The Impact of Financial Development in Driving Economic Growth in the MENA Region

Raed Hanoun[1*], Oussama Badr[2]

[1,2]Beirut Arab University, Beirut, Lebanon.

*Corresponding author: Raed Hanoun (Email: Raedhanoon@hotmail.com)

ABSTRACT

Purpose: This article aims to study the role of financial development in driving economic growth in the Middle East and North Africa region during the period 2012–2022, using panel data analysis.

Design/Methodology/Approach: The methodology used in this study is the Pooled Ordinary Least Squares (POLS) model, the Fixed Effects Model (FE), and the Generalized Method of Moments Model (GMM).

Findings: The estimation test results indicate that the best model is the system GMM (SYS-GMM), which reveals a statistically significant and positive impact of financial development on Gross Domestic Product (GDP) in the MENA countries.

Conclusion: The System GMM (SYS-GMM) model's estimation showed a positive impact of the lagged value of GDP on the current value of GDP by 0.313 percentage points. In addition, financial development positively impacts economic growth in the MENA region by 0.513 percentage points. In contrast, the inflation rate negatively affects GDP, decreasing it by 0.344 percentage points. Furthermore, technology negatively influences GDP, reducing it by 0.241 percentage points.

Research limitation: Lack of data in Middle Eastern and North African countries.

Practical implications: Policymakers should prioritize the financial system by improving financial services and encouraging financial inclusion to spur economic growth.

Contribution to the literature: This study contributes a new measurement of financial development in Middle Eastern and North African countries. The results of the chosen model highlight the importance of domestic credit to the private sector and gross domestic savings in driving economic growth.

Keywords: *Economic growth, Endogenous growth theory, Financial development, Fixed effect model (FE), Generalized method of moments (GMM), Middle East and North Africa, Pooled ordinary least squares (POLS).*

1. INTRODUCTION

The Middle East and North Africa (MENA) region is considered heterogeneous in its political, economic, cultural, natural, and social conditions, which differ from country to country. These differences between countries explain the varying needs and priorities required to achieve sustainable development.

The subject of financial development and economic growth is crucial and widely debated among researchers and economists. In theory, financial development positively influences economic growth. Therefore, it is important to highlight the significance of financial development in Middle Eastern and North African countries, given the lack of recent studies examining its impact on economic growth.

Financial development refers to the instruments, institutions, and markets present in the financial system, along with the regulatory framework that facilitates transactions and expands credit.

Thus, financial development plays a pivotal role in fostering economic development, a fact widely acknowledged in the literature A well-functioning financial system can significantly enhance economic performance by promoting savings, encouraging innovation, and facilitating capital allocation. However, the challenges in the Middle Eastern

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

and North African countries hindered financial development and led to a diminishment in economic activities in this region (WB, 2020).

Grappling with a combination of geopolitical and economic challenges, the Middle Eastern and North African countries faced an ongoing conflict in Gaza, which has had an adverse impact, creating a significant economic meltdown. According to the International Monetary Fund (IMF), economic growth has been projected to decrease by 2.9 percentage points in 2023.

This conflict is accompanied by a surge in poverty rates that exceed 50 percentage points, followed by natural disasters such as the floods in Libya and the earthquake in Morocco, which affect human and physical capital (IMF, 2024).

Therefore, this paper aims to delve deeper into the role of financial development in economic growth in order to examine the resilience of financial markets and recommend new policy strategies in the MENA region, taking into account other factors such as technology, labor, human capital, foreign direct investment, governance, inflation, and population growth as components of economic growth.

Prior research has shed light on the impact of financial development on economic growth using different techniques such as system GMM, the autoregressive distributed lag model (ARDL), and proxies of financial development such as credit to the private sector, money supply (M2), financial depth, etc. However, the lack of recent studies means that there has been no implementation of a new index. Therefore, this study fills this gap by integrating two indicators of financial development into an index to measure its effect on economic growth in the MENA countries using different quantitative techniques.

Hence, the problem of this study is: Is there a positive impact of financial development on economic growth in the MENA region?

In the first section, this study explains the theoretical background of financial development and economic growth. The second section presents the literature review. Then, in order to quantify financial development, the methodology section outlines the tools and methods used to examine its impact on gross domestic product (GDP), including the variables used, model specification, and estimation. Lastly, the discussion, findings, and conclusion address the results of the estimation model, implications, limitations of the study, and open a new horizon for further research.

2. THEORETICAL BACKGROUND

Based on the endogenous growth theory, this article focuses on the factors influencing economic growth with focusing on the role of financial development.

2.1. Economic Growth

Different theories explain economic growth, including the Neoclassical Growth Theory, Solow Theory, and Human Capital Theory. These theories are based on the Cobb-Douglas production function, where $Y = AK^{\alpha}L^{\beta}$. Here, Y represents production, A denotes technological progress, K stands for capital, and L signifies labor (Solow, 1999).

The neoclassical theory is explained by the Harrod-Domar model, which focuses on the capital-to-output ratio combined with technology to achieve efficient production, as per the Cobb-Douglas production function. Essential components of this model are the savings rate and investment, which lead to economic growth.

The Solow model asserts that economic growth will occur in the long term through skilled labor, capital accumulation, population growth, and technological advancement. Technology, as explained by Schumpeter, is an exogenous factor essential for innovation and economic growth.

Furthermore, Schultz (1992) and Becker (1975) propose the Human Capital Theory, which emphasizes the importance of investing in human and physical capital. Investment in human capital can create jobs by developing new skills, thereby leading to economic growth.

2.2. Financial Development

Financial development is explained by King and Levine (1993) who highlight the importance of financial intermediaries in minimizing transaction costs. Savings, as a measure of financial development, are explained by the Solow and Swan Growth Model (Narayan & Narayan, 2013).

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

According to Levine (1997) economic growth and financial development have a bidirectional relationship. Economic growth is driven by the financial sector in the long term through the transmission of information that boosts investment, which in turn leads to economic growth (Hassan, Sanchez, & Yu, 2011).

Moreover, financial development is an essential factor contributing to economic growth. This factor is explained by Shaw (1973); Goldsmith (1959) and McKinnon (1973) who state that financial development can mitigate the problem of adverse selection, facilitate trading, and enhance the implementation of new technology. This, in turn, boosts savings, financial assets, and capital formation, ultimately leading to economic growth (Ahmed & Ansari, 1998).

Additionally, financial development positively influences economic growth by increasing the efficiency of capital accumulation. Likewise, it raises savings and investment levels, leading to higher economic growth accompanied by advanced technology and innovation (Shahbaz, Abosedra, & Sbia, 2013).

Financial development is measured through a broad concept with various dimensions. According to the World Bank, there are four dimensions for measuring financial development: stability, efficiency, access, and financial depth. These are crucial mechanisms in the financial sector, encompassing financial markets and financial institutions.

On one hand, the financial depth of financial institutions can be measured by credit to the private sector as a percentage of gross domestic product (GDP), deposits to GDP, money supply (M2) to GDP, and gross value added of the financial sector to GDP. On the other hand, the financial depth of markets is measured by stock market capitalization, public and private debt securities to GDP, stock market capitalization to GDP, stocks traded to GDP, and international debt securities to GDP.

Therefore, this article measures financial development using principal component analysis (PCA) by calculating domestic credit to the private sector (% of GDP) and gross savings (WB, 2020).

3. LITERATURE REVIEW

This article sheds light on the influence of economic growth by financial development, with macroeconomic variables. Economic growth uses the gross domestic product (GDP) as a proxy and is considered a dependent variable. Financial development is considered an independent variable, while other factors such as foreign direct investment, labor, school enrollment in secondary education as human capital, population growth, governance, inflation, and technology are considered control variables.

Several studies explain the relationship between economic growth and financial development. For instance, a study employing the autoregressive distributed lag model (ARDL) from the period 1971 to 2011 demonstrated an insignificant and negative influence between these two variables (Iheanacho, 2016).

In addition, there are several measurements expressing financial development, such as the stock market, credit to the private sector, turnover ratio, and value of shares traded. Different methods are used to investigate the influence of financial development on economic growth, such as ordinary least squares (OLS) and the generalized method of moments (GMM).

A study using the generalized method of moments, one-step system GMM (SYS-GMM), for Brazil, Russia, India, China, and South Africa (BRICS countries) from 1993 to 2014 found that the credit to the private sector and the credit-to-deposit ratio, used as proxies for financial development, positively influence economic growth (Guru & Yadav, 2019).

On the one hand, a study examined the effect of financial development on economic growth in 42 middle-income countries from 1995 to 2018. This study employed the autoregressive distributed lag (ARDL) model, indicating a positive impact of financial development on economic growth in the long run for middle- and upper-income countries (Abbas, Afshan, & Mustifa, 2022).

On the other hand, a study investigated the impact of financial development on economic growth in Group 7 and BRICS (Brazil, Russia, India, China, South Africa) countries over the period 1980–2017. The result of the cointegration test using the bound test through the autoregressive distributed lag model (ARDL) demonstrates that the increase in finance leads to a decrease in economic growth. The results prove the positive impact of finance in middle-income countries, while it has a negative impact in high-income countries (Boukraine, 2020).

As mentioned above, economic growth is influenced by different indicators such as foreign direct investment, school enrollment for secondary education, inflation, governance, labor, technology, and population. A study employing the autoregressive distributed lag (ARDL) model from 1999 to 2012 in the Middle Eastern and North African (MENA)

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

countries denotes that economic growth is influenced positively by foreign direct investment in the long run (Kalai & Zghidi, 2019).

Secondly, enrollment in secondary school, used as a proxy for human capital, indicates that school enrollment and expenditure on education increase economic growth. Schultz (1992) demonstrated the importance of educational level in increasing the skills of the labor force, leading to an increase in capital accumulation, job opportunities, and economic growth. Likewise, investment in human capital through labor training enhances the labor force's skills, thereby increasing economic growth.

A study found that secondary school enrollment positively influences economic growth, explained by employing the Ordinary Least Squares technique from 1980 to 2016 in Nigeria (Salis, 2021).

Thirdly, governance plays a crucial role in increasing economic growth. In this article, we added the control of corruption as a proxy for governance. A study investigating the effect of control of corruption on economic growth from 2002 to 2019 in MENA countries through the Generalized Method of Moments (GMM) model and Panel Vector Auto Regression (PVAR) estimation model denotes a positive impact of control of corruption as a component of governance on economic growth (Hasanimoghadam, Farhang, Abounoori, & Mohammadpour, 2021).

Moreover, technology positively influences economic growth, as mentioned in the theory of endogenous growth. A study analyzing the effect of information and communication technology (ICT) on economic growth in Sub-Saharan Africa (SSA) and developing countries in the MENA region from 2007 to 2016 using the panel Generalized Method of Moments (GMM) demonstrates the positive impact of ICT on economic growth (Bahrini & Qaffas, 2019).

Furthermore, inflation negatively influences economic growth. A study in OECD (Organization for Economic Co-operation and Development) countries and Asian countries demonstrated the negative impact of inflation in Asian countries but an insignificant impact in OECD countries (Akinsola & Odhiambo, 2017).

Finally, population growth has a positive impact on economic growth. A study investigating the impact of population growth and human capital on economic growth, using unbalanced panel data from 1980 to 2020, examined the effect of human capital on life expectancy and education enrollment by employing the panel corrected standard error (PCSE) and the feasible generalized least squares (FGLS) models. The results of these estimations prove the positive influence of population and human capital on economic growth in 19 countries in the Middle Eastern and North African (MENA) region (Adeleye, Bengana, Boukhelkhal, Shafiq, & Abdulkareem, 2022).

Therefore, most studies link financial development and economic growth using the GMM or autoregressive distributed lag (ARDL) model, taking into consideration a proxy of financial development using one of the financial indicators such as financial depth, turnover ratio, or credit to the private sector. This study, however, uses a different technique, such as pooled ordinary least squares (POLS), fixed effects, and the GMM system, with the implementation of a new index of financial development composed of gross savings and credit to the private sector, taking into account governance, to shed light on the importance of the state in the MENA region. This fills the gap in other studies.

4. METHODOLOGY

This article analyzes the effect of financial development on economic growth in the Middle East and North Africa (MENA) countries, which include Algeria, Djibouti, Egypt, Iran, Jordan, Lebanon, Mauritania, Morocco, Sudan, Tunisia, and Turkey. Other countries such as Bahrain, Iraq, Palestine, Kuwait, Libya, Oman, Qatar, Saudi Arabia, the United Arab Emirates, and Yemen are not covered in this study due to a lack of data.

Panel data is used in the econometric analysis, covering the period from 2012 to 2022, where T = 11 years and N = 12 countries, resulting in 132 observations.

This model is based on the study of De Gregorio and Guidotti (1995) in theory and follows the study of Carlos (2010) which uses dynamic and static panel data analysis for 27 European countries from 1980 to 2006 (Leitao, 2010). This model employed the system GMM, including the ratio of total credit to GDP and the assets of deposit money banks as separate proxies of financial development. Other researchers have used the autoregressive distributed lag (ARDL) model for the BRICS countries, covering the period 1980–2017. Furthermore, another study used the fully modified ordinary least squares (FMOLS) model to explain the relationship between economic growth and financial development, covering the period 1996–2014 and 15 countries in MENA.

Our study employed several estimation models covering the period 2012–2022. We utilized three different estimation models and added governance, represented by the control of corruption, as an additional variable that

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

reflects the role of government in financial development leading to economic growth. In addition, we created an index of gross savings and domestic credit to the private sector as a measurement of financial development using principal component analysis (PCA). We employed the pooled ordinary least squares model (POLS) to eliminate heterogeneity, the fixed effects model as a lower bound to control heterogeneity, and finally, the system GMM to improve the model and control endogeneity, filling the gap in previous studies.
Our choice of methods differs from prior research due to the following:

- Using the GMM system, endogeneity is controlled.
- In this study the number of years T= 11 <N=12 countries, which is inefficient in the Autoregressive Distributed Lag model (ARDL).
- The fixed effects model controls unobserved heterogeneity, which can provide a precise estimate with small standard errors.
- The system GMM model provides robustness and avoids the problem of heteroskedasticity (Manuel Arellano & Bond, 1991).

In order to choose between Difference GMM and System GMM in Generalized Method of Moments (GMM), it is important to estimate the Pooled Ordinary Least Squares first as the upper bound, then the fixed effects model as the lower bound. If the estimation of Difference GMM indicates an estimator close to or below the fixed effects model's estimator, it is preferred to estimate System GMM.
In the estimation model, we used the Pooled Ordinary Least Squares (POLS) model. It is used to pool all the variables of each country; this model individually eliminates the individual specific effect. Its advantage is handling unbalanced panel data (Park, 2011).
Therefore, as a lower bound, the fixed effects model is used. This model estimates the effect of variables that vary in a period of time. Its advantage is solving the problem of unobserved heterogeneity (deHaan, 2021). The final estimation is the Generalized Method of Moments (GMM), which aims to address the issue of endogeneity and the problem of heteroskedasticity. Firstly, we estimate the Difference GMM, then the System GMM (SYS-GMM). Difference GMM necessitates a first-difference of the data in order to remove the fixed effects. System GMM enhances Difference GMM by estimating levels and differences, where each equation has a distinct instrument (David Roodman, 2009). Therefore, Manuel Arellano and Bond (1991) estimator considers the model as a system of equations, one for each time. The equations differ individually in their instrument. Arellano and Bover (1995) explains how more moment conditions might be used to improve efficiency if the system included the original equations in the levels (Roodman, 2020).

4.1. Variables

This article examines the effect of financial development on economic growth by introducing the macroeconomic variables as control variables. The association between the dependent and independent variable is based on Levine (1997) which sheds light on the importance of financial development in driving efficiency in the economy, leading to economic growth (Hassan et al., 2011). These variables are secondary data extracted from the World Bank.

4.1.1. Dependent Variable

The economic growth is proxied by the gross domestic product per capita annual growth (GDP) expressed as a percentage, calculated by midyear residents. It is the sum of the gross additional value by residents in an economy, at purchaser's prices.

4.1.2. Independent Variable

Financial development (FD) is calculated using Principal Component Analysis (PCA), by including credit to the domestic private sector as a percentage of GDP, which refers to financial resources provided to the private sector such as loans, securities, and trade credits. The other variable is gross savings, which is calculated by including total net transfers and gross national income consumption.

4.1.3. Control Variables

a) Foreign direct investment (FDI): This is the net inflows of investment, considered as the sum of capital equity, capital in the short and long term, divided by GDP and expressed as a percentage.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

b) Inflation rate (INF): This is the annual change in consumer prices, expressed as a percentage. It represents the change in the average price of a basket of goods and services.
c) School enrolment secondary (SEC): This is expressed as a percentage and represents the total enrollment ratio of the population in the age group for secondary education, taking into account primary education as the starting point. Total enrollment is considered a proxy for human capital.
d) Control of corruption (CC): This is the estimate of the control of corruption, noting the extent to which corporate interests and elites "capture" the state and exploit public authority for personal gain, including both small- and large-scale corruption.
e) Labor force participation rate (L): This is expressed as a percentage and represents the proportion of the active population, aged 15 to 64, who supply labor during a given period.
f) Population growth (POP): This is expressed as a percentage and represents the annual population growth rate, considering all residents in year t.
g) Technology (TECH): This is represented by medium and high-tech manufacturing, expressed as a percentage. It represents the share of high- and medium-tech trade value added in manufacturing's overall value added.

4.1.4. Model Specification

Based on the function of production of Cobb-Douglass, which is represented by Y=F (K, L), where K is the capital and L is the labor on time t, by adding the technological progress, this function became Y=F (A, K, L), Where A represents the technological progress.

$$LNGDPit = \beta 0 + \beta 1LLNGDPit + \beta 2LNFDIit + \beta 3LNFDit + \beta 4LNSECit + \beta 5LNINFit + \beta 6LNTECHit + \beta 7LNGOVit + \beta 8LNLit + \beta 9LNPOPit + \varepsilon it \quad (2)$$

β_0 is the intercept, β_1, β_2, β_3, β_4, β_5, β_6, β_7, β_8 and β_9 are the coefficients of the independent variables.
It is noteworthy, that the dependent, independent and control variables are converted to natural logarithm in order to standardize the data.

5. Results

5.1. Descriptive Statistics

Descriptive statistics represents a summary displaying the reliability of the data, composed from mean, standard deviation, maximum value, minimum value (Fisher & Marshall, 2009).

Table 1. Descriptive statistics.

Variables	Mean	SD	Minimum	Maximum
GDP	66.5	38.249	1	132
FD	-0.129	1.107	-2.151	2.194
TECH	47.189	33.685	1	109
FDI	66.5	38.249	1	132
SEC	33.409	30.910	1	93
INF	8.037	22.133	-3.749	171.205
L	57.812	14.451	38.058	89.623
GOV	-0.177	0.524	-1.248	1.103
POP	2.169	2.656	-2.879	11.794

Source: Author's calculation using STATA 17.

Table 1 above denotes the summary of descriptive statistics as follows: The dependent variable, gross domestic product per capita growth (GDP), indicates the highest mean value of 66.6 percentage points, with a standard deviation of 38.249, which is less than the mean value. This denotes that the data is dispersed around the mean. In addition, the minimum value of the gross domestic product per capita growth is 1 percentage point, and the maximum value is 132 percentage points. Furthermore, the dependent variable has the highest mean value among the other variables.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

In contrast, the lowest mean is -0.129, which refers to financial development (FD), and it is less than its standard deviation value of 1.107. Therefore, the data is more spread out. The minimum value is -2.151, and the maximum value is 2.194 for financial development.
Likewise, the mean value is less than the standard deviation for governance (GOV), population (POP), and inflation (INF), which are respectively (-0.177 < 0.524), (2.169 < 2.656), and (8.037 < 22.133). These values indicate the variability of the data. In contrast, the other variables, such as technology (TECH), foreign direct investment (FDI), school enrollment (SEC), and labor force (L), have a mean value greater than the standard deviation, indicating that the data is clustered around the mean.

5.2. Correlation Matrix

The correlation matrix represents the association between independent variables and dependent variable and the independent variables itself through the coefficient of correlation r, indicating the strong relationship when the value of r is greater than 0.7, while it is weak when it is less than 0.4 (Helwig, 2017).

Table 2. Correlation matrix.

Variables	GDP	FD	TECH	FDI	SEC	L	GOV	POP	INF
GDP	1								
FD	0.1226	1							
TECH	-0.2223*	0.0505	1						
FDI	0.1416	-0.2546*	-0.3849*	1					
SEC	-0.0649	-0.2480*	0.2779*	-0.0618	1				
L	-0.1487	0.3842*	0.2064*	-0.3108*	0.1660	1			
GOV	-0.1773*	0.1934*	0.2580*	-0.1899*	-0.0038	0.6518*	1		
POP	-0.3197*	-0.1033	0.0944	0.0028	0.1923*	0.1086	0.2897*	1	
INF	0.0109	0.0335	-0.1701	-0.0584	-0.0974	-0.1928*	-0.4363*	-0.2401*	1

Note: * is the significance at level 5%.
Source: Author's calculation using STATA 17.

Table 2 shows the correlation between the dependent and independent variables. It denotes a negative, weak, and significant correlation between gross domestic product (GDP) and the independent variables such as technology (TECH), governance (GOV), and population (POP), with the coefficient of correlation being r = -0.2223, r = -0.1773, and r = -0.3197, respectively. In contrast, there is an insignificant association between the other independent variables and the dependent variable (GDP).
Notably, the negative correlation between technology, governance, and population growth with gross domestic product (GDP) can be explained by the limited use of technology in most of the MENA region countries. Likewise, the negative impact of population growth on gross domestic product (GDP) refers to the high population of unskilled individuals, which decreases productivity.
Hence, the negative impact of technology on economic growth refers to the lack of technological infrastructure in the majority of the countries in the Middle East and North Africa (MENA) region covered in this study (Bahrini & Qaffas, 2019). In addition, the negative impact of governance on economic growth refers to the failure of governance in the MENA region in achieving a good quality of institutions and socio-economic development (Szmolka, 2017).
Additionally, the negative effect of population on economic growth refers to the high number of migrations in the MENA region (McKee, Keulertz, Habibi, Mulligan, & Woertz, 2017).

5.3. Regression Results

The regression analysis contains the Pooled Ordinary Least Squares model (POLS) estimation, the Fixed Effects model (FE) estimation, Difference Generalized Method of Moments (DIFF GMM) estimation, and System Generalized Method of Moments (SYS-GMM) model estimation.
In addition, it is crucial to examine the validity of the models by using different diagnostic tests such as multicollinearity, heteroskedasticity, autocorrelation, and overidentification.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

Table 3. Estimation model- dependent variable- economic growth.

Regressors	Pooled ordinary least squares		Fixed effects model		Arellano bond		Arellano—Bover/Blundell-Bond	
	Coefficient	Robust standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
LLNGDP	0.290	0.255	-0.045	0.260	-0.192	0.321	0.313*	0.128
LNINF	-0.060	0.213	-0.269	0.201	-0.406**	0.123	-0.344**	0.106
LNFDI	-0.046	0.214	0.138	0.262	0.385**	0.148	0.068	0.211
FD	0.308	0.299	-0.295	0.383	-1.539*	0.686	0.513*	0.252
LNTECH	-0.229	0.153	-0.671*	0.191	-0.860***	0.109	-0.241*	0.098
LNL	0.374	1.201	-24.048*	7.466	-64.447***	15.972	0.740	0.404
LNGOV	-0.288	0.299	0.109	0.814	0.193	0.369	-0.371	0.246
LNSEC	-0.061	0.170	0.037	0.279	0.564*	0.248	-0.127	0.248
LNPOP	0.102	0.229	0.124	0.614	0.298*	0.146	0.097	0.084
Diagnostic tests								
Multicollinearity								
Mean variance inflation factor VIF	2.51							
Heteroskedasticity								
Chi2(1)	6.96							
P-value	0.0084							
Serial correlation								
F (1,4)	2.796				0.2123			
P-value	0.1698				0.3269			
AR (1) First order serial correlation					0.1094			
AR (2) Second order serial correlation					0.1098			
R squared	0.4285		0.5632		0.4285			
F statistics	6.35		2.72		6.35			
P-value	0.0001		0.0316		0.0001			
Wald Chi2	2		2.72		34.66		1.03e+09	
P-value>Chi2	0.0849		0.0316		0.0000		0.0000	
Sargan								
Chi2(12)					10.891		17.890	
Prob>Chi2					0.5383		0.9289	

Note: *, **, *** denotes 5%, 1% and 0.1% respectively.
Source: Author's computation using STATA 17.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

Therefore, the multicollinearity test examines the existence of high correlation, while the heteroskedasticity test is examined by the Breusch-Pagan test, where the null hypothesis requires that the data is homoscedastic Halunga, Orme, and Yamagata (2017).

Moreover, the serial correlation test, represented by Wooldridge, examines the presence of autocorrelation, meaning the relationship between the value of a variable and its lagged value, where the null hypothesis is the absence of serial correlation (Baltagi & Li, 1995).

Finally, it is important to test the validity of instruments in GMM estimation. Hansen and Sargan tests consider the null hypothesis that the instruments are valid (Sargan, 1958).

Therefore, Table 3 indicates the results of the regression estimations.

The results in Table 3 indicate that the estimation of the Pooled Ordinary Least Squares (POLS) model shows the absence of a significant influence of the independent and control variables on economic growth. Additionally, the estimator of Pooled OLS indicates a coefficient of 0.290.

The result of diagnostic tests indicates the following: an absence of multicollinearity, with the mean of VIF being 2.51, which is less than 10; a presence of heteroskedasticity, where the P-value is 0.0084, which is less than $\alpha = 0.05$. Therefore, we used the robust test to correct for heteroskedasticity. Additionally, the result of the serial correlation test by Wooldridge showed a P-value = 0.1698, which means the absence of correlation.

In addition, the estimation of the fixed effects model indicates a negative and insignificant coefficient, which is less than the estimator of the Pooled OLS model. Notably, the logarithm of technology (LNTECH) has a significant negative influence on economic growth in the MENA region, where an increase in technology leads to a decrease of 0.671 percentage points in economic growth (P-value = 0.017 < $\alpha = 0.05$). Additionally, there is a negative effect of the logarithm of labor (L) on economic growth (P-value = 0.023 < $\alpha = 0.05$); where an increase in labor by 1 percentage point will lead to a decrease of 24.048 percentage points in economic growth.

In contrast, the constant term indicates a value of 105.242, meaning that the baseline of economic growth is 105.242 when all the variables are in their normal state. The diagnostic tests related to the fixed effects model showed a value of F-statistics with a p-value of 0.0316 < $\alpha = 0.05$, indicating the significance of the model, and R-squared is 0.5632, meaning that 56.32% of the change in the dependent variable is explained by the explanatory variables.

After estimating the fixed effects model, it is crucial to estimate the generalized method of moments (GMM) model. Therefore, we started with Difference GMM, which is represented by Arellano-Bond. The results of the estimation of Difference GMM indicate the insignificance of the constant term and the control of corruption. In contrast, inflation negatively and significantly affects economic growth at the 1% significance level, where an increase in the inflation rate by 1 percentage point will decrease economic growth by 0.406 percentage points. Moreover, the financial development index, the logarithm of technology, and the logarithm of labor significantly and negatively affect economic growth in the MENA countries. Therefore, an increase in financial development, the logarithm of technology, and the logarithm of labor by 1 percentage point will lead to increases of 1.539%, 0.860%, and 64.447%, respectively, in economic growth.

Whereas foreign direct investment denotes a positive and significant influence on economic growth at the 1% significance level. An increase in the logarithm of foreign direct investment by 1 percentage point leads to a rise in economic growth by 0.385 percentage points. Moreover, an increase in the logarithm of secondary school enrollment by 1 percentage point will lead to an increase of 0.564% in economic growth. Likewise, an increase of 0.298 percentage points in economic growth will be caused by an increase in the logarithm of population at the 5% significance level.

Additionally, the Sargan test, used as a diagnostic test, indicates a p-value of 0.5383, which means that the instruments are valid. The Wald test indicates a P-value of 0.0000 < $\alpha = 0.05$, which means that the model is significant. Furthermore, the serial correlation test indicates an AR(1) p-value of 0.1094, which is greater than the 5% significance level, meaning that we fail to reject the null hypothesis, indicating that there is no significant evidence of first-order correlation. Similarly, the serial correlation test indicates an AR(2) p-value of 0.1098, which is greater than the significance level $\alpha = 0.05$, indicating that we fail to reject H0, meaning that there is no significant evidence of second-order correlation.

As the result of the Arellano-Bond estimator indicates a negative coefficient of -0.192, which is less than the fixed effects estimator of -0.045, this suggests an estimation of System GMM. Therefore, the estimation of Arellano-Bover/Blundell-Bond shows a significant estimator, where it is 0.313, positive, and significant at the 5% level.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

On one hand, the logarithm of the inflation rate and the logarithm of technology indicate a negative and significant effect at the 5% level. An increase in these variables will lead to a decrease in economic growth by 0.344 percentage points and 0.241 percentage points, respectively. On the other hand, an increase in financial development by 1 percentage point will lead to an increase of 0.513 percentage points in economic growth, as indicated in the table above.

The Sargan test indicates a P-value of 0.9289 > α = 0.05, meaning that we fail to reject the null hypothesis, showing that the instruments are valid, and the Wald test indicates a P-value of 0.000 < α = 0.05, meaning that the model is significant. Furthermore, the serial correlation test indicates an AR(1) p-value of 0.2123, which is greater than the significance level α = 0.05, indicating that we fail to reject the null hypothesis, meaning that there is no significant evidence of first-order correlation. Likewise, the serial correlation test indicates an AR(2) p-value of 0.3269, which is greater than the significance level α = 0.05, indicating that we fail to reject the null hypothesis, meaning that there is no significant evidence of second-order correlation.

6. DISCUSSION

This article sheds light on the impact of financial development on economic growth through an econometric estimation that begins with descriptive statistics, a correlation matrix, and then an estimation of the Pooled Ordinary Least Squares (POLS) model, Fixed Effects model, Difference GMM, and System GMM models.

The results of the correlation matrix indicate a weak, negative, and significant association between technology and Gross Domestic Product (GDP). This is explained by the lack of adoption of technology in the region, which has weak competition. Additionally, higher income typically leads to higher adoption of technology, but this is not the case in the majority of MENA countries (Arezki, Fan, & Nguyen, 2021).

Likewise, the correlation matrix shows a negative, weak, and significant association between governance and population growth on economic growth. This refers to the weakness in regulations and the lack of adoption of good governance practices in government institutions (Szmolka, 2017). In terms of population, 50% are under 25 years old with a high rate of unemployment, particularly in Iran, Morocco, and Egypt, which contributes to political instability and weakens governance, leading to a decrease in economic growth (Forouheshfar, El Mekkaoui, & d'Albis, 2020). This is not aligned with endogenous growth theory, which posits that an increase in population growth will lead to economic growth. In contrast, it aligns with Arellano-Bond estimation (Adeleye et al., 2022).

Additionally, the estimation of the System GMM showed a positive impact of the lagged value of GDP on the current value of GDP by 0.313 percentage points.

The impact of the inflation rate is negative on economic growth. The inflation rate increased from 2.3% in 2021 to 5% in 2022 in the MENA region, according to the World Bank. In particular, Lebanon has witnessed an increase in inflation from 154.8% in 2021 to 171.2% in 2022, reaching 222.42% in 2023. This reflects the turmoil in the MENA region and the banking system, particularly in Lebanon, which has faced numerous challenges (Abou Ltaif, Mihai-Yiannaki, & Thrassou, 2024).

Likewise, technology (LNTECH) has a negative impact on economic growth, with a decrease of 0.241 percentage points, indicating a lack of technology adoption in most MENA countries.

In contrast, an increase in financial development by 1 percentage point leads to an increase of 0.513 percentage points in economic growth in the MENA region. This is due to financial openness, which enhances the financial system in many MENA countries that have a well-developed financial sector, particularly the banking sector. This result aligns with the theories of Shaw (1973); Goldsmith (1959); and Levine (1997) which consider the positive effect of financial development on economic growth. However, some studies, such as Boukraine (2020) note the negative influence of financial development on economic growth.

Furthermore, the negative influence of technology on economic growth is not aligned with growth theory, which considers technology to be an important factor in economic growth, such as the study of Bahrini and Qaffas (2019) which shows a positive effect of technology on economic growth.

Additionally, the negative influence of inflation on economic growth aligns with the study of Akinsola and Odhiambo (2017) which suggests that inflation has a negative impact on economic growth in Asian countries. In contrast, this relationship is opposite in OECD (Organization for Economic Co-operation and Development) countries.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

7. FINDINGS

The findings of this study reveal that the estimation of Arellano-Bover denotes a negative impact of inflation and technology on economic growth, where an increase in inflation and technology by one unit leads to a decrease in economic growth by 0.344 and 0.241 units, respectively. Conversely, financial development positively influences economic growth in the MENA region, with an increase of 0.513 units. Likewise, economic growth in the current year is positively influenced by 0.313 units from the economic growth in the previous year.

8. CONCLUSION

This study aims to investigate the impact of financial development on economic growth in the MENA region by employing several estimation methods such as Pooled Ordinary Least Squares (POLS), fixed effect model, difference, and system GMM.

The estimation of the aforementioned models indicates that the chosen model is system GMM. The results show a positive impact of financial development on economic growth, and a negative impact of inflation and technology on economic growth.

Consequently, the estimation model supports the hypothesis that financial development has a positive impact on economic growth in the MENA region. It is recommended to improve e-government in order to address the technology gap in Middle Eastern and North African countries and minimize unproductive government expenditure, which will lead to an increase in investment and a decrease in the inflation rate. Additionally, providing subsidies for essential goods and services to maintain purchasing power requires the implementation of prudent monetary and fiscal policies, which will contribute to an increase in economic growth.

8.1. Implications

The Middle Eastern and North African countries face a lack of technology; therefore, this study sheds light on the importance of enhancing technology and how policymakers should stimulate economic growth by prioritizing financial development and the implementation of new technology in the government and banking sectors to address this issue. This would lead to an increase in investment, create new opportunities, and drive economic growth.

8.2. Limitations

Other countries, such as Bahrain, Iraq, Palestine, Kuwait, Libya, Oman, Qatar, Saudi Arabia, the United Arab Emirates, and Yemen, are not covered in this study due to a lack of data.

8.3. Future research

It is important to study in the future the evaluation of financial development in the MENA region using a new measurement and index of financial development by identifying the key components of financial development. Additionally, it is crucial to examine the causality between economic growth and financial development using a new econometric technique.

FUNDING

This study received no specific financial support.

INSTITUTIONAL REVIEW BOARD STATEMENT

Not Applicable

TRANSPARENCY

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

DATA AVAILABILITY STATEMENT

The data is available in the World bank website.
https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**:* www.nurture.org.pk
***Publisher:** Nurture Publishing Group*

AUTHORS' CONTRIBUTIONS
Both authors have sufficiently contributed to the study and agreed on the results and conclusions.

ARTICLE HISTORY
Received: 5 August 2024/ Revised: 23 January 2025/ Accepted: 28 March 2025/ Published: 5 April 2025

REFERENCES

Abbas, Z., Afshan, G., & Mustifa, G. (2022). The effect of financial development on economic growth and income distribution: An empirical evidence from lower-middle and upper-middle-income countries. *Development Studies Research, 9*(1), 117-128. https://doi.org/10.1080/21665095.2022.2065325

Abou Ltaif, S. F., Mihai-Yiannaki, S., & Thrassou, A. (2024). Lebanon's economic development risk: Global factors and local realities of the shadow economy amid financial crisis. *Risks, 12*(8), 1-21.

Adeleye, B. N., Bengana, I., Boukhelkhal, A., Shafiq, M. M., & Abdulkareem, H. K. (2022). Does human capital tilt the population-economic growth dynamics? Evidence from Middle East and North African countries. *Social Indicators Research, 162*(2), 863-883. https://doi.org/10.1007/s11205-021-02867-5

Ahmed, S. M., & Ansari, M. I. (1998). Financial sector development and economic growth: The South-Asian experience. *Journal of Asian Economics, 9*(3), 503-517. https://doi.org/10.1016/s1049-0078(99)80100-6

Akinsola, F. A., & Odhiambo, N. M. (2017). Inflation and economic growth: A review of the international literature. *Comparative Economic Research, 20*(3), 41-56.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277-297. https://doi.org/10.2307/2297968

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29–51. https://doi.org/10.1016/0304-4076(94)01642-D

Arezki, R., Fan, R. Y., & Nguyen, H. (2021). Technology adoption and the middle-income trap: Lessons from the Middle East and East Asia. *Review of Development Economics, 25*(3), 1711-1740. https://doi.org/10.1111/rode.12775

Bahrini, R., & Qaffas, A. A. (2019). Impact of information and communication technology on economic growth: Evidence from developing countries. *Economies, 7*(1), 21. https://doi.org/10.3390/economies7010021

Baltagi, B. H., & Li, Q. (1995). Testing AR (1) against MA (1) disturbances in an error component model. *Journal of Econometrics, 68*(1), 133-151. https://doi.org/10.1016/0304-4076(94)01646-h

Becker, G. S. (1975). Investment in human capital: Effects on earnings. In Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. In (2nd ed., pp. 13-44): NBER.

Boukraine, W. (2020). The finance-growth nexus in high and middle income economies. *Journal of Smart Economic Growth, 5*(2), 45-58.

Carlos, N. M. P. D. S. (2010). *Tunneling processes in rock masses: The state of the art.* Doctoral Dissertation.

De Gregorio, J., & Guidotti, P. E. (1995). Financial development and economic growth. *World Development, 23*(3), 433-448.

deHaan, E. (2021). Using and interpreting fixed effects models. *Available at SSRN 3699777*.

Fisher, M. J., & Marshall, A. P. (2009). Understanding descriptive statistics. *Australian Critical Care, 22*(2), 93-97. https://doi.org/10.1016/j.aucc.2008.11.003

Forouheshfar, Y., El Mekkaoui, N., & d'Albis, H. (2020). Demographics in MENA countries: A major driver for economic growth. *De Economist, 168*(2), 183-213. https://doi.org/10.1007/s10645-020-09357-y

Goldsmith, R. W. (1959). Financial structure and development as a subject for international comparative study. In the comparative study of economic growth and structure. In (pp. 114-123): NBER.

Guru, B. K., & Yadav, I. S. (2019). Financial development and economic growth: Panel evidence from BRICS. *Journal of Economics, Finance and Administrative Science, 24*(47), 113-126. https://doi.org/10.1108/jefas-12-2017-0125

Halunga, A. G., Orme, C. D., & Yamagata, T. (2017). A heteroskedasticity robust Breusch–Pagan test for Contemporaneous correlation in dynamic panel data models. *Journal of Econometrics, 198*(2), 209-230.

Hasanimoghadam, R., Farhang, A., Abounoori, A., & Mohammadpour, A. (2021). The effect of corruption control and economic policies on economic growth in the Middle East and North Africa (MENA). *Journal of Econometric Modelling, 6*(4), 61-91.

Hassan, M. K., Sanchez, B., & Yu, J.-S. (2011). Financial development and economic growth: New evidence from panel data. *The Quarterly Review of Economics and Finance, 51*(1), 88-104. https://doi.org/10.1016/j.qref.2010.09.001

Helwig, N. E. (2017). *Data, covariance, and correlation matrix*. Twin Cities: University of Minnesota.

Iheanacho, E. (2016). The contribution of government expenditure on economic growth of Nigeria disaggregated approach. *International Journal of Economics and Management Sciences, 5*(5), 1-8.

IMF. (2024). *Middle East and North Africa: Conflict compounding economic challenges*: International Monetary Fund.

Kalai, M., & Zghidi, N. (2019). Foreign direct investment, trade, and economic growth in MENA countries: Empirical analysis using ARDL bounds testing approach. *Journal of the Knowledge Economy, 10*, 397-421. https://doi.org/10.1007/s13132-017-0460-6

King, R. G., & Levine, R. (1993). Finance, entrepreneurship and growth. *Journal of Monetary Economics, 32*(3), 513-542.

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature, 35*(2), 688-726.

McKee, M., Keulertz, M., Habibi, N., Mulligan, M., & Woertz, E. (2017). *Demographic and economic material factors in the MENA region Middle East and North Africa regional architecture: Mapping geopolitical shifts*. Retrieved from Regional Order and Domestic Transformations Working Papers. No. 43:

McKinnon, R. I. (1973). *Money and capital in economic development*. Washington, D.C: The Brookings Institution.

Narayan, P. K., & Narayan, S. (2013). The short-run relationship between the financial system and economic growth: New evidence from regional panels. *International Review of Financial Analysis, 29*, 70-78. https://doi.org/10.1016/j.irfa.2013.03.012

Park, H. M. (2011). Practical guides to panel data modeling: A step-by-step analysis using stata. *Public Management and Policy Analysis Program, Graduate School of International Relations, International University of Japan, 12*, 1-52.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics, 71*(1), 135-158.

Roodman, D. (2020). *Xtabond2: Stata module to extend xtabond dynamic panel data estimator. Boston College Department of Economics*. Retrieved from https://ideas.repec.org/c/boc/bocode/s435901.html

Salis, K. Y. (2021). An analysis of primary and secondary school enrolment and inclusive growth in Nigeria. *International Journal of Academic Research in Economics and Management and Sciences, 10*(4), 99-115.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*

Sargan, J. D. (1958). The estimation of economic relationships using instrumental variables. *Econometrica: Journal of the Econometric Society, 26*(3), 393-415.

Schultz, T. W. (1992). The role of education and human capital in economic development: An empirical assessment. *Economic Development and Cultural Change, 40*(4), 697–726. https://doi.org/10.1086/451970

Shahbaz, M., Abosedra, S., & Sbia, R. (2013). Energy consumption, financial development, and growth: Evidence from cointegration with unknown structural breaks in Lebanon. *Energy Economics, 36*(1), 456–469. https://doi.org/10.1016/j.eneco.2012.09.002

Shaw, E. S. (1973). *Financial deepening in economic development*. London: Oxford University Press.

Solow, R. M. (1999). Neoclassical growth theory. *Handbook of Macroeconomics, 1*, 637-667.

Szmolka, I. (2017). *Political change in the Middle East and North Africa: After the Arab Spring*. Edinburgh: Edinburgh University Press.

WB. (2020). *Global financial development report 2019 / 2020: Bank regulation and supervision a decade after the global financial crisis*: World Bank.

Nurture**: Volume 19, Issue 1, 100-113, **2025
***Online ISSN**: 1994-1633/ **Print ISSN**: 1994-1625*
***DOI**: 10.55951/nurture.v19i1.989| **URL**: www.nurture.org.pk*
***Publisher:** Nurture Publishing Group*