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The Relationship between Financial Inclusion and Economic Growth Empirical Study from MENA Countries

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ABSTRACT

Purpose: The relationship between financial inclusion and economic growth is an intriguing topic that is generating extensive attention among researchers and merits comprehensive investigation. This paper aims to empirically explore this relationship using panel data for 13 Middle Eastern and North African countries spanning the period 2004-2020. The multidimensional index of financial inclusion (encompassing access, usage, and depth) developed by Chehayeb (2024) using a new technique is utilized to generate comprehensive results across countries in emerging economies. **Design/methodology/approach:** An Autoregressive Distributed Lag (ARDL) regression model is applied to test for co-integration. Vector Auto-Regression (VAR) models and Granger causality tests are employed to investigate the main research questions.

Findings: The paper reports an insignificant impact of financial inclusion on economic growth, aligning with the realist perspective of a few studies found in the literature - as opposed to the positivist perspective of most scholars. The results obtained from using the new financial inclusion index highlight the discrepancies and conflicting results among existing studies using multiple proxies of financial inclusion. However, empirical results suggest that there is a unidirectional Granger causality from economic growth to financial inclusion. Findings also reveal the positive impact of economic growth on the access and usage dimensions of financial inclusion, whereas school enrollment, trade openness, and inflation do not appear to be significantly related to financial inclusion.

Research limitations/implications: This study is limited to the banking institutions in emerging economies. The study recommends that policymakers and central bank governors in this region utilize the growth of the economy to build an efficient and strong financial system favoring disadvantaged individuals. Future studies on this topic can provide clearer insights with research inclusive of religion levels, political issues, and corruption.

Originality/value: This study contributes to the existing literature by using a new measurement of financial inclusion in studying the relationship between financial inclusion and economic growth.

Keywords: ARDL, Economic growth, Financial inclusion index, Middle East and North Africa, VAR models

I. Introduction

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Financial inclusion is a broad concept which can be defined in many ways. Financial inclusion implicates easy access to useful financial services at an inexpensive cost, leading to the financial stability of an economy.

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Several scholars have defined financial inclusion based on features that indicate a wide access to financial services. Bhaskar (2013) states that financial inclusion is the worldwide access to an affordable and unlimited variety of financial products. It is also defined by the World Bank (2023)1) as the access to useful and affordable financial products and services that meet consumers' and businesses' needs being delivered in a responsible and sustainable way. Schumpeter (1911) argues that finance stimulates growth, and that financial services and financial education can boost capital formation, thus stimulating investment. Lusardi and Mitchell (2014) suggest that endogenized financial knowledge has significant implications on welfare. Furthermore, Kodan and Chhikara (2013) emphasize the role of policymakers around the globe to remove regional imbalances, and therefore, reach the optimal and sustainable level of financial inclusion leading to inclusive economic growth.

In recent decades, financial inclusion has been a policy goal in many emerging economies, as encouraged by the World Bank and the $G20^{2}$). Financial inclusion is desirable because a highly inclusive financial system promotes savings, loans, and risk management solutions among entrepreneurs and needy populations. Therefore, educating and bridging the gap between the financial sector and unbanked populations-those who neither have bank accounts nor use banking services- are needed now more than ever. However, development supporters have not agreed on a conclusion regarding the impact of financial inclusion on macroeconomic indicators. This created an increased interest among scholars to investigate the relationship between financial inclusion and economic growth.

Research studies investigating the relationship between financial inclusion and economic growth have increased over the years. Prior to 2017, very little research tackling this subject is found in literature, between 2000 and 2022 there are a few studies that focus on a single region (Ozili et al, 2023). Some of the studies tackling this subject have adopted time-series data (Sharma, 2016 and Migap et al., 2015). The financial inclusion indices found in literature have not captured the full variations, leading to different results across studies. Several research studies show a positive relationship between financial inclusion and economic growth, whereas other studies document a negative relationship. Yet, none of these research studies use the new multidimensional financial inclusion index (FINCI) developed by Chehayeb (2024). Following Sarma's (2008) approach, FINCI has proved to be useful in measuring financial inclusion levels for countries over the years due to its comparability and simplicity. Therefore, the ongoing theoretical debate about the types of relationships between financial inclusion and growth has shown that the studies are inadequate as researchers have not agreed on the type of causality between the two variables (Ozili et al, 2023).

Therefore, this paper aims to close the research gap identified between the theoretical and the latest implications of the ongoing debate observed in literature on whether a causal relationship exists between financial inclusion and economic growth, with a significant contribution to the existing research, specifically in the MENA region. Unlike previous studies that use individual financial inclusion indicators or other indices that failed to capture significant dimensions, this paper utilizes a new index of financial inclusion (FINCI) developed by (Chehayeb, 2024) applied on 13 chosen countries from the MENA region: Algeria, Djibouti, Egypt, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and United Arab Emirates over 2004-2020. This study contributes to policy discussions about the role of policymakers and central bank governors in improving the welfare of the economies.

To the best of my knowledge, this subject has not been studied in any recent panel analysis in the MENA region utilizing *FINCI*. Furthermore, this study examines each dimension of the financial inclusion index (access, usage, and depth) to explore its individual interlinkage causal effect on economic

Financial Inclusion Overview (worldbank.org) visited on 12/15/ 2023

G20 is a group of sovereign countries works on global issues including international financial stability.

growth. This new composite financial inclusion index (*FINCI*), which is based on Sarma (2012) and UNDP methodology, better captures the dimensions of financial inclusion ignored in previous studies (Chehayeb, 2024). Also, the choice of the countries has been based on the similarities in their economies' cultures, languages, politics and geographic locations as well as the availability of data and appropriate literature to support the arguments. The remainder of this research is laid out as follows: Section 2 summarizes the literature review. Section 3 explains the research methodology. Section 4 presents and analyses the empirical results. Section 5 concludes.

II. Literature Review

The literature reviewed on the driving forces of economic growth shows that labor, physical capital, level of technology and natural resources constitute the factors of production that determine economic growth. The economic growth analysis was first noticeable by Solow (1956), whose growth model suggests that the size of capital stock depends primarily on the savings rate of the economy, which would determine its level of output. In addition, developing countries can benefit much more from increasing their savings rates to stimulate their economic growth. Liu and Guo (2002) suggest that developing countries will enhance their GDP by encouraging the savings in their countries. This can be made possible through mobilizing the creditable capital available to finance aggregate investment, thus increasing the countries productivity level (Stern, 1991). Cobb et al. (1995) emphasizes the importance of GDP and GDP per capita for measuring the economic welfare of a particular country, claiming that it is a primary indicator that societies should work on to enhance their social welfare. Several research studies adopt GDP per capita as a proxy for growth rate, such as Kim et al. (2018) and Van et al. (2021). This allows the population size to be taken into

consideration, therefore reducing a possible heterogeneity problem.

The theory of finance and growth emphasizes the importance of financial institutions in improving financing conditions that would reflect on investment and productivity levels, therefore influencing economic output and growth (Gurley and Shaw (1955), McKinnon (1973) and Levine (2005)). The theory argues that financial institutions better allocate credit toward productivity and growth (Levine, 2005). Ozili (2020a) in his theoretical study about "the system theory of financial inclusion" argues that financial inclusion can be attained through several parts of the economic sector, such as through formal financial institutions, resulting in outcomes with a positive effect on the economic system.

Several empirical studies show a positive relationship between financial inclusion and economic growth. A study by Sahay et al. (2015) reveals a positive correlation between financial access (ATMs or bank branch availability) and financial depth (financial services' volume) with economic growth. Sarma (2008), Aduda and Kalunda (2012), Hariharan and Marktanner (2012), and Onaolapo (2015) agree that financial inclusion boosts economic activities in the given economies. They use various banking indicators for financial inclusion assessment, including bank branches, deposits and credit, and Automated Teller Machines, as well as various approaches including Ordinary Least Square (OLS). Fully Modified Least Square (FMOLS), Vector Auto-Regression (VAR) and Autoregressive Distributed Lag (ARDL). As such, similar results were achieved by Sharma (2016), who suggests a positive interlinkage relationship between financial inclusion's dimensions and economic growth. Musembi and Chun (2020) reveal the positive impact of financial inclusion on future economic growth while Mustafa and Rahman (2015) find that bank-based financial inclusion has a positive impact on Gross State Product growth. However, Hariharan and Marktanner (2012) conclude that this relationship is still not wellcovered by empirical literature although they suggest a causal association running from financial inclusion to economic growth, specifically boosting productivity and the accumulation of capital for a country.

Using a panel causality test to study the bi-directional causality between financial inclusion and economic growth, Sethi and Acharya (2018) find that financial inclusion spurs economic growth. Using panel co-integration, their study reveals a positive long-run correlation between financial inclusion and economic growth. Central banks play a crucial role in highlighting the importance of an inclusive financial system and establishing adequate political security procedures for the growth of an economy. This helps stimulate public confidence to increase savings deposits and account creations within the financial system (Babajide et al., 2015) and (Lenka and Sharma, 2017).

Some studies show that financial inclusion may have a negative impact on economic development. A study by Barajas et al. (2013) reveals that "it is not necessary that all economies exhibit a positive growth-finance nexus, and it may not lead to a positive finance-growth nexus." Therefore, some of the few literatures approve the negative effect of financial inclusion on growth, failing to prove a positive impact. Regarding financial inclusion in the Middle East and North Africa (MENA) region, Pearce (2011) emphasizes its importance in competitiveness, employment creation, and poverty reduction, recommending prioritizing it as an objective and a policy focus for financial regulators across the region. Pearce argues that despite the efficient financial systems in place, it is still unable to reach low income and disadvantaged groups. Mehrotra and Yetman (2015) argue that financial inclusion may fail to prove a positive impact on all economies, pointing out the possible negative effects of credit growth and unregulated financial sector bodies on financial stability. This leads to financial crises and deficient economic structures. which in turn would significantly impact the correlation between finance and growth. A study performed by Sulong and Bakar (2018) argue that weak or low access to financial resources is the main reason studies fails to prove a positive impact of financial inclusion on growth.

III. Research Methodology

The existing literature has helped in identifying the appropriate methodology combining Cross-section and Time-Series data (unbalanced panel data), containing observations on 13 selected MENA countries (Algeria, Djibouti, Egypt, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates) using cross sectional data across the period 2004-2020. This study uses time series and cross-country data, the lag effect of variables such as the GDP and other macroeconomic variables is to be dealt with as some of these variables may be substantially affected by their previous year's values. Thus, it is essential to include the lag effect and causality in the econometric model developed in this paper to attain the desired outcome.

This research study utilizes Chehaveb's (2024) Index (FINCI) for measuring financial inclusion. Using this research tool with MENA countries will contribute academic benefit for several reasons. First, it is a new multidimensional index which has not been used in similar research hypotheses. Second, FINCI's methodology, which follows Sarma's (2012) approach and other indices including HDI, has proven to be useful in measuring the financial inclusion evolvement of each country over the years. Third, it is comparable across countries. Lastly, including the depth dimension as a new sub-dimension measured by the variables "private credit by deposit money banks and other financial institutions to GDP (%), financial system deposits to GDP (%), and remittance inflows to GDP (%)," has revealed a significant effect on the results. It is worth mentioning that Sarma (2012) uses three dimensions to measure financial inclusion: banking penetration, availability of financial services, and usage for the period 2004-2010.

The following research hypotheses are developed:

- H₀₁: A causal association exists between financial inclusion and economic growth.
- H₀₂: A causal association exists between the access dimension and economic growth.
- H₀₃: A causal association exists between the usage

dimension and economic growth.

H₀₄: A causal association exists between the depth dimension and economic growth.

Stationarity in the time-series is checked using a unit root test. Data might experience a non-stationary drive of series, which would lead to spurious regression. The most popular test for determining whether the series is stationary or non-stationary is the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981), which is applied in this study to check for stationarity (Hill et al., 2018).

The econometric methods used in this research study include Autoregressive Distributed Lag (ARDL) regression model, similar to the study by Sethi and Sethy (2018), to test for cointegration to explore the long-run correlation between variables with the help of bound test (F-Statistic) and Johansen System Cointegration tests. The ARDL model is beneficial in capturing dynamic effects from lagged x's and lagged v's and helps to eliminate serial correlation in the errors if enough lags of y's and x's are included. Each dependent variable is regressed on what it was in the previous time periods (lagged values of the dependent variable y) as well as on the explanatory variables with lagged values (an explanatory variable x, and its lags). For instance, a change in a financial inclusion value now may have an impact on economic growth now and in future periods as well as on financial inclusion levels in the future: it takes time for the effect of financial inclusion to fully work its way through the economy. The lowest Akaike information criterion (AIC) value is used to identify the ideal lag length. Deciding on the empirical lag length is crucial because excessive lags can create a loss of degrees of freedom, statistically insignificant coefficients and multicollinearity while insufficient lags can result in specification errors (Hill et al., 2018).

Also, the unrestricted Vector Auto-Regression (Sims, 1980) is estimated using Ordinary Least Square (OLS) method to ensure flexibility in choosing endogenous and exogenous variables. The VAR model is a general framework used to examine the dynamic relationship between stationary variables. On the other hand, it is used between variables in first difference which are not cointegrated (Hill et al., 2018). Moreover, the VAR Granger causality test (Granger, 1988) will be used to examine the direction of causal association between *FINCI* and economic growth, as well as to test the interlinkage between each of the three core dimensions of *FINCI* and economic growth, similarly to studies found in the literature such as Sethi and Acharya (2018), Sethi and Sethy (2018), and Kim et al. (2018). The concept of Granger causality is very practical and popular in econometric applications; it refers to predictability as one of the characteristics of causal relations.

The variables are annual and extracted from the World Development Indicators/The World Bank database, including the data for the gross domestic product per capita, as well as the data for the control variables: inflation, trade openness and school enrollment ratio. Whereas data on financial inclusion is obtained from the study conducted by Chehayeb (2024) using the values of *FINCI*. Each of these variables enters as an endogenous variable in one model and as an exogenous variable in all other models with a lag. To fill the gap for missing data on primary education for Lebanon and Saudi Arabia, an assumed value is obtained, taking into consideration both the literacy rate and the tertiary school enrollment data available.

The following models including the lag effects are proposed:

$$LGDP_{it} = \beta_{0i} + \beta_{1i} GDP_{it-1} + \beta_{2i} FINCI_{it-1} + \beta_{3i}X_{it-1} + \varepsilon_{it}$$

$$+ \varepsilon_{it}$$

$$FINCI_{it} = \beta_{0i} + \beta_{1i} FINCI_{it-1} + \beta_{2i} LGDP_{it-1} + \beta_{3i}X_{it-1} + \varepsilon_{it}$$

$$(2)$$

Where *i* represents the cross-section countries, *t* indicates the current year time series, *t* - *l* exhibits the lag relationship (optimal lag length based on the lowest AIC value), β_i stands for the parameter of the intercept and slope coefficient, and ε_{ii} the stochastic disturbance term capturing the effects of the other missing variables has a mean of zero, a constant variance and covariance. *GDP* denotes real Gross Domestic Product per capita; the most common measure of economic growth is the logarithm of GDP

per capita, as indicated by the IMF (2010) and World Bank (2014). Therefore, this study adopts real GDP per capita (GDP) as a proxy for economic growth following Levine (1999) and other studies such as Kim et al., (2018), Sharma (2016), and Van et al. (2021). *FINCI* is a composite index for measuring financial inclusion at a time *t* developed by Chehayeb (2024). It consists of three dimensions of banking services: access, usage, and depth. X_{it} denotes other macroeconomic variables as control variables.

To explore the relationship between financial inclusion and economic growth, the below equations are empirically estimated:

$$FINCI_{it} = \beta_{0i} + \beta_{1i}FINCI_{it-1} + \beta_{2i} \ LGDP_{it-1} + \beta_{3i}INF_{it-1} + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it}$$
(3)
$$LGDP_{it} = \beta_{0i} + \beta_{1i} \ LGDP_{it-1} + \beta_{2i}FINCI_{it-1} + \beta_{3i}INF_{it-1} + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it}$$
(4)

Moreover, the below sub-models are tested for the financial inclusion dimensions, which include access, usage, and financial depth to explore the causal effect and strength of each dimension on the growth of the MENA economies.

$$\begin{split} LGDP_{it} = & \beta_{0i} + \beta_{1i} \ LGDP_{it-1} + \beta_{2i}ACCESS_{it-1} + \beta_{3i}INF_{it-1} \\ & + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it} \quad (5) \\ ACCESS_{it} = & \beta_{0i} + \beta_{1i}ACCESS_{it-1} + \beta_{2i} \ LGDP_{it-1} \\ & + \beta_{3i}INF_{it-1} + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it} \\ & (6) \\ LGDP_{it} = & \beta_{0i} + \beta_{1i} \ LGDP_{it-1} + \beta_{2i}USAGE_{it-1} + \beta_{3i}INF_{it-1} \\ & + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it} \\ & (7) \\ USAGE_{it} = & \beta_{0i} + \beta_{1i} \ LGDP_{it-1} + \beta_{2i} \ LGDP_{it-1} \\ & + \beta_{3i}INF_{it-1} + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it} \\ & (8) \\ LGDP_{it} = & \beta_{0i} + \beta_{1i} \ LGDP_{it-1} + \beta_{2i}DEPTH_{it-1} + \beta_{3i}INF_{it-1} \\ & + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it} \\ & (9) \\ DEPTH_{it} = & \beta_{0i} + \beta_{1i}DEPTH_{it-1} + \beta_{2i} \ LGDP_{it-1} + \beta_{3i}INF_{it-1} \\ & + \beta_{4i}TRADE_{it-1} + \beta_{5i}SEP_{it-1} + \varepsilon_{it} \\ & (10) \end{split}$$

In all of the above equations, *LGDP* denotes the logarithm of Gross Domestic Product per capita, *FINCI* refers to the Financial Inclusion Index calculated by Chehayeb (2024), and *INF*, *TRADE*, and *SEP* indicate inflation (annual %), trade openness (% of GDP) and primary school enrollment, (% gross)

respectively. ACCESS, USAGE, and DEPTH represent the three dimensions of FINCI.

Moreover, to control economic growth, the current study uses macroeconomic factors such as inflation (INF), trade openness (Trade (%GDP)), and school enrollment ratio (SEP, primary school enrollment (% gross)), as omitting significant variables in a regression model sometimes cause biased results (Gujarati, 2009). The choice for inflation is dictated by the adverse relationships found in literature between inflation and economic growth. The study conducted by Kablan (2010) on the Sub-Saharan African countries reveals the destabilization effect of inflation on financial development. Also, this negative effect is deduced in the studies of Fischer (1993), Barro (1996), Mensah et al (2012), and Bruno & Easterly (1998). Fischer (1993) examines the influence of macroeconomic factors on economic growth, he does not only conclude a negative association between inflation and economic growth but also finds that inflation leads to a reduction in investment. Furthermore, McKinnon (1973) and Shaw (1973) find a negative relationship between inflation as well as trade openness with economic growth. Kim et al. (2018) use macroeconomic factors such as inflation, school enrolment for primary education, and trade, while Sethi and Acharya (2018) use Human Capital Index and openness. The choice for school enrollment ratio assumes that educated and knowledgeable consumers can make sound financial decisions improving their ability to develop personal finance skills. Lusardi and Scheresberg (2013) stresses that education can positively influence the financial behavior of households, which positively affects the performance of the economy. In another study, Klapper et al. (2012) argues that financial literacy has quite the influence on a range of economic indicators from having substantial spending capacity to having access to a bank account and bank credit. Dabbous and Nassereddine (2018) state that education creates a knowledgeable population in which individuals are aware of the various financial services available. Finally, trade openness is chosen in line with Musembi and Chun (2020) and Neaime and Gaysset (2018). Trade openness is defined by the World Bank as "the sum of exports and imports of goods and services computed as a percentage of GDP." This measure signifies the exposure of an economy to global trade, which creates economic growth.

However, due to insufficient data, some influential variables are excluded from the model despite their importance for financial inclusion, for example corruption levels and the quality of regulations, which is also emphasized by Demirguc-kunt et al. (2014 and 2018). As well as income inequality, which is highlighted by Sarma and Pais (2011) as countries characterized with greater income disparity suffer from a lower level of financial inclusion. Unfortunately, it was not possible to include this control variable in the model due to lack of data for the Gini index, which

serves as a proxy for income inequality, for the countries included in the sample of the current study.

IV. Empirical Results and Discussion

Table 1 presents a brief descriptive statistic of variables (2004-2020), in which the inconsistency in the number of observations owing to lack of data. It discloses the enormous variation in financial inclusion among the MENA countries in addition to the volatility in the control variables and GDP as indicated by the standard deviation values.

The low financial inclusion values (Table 2) reflect

Table 1. Descriptive statistics of the variables 2004-2020 estimated using EViews

Variables	Mean	Median	Maximum	Minimum	SD	Observations
LGDP	9.04	8.66	11.35	6.76	1.18	221
FINCI	0.29	0.30	0.55	0.08	0.12	195
ACCESS	0.39	0.38	0.88	0.03	0.23	203
USAGE	0.27	0.25	0.49	0.06	0.10	218
DEPTH	0.21	0.21	0.43	0.00	0.10	213
INF	4.55	3.26	84.86	-4.86	7.16	221
SEP	96.45	100	125.64	41.02	15.65	202
TRADE	96.91	90.37	347.99	30.25	47.70	209

Note: LGDP denotes the natural logarithm of GDP per capita; ACCESS, USAGE and DEPTH represent the dimensions of FINCI; INF: inflation (annual %); SEP; primary school enrollment (% gross); TRADE: trade openness (% of GDP).

Table 2. Financial inclusion values estimated by Chehayeb (2024)

Country	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Algeria	0.1	0.09	0.09	0.1	0.1	0.11	0.11	0.1	0.1	0.11	0.13	0.14	0.14	0.15	0.15	0.15	
Djibouti	0.11	0.11	0.11	0.12	0.12	0.14	0.16	0.14	0.14	0.12	0.13	0.13	0.13	0.15	0.15	0.16	0.17
Egypt	0.21	0.22	0.21	0.2	0.19	0.17	0.18	0.17	0.17	0.17	0.18	0.19	0.23	0.25	0.24	0.23	0.25
Jordan				0.38	0.37	0.36	0.36	0.36	0.36	0.37	0.37	0.36	0.4	0.4	0.4	0.39	0.41
Kuwait	0.28	0.29	0.31	0.35	0.36	0.41	0.4	0.38	0.39	0.4	0.43	0.43	0.39	0.42	0.42		
Lebanon	0.54	0.53	0.5	0.51	0.52	0.51	0.53	0.54	0.54	0.53	0.54	0.55	0.52	0.53			
Libya	0.09	0.08	0.09	0.09	0.1	0.12	0.12	0.2	0.13								
Morocco	0.23	0.25	0.27	0.3	0.32	0.35	0.35	0.37	0.38	0.38	0.39	0.4	0.41	0.41	0.41	0.41	0.41
Oman							0.26	0.25	0.25	0.26	0.25	0.29	0.31	0.31	0.29	0.31	0.26
Qatar	0.28	0.31	0.31	0.32	0.32	0.37	0.38	0.35	0.39	0.35	0.38	0.36	0.39	0.41	0.38	0.4	0.46
Saudi Arabia	0.17	0.17	0.18	0.2	0.21	0.24	0.23	0.2	0.2	0.21	0.23	0.26	0.27	0.26			
Tunisia	0.22	0.22	0.23	0.24	0.25	0.27	0.29	0.3	0.31	0.32	0.33	0.33	0.34	0.34	0.33	0.33	0.36
UAE	0.22	0.28	0.28	0.31	0.34	0.42	0.4	0.39	0.39	0.38	0.4	0.4	0.41	0.4	0.39	0.38	0.37

the weak financial inclusion efforts in the MENA region. The study by Chehayeb (2024) emphasizes the significance of financial access for financial inclusion with regards to branches, ATMs and the point -of-sale and emphasizes the importance of the usage of financial products and financial depth dimensions. It is worth mentioning that a higher index value designates a higher level of financial inclusion, and a lower index value denotes a lesser level of financial inclusion. The missing values are due to inadequate data on some of the factors of the dimensions used to calculate financial inclusion. Table 2 exhibits FINCI values calculated by Chehayeb (2024), which will be used in the current empirical study.

Despite the improvement in the financial inclusion values as revealed in Table 3, as the proportion of low FINCI countries decreased from 90.9% in 2004 to 37.5% in 2020, the high-income countries are still behind in their financial inclusion levels as no country from the 13 selected MENA countries has attained an extraordinary level of financial inclusion (Chehayeb, 2024). It is also worth mentioning that countries are classified by the World Bank according to the income level, then categorized using FINCI values following Sarma's (2012) classification- low for values less than 0.3, medium for values between 0.3 and 0.6, and high for values above 0.6. The below table (Table 3) summarizes the descriptive statistics for FINCI.

A. Panel Unit Root Results

Before estimating the model, testing the time-series for the existence of a unit root is essential using the augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981), Table 4 reveals that LGDP, FINCI, and D1_ACCESS need to be corrected to become stationary at first difference, while D2_USAGE, D3_DEPTH, INF, SEP, and TRADE are found to be stationary at levels (at 5% significance level), where the null hypothesis for all these tests is non-stationary. The results obtained allow the use of panel cointegration that needs a level or 1st difference order of integration.

B. Cointegration Tests

As all variables are proved to be stationary at either level or 1^{st} difference and none at 2^{nd} difference, ARDL regression model can be applied to test for cointegration with the help of bound test (F-Statistic) and Johansen Cointegration test, where the null hypothesis is "no cointegration exists." Table 5 reveals that F-statistic values for equations 3,4,5,7,9,and 10 are less than the critical values for the lower bound I (0) and upper bound I(1); thus, the null hypothesis cannot be rejected indicating that there is no presence of cointegration and there is no evidence of a long-

Table 3. Descriptive statistics for FINCI for the 13 selected countries over provided years

	2004	2009	2015	2016	2017	2018	2019	2020
Minimum	0.09	0.08	0.13	0.13	0.15	0.15	0.15	0.17
Maximum	0.54	0.53	0.55	0.52	0.53	0.42	0.41	0.46
Mean	0.22	0.23	0.32	0.33	0.34	0.32	0.31	0.34
Standard Deviation	0.12	0.13	0.12	0.12	0.11	0.10	0.10	0.10
CV(SD/Mean)	0.54	0.55	0.39	0.36	0.34	0.33	0.33	0.34
#of countries	11	11	12	12	12	10	9	8
High FINCI countries	0	0	0	0	0	0	0	0
Medium FINCI countries	1	1	7	8	8	6	6	5
Low FINCI countries	10	10	5	4	4	4	3	3
Proportion of low FINCI countries (%)	90.9	90.9	41.7	33.3	33.3	67	33.3	37.5

Source: Chehayeb (2024)

Variablas	Lev	vel	First Difference				
variables	t-statistic	p-value	t-statistic	p-value			
LGDP	-2.8416	0.1841	-13.8033	0.0000			
FINCI	-2.4257	0.3651	-15.9060	0.0000			
D1_ACCESS	-2.4507	0.3524	-13.9708	0.0000			
D2_USAGE	-4.3663	0.0030					
D ₃ _DEPTH	-3.6486	0.0056					
INF	-12.1711	0.0000					
SEP	-3.4715	0.0453					
TRADE	-5.4537	0.0000					

Table 4. ADF Unit Root test (Augmented Dickey-Fuller test statistic), null hypothesis: variable has a unit root

Table 5. Cointegration results-Author's work via EViews

Dependent variable — Equation (Eq.)		Bound Test	Short-Run Associatio	Short-Run Association among variables			
	F-statistic	Critical val @5%	ue I(0)&I(1) 6 sig.	CointEq (-1) coefficient	p-value		
FINCI (Eq.3)	1.4031	2.86	4.01	-0.047	0.0081		
LGDP (Eq.4)	1.4752	2.86	4.01	-0.038	0.0067		
LGDP (Eq.5)	1.5557	2.86	4.01	-0.053	0.0054		
ACCESS (Eq.6)	8.9718	2.86	4.01	-0.063	0.0000		
LGDP (Eq.7)	1.6288	2.86	4.01	-0.044	0.0044		
USAGE (Eq.8)	6.2846	2.86	4.01	-0.141	0.0000		
LGDP(Eq.9)	1.9628	2.86	4.01	-0.040	0.0018		
DEPTH(Eq.10)	1.6866	2.86	4.01	-0.072	0.0038		

term relationship. Therefore, the results obtained suggest that there is no long-run association between financial inclusion and economic growth and between depth and economic growth in the MENA countries, as aligned with Sulang and Baker (2018), Mehrotra and Yetman (2015), and Pearce (2011) and their arguments on the possible failure of a positive long-run relationship between financial inclusion and economic growth. Similarly, studies by Maune (2018) and Nkwede (2015) reveal a negative effect of financial inclusion on economic growth in Zimbabwe and Nigeria respectively. As equations 6 and 8 show long-term cointegration in the F-statistic Bound Test, therefore, a long-term association exists between the access dimension and economic growth and a significant long-term association exists between usage and economic growth, in line with Sarma (2008, 2012) and Sharma (2016).

To estimate the VAR Model, the probability values (p-values) need to be observed. The p-values of all the coefficients in the "unrestricted constant and no trend" portion is greater than 5%, so there is no long-run coefficient effect in both cases. Moreover, Johansen system cointegration tests reveal the absence of cointegration across the variables, based on a comparison between the Trace statistics and the critical values, as well as that between the Max Eigen values and the critical values. It is found that both the Trace statistics and the Max Eigen values are less than the critical values. Therefore, there is no evidence to reject the null hypothesis, indicating that a long-term cointegration across the variables studied is nonexistent.

Testing the short-run association among variables, all CointEq (-1)-Error Correction Measure- values obtained from running the Error Correction Form are negative and significant at a significance level of 5%. Meaning that evidence of short-run association between the variable exists, but with very slow adjustment for the long run (Table 5).

Therefore, the cointegration results indicate a short-term association among all variables of interest; however, the Bound F-statistic test reveals a long-term association between two dimensions of FINCI (access and usage) and economic growth. No long-term cointegration seems to exist between FINCI and economic growth as well as between the financial depth variable of FINCI and economic growth. These results align with Barajas et al. (2013) whose study reveals that there might be cases in which such a relationship fails to prove significant.

C. Vector Autoregressive (VAR) Model

The lowest Akaike information criterion (AIC) value is used to identify the ideal lag length. For all models in the current study, the lowest AIC value is found to be at lag (1), which is the optimal lag. However, lag (2) is used to understand the VAR Model in a better way. The first causality test to consider is the Ordinary Least Square (OLS) at 5% level of significance. The results obtained indicate insignificant interlinkage between the variables of interest with an exceptionally significant effect of

Table 6. First and second causality test outcomes

GDP on ACCESS. The second causality test, VAR Granger Causality/Block Exogeneity Wald Tests use an absence of causality as the null hypothesis. The outcomes suggest that there exists a significant impact of all lags of LGDP on the FINCI dimensions USAGE and ACCESS. All remaining null hypotheses related to the other effects could not be rejected, as shown in Table 6. Both causality tests prove that GDP significantly affects the access dimension, while suggesting an insignificant interlinkage between both FINCI with GDP and DEPTH with GDP. The results are summarized in Table 6. Also, school enrollment, trade openness, and inflation do not appear to be significantly related to financial inclusion.

The results obtained from using the new financial inclusion index emphasize the discrepancies and conflicting results among existing studies using multiple proxies for financial inclusion, including single indicator like access or usage while ignoring other dimensions such as depth. As access and usage dimensions have proven to be affected by economic growth in the MENA region.

D. Panel Granger Causality Test

A panel Granger causality test is utilized to test the direction of causality between variables. Despite the great cross-sectional differences across countries

Dependent Variable	T-statistics (OLS)	Granger/Wald Test
FINCI (Eq.3)	LGDP, SEP, TRADE, INF are insignificant.	LGDP, SEP, TRADE, INF are insignificant.
LGDP (Eq.4)	FINCI, SEP, and TRADE are insignificant at 1^{st} and 2^{nd} lags, $I\!N\!F$ sig. at 1^{st} lag only	FINCI, SEP, TRADE, INF are insignificant.
LGDP (Eq.5)	ACCESS, SEP, TRADE, INF are insignificant.	ACCESS, SEP, TRADE, INF are insignificant.
ACCESS (Eq.6)	LGDP is significant at 1 st and 2 nd lag. SEP, TRADE and INF are insignificant	\boldsymbol{LGDP} is significant. SEP, TRADE and INF are insignificant
LGDP (Eq.7)	USAGE, SEP, INF, and TRADE are insignificant.	USAGE, SEP, TRADE, INF are insignificant.
USAGE (Eq.8)	LGDP, SEP, INF, and TRADE are insignificant.	LGDP is significant. SEP, TRADE and INF are insignificant
LGDP (Eq.9)	DEPTH, SEP, and TRADE are insignificant at 1^{st} and 2^{nd} lags, $I\!N\!F$ sig. at 1^{st} lag only	DEPTH, SEP, TRADE, INF are insignificant.
DEPTH (Eq.10)	LGDP, SEP, INF, and TRADE are insignificant.	LGDP, SEP, TRADE, INF are insignificant.

in the MENA region, the missing data in the FINCI, TRADE, and SEP for some countries has led to an assumption that all cross-sections have the same coefficients, so to treat the panel data as one large, stacked set. Therefore, the Granger causality test is used to measure the direction of causality, the null hypothesis is "X does not Granger Cause Y." For brevity, only results that are relevant to the main research questions are presented in Table 7.

Therefore, the results suggest a unidirectional causality going from GDP (as a proxy of economic growth) to FINCI, as well as from economic growth to ACCESS. The results obtained reflect the specific characteristics of the MENA countries and their financial system. These results are in line with the finding of Kar et al.'s (2011) research paper covering 15 MENA countries over the period 1980-2007 as their study fail to find clear consensus on the direction of causality between finance and growth and the findings are country specific. In addition, using the VAR model, the study conducted by Shan, et.al (2001) reveal slight support for the theory that finance influences growth. In contrast, Sethi and Sethy (2018) reports a unidirectional causality on the effect of financial inclusion on economic growth but not vice versa, in India. Similarly, Kim et al. (2018) finds a unidirectional causality running from financial inclusion, using individual indicators such as ATMs, Branches, Deposits, etc.., to GDP per capita in OIC countries.

E. Wald Coefficient Test/Residual Analysis Tests/Variance Decomposition Analysis/ AR/MA Roots Test/ Correlogram Test

To test for model existence, the Wald Coefficient Test is utilized where the following null hypothesis is used "All the coefficients are equal to zero, model does not exist." Alternative hypothesis "At least one of the coefficients is not equal to zero, model exist." As all the p-values are found to have a significance level of less than 0.05, the null hypothesis is rejected, and all the models do exist. Thus, at least one coefficient in each model is significant.

Three tests are used for residuals analysis: the Auto Correlation LM Test reveals that there is a presence of serial correlation, the Cholesky factor of covariance (Lutkepohl) shows that jointly residuals in VAR system are not normally distributed, and the Heteroskedasticity Test (white heteroscedasticity (No Cross terms)) proves that residuals are heteroskedastic.

Variance Decomposition Analysis is used to assist the VAR Model to identify the value and sources of the forecast error variance. The results obtained suggest that in the short run, 100% of the GDP forecast error variability is explicated by itself, concluding that other variables in the model have weak effect on GDP. Therefore, other variables (FINCI, INF, TRADE, and SEP) have a strong exogenous influence, so these variables are weakly endogenous. However, the forecast error variances by FINCI, INF, TRADE, and SEP are increasing in the long term. In the short run, an 86% of the FINCI forecast error variability is explicated by itself, so other variables in the model have weak effect on FINCI although LGDP does

Table '	7.	Granger	Causality	Test,	Author's	work	via	EViews
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Granger Causality Test					
GDP Granger Causes FINCI	FINCI fails to Granger Cause GDP				
GDP Granger Causes ACCESS	ACCESS fails to Granger Cause GDP				
	USAGE fails to Granger Cause GDP				
	DEPTH fails to Granger Cause GDP				
	GDP fails to Granger Cause USAGE				
	GDP fails to Granger Cause DEPTH				



Figure 1. Correlogram for autocorrelation

contribute slightly. This indicates that LGDP, INF, SEP, and TRADE have strong exogenous influences, and thus these variables are weakly endogenous. As the forecast error variance by LGDP is decreasing in the long term, so LGDP is a weak predictor for FINCI in the long run.

The AR/MA Roots Test proves that the VAR Model is stationary and stable since all root values lie inside the unit circle indicating that they are less than 1 and are decreasing. Therefore, VAR satisfies the stability condition. It is also concluded from the Correlogram Test that autocorrelation does not exist in the model (Figure 1).

V. Conclusion and Policy Implications

The purpose of this study is to empirically explore the causal relationship between financial inclusion and economic growth using FINCI, the index of financial inclusion developed by Chehayeb (2024) across 13 countries of the Middle East and North Africa region over the years 2004-2020. MENA countries are focused on in this study due to the banking sector's domination in the financial system (Damra et al., 2023), which has been developed quickly in the last few years, as reflected in the increased number of bank branches and ATMs in the region (World Bank Group database). This has enabled more citizens to access the financial system through the widespread adoption and usage of ATMs and branches. Therefore, the challenge in accelerating financial inclusion is including remote and impoverished areas. However, despite an extraordinary increase in profitability and proficiency in the MENA region, the financial inclusion values estimated by Chehayeb (2024) reveal that these countries' advanced banking systems are falling behind the goal of G20 to achieve financial inclusiveness by 2030. This is due to a vast segment of people being excluded from the banking sector, especially in more disadvantaged communities.

The Autoregressive Distributed Lag (ARDL) regression model is applied to test for cointegration with the help of the Bound Test (F-Statistic) and the Johansen Cointegration Test. The regression outcomes propose a short-term association between all variables of interest; however, they only reveal a long-term association between two dimensions of FINCI (ACCESS and USAGE) with economic growth. No long-term cointegration seems to exist between FINCI and economic growth or between the Financial Depth dimension of FINCI and economic growth.

Moreover, Vector Auto-Regression (VAR) models, Ordinary Least Square (OLS), Block Exogeneity Wald Tests, and Granger Causality Tests are employed to investigate the main research questions. Both causality tests, Ordinary Least Square (OLS) and VAR Granger Causality/Block Exogeneity Wald Tests, propose that economic growth has a substantial impact on the Access dimension and insignificant interlinkage between FINCI and economic growth, with an exceptional significant effect of economic growth on Usage, as shown by the latter test.

Empirical results suggest that there is a unidirectional Granger causality from economic growth to financial inclusion and from economic growth to the access dimension of financial inclusion. Other observed results reveal the positive influence of economic growth on the access and usage dimensions of financial inclusion. Finally, the empirical evidence indicates the insignificant impact of financial inclusion on economic growth. These results are in line with Sulong and Bakar (2018) and Mehrotra and Yetman (2015), whereas school enrollment, trade openness, and inflation do not seem to be significantly associated with financial inclusion

The argument concerning the hypothesis that financial inclusion causes economic growth has not proved to be always valid. Regardless of the confirmed positive effects found in literature of much of the empirical scholar-works for both individual and cross-section studies, negative effects are confirmed in a few other studies. Obstacles such as a weak financial system, poor financial instruments, and inappropriate policies could significantly deter economic growth. This is a crucial issue because the results drawn from this study have profound policy suggestions for emerging economies. The study recommends that policymakers and central bank governors in said region utilize the growth of the economy to build an efficient and strong financial system favoring disadvantaged individuals through creating effective opportunities and a competitive environment for the financial sector. Pearce (2011) points out that inappropriate regulations and insufficient institutional structures have slowed down financial inclusion development in the MENA region. Thus, extensive measures must be taken to battle corruption and promote investments by creating an environment conducive to investors. All these measures will, in turn, strengthen the economy and improve its financial inclusiveness.

Although this study finds some sort of positive relationship between financial inclusion and economic growth in MENA countries, the differences among countries and the level of financial inclusion in each country make it difficult to generalize results. Such differences include religion levels, illiteracy rates, income levels, policies, political issues, corruption, etc. Thus, considering other factors once the data is available would help in better understanding the relationship between financial inclusion and economic growth in MENA region, therefore enhancing this study's contribution.

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