



Economic Growth Dynamics in Emerging Economies: The Impact of Monetary Policy, Oil Price Shocks, and Capital Flows - Evidence from Panel Data Models

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Abstract

This study examines the effects of monetary policy, foreign direct investment (FDI), oil prices, and international reserves on economic growth in selected emerging economies. The analysis uses annual panel data for eight countries (Turkey, Egypt, Mexico, Algeria, Indonesia, Malaysia, Brazil, and South Africa) over 2000–2024. The empirical strategy applies the Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) model and a Panel Error Correction Model (ECM). Results confirm a long-run equilibrium relationship among variables. In the long run, FDI, oil prices, and international reserves positively affect growth, while monetary expansion has a negative effect. Inflation is insignificant. Short-run results indicate rapid adjustment toward equilibrium with heterogeneous country responses. Granger causality shows unidirectional causality from money supply to growth and linkages between oil prices and liquidity. The findings highlight that sustainable growth requires coordinated macroeconomic policies, effective monetary transmission, and stronger external stability.

Keywords: Economic growth; monetary policy; oil price shocks; foreign direct investment; PMG-ARDL model

JEL Classification: : E52, O47, Q43, F41, C23

1.Introduction

Over the past few decades, countries with emerging and developing economies (EMEs) have whitened significant structural progress and transformation, strengthening their role as key players in the global economy structure. Once considered peripheral to advanced economies, these countries now contribute substantially to global output. According to purchasing power parity indicators, they account for more than two-thirds of global growth, reflecting a gradual shift in the center of global economic gravity toward these economies (World Bank, 2025; IMF, 2025).

This development and transformation can be attributed to several fundamental factors, most notably trade liberalization, the expansion of the productive base, and improvements in the investment environment. Additionally, demographic growth has played a key role in creating



a broad, productive, and consumer base. The role of these economies extends to being a major driver of global demand, whether through domestic consumption or through their increasing integration into global value chains. Some of these countries have also emerged as regional industrial and financial hubs, contributing to the reshaping of international trade patterns and foreign direct investment flows. In this context, these economies contribute significantly to corroborating the relative stability of the global economy, particularly during periods of slowdown in advanced economies (Frankel & Romer, 1999). However, this positive dynamic does not obscure the existence of a range of deep structural challenges, which expose economic growth in these countries to volatility and limit its sustainability. As a result, they suffer from structural weaknesses, including high vulnerability to external shocks, fragile productive structures, and limited economic diversification, as well as the weak effectiveness of macroeconomic policies and concerns regarding the efficiency of monetary policy transmission in these economies (Checo et al, 2024; De Leo et al, 2024).

In this scenario, the importance of studying the determinants of economic growth in these countries becomes evident. Monetary policy plays a prominent and central role in achieving macroeconomic stability and controlling inflation rates, which is directly reflected in the investment climate and economic growth rates. On the other hand, foreign direct investment is also considered one of the most important sources of external financing, as well as a channel for transferring technology and expertise, thereby enhancing the ability of emerging economies to integrate into the global economy (International Monetary Fund, 2023).

On the flipside, international reserves represent a key precautionary tool that helps strengthen these economies' capacity to counteract external shocks and maintain macroeconomic stability. Moreover, commodity prices are regarded as a fundamental and decisive variable in shaping the path of economic growth, especially in rentier economies that rely heavily on revenues from these resources (International Monetary Fund, 2019).

The countries under study (Algeria, Egypt, Turkey, Indonesia, Malaysia, Mexico, Brazil, and South Africa) represent a rich model that illustrates and reflects the diversity within the group of emerging economies. Despite sharing certain common characteristics, such as the pursuit of integration into the global economy and relatively rapid economic growth, there are crucial differences in their economic structures, levels of diversification, and degree of exposure to external shocks. Algeria represents a typical case of a rentier economy dependent on the hydrocarbons sector, which makes its economic performance highly sensitive to fluctuations in global oil prices. In contrast, countries such as Malaysia and Indonesia have succeeded in achieving a considerable degree of economic diversification by developing export-oriented industrial and technological sectors, thereby enhancing their economic resilience and ability to absorb shocks (World Bank, 2024).

However, countries as Turkey and Egypt face macroeconomic instability, particularly in terms of rising inflationary pressures and exchange rate volatility, in addition to challenges related to the fragility of monetary policy credibility and the declining effectiveness of its instruments in achieving economic stability (De Leo et al., 2024). Meanwhile, many emerging economies face



the challenge of the “middle-income trap,” where their transition toward high-income status is hindered. This is largely due to limited innovation, weak productivity, and the slow pace of structural transformation within the economy (Eichengreen, Park, & Shin, 2013). This situation is evident in the experiences of Brazil, Mexico, Turkey, Indonesia, South Africa, and Malaysia, which, despite achieving notable economic growth, continue to face significant difficulties in increasing value added and improving productive efficiency. This, in turn, limits their ability to achieve a qualitative leap toward a knowledge- and technology-based economy (World Bank, 2024).

Based on the above, and in order to better understand the dynamics of growth in emerging economies, it is essential to conduct a comprehensive analysis that takes into account the interaction between internal factors, such as economic policies and the productive structure, and external factors, including global financial conditions and fluctuations in international markets. In this context, the importance of this study emerges, as it aims to analyze the impact of a set of macroeconomic variables on economic growth in a sample of these countries, to generate results that can help guide economic policies toward achieving more sustainable and stable growth.

Accordingly, the main research problem of this study can be formulated as follows: How do monetary policy, oil prices, foreign direct investment, and international reserves affect economic growth in emerging economies? And do these effects differ depending on the economic structures of the countries? The importance of this issue increases in light of recent global economic transformations, particularly following the COVID-19 pandemic and the energy crisis, which have reshaped the environment of economic growth and deepened disparities between countries.

On the other hand, despite the large number of studies addressing these variables, most have focused on analyzing the effect of each factor separately or within a bilateral framework, while neglecting their joint interactions within a unified econometric model. Moreover, many studies have relied on homogeneous samples or regional groupings without adequately accounting for structural differences among emerging economies. Therefore, the research gap lies in the limited number of comprehensive studies that integrate these factors within a single model while considering structural heterogeneity, especially during recent periods marked by successive global shocks.

This study aims to fill this gap by analyzing the short and long-run effects of monetary policy, oil prices, foreign direct investment, and international reserves on economic growth in a sample of eight emerging economies over the period (2000–2024). It employs the Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) model, which allows for distinguishing between short-run dynamics and long-run equilibrium relationships, while accounting for cross-country heterogeneity. The study also seeks to provide an integrated analytical framework to better understand the transmission mechanisms of economic shocks and to offer appropriate policy recommendations tailored to different types of emerging economies.



The structure of this article is organized as follows: Section one presents the introduction; Section two reviews the relevant literature; Section three outlines the methodology and data used; Section four presents the empirical results; Section five discusses the findings; and Section six summarizes the article with key conclusions and policy recommendations.

2.Literature Review

2.1. Previous Studies

Economic literature increasingly agrees on the growing interest in studying the determinants of economic growth in emerging economies, especially in light of the complex interaction among monetary policy, foreign direct investment, international reserves, and oil prices. Despite the abundance and diversity of studies, most findings have been inconsistent, reflecting differences and disparities in the economic structures of countries (Zehri et al., 2024). This highlights the need for an integrative analysis that takes these structural differences into account in order to achieve a more comprehensive understanding of economic dynamics.

Monetary policy represents a cornerstone in economic studies that investigate the drivers of growth, as its effectiveness varies according to the level of economic development. In a study on Ethiopia, Hailu & Debele (2015) confirmed, through the use of the Autoregressive Distributed Lag Model (ARDL) model, the pivotal role of monetary expansion in stimulating private investment in both the short and long run. Meanwhile, Twinoburyo and Odhiambo (2018), using comparative econometric methodologies to analyze the effectiveness of monetary policy in advanced and emerging economies, found that the impact of monetary policy is stronger in advanced economies than in emerging ones. This is attributed to the development of financial markets, the effectiveness of monetary policy transmission channels, and the stability of the institutional framework.

Regarding foreign direct investment, the literature indicates clear variation in its outcomes depending on the nature of the economy and the accompanying macroeconomic framework. Karahan and Bayır (2022) relied on analytical econometric models to examine the effect of expansionary monetary policies on foreign direct investment inflows and concluded that such policies contribute to enhancing these inflows. On the other hand, Zardoub (2023) used long-run econometric models to analyze the relationship between foreign investment and economic growth, finding that foreign direct investment has a limited influence on some developing economies in the long term. Similarly, Makanda and Fasanya (2025) employed time-series analysis models to study the impact of economic stability and concluded that foreign direct investment may have a negative effect in unstable environments. In addition, Sultana et al (2024) used financial stability and exchange rate analysis models and highlighted that these two factors constitute key determinants for attracting foreign direct investment inflows.

However, regarding oil prices, the literature has reached heterogeneous conclusions regarding the nature of their impact and transmission channels. Danladi (2025) relied on economic shock analysis models to examine the relationship between oil prices and monetary policy, concluding that declining oil prices deepen the negative effects of monetary shocks on growth in oil-importing countries. In contrast, Mugodzva and Marozva (2025) employed co-



integration models and long-run time-series analysis and confirmed the existence of a positive effect of oil consumption on economic growth in the long run. Likewise, Pea-Assounga et al. (2025) used a multiple linear regression model for comparative macroeconomic analysis to study exporting countries, and their findings demonstrated the positive role of oil prices in supporting growth despite the existence of environmental effects that reduce net economic gains. In their study, Faisal et al. (2021) relied on structural econometric models to analyze the relationship between oil prices and growth, and their results indicated a negative impact in some economies, which could nevertheless be mitigated through economic diversification. Meanwhile, Agboola et al. (2024) employed nonlinear regression models to analyze oil shocks and revealed the asymmetric nature of these shocks and their repercussions on economic stability.

With regard to international reserves, Benli and his coworkers used Cross-Sectionally Augmented Autoregressive Distributed Lag Model; the findings showed that higher levels of international reserves contribute to supporting economic growth by reducing inflation and limiting exchange rate volatility (Benli et al. 2022). In the same direction, Vieira and da Silva (2022), relying on long-run growth analysis models in open economies, concluded that increasing reserves enhances economic stability and growth in the long term, although it may lead to temporary opportunity costs in the short run. Within the African context, Thabana and Fasanya (2024), using economic institutional analysis models, highlighted that the effectiveness of reserves in promoting growth increases under conditions of strong institutional stability. Similarly, Kashif et al. (2017), through the use of dynamic time-series models, demonstrated the existence of a positive relationship between international reserves and economic growth, particularly in rentier economies dependent on primary commodity exports. Based on the abovementioned literature, it can be observed that there is substantial divergence in the previous literature regarding the direction and strength of the relationship between the variables under study. This reflects a lack of theoretical consensus and conclusive empirical findings. Such inconsistencies can be attributed to differences in the econometric methodologies employed, variations in the time periods examined, and the structural specificities of the economies under investigation. Moreover, most previous studies have been partial in nature, addressing these variables either separately or within narrow frameworks, thus lacking an integrative perspective capable of combining these factors into a unified model that can account for the structural heterogeneity of emerging economies, particularly in the North African region. This is precisely what the present study seeks to address through the use of the Panel Autoregressive Distributed Lag Model.

2.2. Research Gap and Hypotheses Development

Based on the foregoing, the research gap becomes clearly evident in the lack of comprehensive studies that integrate monetary policy, oil prices, foreign direct investment, and international reserves within a unified econometric framework, particularly through the use of dynamic models such as PMG-ARDL that account for heterogeneity among countries. Moreover, the



joint interaction among these variables has not been sufficiently examined, especially in the context of mixed emerging economies (both oil-exporting and oil-importing countries).

In light of the theoretical literature and previous empirical findings, the study hypotheses are formulated as follows:

H1. Monetary policy significantly affects economic growth, with the strength of the effect varying according to institutional effectiveness and monetary stability.

H2. Foreign direct investment contributes to enhancing long-term economic growth, particularly in open and diversified economies.

H3. The impact of oil prices on economic growth differs depending on the nature of the economy, between oil-exporting and oil-importing countries.

H4. International reserves contribute to supporting economic growth by corroborating macroeconomic stability and reducing external shocks.

3.Data and Methodology

3.1. Data sources

To investigate the impact of monetary policy, foreign direct investment, oil prices, and international reserves on the growth rate of Gross Domestic Product (GDP), this study relies on data obtained from the World Bank database, specifically from the World Development Indicators (WDI). The study period covers the years 2000–2024. The dependent variable in this study is the GDP growth rate, while the main independent variables include broad money supply (BMNY) as an indicator of monetary policy and monetary liquidity, foreign direct investment (FDI), the rate of change in global oil prices (OILP), and the rate of change in international reserves (TOTRES). Additionally, the inflation rate (INF) is included as a control variable as presented in Table 1.

Table 1. Description of Variables

Variable name	Description
GDP (Growth rate %)	Dependent variable representing the annual growth rate of real Gross Domestic Product (GDP), expressed in percentage terms
BMNY (% of GDP)	Broad Money (M2) as a percentage of GDP is used as a proxy for monetary expansion and financial development.
FDI_GDP (%)	Net inflows of Foreign Direct Investment as a percentage of GDP, capturing external capital inflows.
OILP (Growth %)	Annual growth rate of international oil prices, reflecting external shocks affecting oil-dependent economies
TOTRES (Growth %)	Growth rate of total international reserves, indicating external financial stability and liquidity conditions
INF (%)	Annual inflation rate measured by the Consumer Price Index (CPI), representing macroeconomic instability

Source: Author's construction based on World Bank (WDI, 2026).



The study Sample

The study sample consists of eight emerging and middle-income countries selected to ensure geographical and economic diversity according to the 2026 classification of the World Bank. The sample includes the following countries: Turkey, Mexico, Algeria, Indonesia, Malaysia, Brazil, South Africa, and Egypt. These countries are classified as emerging economies. Turkey, Mexico, Brazil, South Africa, and Malaysia belong to the upper-middle-income category, whereas Algeria, Egypt, and Indonesia are classified as lower-middle-income countries according to the World Bank classifications. This diversity reflects significant differences in the economic structures of the selected countries. For instance, Algeria relies heavily on oil resources, while Malaysia and Indonesia are characterized by advanced industrial and export-oriented economies. Brazil and Mexico are among the largest economies in Latin America, whereas Turkey combines industry, tourism, and services in its economic structure. South Africa represents the most developed economy on the African continent, while Egypt plays a prominent and strategic economic role in the Middle East and North Africa. Such diversity provides a more comprehensive framework for analyzing the impact of monetary and external variables on economic growth across different economic environments (World Bank, 2026).

3.2. Basic estimation technique

This study seeks to examine the impact of a set of economic and financial determinants on economic growth. The dependent variable is measured by the GDP growth rate, while the independent variables include broad money supply (BMNY) as an indicator of financial development, foreign direct investment (FDI), fluctuations in global oil prices (OILP), and changes in international reserves (TOTRES), in addition to the inflation rate (INF).

$$GDP_{it} = \alpha_0 + \alpha_1 BMNY_{it} + \alpha_2 FDI_{it} + \alpha_3 OILP_{it} + \alpha_4 TOTRES_{it} + \alpha_5 INF_{it} + \varepsilon_{it} \quad (1)$$

Where GDP represents the growth rate of gross domestic product, BMNY denotes broad money supply as an indicator of financial development, FDI refers to foreign direct investment, OILP represents the volatility of global oil prices, TOTRES indicates the variation in international reserves, and INF stands for the inflation rate. The term ε denotes the stochastic error term, while the subscripts i and t refer respectively to the cross-sectional dimension (country) and the time dimension.

3.3. Cross-sectional dependency and unit root tests

When analyzing the long-term relationship among variables, testing for cross-sectional dependence is considered an essential step before proceeding with econometric estimation. Ignoring this type of dependence in panel co-integration models may lead to inaccurate and unreliable results. Such dependence is generally attributed to the presence of unobserved common factors that simultaneously affect cross-sectional units, such as global pandemics, climate change, international financial crises, technological developments, the spread of diseases, and transboundary pollution. These factors may generate correlation in the error terms over time, leading to spurious results if they are not properly accounted for in econometric models.



In this context, the present study employs the cross-sectional dependence test proposed by M. Hashem Pesaran (2004) to detect the existence of this type of dependence among cross-sectional units. The test statistic is expressed as follows:

$$D = \sqrt{\left(\frac{2T}{N(N-1)}\right)} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \rho_{ij} \sim N(0,1) \quad (2)$$

Where N represents the number of cross-sectional units, and T denotes the number of time periods, while ρ_{ij} refers to the pairwise correlation coefficient between the residuals of the model for each pair of cross-sectional units.

To test for the presence of a unit root, the CADF and CIPS tests developed by M. Hashem Pesaran (2007) were used. These tests take into account the property of cross-sectional dependence among countries, which gives them an advantage over first-generation tests that assume cross-sectional independence. Therefore, these tests are considered more appropriate and accurate in the presence of cross-sectional dependence in panel data.

The corresponding equations are presented below:

$$\Delta Y_{it} = \alpha_1 + p_i Y_{it-1} + \beta_i Y_{it-1} + \sum_{j=0}^k Y_{ij} \Delta Y_{it-1} + \sum_{j=0}^k \delta_{ij} \Delta Y_{it-1} + \varepsilon_{it} \quad (3)$$

$$CIPS = \left(\frac{1}{N}\right) \sum_{i=1}^N t_i(N, T) \quad (4)$$

Where α_i is a deterministic term, k is the lag order, y_t is the cross-sectional mean of time t

3.4. Panel regression model

This study relies on an econometric analysis using the Panel Autoregressive Distributed Lag (Panel ARDL) model, based on the Pooled Mean Group (PMG-ARDL) approach developed by Pesaran et al. (1999). This methodological framework is used to measure the relationship between economic variables in both the short and long term within a flexible dynamic setting that allows for heterogeneous responses across cross-sectional units. This model is particularly suitable for data that combine time series and cross-sectional dimensions, especially when variables are stationary at level $I(0)$, at first difference $I(1)$, or a mix of both, provided that none of the variables are integrated of order two $I(2)$. These properties have been verified using panel unit root tests, which confirmed the appropriateness of applying the Panel ARDL model. The model is based on separating short-run effects from long-run relationships through the inclusion of an Error Correction Term (ECT), which allows us to measure the speed of adjustment back to equilibrium following any economic shocks.

This econometric model is distinguished by its ability to address several common econometric problems, such as autocorrelation, heteroskedasticity, multicollinearity between variables, and the issue of endogeneity. These features enhance the reliability of the estimated results (Pesaran, Shin, & Smith, 1999).

The estimation framework consists of three main models:

- Pooled Mean Group (PMG) model
- Mean Group (MG) model



- Dynamic Fixed Effects (DFE) model

The Hausman test (Hausman, 1978; Baltagi, 2021) was used to choose between these models. The results indicated that the PMG model is the most statistically and economically appropriate; therefore, it was adopted to estimate the long-run relationships between the variables under study.

The following presents the empirical equations of the PMG model (Pesaran, Shin, & Smith, 1999):

$$GDP_{it}\alpha_i + \sum_{j=1}^p \beta_{ij}GDP_{it-j} + \sum_{j=1}^q \delta_{ij}Z_{it-j} + \varepsilon_{it} \quad (5)$$

Where

$$z_{it} = (BMNY, FDI, OILP, TOTRES, INF) \quad (6)$$

α_i represents the country fixed effects;

β_{ij} shows parameter estimates of lagged GDP;

δ_{ij} indicates the coefficients of the lagged explanatory variables;

ε_{it} represents the stochastic error term.

3.5 Panel causality test

In order to examine the causal relationships among the various variables under study, this research employs the panel data causality test developed by Elena-Ivona Dumitrescu and Christophe Hurlin (2012), which is based on the Granger Causality framework. This test is considered one of the advanced econometric approaches for analyzing causality in panel data models due to its ability to account for unobserved heterogeneity across economic units. This test was selected over other traditional causality tests because it possesses strong statistical properties, providing consistent and reliable results even in the case of small samples and in the presence of cross-sectional dependence among units. It is also highly flexible in dealing with unbalanced panel data, in addition to allowing for different lag structures across countries or cross-sectional units, which makes it particularly suitable for the nature of the data used in this study.

The test is employed to identify the directions of dynamic causality among the variables, and its standard specification is presented as follows:

$$Y_{it} = \sum_{j=1}^d \alpha_i(d)Y_{it-d} + \sum_{j=1}^d \beta_i(d)X_{it-d} + \varepsilon_{it} \quad (7)$$

Where Y and X represent the following variables: Gross Domestic Product growth rate (GDP), broad money supply (BMNY), foreign direct investment (FDI), world oil prices (OILP), international reserves (TOTRES), and inflation rate (INF). d represents the length of lag periods, while $\alpha_i(d)$ denotes the autoregressive coefficients specific to each cross-sectional unit. In contrast, $\beta_i(d)$ represents the coefficients that allow for heterogeneity across cross-sectional units (heterogeneity) among the countries under study.



4. Results

4.1. Descriptive Statistics

In this section, a descriptive presentation of the study variables is provided through the use of the most common and important basic statistical measures, such as the arithmetic mean and standard deviation, in order to identify the characteristics of the data and the extent of their variability, as indicated below in Table 2. In addition, this analysis helps provide a preliminary overview of the nature of the variables before proceeding to econometric estimation and hypothesis testing.

Table 2. Descriptive Statistics of the Variables Under Study

Variable	Mean	Median	Max	Min	Std Dev	Skewness	Kurtosis	Jarque-Bera
GDP (Growth rate %)	3.53	3.80	11.81	-8.35	3.01	-0.99	5.51	84.80
BMNY (% of GDP)	68.70	65.42	140.09	21.36	30.45	0.75	2.76	19.20
FDI_GDP (%)	1.61	1.55	6.17	-1.15	1.27	0.68	3.40	16.53
OILP	9.88	11.72	67.18	-43.63	28.20	0.01	2.24	4.82
TOTRES	9.32	5.21	120.57	-49.67	19.73	1.99	11.21	690.85
INF (%)	7.75	5.19	72.31	-1.14	9.92	4.09	21.57	3414.36

Source: Author's calculations based on EViews 13 output.

The descriptive statistical results indicate a clear variation in the behavior of the variables under study. The GDP growth rate exhibited noticeable fluctuations between periods of expansion and contraction, with a standard deviation reflecting a considerable degree of volatility. As for broad money supply as a percentage of GDP and foreign direct investment, both variables recorded varying levels of dispersion, reflecting differences in economic and financial policies among the countries under study. In contrast, oil prices showed significant fluctuations during the study period, while the indicators of international reserves and inflation rate revealed high levels of variability and instability, reflecting evident economic imbalances among the observed values. Regarding the distributional properties, the skewness and kurtosis values, together with the Jarque–Bera statistic, indicate that most variables do not follow a normal distribution, which is a common characteristic of macroeconomic data.

In summary, the results revealed the existence of clear heterogeneity as well as temporal and cross-sectional fluctuations among the study variables. This finding methodologically supports



the use of Panel ARDL models, as they are considered the most appropriate framework for analyzing the dynamic relationships among these variables. After presenting and analyzing the basic statistical characteristics of the study variables, the analysis proceeds to examine the preliminary linear relationships among them through the correlation matrix.

Table 3. Pairwise correlation matrix

	GDP	BMNY	FDI_GDP	OILP	TOTRES	INF
GDP	1.00					
BMNY	0.04	1.00				
FDI_GDP	0.20	0.23	1.00			
OILP	0.49	-0.06	0.06	1.00		
TOTRES	0.20	-0.12	-0.01	0.19	1.00	
INF	0.07	-0.17	-0.13	0.03	0.00	1.00

Source: Author's calculations based on EViews 13 output.

The results presented in Table 3 reveal the existence of varying linear relationships among the economic variables under study during the study period for a sample consisting of eight countries. The table shows that the GDP growth rate is positively correlated with oil prices, foreign direct investment, and total reserves, indicating the stimulating role of these variables in supporting economic growth. In contrast, economic growth exhibits a very weak correlation with broad money supply, reflecting the limited effect of monetary liquidity on economic performance in the short run. As for the inflation rate, it is weakly and negatively associated with most variables, reflecting its adverse impact on investment and liquidity.

The results also reveal a positive relationship between oil prices and total reserves, alongside a negative relationship with broad money supply, highlighting the sensitivity of the economies under study to fluctuations in oil prices. In general, the correlation matrix indicates that most relationships range from weak to moderate, with the relationship between economic growth and oil prices emerging as the strongest correlation. This finding supports the use of dynamic multivariate models in the econometric analysis.

4.2. Results of the cross-sectional dependence and unit root test

This section aims to test for the existence of cross-sectional dependence among the economic units under study in order to verify the extent of independence among the countries within the sample, which constitutes an essential step before applying the appropriate panel unit root tests as indicated in Table 4.

Table 4. Cross-Sectional Dependence Test

Test	Statistic	p-value
Breusch-Pagan LM	105.29	00000
Pesaran scaled LM	10.33	00000
Pesaran CD	6.02	00000

Source: Author's calculations based on EViews 13 output.



The results presented in the table above indicate the existence of strong cross-sectional dependence among the countries under study. All the tests employed (Breusch–Pagan LM, Pesaran scaled LM, and Pesaran CD) show statistically significant values at the 1% significance level, leading to the rejection of the null hypothesis that assumes cross-sectional independence. This implies the presence of economic interdependence and common interactions among the countries, which is common in studies dealing with interconnected economies or economies affected by common external shocks such as oil price fluctuations or global economic crises. Accordingly, the second-generation Panel Unit Root test, namely the CIPS Panel Unit Root Test (Westerlund et al., 2016), is adopted, as it is appropriate in the presence of cross-sectional dependence and thus ensures the accuracy and reliability of the stationarity test results for the variables. The following presents the results of the CIPS test for the variables under study:

Table 5. CIPS Panel Unit Root Test Results for Selected Variables

Variable	CIPS t-stat	Truncated CIPS t-stat	p-value (CIPS)	p-value (Truncated)	Integration Order
GDP	-3.684	-3.061	0.000	0.000	I(0)
BMNY	-15.942	-3.053	0.000	0.012	I(0)
FDI_GDP	-2.564	-2.564	0.031	0.031	I(0)
OILP	—	0.000	0.118	0.118	I(1)
TOTRES	-12.144	-2.636	0.000	0.087	I(0)
INF	-0.791	-3.380	0.142	0.000	I(1)

Source: Author's calculations based on EViews 13 output.

After testing the stationarity of all panel variables using the Cross-sectionally Augmented IPS (CIPS) test, and taking into account the presence of cross-sectional dependence that was previously confirmed, as shown in Table 5, the results indicate that some variables are stationary at level I(0), while others become stationary after first differencing I(1), with no variable found to be integrated of order I(2). This confirms the suitability of the dataset for applying the PMG-ARDL model and ensures the reliability of subsequent co-integration tests. It also allows for an accurate separation between short-run and long-run dynamics.

4.3. Co-integration test results

In order to verify the existence of a long-run equilibrium relationship among the variables under study, cointegration tests are conducted using two commonly employed panel data tests, namely the Pedroni (1999) test and the Kao (1999) test. These tests are used because of their ability to detect cointegration in the presence of heterogeneity across cross-sectional units, as presented in Tables 6 and 7.



Table 6. Pedroni Panel Cointegration Test Results

Test	Statistic	p-value	Result
Panel PP-Statistic	-2.117	0.017	Significant
Panel ADF-Statistic	-2.145	0.016	Significant
Group PP-Statistic	-1.193	0.116	Not significant
Group ADF-Statistic	-1.197	0.116	Not significant

Source: Author's calculations based on EViews 13 output.

Table 7. Kao Residual Cointegration Test Results

Component	Statistic	Value
Kao ADF Test	t-statistic	-1.980
	p-value	0.023
Residual Variance	—	7.4253
HAC Variance	—	0.790

Source: Author's calculations based on EViews 13 output.

The results of the Pedroni and Kao cointegration tests indicate the existence of a long-run equilibrium relationship among the variables under study. The results of the Pedroni test show statistical significance for both within-dimension statistics (Panel PP-statistic and Panel ADF-statistic) at the 5% significance level, which allows the rejection of the null hypothesis of no cointegration. Meanwhile, the between-dimension statistics (Panel v-statistic and Panel rho-statistic) did not show statistical significance. The Kao cointegration test also confirms the existence of a significant long-run relationship, as the ADF statistic was negative and statistically significant at the 5% level, thereby reinforcing the results of the Pedroni test.

Based on these findings, it can be confirmed that cointegration exists among the variables under study during the analyzed period, which supports the use of Panel ARDL (PMG) models in estimating both long-run and short-run relationships with greater accuracy.

4.4. Panel PMG-ARDL results

The Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) model was employed to analyze the relationship among the study variables due to its ability to handle heterogeneous panel data and provide accurate dynamic estimations. This model is based on the methodology developed by M. Hashem Pesaran et al. (1999), which offers an integrated framework combining structural changes and dynamic relationships among variables. In this context, both long-run and short-run relationships were analyzed within the general framework of the model, allowing for a comprehensive understanding of the dynamics of the variables under study. The estimation results of the model are presented in the following tables.



Table 8. Long-run (Pooled) coefficients

Variable	Coefficient	Std Error	t-Statistic	p-value
BMNY	-0.0149	0.0050	-2.993	0.0031
FDI_GDP	0.7276	0.1455	5.001	0.0000
OILP	0.0233	0.0082	2.839	0.0050
TOTRES	0.0304	0.0087	3.483	0.0006
INF	-0.0140	0.0185	-0.757	0.4502
C	3.6896	0.4469	8.255	0.0000

Source: Author's calculations based on EViews 13 output.

Table 9. Short-run dynamics (Mean Group coefficients)

Variable	Coefficient	Std Error	t-Statistic	p-value
COINTEQ	-0.6514	0.0751	-8.679	0.0000
D(BMNY)	-0.3716	0.1426	-2.606	0.0010
D(FDI_GDP)	0.6104	0.4418	1.382	0.1687
D(OILP)	0.0143	0.0096	1.501	0.1350

Source: Author's calculations based on EViews 13 output.

The estimation results of the Panel PMG-ARDL model reveal the existence of dynamic relationships between the study variables and economic growth (GDP) during the study period, as presented in the tables above.

In the long term, the results indicate that broad money supply (BMNY) has a negative and statistically significant effect on economic growth, with a coefficient of (-0.0149) and a probability value of (0.0031), significant at the 1% level. In contrast, foreign direct investment (FDI_GDP) exhibits a strong positive and statistically significant impact on economic growth, with a coefficient of 0.7276 and a probability value of 0.0000, indicating a very high level of statistical significance. Similarly, oil prices (OILP) positively and significantly affect economic growth, with a coefficient of 0.0233 and a probability value of 0.0050. Total reserves (TOTRES) also exert a positive and statistically significant effect, with a coefficient of 0.0304 and a probability value of 0.0006. However, the inflation rate (INF) appears to be statistically insignificant, as its coefficient reached (-0.0140) with a probability value of (0.4502).

In the short run, the error correction term (COINTEQ) is negative (-0.6514) and statistically significant at the 1% level, with a probability value of 0.0000. This indicates that approximately 65.14% of short-run disequilibria are corrected within one period in order to return to the long-run equilibrium. The remaining short-run results show that changes in broad money supply (D(BMNY)) negatively and significantly affect economic growth, with a coefficient of (-0.3716) and a probability value of (0.001). On the other hand, changes in both foreign direct investment (FDI_GDP) and oil prices (OILP) do not exhibit statistically significant effects, with probability values of 0.1687 and 0.1350, respectively.



Overall, the results demonstrate that long-run relationships among the variables possess stronger explanatory power and higher statistical significance compared to short-run effects, reflecting the stability of the model's equilibrium structure over time. Furthermore, the significance of the error correction coefficient confirms the existence of an effective adjustment mechanism that restores equilibrium following short-run disturbances. This finding supports the presence of a long-run equilibrium relationship among the variables under study and reinforces the robustness of the adopted model.

4.5. Cross-Country Empirical

Results of the Panel ECM Model

This section is based on the Panel Error Correction Model (Panel ECM) to study the short-term dynamics and the equilibrium relationship among the variables. The estimation is conducted individually for each country under study in order to highlight the heterogeneity in their economic responses and the speed of adjustment toward the long-term equilibrium. The following table presents the empirical results for each country separately in the short term.

Table 10. Short-Run ECM Results for Emerging Economies (Panel ARDL)

Country	COINTEQ	D(BMNY)	D(FDI_GDP)	D(OILP)
Turkey	-0.989*** (t=-5.734, p=0.00001)	-0.232** (t=-2.118, p=0.047)	1.635* (t=1.789, p=0.089)	0.051*** (t=2.858, p=0.0097)
Egypt	-0.678** (t=-2.572, p=0.018)	0.012 (t=0.363, p=0.721)	0.200 (t=0.410, p=0.686)	-0.009 (t=-0.961, p=0.348)
Mexico	-0.487*** (t=-3.585, p=0.0019)	-1.272*** (t=-3.743, p=0.0013)	-0.108 (t=-0.189, p=0.852)	0.042** (t=2.321, p=0.031)
Algeria	-0.616*** (t=-3.422, p=0.0027)	-0.138* (t=-1.764, p=0.093)	-0.730 (t=-0.872, p=0.393)	0.011 (t=0.902, p=0.378)
Indonesia	-0.752*** (t=-5.199, p=0.00005)	-0.597*** (t=-5.258, p=0.00004)	-0.543* (t=-1.733, p=0.099)	0.004 (t=0.476, p=0.639)
Malaysia	-0.821*** (t=-5.964, p=0.000008)	-0.301*** (t=-6.699, p=0.0000016)	0.122 (t=0.480, p=0.636)	-0.029* (t=-2.077, p=0.051)
Brazil	-0.574*** (t=-3.985, p=0.0007)	-0.283*** (t=-3.066, p=0.0061)	1.424 (t=1.521, p=0.144)	0.010 (t=0.664, p=0.514)
South Africa	-0.295 (t=-1.537, p=0.140)	-0.162 (t=-1.217, p=0.238)	2.884 (t=1.568, p=0.133)	0.034** (t=2.513, p=0.021)



Source: Author's calculations based on EViews 13 output.

Notes:

- ✓ Values reported as: Coefficient (t-statistic, p-value) ;
- ✓ ***, **, * indicate significance at 1%, 5%, 10% ;
- ✓ COINTEQ represents the speed of adjustment toward the long-run equilibrium.

The results of the Panel Error Correction Model (Panel ECM) for the eight countries under study, as shown in Table 11, indicate the presence of a long-term equilibrium relationship among the economic variables. The error correction coefficients (COINTEQ) are negative for all countries and statistically significant in most cases, confirming the validity of the ARDL-ECM model in explaining economic dynamics.

The results also reveal differences and variations in the speed of adjustment across countries. Turkey recorded the highest adjustment speed with a coefficient of (-0.989431), followed by Malaysia (-0.821316), Indonesia (-0.751732), Egypt (-0.677733), Algeria (-0.615908), Brazil (-0.573614), and Mexico (-0.486851), all of which are statistically significant. In contrast, South Africa recorded the lowest correction speed, with a coefficient of (-0.294732) and no statistical significance.

In the short run, the changes in the money supply (D(BMNY)) showed negative and significant effects in a number of countries, while they were not significant in others. As for foreign direct investment flows (D(FDI_GDP)), they were mostly statistically insignificant, with a few limited exceptions showing varying effects. Regarding oil prices (D(OILP)), their effects varied across countries, with positive and significant impacts observed in some economies, negative and significant in others, while remaining insignificant in the remaining cases. Overall, these results reveal structural heterogeneity across countries in terms of the speed of adjustment to economic imbalances, as well as in the magnitude and significance of the short-term effects of the variables. This highlights the differences in economic characteristics and the degree of responsiveness of these economies to shocks.

4.6. Panel causality test results

To determine whether changes in one variable precede and explain changes in other variables, we conduct a test of the causal direction among the variables under study, relying on panel data causality tests. The following are the results of the panel causality test between the study variables:

Table 11. Panel Pairwise Granger Causality Analysis

Null Hypothesis	F-Statistic	Prob
BMNY does not Granger Cause GDP	4.12774	0.0177**
GDP does not Granger Cause BMNY	0.75579	0.4711
FDI does not Granger Cause GDP	0.30540	0.7372
GDP does not Granger Cause FDI	0.11340	0.8929
OILP does not Granger Cause GDP	1.30149	0.2747

Source: Author's calculations based on EViews 13 output.



From the table above, the results of the pairwise Granger causality test indicate a unidirectional causal relationship running from broad money supply (BMNY) to economic growth (GDP), as the relationship is statistically significant at the 5% level. This implies that changes in the money supply precede changes in economic growth. In contrast, no significant causal relationship was recorded from either foreign direct investment (FDI) or oil prices (OILP) to economic growth, as the probability values are not statistically significant. This indicates the absence of a direct causal effect of these two variables on economic growth during the study period.

5. Discussion of Results

Discussing the results is an essential and important step in the study, as it allows for the interpretation and evaluation of statistical findings in light of the theoretical framework and previous studies, thereby enabling the extraction of economic and scientific implications from the obtained results. In this context, the empirical results reveal a clear structural heterogeneity in economic performance among the countries under study during the period 2002–2022. The descriptive statistics show cyclical fluctuations in GDP growth between periods of expansion and contraction, along with high levels of dispersion in both money supply and foreign direct investment, indicating differences and variations in economic and financial policies across countries. They also show that oil prices experienced considerable and significant fluctuations. Meanwhile, international reserves and inflation rates reflect clear disparities in economic stability. The Jarque-Bera indices, skewness, and kurtosis confirm that most variables do not follow a normal distribution, indicating the nonlinear and complex nature of macroeconomic data and justifying our use of dynamic models such as the Panel ARDL.

In the preliminary analysis phase, the correlation matrix reveals varying relationships among the variables. For example, economic growth is positively correlated with oil prices, foreign direct investment, and international reserves, highlighting their stimulative role in supporting economic activity. In contrast, there is a weak correlation between economic growth and the money supply, indicating the limited effectiveness of monetary liquidity in the short term. The inflation rate is negatively correlated with most study variables, reflecting its restrictive impact on investment and macroeconomic stability. The matrix also shows a clear positive relationship between oil prices and international reserves, contrasted with a negative relationship with the money supply, indicating the sensitivity of these economies to oil price shocks, with oil prices emerging as the strongest determinant of economic growth.

The results of cross-sectional dependence tests (Breusch-Pagan LM, Pesaran CD, and others) show a strong and significant interdependence among countries at the 1% level, revealing common shocks and mutual economic interactions, particularly those related to global markets and oil prices. On this basis, the second-generation unit root test (CIPS) was adopted, which showed that the variables are stationary either at the level or after first differencing, with no variable integrated of order two, supporting the suitability of the Panel ARDL (PMG) model. Furthermore, the results of the cointegration tests (Pedroni and Kao) confirmed the existence of a long-term equilibrium relationship among the variables, indicating their common



movement toward a stable equilibrium path despite short-term imbalances, which strongly supports the use of the PMG-ARDL model to disentangle short-term and long-term dynamics. Regarding the estimation outputs, the results show a long-term equilibrium relationship between the variables and economic growth, with clear structural heterogeneity evident in the short-term responses, reflecting differences in the level of institutional and financial maturity across countries. In the long term, monetary expansion negatively affects economic growth, indicating the weak and limited transformation of liquidity into productive investment in some economies, particularly rentier ones. This is consistent with the limitations of financial intermediation and the misallocation of credit, partially aligning with the findings of Hailu & Debele (2015) on the stimulative role of money, though it differs in economies suffering from weak institutional efficiency.

As for foreign direct investment (FDI), its effect on economic growth is positive and strong in the long term, especially in economies with high trade and financial openness. This aligns with the findings of Karahan and Bayır (2022) and concurrently confirms what Zardoub (2023) and Makanda and Fasanya (2025) pointed out that the effectiveness of FDI depends on institutional and economic stability and can be limited or even negative in unstable environments. These results are also consistent with Sultana et al. (2024) regarding the importance of financial stability and the exchange rate as key determinants for attracting FDI flows. Regarding oil prices, their effect on economic growth is positive in the long term, with variations in the short term, reflecting the rentier nature of some economies and their near-total dependence on natural resources as a primary driver of economic growth. This is consistent with the heterogeneous literature: Mugodzva and Marozva (2025) and Pea-Assounga et al. (2025) confirmed a positive effect in exporting countries, while Danladi (2025) pointed out that oil price volatility may amplify monetary shocks in importing countries. The results of Agboola et al. (2024) and Faisal et al. (2021) further support the nonlinear nature and asymmetric effects of oil price shocks.

With respect to international reserves, the results show a positive effect and a clear role in economic growth, consistent with Benli et al. (2022), who emphasized their role in reducing inflation and stabilizing the exchange rate, as well as Vieira and da Silva (2022), who highlighted their role in enhancing long-term growth despite short-term costs. This is further supported by Thabana and Fasanya (2024) and Kashif et al. (2017) regarding their importance, especially in rentier economies.

Regarding short-term dynamics, the results of the (negative) error correction coefficient confirm the existence of an effective equilibrium adjustment mechanism toward the long-term path. However, the lack of significance of most variables reflects the slow transmission of the impact of economic policies due to structural constraints and weak financial channels. The variation across countries also reveals clear differences in the speed of adjustment: some economies, such as Turkey and Malaysia, exhibit high responsiveness reflecting effective transmission mechanisms, while others, such as South Africa, show slow adjustment, revealing disparities in institutional structure and the degree of economic development. As for the Granger causality results, they show a unidirectional causal relationship running from money



supply to economic growth, indicating the effective role of monetary policy in shaping and explaining economic growth. In contrast, no strong causal relationships were found for foreign direct investment or oil prices. The results also highlight the rentier nature of these economies, where oil price shocks are reflected in the size of the money supply. Conversely, the impact of foreign investment is determined by the efficiency and quality of institutions, not merely by the volume of flows.

In conclusion, the results confirm that the effectiveness of economic policies is not only linked to the size of macroeconomic variables but is fundamentally determined by institutional quality, the degree of economic diversification, and the efficiency of financial channels. This supports the necessity of adopting structural reforms that enhance resource allocation efficiency, promote economic diversification, and improve the transmission of monetary policies, thereby ensuring sustainable economic growth with a higher degree of stability.

6. Conclusion

Based on the various stages of analysis addressed in this study and the econometric and interpretive results obtained, we can now present the general conclusion that answers the research problem and summarizes the main findings.

This study began with a research problem centered on the limited integrative treatment of the relationship between monetary policy, foreign direct investment, oil prices, and international reserves in explaining economic growth within a group of heterogeneous emerging economies. In this context, the study aimed to test four main hypotheses using the Panel PMG-ARDL model and the Error Correction Model, allowing for an understanding of short- and long-term dynamics while accounting for structural heterogeneity across countries.

The empirical results reveal the existence of a long-term equilibrium relationship among the variables under study, reflecting the importance of the interaction between monetary, financial, and energy factors in explaining economic growth. At the hypothesis level, the second hypothesis, which states that foreign direct investment contributes to supporting long-term economic growth, especially in more diversified and open economies was confirmed. The fourth hypothesis, highlighting the positive role of international reserves in enhancing economic stability and absorbing external shocks, was also confirmed.

In contrast, the first hypothesis was not fully confirmed. The results showed that monetary expansion does not necessarily lead to enhanced economic growth; in fact, the two variables may sometimes be associated with a negative effect in the long run, reflecting the weak efficiency of financial intermediation and the presence of institutional constraints that limit the transformation of liquidity into productive investments. As for the third hypothesis, the results were partial: oil prices were found to positively affect economic growth in rentier countries such as Algeria, while their effect was weak, limited, or indirect in economies less dependent on energy. This reflects the differing nature of the relationship across the countries under study. At the short-term level, the results confirmed a considerable speed of adjustment toward equilibrium; however, the impact of economic variables remained relatively limited, reflecting the slow transmission of the effects of economic policies and weak institutional channels,



particularly in economies with underdeveloped financial structures. The comparative analysis revealed clear structural heterogeneity across countries: economies characterized by a wide diversification in their sectoral structure and sources of economic growth, such as Indonesia and Malaysia, showed a greater capacity for adjustment. In contrast, rentier economies such as Algeria suffered from limited diversification and weak dynamic responsiveness. Meanwhile, middle-income economies exhibited varying patterns reflecting the impact of institutional constraints and external fluctuations.

Regarding the causality results, the Granger causality tests showed an absence of a direct causal relationship between foreign direct investment and economic growth, indicating that the impact of this variable is neither automatic nor spontaneous but rather depends on the efficiency of the institutional environment and the economy's ability to absorb these flows and transform them into real value added. In contrast, a causal relationship emerged between oil prices and money supply, indicating the rentier nature of some of the economies under study, where oil revenues directly affect monetary liquidity, which in turn impacts macroeconomic balances. The results also revealed a reciprocal relationship between inflation and money supply, reflecting clear challenges in achieving a balance between stimulating economic growth and maintaining price stability, and underscoring the need for more disciplined and effective monetary policies.

The scientific contribution of this study lies in providing an integrated econometric analysis of the relationship between monetary policy variables and the determinants of economic growth within a dynamic framework that accounts for the differences between the short and long run, using advanced panel model methodologies. The study also contributes to enriching the economic literature by testing the nature of these relationships in the context of heterogeneous emerging economies, in order to highlight similarities and differences in the responses of economic variables across countries. Furthermore, this study offers an applied contribution through the use of the PMG-ARDL model in analyzing the transmission channels of economic policy, which enhances the understanding of the mechanisms of interaction among the variables under study and supports recent research directions in applied econometrics.

Based on the above, the study recommends the adoption and implementation of integrated economic policies based on improving the efficiency of the financial system, enhancing the attractiveness of foreign direct investment, diversifying the productive base, and effectively managing international reserves and natural resource revenues in order to achieve sustainable economic growth and reduce vulnerability to external shocks.

Despite the importance of the findings, the study remains limited by the lack of an in-depth analysis of individual country differences and the exclusion of certain dynamic interactions among variables, which opens the door for future studies to expand the model by incorporating additional variables such as institutional quality, innovation, and digital transformation in order to deepen the understanding of growth dynamics in emerging economies.



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