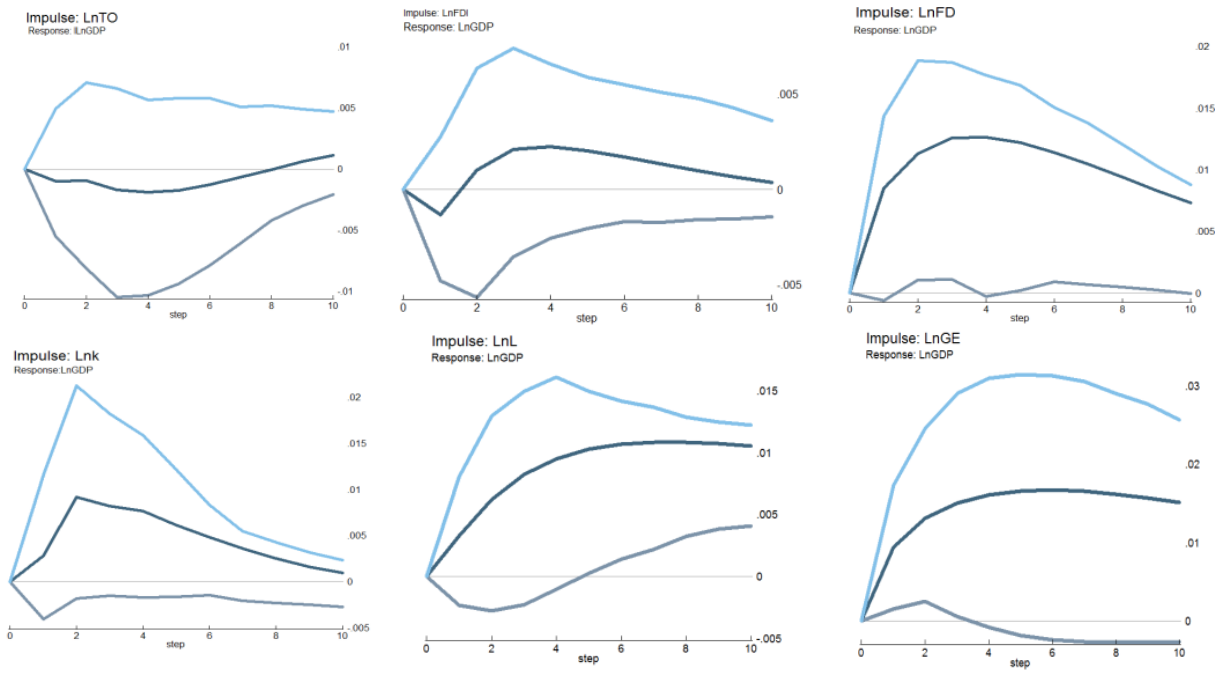

Figure 5. The impulse response function for the low-income countries. Note: The lines one and three show the 95% confidence interval band that was generated, based on 500 Monte Carlo simulations.

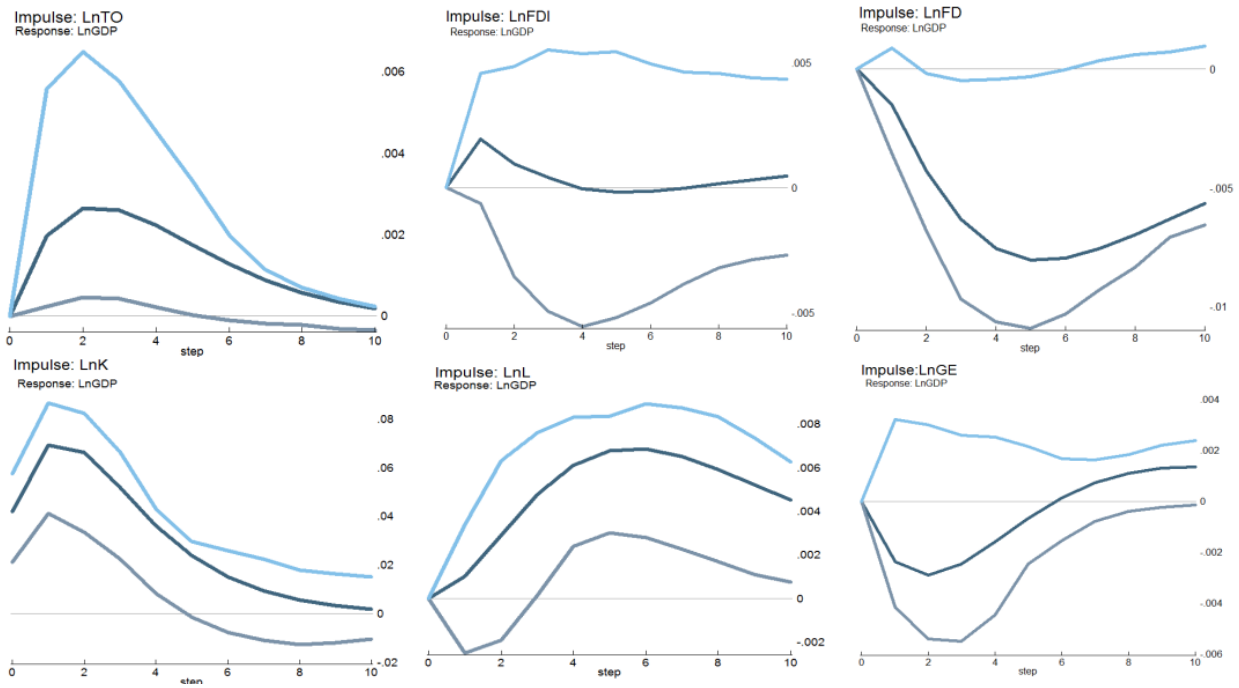

Figure 6. The impulse response function for the high-income countries. Note: The lines one and three show the 95% confidence interval band that was generated, based on 500 Monte Carlo simulations.

Though the IRF can determine the sign of influence, as well as the period in which the impact occurs, it is unable to determine the magnitude of influence [76,77]. As a result, we estimated the variance decomposition over 20 years. For further detail on the variance decomposition method, please see [78]. Results from the variance decomposition analysis for the low-income countries are displayed in Table 10. It is worth noting that in the 5th forecasting year, about 71% of the one-step forecast variance in economic growth is accounted for by its internal dynamic shocks, as well as a combined 29% from trade openness, FDI, financial development, capital, labor, and government expenditure. Response to the internal shocks results in a decline to 42% in the long run (year 20), while the external shocks from the other variables in the same period are projected to increase to 58%. The 58% consists of about 36% shock in trade openness, 14% dynamic shocks in financial development, ~4% from FDI and government expenditure, and less than 1% each from both capital and labor. These findings reiterate that while trade openness is projected to have a strong impact on economic growth, financial development is also likely, in the long term. This notwithstanding, the projected impact of FDI, government expenditure, capital, and labor appears to be minimal for low-income countries. In high-income countries, the forecast over five years indicates that an 87% response in economic growth is engineered by internal shocks, while altogether 13% account for the shocks in trade openness, FDI, financial development, capital, labor, and government expenditure. In the long term, however, the response of economic growth to its internal shocks declines to 48% (year 20). On the contrary, the dynamic shocks from the other variables are projected to increase from an accumulated 13% in year five to about 52% in year 20. The result implies that government expenditure, financial development, and trade openness will strongly impact economic growth in the future whereas the impact from FDI, capital, and labor is weak.

Table 10. Variance decomposition of economic growth for the low-income countries.

Period	LnGDP	LnTO	LnFDI	LnFD	LnK	LnL	LnGE
1	100.000	0.000	0.000	0.000	0.000	0.000	0.000
2	94.112	5.485	0.254	0.057	0.006	0.004	0.081
3	85.793	12.978	0.650	0.445	0.004	0.010	0.122
4	77.769	19.735	1.082	1.252	0.005	0.015	0.143
5	70.908	25.028	1.494	2.370	0.010	0.020	0.171
6	65.312	28.912	1.862	3.648	0.018	0.025	0.224
7	60.824	31.657	2.181	4.963	0.030	0.030	0.315
8	57.237	33.544	2.453	6.238	0.043	0.035	0.449
9	54.356	34.802	2.685	7.428	0.058	0.040	0.631
10	52.026	35.608	2.881	8.509	0.075	0.045	0.856
11	50.126	36.093	3.046	9.476	0.091	0.049	1.118
12	48.563	36.355	3.186	10.330	0.107	0.053	1.406
13	47.267	36.462	3.304	11.077	0.123	0.056	1.711
14	46.185	36.465	3.405	11.726	0.139	0.058	2.023
15	45.275	36.402	3.490	12.287	0.153	0.060	2.333
16	44.508	36.297	3.563	12.770	0.166	0.061	2.634
17	43.856	36.171	3.626	13.185	0.179	0.061	2.922
18	43.302	36.034	3.679	13.541	0.190	0.062	3.192
19	42.829	35.896	3.726	13.845	0.200	0.061	3.442
20	42.425	35.763	3.767	14.105	0.209	0.061	3.671

4.3. Discussion

In this section, we discuss the main variables of the study. From the forgoing, it is evident that the effect of trade openness on economic growth endorses the trade-led growth hypothesis in high- and low-income countries. This finding is consistent with Kong, et al. [2] and Radmehr, et al. [79]. Similarly, the result on FDI validates the FDI-led growth hypothesis. This implies that, for a sustained economic growth, countries must first open their borders for international trade and provide an enabling economic environment to attract foreign investment. This result is supported by Ciobanu [4]. However, these must be complemented with effective regulations and policies that will ensure that the host country benefits from the trade. For instance, Fatima, et al. [35] argue that trade openness boosts economic growth at a given level of human capital accumulation below which a detrimental effect will be realized. It is, therefore, important that countries invest in human capital development to take full advantage of the associated positive economic externalities. Furthermore, although FD promotes economic growth in the long term in low-income countries, it imposes a deteriorating effect in the same period in high-income countries. This finding, somehow, contradicts the study's expectation and that of Song, et al. [49], who advocate for a positive correlation between FD and economic growth in high-income countries and a negative effect in low-income countries. The reason is that the high prevalence of corruption and its related activities are high in low-income economies due to a weaker regulation and regulatory institution which hinders FD and, thus, drives economic development down. However, in high-income countries, which usually consist of developed economies, the effective supervision and bureaucratic processes discourage corruption and improve FD, which results in an improved economic development. It is therefore imperative for countries that are not benefiting from the positive economic externalities of FD, to implement effective policies and regulations and strengthen their bureaucratic processes to discourage corruption and its related activities to boost FD [73]. With regard to the outcome of this study, it is important to note that the kind of effect FD has on an economy, may depend on the stage or level of economic development. Most high-income countries are at the latter stages of economic development and are thus not prioritizing FD as a factor for economic growth, unlike low-income countries. This could possibly be the reason for our study outcome.

5. Conclusions and Policy Implications

This study provided new empirical evidence, via the use of a multivariate panel approach that ensured that different panel estimation techniques within the debate on trade openness, FDI, financial development, government expenditure, and economic growth as essential indicators of global economic development in both high- and low-income countries are explored. Considering the disparities in the economic strengths of the two sets of income groups, it is imperative to stress that the strength of the adopted analytical process for this study is enshrined in the robustness of the preliminary tests and applied models, as well as the careful selection of the direct explanatory variables and control variables. The robustness of the investigation techniques is affirmed by first determining the presence of CSD which signals the interdependence of the countries with common characteristics. The confirmation of the long run association among the variables at both order I(0) and I(1) and the presence of cointegration via the unit root and cointegration tests, justify the use of the PMG, MG, and DFE estimators. Upon satisfying the conditions for estimating the PMG, MG, and DFE, we proceeded to estimate the long and short run relationships among the variables. We also contributed to the ongoing economic debate by exploring the complex web of causal interaction between the variables. The IRF was then estimated to provide a pictorial view of the response of economic growth to the various shocks in each of the explanatory variables. However, given the limitation of the IRF, with regards to determining the magnitude of impact, the variance decomposition analysis was performed to address this problem.

The results for low-income countries reveal that trade openness, FDI, financial development, labor, and government expenditure positively impact economic growth in the long term, whereas in the short term, capital stock and government expenditure have positive and negative effects on economic growth respectively. Additionally, there is clear evidence of positive long run effects of trade openness, FDI, and capital stock on economic growth in high-income countries. On the contrary, financial development and government expenditure exert a negative influence on economic growth. The Granger causality Wald test for both low- and high-income countries, reveals a bidirectional causality between all variables indicating that the variables are interdependent, hence, policies targeting one variable would affect the other. Finally, the results from the IRF and variance decomposition for the low-income countries show high future impacts of trade openness and financial development on economic development while FDI, capital, labor, and government expenditure would be weak. For the high-income countries, trade openness financial development, and government expenditure are projected to have a huge impact in the long term with FDI, capital, and labor having a minimal impact.

Based on the findings noted in the previous section, the effect of trade openness on economic growth varies between poor and rich countries. In low-income countries, although trade openness plays a critical role in boosting economic growth in the long run, it hinders economic growth in the short term. Because the trade liberalization policies in these countries can lead to increased imports, the closure of low-productivity plants, industries, and jobs moving to other countries, have a comparative advantage [80]. Since trade openness contributes to both short and long term economic growth in high-income countries, policymakers could pursue policies that promote trade openness, such as concluding bilateral and multilateral trade agreements, granting tax exemptions, and other incentives to exporters, creating an attractive environment for international trade and relevant technology transfer [81]. In addition, according to the evidence obtained from the Granger causality test, trade openness has an effect on economic growth by affecting FDI in these income groups [33]. Since the long term economic growth of poor and rich countries depends on FDI flows, policymakers could encourage FDI inflows, especially to technology and knowledge-intensive businesses. These policies may help these countries elevate their technology and upgrade their productivity and competitiveness levels. Factors, such as access to skilled labor, adequate infrastructure, developed financial markets, access to international trade, and efficient administrative procedures, could have a significant effect

on attracting FDI, especially in poor countries. Therefore, to achieve sustainable economic growth, policymakers could adopt policies to meet these prerequisites.

The results of this study showed that financial development does not have the same effect on economic growth in both income groups. Given the positive long run impact of financial development on economic growth of poor countries, policymakers could pursue policies that lead to financial development, by focusing on ensuring that banks and financial institutions are able to provide the financial resources required for economic growth in this group of countries. Policymakers could ensure that the money supply in circulation is significantly diverted to the private sector for productive purposes [33]. Moreover, the evidence obtained from this study shows that financial development fails to affect the economic growth of rich countries. Schoenmaker [82] indicated that rich European countries have suffered from 'financial trilemma'-where financial stability, financial integration, and national financial policies are incompatible. Many of these countries do not have strong financial instruments to manage the rapid inflow of capital, which leads to delivering capital to the unproductive sector of the economy, which poses a systematic risk to the banking and financial sectors [83]. Hence, the adoption of policies that lead to the strengthening of the banking and financial systems of this group of countries is needed to achieve more favorable economic growth.

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