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-RESEARCH ARTICLE-

ENHANCE THE LINK BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: INSIGHTS FROM A GMM-VAR APPROACH

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─Abstract─

This research investigates the complex interplay between financial development and economic growth within the Middle Eastern context, employing an advanced

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Generalised Method of Moments (GMM) Panel Vector Autoregressive (VAR) approach. Utilising panel data spanning 12 Middle Eastern economies from 2000 to 2018, the study conducts an empirical evaluation of the bidirectional causality between financial markets and economic expansion, incorporating a structural break analysis to assess the impact of the Arab Spring on this relationship. The investigation utilises the Financial Institutions Index (FII), Financial Market Index (FMI), and Broad Money Supply (M3) as key independent variables to examine their effects on real per capita GDP growth (CGDP). Findings indicate that, following 2010, financial institutions exerted a more pronounced negative influence on economic growth compared to financial markets, primarily due to inefficiencies in credit allocation, banking sector concentration, and weak financial intermediation. The Chow Test validates the presence of a structural break post-2010, necessitating a segmented analysis of the pre- and post-Arab Spring periods. Furthermore, the Granger Causality Test identifies a unidirectional causal relationship from financial markets to economic growth before 2010, whereas, in the post-2010 period, a bidirectional link emerges between financial institutions and economic expansion, lending support to the endogeneity hypothesis. The Impulse Response Function (IRF) analysis further highlights the volatility of financial market shocks, which initially stimulate growth but subsequently contribute to instability. The study underscores the imperative of financial sector reform, with particular emphasis on enhancing banking efficiency, optimising credit distribution mechanisms, and expanding capital markets to ensure financial development translates into sustained economic advancement. The research offers policy recommendations for financial regulators, advocating for the reinforcement of financial infrastructure to mitigate systemic risks and strengthen economic resilience.

Keywords: Financial Development, Economic Growth, GMM Panel VAR, Structural Break, Arab Spring, Financial Institutions, Financial Markets, Granger Causality, Impulse Response Function

INTRODUCTION

Over the past twenty years, the debate surrounding the importance of both quantitative and qualitative improvements in financial markets, institutions, and instruments has been resolved, as numerous studies have established a robust link between the progression of financial markets and institutions and economic growth. Durusu-Ciftci (2017) argues that the intrinsic connection between economic development and financial advancement stems from the fact that financial progress serves as a reliable predictor of future economic growth rates. Financial markets and their associated instruments act as mechanisms to reduce transaction costs for businesses and evaluate the performance of financial systems, thereby facilitating savings, influencing investment decisions, and fostering technological innovation, all of which contribute to sustained economic growth (Al-Yousif, 2002).

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The impact of financial development on economic growth is mediated through two primary channels: capital accumulation and total factor productivity, as outlined by (Gtjrley & Shaw, 1955) and further elaborated by (Ben Ali et al., 2016). Financial institutions mobilise savings, which are then allocated to productive activities, creating new opportunities and expanding project scopes, thereby enhancing production and capital growth (Aglietta & and Breton, 2001; Durusu-Ciftci, 2017). The marginal output of each production factor increases due to the higher marginal product of capital, which in turn stimulates investment (Ahmad et al., 2010). These mechanisms unlock renewable labour potential, thereby enhancing skills and contributing to developmental objectives (Pearce, 2014). Scholars have explored various pathways in published research to comprehend how financial development influences economic growth. The investigation into the relationship between financial development and economic growth remains ongoing, particularly in the context of emerging economies, including those in the MENA region (Ahmed et al., 2018).

The structural foundations of emerging economies, coupled with critical deficiencies in key components, pose significant challenges to achieving robust financial development and, consequently, economic progress. Many developing nations exhibit substantial operational disparities in the functioning of their economies. The Middle East, for instance, grapples with an unstable economic framework characterised by weak macroeconomic structures and limited financial growth, which hinders institutional and operational financial advancement. This study investigates the relationship between financial development and economic growth, focusing on selected countries that implemented financial liberalisation reforms from the 1980s to the 1990s, adopting policies that minimised intervention in financial market operations.

Significance of the Study

The findings of this study offer crucial insights that should inform the strategies of policymakers, financial regulators, and economic planners in Middle Eastern economies. The structural break identified after 2010, coinciding with the Arab Spring and regional economic shocks, underscores the necessity for updated financial policies. Post-2010, the research highlights adverse effects on the growth of financial institutions, suggesting that regulators must reassess financial governance frameworks to enhance credit efficiency, reduce market concentration, and promote financial inclusion. The data underscores the need for strategic restructuring of financial markets, as their current instability diminishes their growth impact compared to predictions from economic forecasting models. Policymakers should leverage these insights to implement stabilising market interventions, prioritising liquidity enhancement, bolstering investor confidence, and fostering innovation within the financial sector. The study reveals that economic growth is directly influenced by the broad money supply (M3), emphasising the critical role of monetary policy measures.

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Furthermore, the findings regarding the impact of financial institutions on economic development suggest that sectoral development strategies must align with national macroeconomic objectives. The Granger causality analysis provides empirical evidence that can assist investors in making informed decisions. Strengthening banking networks, expanding access to financial services, and improving capital allocation efficiency should be prioritised by institutional investors, as these measures yield more substantial growth effects than those generated by financial markets alone. These recommendations aim to address the structural and operational challenges faced by Middle Eastern economies, fostering sustainable economic progress.

The findings of this study hold global significance, as the Middle East continues to play a pivotal role in the international financial system, particularly in energy markets and sovereign wealth management. The examination of financial sector dynamics offers valuable insights for policymakers overseeing economies with similar financial structures and economic challenges. The study's outcomes equip development agencies and financial institutions with the necessary analytical foundation to design targeted programmes that inform policy recommendations and investment strategies within the Middle Eastern context.

By presenting a comprehensive cross-sectional analysis, this research makes substantial contributions to economic theories, their practical applications, and financial strategies for institutional and regional economic development. It provides decision-makers at various levels with empirical evidence to support informed policymaking, particularly by elucidating the intricate interactions between financial institutions, markets, and economic expansion. The study's innovative methodological approach and robust empirical validation establish a foundation for future academic research, thereby enhancing the strategic decision-making capabilities of scholars, policymakers, and financial market professionals engaged in economic and financial development.

Research Objectives

This research examines financial development's effects on Middle Eastern economic expansion. The research goals focus on essential information deficiencies by providing evidence supporting policy development. The research study establishes the following main objectives:

- This research will examine how financial development creates two economic growth effects.
- This study will determine how financial development creates economic growth and identify which factor between these two components leads financial markets forward. It will also analyse how financial institutions and financial markets influence economic performance.
- The research will investigate the extent and significance of post-Arab Spring

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structural changes in financial sector activity and economic growth patterns before and after 2010.

- The study will examine individual contributions between financial institutions and financial markets for economic growth and distinguish FII from FMI effect patterns to understand their separate roles in economic development.

Literature Gap

The academic foundation exploring the relationship between financial development and economic growth includes economic model, which emphasises finance-driven expansion, and adopts a demand-oriented perspective (Schumpeter, 1883). However, empirical studies examining this relationship in the context of Middle Eastern economies have yielded limited and inconclusive results. The scientific community has yet to establish a standardised causal model due to methodological limitations, incomplete analysis of economic disruption factors, and reliance on basic financial system metrics. Several critical gaps in the literature necessitate further investigation to refine empirical analysis, as these gaps significantly impact the understanding of the finance-growth nexus.

Conventional empirical studies predominantly employ static panel regressions and cross-sectional models, which assume that financial development variables are independent of other factors. This methodological approach often leads to unreliable results, as it underestimates the interconnected nature of these variables. Furthermore, the field has largely failed to effectively address the feedback dynamics between financial institutions, financial markets, and macroeconomic growth indicators, which are crucial for shaping long-term economic sustainability.

A significant gap in current research is the omission of structural break analysis, particularly in the period following the Arab Spring. Over the past two decades, the Middle Eastern financial landscape has experienced substantial disruptions due to the dual impact of the 2008 global financial crisis and the socio-political upheavals of the Arab Spring in 2011. Few empirical studies have comprehensively examined how these events influenced the developmental trajectory of financial sectors and subsequent economic growth. The absence of structural break analysis in empirical models leads to flawed findings, as it overlooks critical transition points that shape policy adoption and financial sector adjustments in response to economic and political disturbances.

Additionally, research on financial development predominantly relies on a single indicator, such as the private sector credit-to-GDP ratio, to measure financial development, often treating it as a monolithic construct. Previous studies that employ aggregate financial development metrics fail to disentangle the distinct growth effects of banking systems and capital markets due to their non-specific methodologies. Developing economies, in particular, exhibit significant financial sector volatility,

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which directly impacts growth stability, investment confidence, and macroeconomic resilience.

How This Research Addresses the Gap

This study employs the GMM-based VAR framework, as it is specifically designed to model endogenous interactions between financial institutions, financial markets, and economic growth. Unlike traditional regression-based approaches, the Panel VAR methodology facilitates the examination of dynamic feedback mechanisms, allowing for a comprehensive analysis of finance-growth causality across variables. By incorporating a simultaneous system of equations that links financial indicators to economic output dynamics, this approach ensures both theoretical soundness and empirical robustness. To assess the transformative economic shifts triggered by the Arab Spring in Middle Eastern economies, the study integrates structural break analysis using the Chow Test. The dataset is segmented into two distinct periods, enabling an evaluation of how financial sector operations and patterns of economic expansion evolved in response to macroeconomic disruptions, political instability, and policy adjustments. This analytical strategy enhances the reliability of the findings by mitigating bias associated with unaccounted structural changes across different economic regimes. This research adopts a comprehensive financial development framework, categorising financial metrics into three primary dimensions:

- Financial Institutions Index (FII): Assesses institutional depth, efficiency, and accessibility.
- Financial Markets Index: Measures market liquidity, development, and integration.
- Broad Money Supply (M3): Evaluates financial system liquidity and monetary depth.

By disaggregating these indicators, the study provides a nuanced understanding of financial development-economic growth dynamics, enabling tailored policy recommendations for institutional and market needs.

LITERATURE REVIEW

Numerous studies examine financial development as a driver of economic growth. Goldsmith (1969) established the link between financial intermediaries and GDP across 35 nations over 103 years (1860–1963) (Roubini & Sala-i-Martin, 1992). Financial institutions and markets play a crucial role by facilitating efficient resource allocation, risk diversification, and investment mobilisation (Atje & Jovanovic, 1993). Schumpeter (2008) highlighted this relationship, while empirical studies have applied econometric techniques such as panel data analysis, time-series models, and structural break assessments (King & Levine, 1993; Al-Yousif, 2002). Conversely, the demand-following hypothesis posits that economic growth increases demand for financial

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services, fostering financial sector expansion (Jackson & Fethi, 2000). Cross-sectional data analysis has been widely used to examine the relationship between financial structures and economic growth (Gupta, 1984; Jung, 1986).

The literature presents diverse findings on financial development. Many studies confirm a strong positive relationship between financial development and economic growth, termed PIDE (Positive Impact Development Expansion) (Goldsmith, 1969; King & Levine, 1993). However, some research indicates a negative or negligible impact, with data suggesting no significant economic benefits from financial development (Demirgüç-Kunt & Maksimovic, 1998). King and Levine (1993) argue that financial development does not directly influence economic growth but is linked to broader growth parameters, a claim supported by statistical evidence on financial depth (Mabeba, 2024). Stock market liquidity has also been identified as a key determinant of economic growth (McCaig & Stengos, 2005). Econometric techniques assess financial growth dynamics, with (Mishra & Narayan, 2015) applying a nonparametric model to analyse longitudinal financial sector data. Additionally, various studies explore the non-linear relationship between financial development and economic growth (Al-Sabaawe et al., 2024; Greenwood & Jovanovic, 1990).

Kar et al. (2011) investigated economic growth and financial development across 15 MENA nations from 1980 to 2007, but statistical analysis failed to determine the direction of causality between financial indicators (Botev et al., 2019; Hammudeh et al., 2020). Gazdar and Cherif (2015) assessed the impact of institutional quality on economic growth in 18 MENA countries using GMM estimators. Their data revealed insufficient statistical evidence to confirm financial development's effect on growth from 1985 to 2005. Focusing on 13 Middle Eastern nations, the study employed various analytical methods to examine financial development's influence on the economy. Saidi (2020) examined how institutional quality influences the relationship between capital account liberalisation and economic growth across the MENA region using a two-stage analysis model from 1997 to 2016. The findings indicate that high-quality institutions reduce the positive impact of capital control relaxation on development. Chebab et al. (2020) investigated financial development and economic growth in African nations from 1987 to 2015. Their analysis, utilising PMG, MG, and DFE datasets, revealed a long-term positive correlation between financial development and economic growth.

Economic Reform in the Arab Countries

The economic performance of most emerging nations, particularly those in the Arab world, lagged behind the levels achieved during the 1970s. During the 1990s, Arab countries faced a combination of economic challenges and opportunities. While many of these nations undertook significant efforts to transform and modernise their

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economic sectors, some struggled to effectively address persistent economic issues and financial imbalances. Reform initiatives varied across the region: countries such as Morocco and Tunisia focused on restructuring public sector entities and assessing their financial sustainability, while others like Egypt and Algeria opted to grant greater autonomy to public sector institutions. In contrast, the Gulf Cooperation Council (GCC) states pursued strategies that included the partial privatisation of state-owned enterprises through the sale of shares (El-Naggar, 1993). These divergent approaches reflect the varying degrees of success in achieving economic stability and growth across the region during this period.

Financial Sector Reforms

The processes of financial liberalisation varied significantly across nations, with Qatar adopting a strategy that included monitoring developments in international financial markets as part of its broader financial system development (Rathmell & Schulze, 2000). Meanwhile, other countries implemented decisive measures to eliminate preferential lending practices for state-owned organisations (Eltony, 2003). Despite these financial liberalisation efforts, many Arab nations continue to face persistent obstacles that hinder the progress of their financial markets and institutions. A notable disparity exists between the substantial wealth accumulated in several Arab countries and the relatively underdeveloped state of their financial markets (Demetriades & Hussein, 1996). For instance, while the Arab Gulf oil sector has generated significant financial assets over recent decades, investment opportunities within local markets remain severely limited due to the region's inadequate financial infrastructure (O'Sullivan et al., 2011). Key factors contributing to the underperformance of financial institutions in the Middle East include dominant government sectors, weak institutional frameworks, underdeveloped financial markets, and inefficient investment practices (O'Sullivan et al., 2011). Furthermore, the financial systems in Arab nations are predominantly institution-centric, diverging from global trends, with the governmental and semi-public banking sectors controlling the majority of bank loans (Arestis & Demetriades, 1997). These structural and operational challenges highlight the need for comprehensive reforms to foster more robust and inclusive financial systems in the region.

METHODOLOGY

Advancements in methodology, data accessibility, and financial globalisation have led to diverse analytical approaches in examining the relationship between finance and economic development, with panel models being widely utilised. Many studies employing panel data face heterogeneity issues (Abu-Bader & Abu-Qarn, 2008), relying on econometric models that adopt conventional frameworks, which assume a unidirectional effect between finance and economic growth while treating independent variables as exogenous (Khalifa Al-Yousif, 2002; Ouyang & Li, 2018). This study investigates the endogenous relationship between economic growth and finance using panel data from 12 Middle Eastern nations (2000–2018) through a GMM panel VAR

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methodology. This approach enables the identification of homogeneous correlations among the four variables, allowing all variables to be treated as endogenous within a system of equations (Ouyang & Li, 2018).

Dependent Variable

The study quantifies the dependent variable using the actual annual per capita growth of CGDP, with 2010 as the base year. After applying the natural logarithm to country data (1=1,...,N), economic growth is measured as the difference between periods t and t-1 (Arayssi & Fakih, 2017; Hassan et al., 2011).

Independent Variable

The independent variables are defined as follows: the FMI consolidates multiple sub-indices, including the Financial Market Depth Index, Financial Market Efficiency Index, and Financial Market Access Index. Broad Money (M3) measures the money supply, encompassing M2 along with large time deposits, institutional money market funds, and other highly liquid short-term assets. The descriptive statistics of these variables have been mentioned in Table 1.

Table 1: Descriptive Statistics

Variable	Mean	Obs	Std. Dev.	Max	Min
CGDP	0.005	228	0.197	1.349	-1.035
FII	0.377	228	0.076	0.524	0.201
FMI	0.343	228	0.21	0.724	0.002
M3	11.564	228	8.991	54.051	-7.751

Figure 1, covering the period 2001–2010, shows that economic growth rates in Arab nations initially increased but later declined towards zero. Jordan and Algeria experienced weak growth, nearing zero, while some economies exhibited more notable trends. The graph also indicates negative growth rates from 2000 to 2003, followed by a modest recovery approaching zero.

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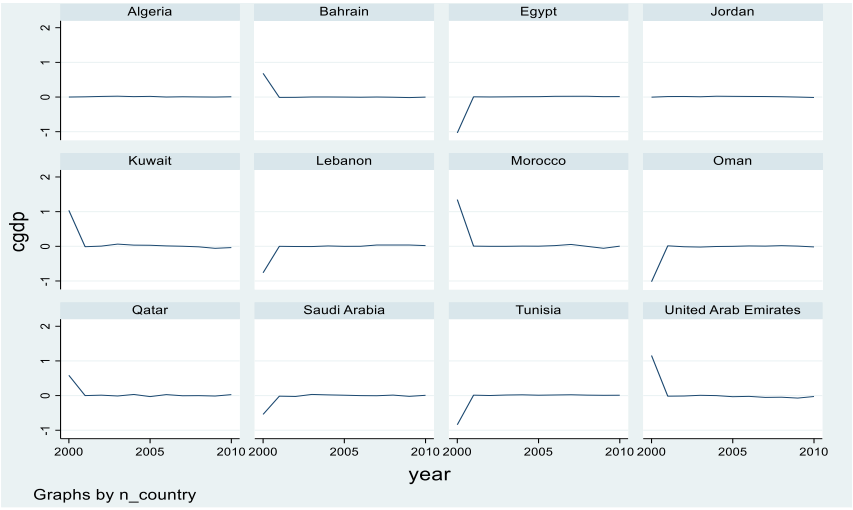

Figure 1: Growth Rates of Arab Nations from 2000 to 2010

Figure 2 highlights significant volatility in the growth rates of the selected sample, indicating persistent instability. Since 2012, Jordan and Egypt have experienced rising growth rates, whereas Saudi Arabia has shown a distinct decline. Morocco, Oman, and Kuwait exhibit fluctuating growth patterns, while Bahrain and Algeria have seen growth rates drop below zero after 2015.

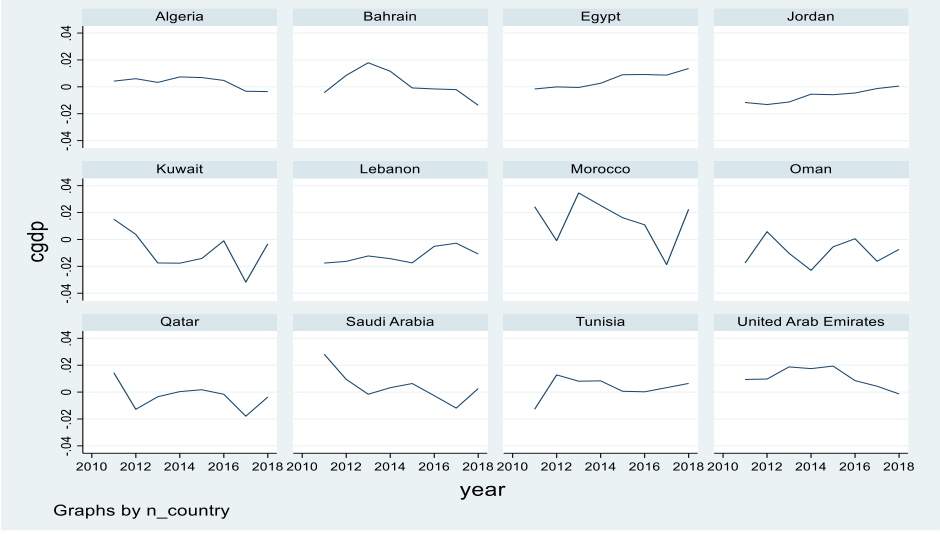

Figure 2: Growth Patterns for the period of 2010-2018

Figure 3 and Figure 4 depict the aggregated growth rates of the selected sample across two periods, highlighting fluctuations and volatility among the nations. Before the Arab Spring, growth rates varied between positive and negative, eventually stabilising near zero for the entire sample. Post-civil demonstrations, growth trends appear more erratic, reflecting heightened economic instability.

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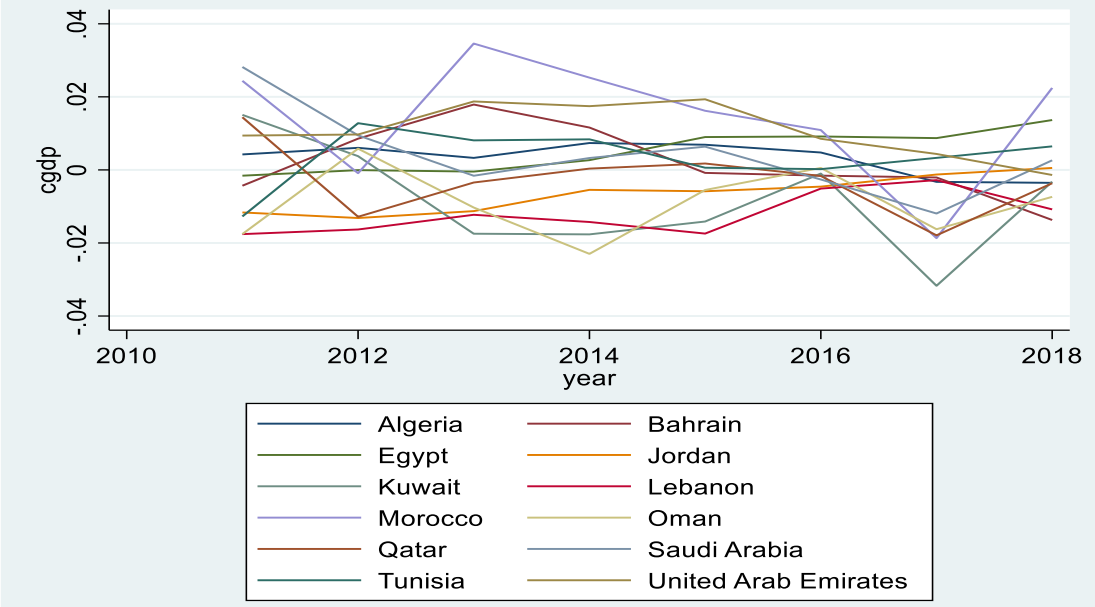

Figure 3: Volatality among Arabs for the period of 2010-2018

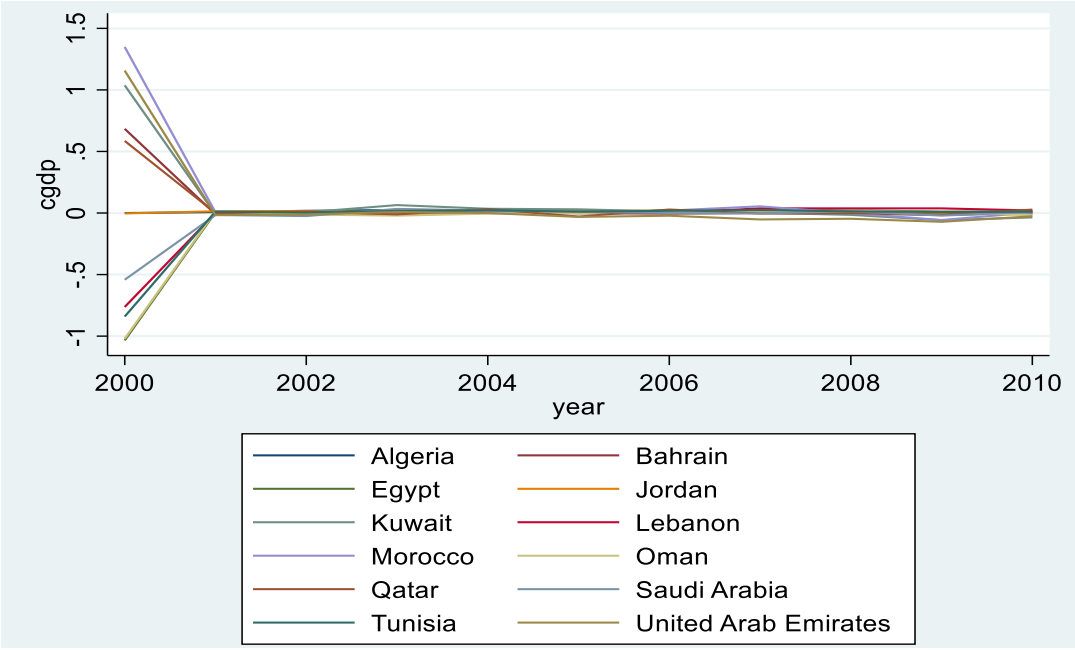

Figure 4: Volatality among Arabs for the period of 2000-2010

Chow Test

Structural changes following the Arab Spring will be examined using the Chow Test. This model is treated as a restricted system, where k+1 constraints ensure coefficient stability throughout the period. A dummy variable is introduced for the Chow Test,

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assigning a value of '1' for the post-2010 period and '0' for the pre-2010 period. This dummy, along with the independent variable, assesses slope changes at the break point. Structural break evidence will be determined based on the significance of the dummy and slope variables (Heckman, 2001).

Unrestricted Models

$$Unrestricted: Y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 D + \alpha_6 x_1 D + \alpha_7 x_2 D + \alpha_8 x_3 D + \alpha_9 x_4 D + u$$

Restricted: $Y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + u$

$H_0: \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = \alpha_9 = 0$ Restricted – No Structural Break

$H_0: \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq \alpha_9 \neq 0$ (Unrestricted – Structural Break

$$F_{est} = \frac{(RSS_R - RSS_1 - RSS_2)/k}{(RSS_1 + RSS_2)/(T-2k)} > F_{cr(0.05,k,T-2k)}$$

In Table 2 the study will reject the null hypothesis in favour of the alternative hypothesis, indicating a structural shift in the time series after 2010. Accordingly, the series will be divided into two periods: 2000–2010 and 2011–2018.

Table 2: Chow Test Result

F_{est}	F_{cr}
F(4, 220) = 2.42 , Prob > F = 0.0497	2.37

Cross-Section Dependency Tests

In Table 3, cross-section reliance is determined by two factors: the degree of cross-sectional correlation and the characteristics of cross-sectional dependence. This research employs three cross-section dependency tests across two timeframes utilising the Lagrange Multiplier (LM) test, Pesaran's scaled LM test, and Pesaran's CD test (2004). In 2004, Lockwood and Pesaran formulated the Pesaran scaled LM and Pesaran CD tests.

Table 3: Cross-Section Means were Removed During Computation of Correlations (2000-2010)

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	162.5546	66	0.0000
Pesaran scaled LM	8.404000		0.0000
Pesaran CD	0.318111		0.7504

The study rejects the null hypothesis, indicating cross-sectional dependence during the 2011–2018 period at a 1% significance level as shown in Table 4.

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Table 4: Cross-Section Means were Removed During Computation of Correlations (2011-2018)

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	113.7613	66	0.0002
Pesaran scaled LM	4.157086		0.0000
Pesaran CD	3.410406		0.0006

*** 1% Significance Level

Panel VAR

The general equation for panel var:

$$y_{it} = \alpha_1 y_{i,t-1} + \cdots + \alpha_p y_{i,t-p} + \beta_0 x_{it} + \beta_1 x_{i,t-1} + \cdots + \beta_m x_{i,t-m} + u_{it}$$

Assuming that the error term u is uncorrelated, the GMM estimators in a univariate framework are susceptible to the weak instruments problem, particularly when the modelled variable approaches a unit root. However, Panel VAR estimations remain consistent when obtained through GMM estimation. Given that all observations are aggregated across the panel, the GMM estimator is expressed as:

$$A = (\tilde{Y}^{*^-} Z \widehat{W} Z^- \tilde{Y}^-)^{-1} = (\tilde{Y}^{*^-} Z \widehat{W} Z^- \tilde{Y}^-)$$

$\widehat{W}$ is K x K weighting matrix , $\boldsymbol{E(Z^- e)} = \mathbf{0}$ **,** and rank E$(\tilde{Y}^{*^-} Z) = kp + 1$

Model Selection

The study relies on the ideal lag to select the panel VAR parameters and moment condition. MMSC are comparable to widely used maximum likelihood-based model selection criteria (AIC, BIC, and HQIC) by applying Andrews and Lu's (2001) MMSC to the GMM estimator, which selects based on the minimization of ⟦MMSC ⟧_AIC, ⟦ MMSC ⟧_BIC, and ⟦MMSC ⟧_HQIC as shown in Table 5.

Table 5: Panel VAR Lag Order Selection on Estimation Sample 2011-2018

Lag	CD	J	J P-Value	MQIC	MAIC	MBIC
1	1	36.407	0.89	-106.497	-59.593	-176.273
2	1	23.717	0.854	-71.552	-40.283	-118.069

The findings in Table 6 indicate that the optimal lag is the first lag.

Table 6: Eigenvalue Stability Condition 2011-2018

Eigenvalue		
Real	**Imaginary**	**Modulus**
0.957	0.00	0.957
0.201	-0.327	0.384
0.201	0.327	0.384
0.123	0.00	0.123

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Eigenvalue tests support these results, as shown in Table 7, which presents the Eigenvalue stability criterion.

Table 7: Running Panel VAR Lag Order Selection on Estimation Sample 2000-2010

Lag	CD	J	J P Value	MBIC	MAIC	MQIC
1	1	41.258	0.744	-171.421	-54.742	-101.646
2	0.998	21.357	0.924	-120.429	-42.643	-73.912

Stability test shows that all the roots are inside the circle indicates the stability in the model and presence of unit root as shown in Figure 5 and Figure 6. Whereas, Table 8 indicates that the financial market negatively impacted economic development between 2000 and 2010. Several global events, including the 2003 Iraq invasion, the 2008 financial crisis, global stock market collapses, internal Arab crises, and fragile market structures, disrupted financial market operations, leading to adverse economic trends. Financial institutions had a more detrimental effect on economic development than financial markets, particularly after the Arab Spring uprisings, which severely affected the financial sector. The findings show that a one-unit increase in the financial institutions index results in a 0.230% decline in economic growth, while each point increase in the financial market index reduces economic growth by 0.0674%. This outcome is attributed to three key factors: (1) the dominant role of public institutions in credit distribution, (2) the foundational economic influence of public sectors, and (3) high banking concentration and low banking density variations across the region.

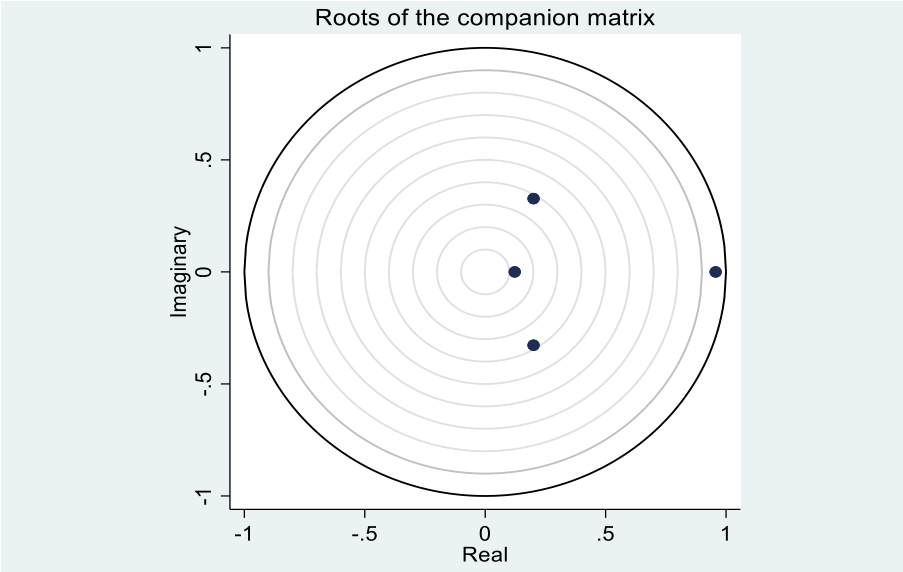

Figure 5: PVAR Satisfies Stability Condition 2011-2018

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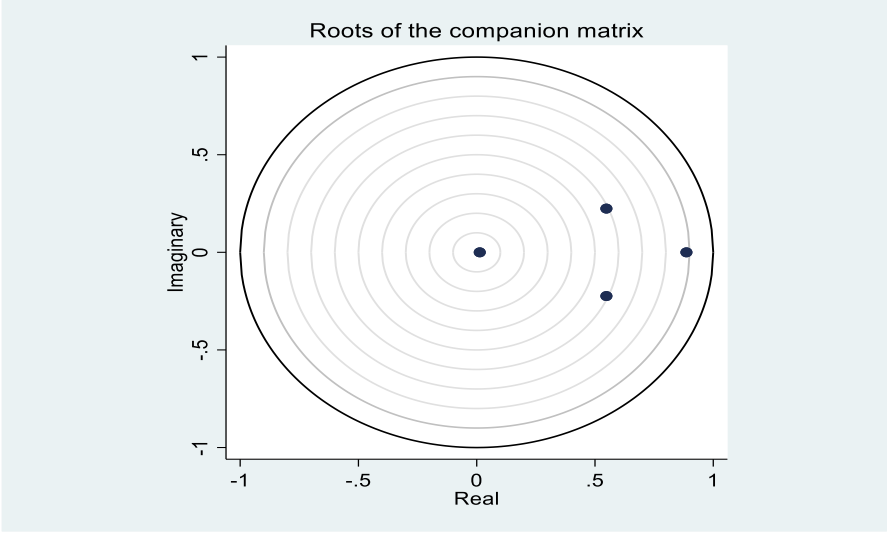

Figure 6: PVAR Satisfies Stability Condition 2000-2010

Table 8: Eigenvalue Stability Condition 2000-2010

Modulus	Imaginary	Real
0.887	0.00	0.887
0.592	0.224	0.548
0.592	-0.224	0.548
0.013	0.00	0.013

In Table 9, the study data indicate that causal relationships among variables align with the research findings based on econometric models. Financial institutions and growth indicators exhibit bidirectional causality, while financial markets influence economic growth in a unidirectional manner. From 2011 to 2018, economic expansion followed a consistent pattern, with broad money supply acting as a causal driver of growth.

Table 9: GMM-VAR PANEL

	2011 - 2018					2000 - 2010		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	**Model 1 CGDP**	**Model 1 FII**	**Model 1 FMI**	**Model 1 M3**	**Model 2 CGDP**	**Model 2 FII**	**Model 2 FMI**	**Model 2 M3**
L.CGDP	-0.0175	1.436***	3.962***	-504.2***	-0.197	0.135*	1.365***	311.6***
	(0.0987)	(0.396)	(0.713)	(143.8)	(0.183)	(0.0767)	(0.269)	(62.33)
L.FII	-0.230***	1.268***	1.225**	-319.4***	0.00115	0.866***	-0.512*	-88.41**
	(0.0616)	(0.232)	(0.492)	(84.75)	(0.194)	(0.0628)	(0.262)	(43.31)
L.FMI	-0.0674***	0.127	0.166	-29.42	-0.339***	0.0348*	0.915***	50.86***
	(0.0244)	(0.0777)	(0.162)	(29.07)	(0.0802)	(0.0200)	(0.0911)	(14.66)
L.M3	-0.000206	0.000235	0.000284	0.0652	0.000732	-0.000205	-0.000382	0.412***
	(0.000170)	(0.000514)	(0.00110)	(0.216)	(0.000450)	(0.000138)	(0.000689)	(0.123)
Observations	96	96	96	96	132	132	132	132

Standard Errors in Parentheses
*** p<0.01, ** p<0.05, * p<0.1

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The outcomes from Chi-square tests for variable exclusions (CGDP, FII, FMI, M3) appear in Table 10.

Table 10: Panel VAR-Granger Causality Wald Test (2011-2018)

Equation\Excluded	chi2	df	Prob>chi2
CGDP			
FII	14.001	1	0.00
FMI	7.601	1	0.006
M3	1.474	1	0.225
ALL	34.944	3	0.00
FII			
CGDP	13.164	1	0.00
FMI	2.693	1	0.101
M3	0.209	1	0.647
ALL	29.287	3	0.00
FMI			
CGDP	30.913	1	0.00
FII	6.208	1	0.013
M3	0.067	1	0.796
ALL	37.195	3	0.00
M3			
CGDP	12.287	1	0.00
FII	14.203	1	0.00
FMI	1.024	1	0.312
ALL	19.444	3	0.00

A model significance test becomes meaningful when the probability value (Prob>chi2) drops below 0.05 during variable exclusion tests. The exclusion of FII and FMI variables produces statistically significant effects on the CGDP model because their calculated probabilities stand at 0.00 and 0.006. The results indicate that M3 has minimal effect on the model since its probability stands at 0.225. The FII equation demonstrates exceptional significance toward CGDP since its probability reaches 0.00, yet FMI and M3 remain insignificant using their probabilities of 0.101 and 0.647. The FMI equation maintains significant relationships with CGDP and FII because their probabilities are 0.00 and 0.013, although M3 becomes insignificant, as shown by a probability of 0.796. The M3 equation demonstrates strong significance for variables CGDP and FII with zero probabilities but lacks influence from FMI shown by its 0.312 probability value. The FII and CGDP variables demonstrate the strongest influence on these models compared to the weakest M3 variable effect.

In Table 11, the Chi-square test results establish CGDP as the key variable because its removal affects various equations significantly at a $p < 0.05$ level. The statistical significance rates show that FII has weak relationships while affecting the M3 model at $p = 0.041$, though only having a marginal impact on the FMI model at $p = 0.051$. FMI shows statistical significance at the 1% level when included in the M3 equation. The exclusion of M3 shows minimal significance only in CGDP since its omission approaches significance at $p = 0.104$. The "ALL" tests verify that simultaneous

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omission of all variables generates significant influence on every model parameter (p = 0.000).

Table 11: Panel VAR-Granger Causality Wald Test (2000-2010)

Equation\Excluded	chi2	df	Prob>chi2
CGDP			
FII	0.00	1	0.995
FMI	17.9	1	0.000
CGDP			
M3	2.644	1	0.104
ALL	18.244	3	0.000
FII			
CGDP	3.089	1	0.079
FMI	3.008	1	0.083
M3	2.201	1	0.138
ALL	11.609	3	0.009
FMI			
CGDP	25.829	1	0.000
FII	3.801	1	0.051
M3	0.307	1	0.579
ALL	71.145	3	0.000
M3			
CGDP	24.99	1	0.000
FII	4.167	1	0.041
FMI	12.029	1	0.001
ALL	82.131	3	0.000

Diagnostic Test

Impulse Response Function (IRF)

The analysis of IRFs provides insights into the dynamic relationships between financial development and economic growth. This methodological approach examines how variables influence one another and assesses their responses to external shocks or disturbances in figure 7 and 8. The findings reveal that the financial institution index initially exerts a positive impact on growth following a shock. However, this effect transitions into negative territory before stabilising at a minimal positive level, which ultimately settles at a neutral or slightly detrimental state. In contrast, shocks to the financial market index demonstrate a more pronounced influence on economic growth compared to those stemming from financial institutions. Between 2010 and 2012, the response to financial market shocks was positive, contributing to growth. However, this trend reversed into negative effects post-2012, before rebounding to positive territory in 2014. Eventually, the impact stabilised at a neutral equilibrium point. These results underscore the varying degrees of influence that financial institutions and markets exert on economic growth, highlighting the importance of distinguishing between these components in policy formulation and economic analysis.

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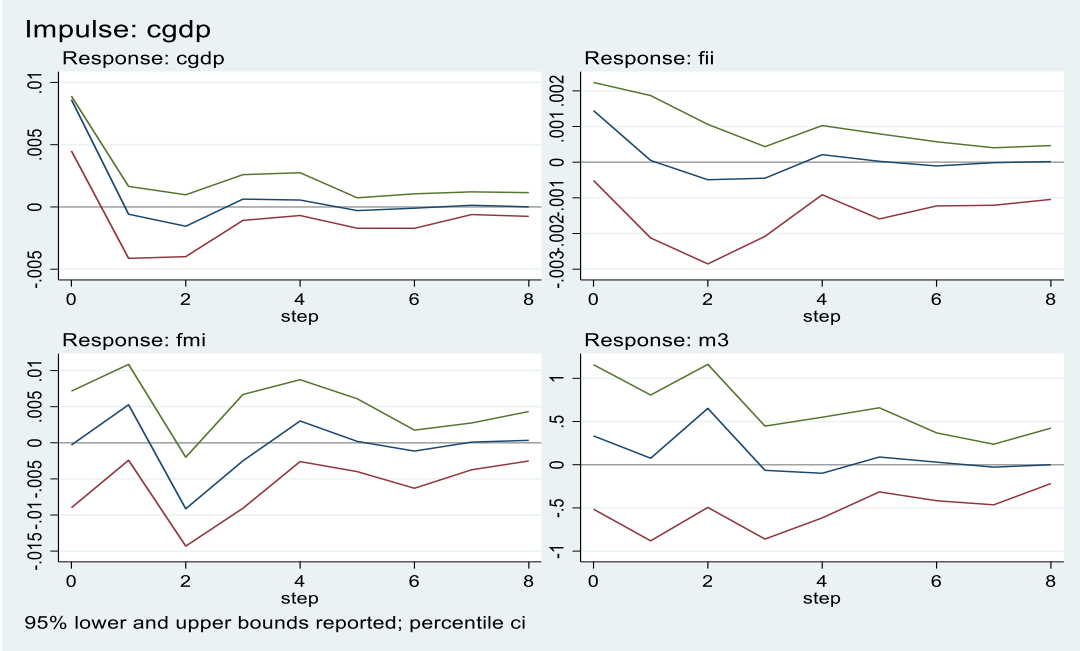

Figure 7: IRF 2011-2018 CGDP

The period before 2010 appears more stable, as data suggest that financial institution index shocks initially negatively affected economic development before declining sharply to nearly zero by 2008 as shown in Figure 8. In contrast, financial market shocks had a positive impact throughout the 2000–2008 period.

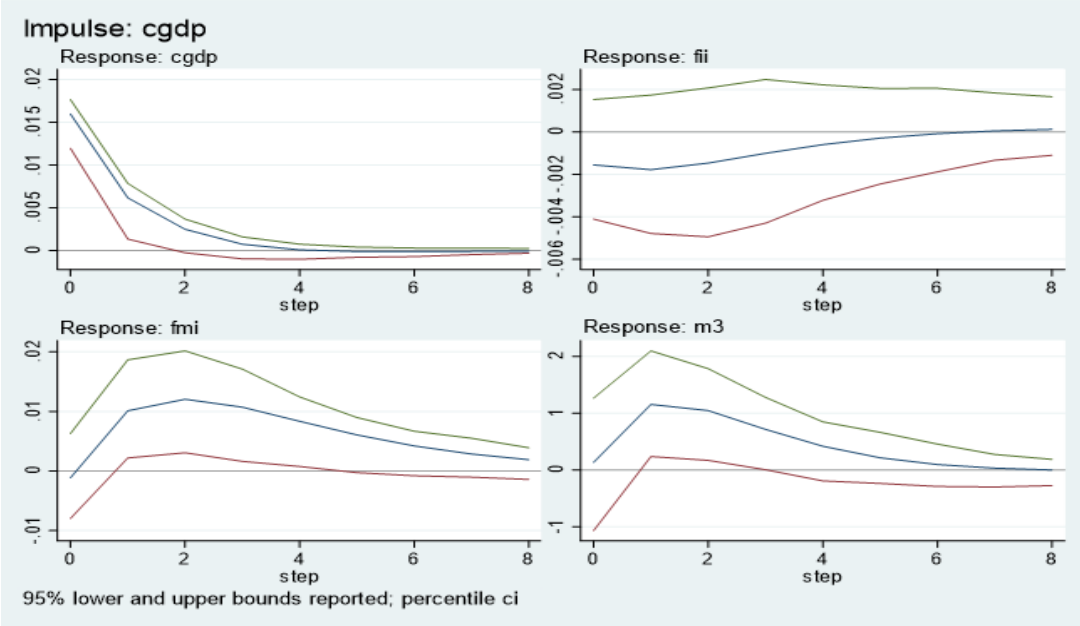

Figure 8: IRF 2000-2010 CGDP

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CONCLUSION

This study examines the interrelationship between financing and economic growth in 12 MENA countries from 2000 to 2018, divided into two phases: 2000–2010 and the subsequent period. The analysis employs VAR models within the GMM framework, utilising impulse response functions to assess variable interactions. The integration of VAR-PANEL with impulse response analysis facilitates a comprehensive understanding of these interdependencies. The findings indicate that financial development negatively affects economic growth in the region, with structural barriers limiting its potential benefits. Economic characteristics unique to these nations hinder financial system efficiency, particularly under conditions of uncertainty. Effective financial growth necessitates government-led reforms to strengthen oversight institutions and improve financial sector regulation.

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