RESEARCH ARTICLE

The Impact of Financial Inclusion on Economic Growth: An Econometric Study of a Sample of Arab Countries from 2004-2023

Kerroumi Assia
Lecturer Class A
Tahri Mohamed University, Béchar
Algeria
Email: kerroumi.assia@univ-bechar.dz

Doi Serial https://doi.org/10.56334/sei/8.8.69

Keywords account ownership for adults, ATMs for 100,000 adults, economic growth, financial inclusion, number of depositors for 1,000 adults

Abstract
Financial inclusion, a fundamental pillar of financial stability and economic growth, is the focus of this study. The aim is to highlight the role of financial inclusion in driving economic growth in a sample of Arab countries. To achieve this goal, data from six Arab countries over the period 2004--2023 were collected. The panel analysis method was used to estimate the relationship between financial inclusion, as indicated by three metrics: ATMs per 100,000 adults, account ownership per adult, the number of depositors per 1,000 adults, and real GDP, a measure of economic growth. The study, which is based on the Cobb–Douglas model, revealed a significant and positive correlation between financial inclusion and economic growth in the sample countries. The practical implications of these findings are significant, particularly the influence of the ATM indicator on real GDP, providing policymakers and financial institutions with valuable insights and empowering them to make informed decisions that can drive economic growth.

Citation. Kerroumi A. (2025). The Impact of Financial Inclusion on Economic Growth: An Econometric Study of a Sample of Arab Countries from 2004--2023. *Science, Education and Innovations in the Context of Modern Problems*, 8(8), 768–787. https://doi.org/10.56352/sei/8.8.69
Issue: https://imcra-az.org/archive/375-science-education-and-innovations-in-the-context-of-modern-problems-issue-8-vol-8-2025.html

Received: 15.01.2025 | Accepted: 10.06.2025 | Published: 16.07.2025 (available online)

Introduction:

Following the global financial crisis that occurred at the end of 2007, international interest in financial inclusion increased. This renewed interest manifested itself in official commitments, international initiatives, and an expansion of research and applications aimed at integrating financially excluded groups into the formal financial system to achieve a more inclusive and stable economy. It also prompted central banks and official authorities to adopt strategies and implement policies and programs that enhance access to financial services for various segments of society, enabling them to use these services appropriately while also providing diverse and innovative financial services at low costs. International organizations such as the G20 and the World Bank took concrete initiatives to establish financial inclusion in the global economic development agenda after 2008, supported by the development of digital financial infrastructure and facilitating access to financial services.

The growing international interest in the term financial inclusion among policymakers stems from the benefits it brings to the economy and society. This is achieved through resource mobilization, increased savings, the resulting increase in investment rates, the creation of new job opportunities, and the provision of financing for start-ups and SMEs. This can help eradicate poverty, achieve social justice, and combat the phenomena of the informal economy and money laundering, which positively impact economic growth levels.

Financial inclusion is closely linked to economic growth because it enables larger segments of society, particularly individuals and SMEs, to access financial services. This enables them to engage in commercial and economic activities effectively and increases their ability to save and invest, which in turn promotes comprehensive and sustainable economic growth.

Problem of the study:

The main problem of this research paper revolves around the following central question: To what extent does financial inclusion affect economic growth in the sample countries from 2004--2023?

Study hypothesis:

To address this problem and discuss it in this study, the following hypothesis was formulated: Financial inclusion contributes to enhancing economic growth in the countries included in the study sample.

Importance of the study

The importance of this study lies in the importance of the topic of financial inclusion, as it has recently become an issue of increasing interest because of its increasing importance in providing opportunities for stability in the financial system, facing the challenges of poverty and unemployment, supporting justice, increasing investment, supporting small projects, and increasing the standard of living. These factors drive economic growth. Research on financial inclusion highlights decision-makers and those interested in the importance of this concept and its economic advantages, emphasizing the need for necessary policies and measures to enhance it.

Study objective:

The study aims, as is clear from its title, primarily to clarify the extent to which financial inclusion contributes to enhancing economic growth in the countries sampled in the study.

Study methodology:

To answer the question posed and test the hypothesis, the study primarily employed a descriptive approach to define the concepts of financial inclusion and economic growth and an analytical approach to examine the relationships among these concepts through econometric models, utilizing the panel data method.

1. Fundamental concepts about financial inclusion

This component presents the concept of financial inclusion and its objectives, highlights its importance, outlines its principles, and outlines the most important indicators used by the G20 to measure financial inclusion.

1.1 The concept of financial inclusion:

There are several definitions of financial inclusion, including:

- It refers to a process by which individuals and businesses can access appropriate, affordable, and timely financial products and services. These include banking, loans, equity, and insurance products. Koker and Jentzsch defined financial inclusion as ensuring access to formal financial services at an affordable cost fairly and transparently. (Alshehadeh, Qasim, & El-Refae, 2020, p. 484)

- The World Bank defines financial inclusion as individuals and businesses having access to and using affordable financial products and services that meet their needs, which are delivered responsibly and sustainably. (World Bank Group, 2025)

- The OECD/INFE has agreed on the following definition of financial inclusion: Financial inclusion refers to the process of promoting affordable, timely and adequate access to a wide range of regulated financial products and services and broadening their use by all segments of society through the implementation of tailored existing and innovative approaches, including financial awareness and education, to promote financial well-being as well as economic and social inclusion. (Adele & Flore-Anne, 2013, p. 11)

- The Central Bank of Egypt and Banking Law No. 194 of 2020 stipulate that financial inclusion involves the avoidance of various financial products for use by all segments of society through formal channels, with adequate quality and cost, while protecting the rights of the consumers of these services, which enables them to manage their finances effectively. (Financial Inclusion Overview, 2024)

- The Central Bank of Algeria defines financial inclusion as follows :Financial inclusion refers to the availability and use of all financial services by different segments of society, including institutions and individuals, especially those who are marginalized, through formal channels, including current and savings accounts, payment and transfer services, insurance services, financing and credit services, and innovations in more appropriate financial services at competitive and reasonable prices. It also works to protect the rights of financial service consumers by supporting them so that they can adequately manage their funds and savings to prevent some consumers from resorting to informal channels and tools that are not subject to any oversight by supervisory bodies and that charge relatively high prices, leading to unmet needs for financial and banking services through these channels and the quality of these services. (Banque d'Algerie, 2022, p. 1)

- The Central Bank of Jordan defines financial inclusion as follows: Financial inclusion is the state in which individuals and businesses have convenient access to and use affordable and suitable financial products and services payments; savings, credit, transactions, and insurance that meet their needs; help improve their lives; and are delivered responsibly and sustainably. (Central Bank of Jordan, p. 9)

According to the previous definitions, financial inclusion is characterized by the following characteristics:

- Expansion: This refers to the ability of individuals and businesses to access financial services through branches in all places, which makes it easier for them to access these services.

- General: the availability of financial services for all segments of society, especially those who are traditionally excluded or underserved by the formal financial system.

- The time: Financial services are accessible year-round at any time.

- Diversity: Financial services must be diverse to meet the needs of all segments of society.

- The price: Financial services should be affordable for everyone.

- Oversight: These services are provided by the official financial system and are subject to oversight and follow-up by specialized agencies.

Consequently, financial inclusion can be defined as the ability to access and use appropriate, affordable and timely financial products and services by all segments of society through formal channels. As financial products include transactions, payments, savings, credit and insurance, these services must be subject to supervision and surveillance by specialized agencies.

1.2 Objectives of financial inclusion:

The most important goals of financial inclusion include the following:

- The financial capacity of society's target segments should be increased by developing financial culture and knowledge among women, youth, and unemployed individuals, as well as increasing their confidence in financial service providers in the banking and nonbanking financial sectors. (Belaa, 2022, p. 77)

- reducing poverty and unemployment, reducing income inequality, and accelerating economic growth. (Ameur, 2024, p. 5)

- **Achieving financial stability and economic growth:** Studies have demonstrated a close relationship between financial inclusion, financial stability, and economic growth. Financial inclusion aims to ensure that various segments of society have access to formal financial services at reasonable costs and through official channels.(سالم الجمل، 2022، صفحة 411)

- Enhancing and facilitating access to financial services and products for all individuals and segments of society and raising citizens' awareness of the importance of these services and how to obtain and benefit from them to improve their social and economic conditions.(محمد الحسين، 2023، صفحة 210)

- **Achieving financial integrity:** Financial inclusion encourages the use of formal financial channels, making transactions more transparent and easily traceable. This reduces the opportunities for corruption and fraud, as it becomes more challenging to conceal illicit financial activities.

- Supporting SMEs and start-ups :Financial inclusion aims to enable these institutions to access the financing necessary to expand their operations, invest in product development, and meet their operational needs, thereby increasing their competitiveness in the market.

- Providing affordable and easy-to-use digital financial services for all segments of society and expanding the use of digital financial services.

- Providing digital financial infrastructure and financial technology, stimulating savings, and expanding banking and financial services.

1.3 Importance of financial inclusion

Financial inclusion has become a focus of attention for governments and relevant authorities, given its importance in achieving social and economic balance. Its importance is evident in the following points:

- Promotion of economic growth. The more inclusive the financial sector is, the greater its ability to collect savings and direct them to finance the investment and consumption needs of various groups. Thus, financial inclusion facilitates access to financing for various large and small projects, encouraging individuals to initiate their ventures, which in turn stimulates economic growth.(بن زغدة و سلامنة، 2023، صفحة 69)

-Financial inclusion contributes to the integration of the informal economy by enabling marginalized groups (such as poor, small and microenterprises and individuals working in the informal economy) to access financial services easily and at a low cost. This results in the integration of these groups into the formal economy and a reduction in the size of the informal economy.

- Financial inclusion plays a crucial role in achieving many sustainable development goals, including eradicating poverty, improving health, promoting education, achieving gender equality, and empowering women.

- Enhancing the stability of the financial system. Increasing the number of users of financial services will lead to the diversification of deposits among financial institutions and banks, thereby reducing concentration rates within them and decreasing the risks to which they are exposed, ultimately leading to increased stability.

-Financial inclusion encourages competition among financial institutions by increasing the diversity and quality of their products, thereby attracting more customers and transactions, creating job opportunities, contributing to economic growth, reducing poverty, improving income distribution, and ultimately increasing the standard of living.

1.4 Principles of Financial Inclusion

The G20 has adopted clear and specific principles to promote financial inclusion globally, often referred to as the G20 Principles for Innovative Financial Inclusion. These principles were formally adopted at the 2010 Toronto Summit and later expanded to include principles specific to digital financial inclusion (2016). These principles serve as a reference for policymakers worldwide when developing financial inclusion strategies. The table below summarizes these principles.

Table 1

Nine Principles for Innovative Financial Inclusion in G20

Principle	the explanation
Leadership	Commitment of higher official authority to develop policies and support financial inclusion.

Diversity	Implementing policies that encourage competition and provide appropriate incentives to provide diverse financial services at reasonable prices, such as credit, deposit, transfer, and insurance services, given the presence of a large and diverse number of providers of these services.
Innovation	Supporting innovation in financial products and services to achieve broader inclusion and greater effectiveness.
Protection	Strong consumer protection measures are in place, such as transparency, financial security, and privacy.
Empowerment	Promoting financial literacy to broaden access to financial services.
Cooperation	Enhancing cooperation between governments, the private sector, and civil society to develop financial solutions and innovations.
Knowledge	Develop policies and procedures based on evidence, studies, and experience sharing.
Proportionality	Applying regulatory provisions in a manner that is appropriate to local risks and contexts, without complexity that hinders financial inclusion.
Framework	Developing financial systems and laws that facilitate and support sustainable financial inclusion.

Note. **Source:** Prepared by the researcher at (GPFI, 2011, p. 5)

In 2020, the G20 issued high-level guidelines on digital financial inclusion policies for youth, women, and SMEs. The eight principles are divided into four main groups, as summarized in the table below:

Table 2

Eight Principles of Financial Inclusion

The group	Principles
Promoting an Enabling, Resilient and Responsible Digital Financial Infrastructure and Ecosystem	The first principle: Promote a competitive environment for banks and nonbanks and support the development of a widely accessible, secure and responsible digital infrastructure and interoperable payment systems
	The second principle: Encourage the availability of tailored digital financial products, while addressing the need for AML/CFT safeguards and the necessary customer due diligence measures, and digital identity systems
Promoting Responsible and Inclusive Policy Making	The third principle: Improve the availability and accuracy of disaggregated data concerning access to and the use of financial products and services
	The fourth principle: Support the adoption of targeted policies and initiatives in national strategies.
	The fifth principle: Support regulatory and legal reforms that reduce unequal access to responsible digital financial services, which results from social, economic, and cultural inequalities.

Promoting Inclusive Growth Through an Enabling Regulatory Framework for Responsible Digital Financial Services	The sixth principle: Consider developing a regulatory framework that supports responsible innovation in the private and public sectors.
Promoting Digital and Financial Literacy and Capability, and Supporting Financial Consumers and Data Protection against Potential Risks	The seventh principle: Enhance financial, business and digital literacy and capabilities through targeted interventions and by leveraging technology
	The eighth principle: Support financial consumer protection measures, including data protection, that address the needs of youth, women and SMEs.

Note. **Source:** (GPFI, 2020, p. 18)

1.5 Financial inclusion indicators

According to the G20, the financial inclusion indicators are based on three main dimensions summarized in Table 3:

Table 3

Financial inclusion indicators according to the G20

Dimensions	Indicators		
1-Access to financial services	Access to a Physical Point of Service	Access to Technology	Access to Identification
	-ATMs per 100.000 adults -Branches per 100.000 adults -Registered mobile money agents per 100.000 adults	-Access to a mobile phone (% age 15+) - Access to internet (% age 15+) -mobile money deployment (# of active services)	-adults with identification(% age 15+)
2-Usage of Financial Services	By Adults	By Enterprises	
	-Account (% age 15+) -Borrowed from a formal financial institution(% age 15+) -Debit cards per 1.000 adults -Deposit account per 1.000 adults -Insurance policy holders per 1,000 adults -Made a digital payment (% age 15+) -Made digital merchant payments online or in store (% age 15+) -Mobile money transactions per 1.000 adults	-SME deposit account -SME loans accounts -SME s with an account at a formal financial institution -SMEs with an outstanding loan or line of credit -SMEs with at least one female owner with an account at a formal financial institution	

3-Quality Of Financial Services	Financial Resilience	Financial Literacy and Capability	Market Regulations and Consumer Protection
	-Coming up with emergency funds in 30 days: somewhat or not difficult(% age 15+)	-Adults who actively budget/keep track of their money(%)	-Mobile Money Regulatory Index (0-100)
	-Main source of emergency funds: savings and very difficult(% age 15+)	-Adults who shop around for financial products(%)	
	-SMEs with outstanding credit who are required to provide collateral on loans (%)	-Adults who understand inflation (%)	

Note. **Source:** (GPFI, 2023)

2. Concepts about economic growth

This element focuses on presenting the concept of economic growth and its types. It also highlights the most important theories that explain economic growth.

2.1 The concept of economic growth

Among the definitions of economic growth, we mention:

- Economic growth is a quantitative concept that expresses the increase in production over the long term. Simon Kuznets defines economic growth as a long-term increase in the potential to supply an increasingly diverse range of economic goods to the population. This increased potential is based on advanced technology and the institutional and ideological adaptations required for it. (Pierre, 2010, p. 2)

- P. Samuelson and W. Nordhaus define economic growth as the expansion of a country's potential GDP, or gross domestic product. In other words, economic growth occurs when a country's production possibility frontier shifts outward. The growth rate of per capita output determines the rate at which a country's standard of living increases. Countries are primarily concerned with growth in per capita output because it leads to a higher average income. (Samuelson & Naurdhos, 2009, p. 502)

Economic growth is the sustained and cumulative increase in the production of goods and services and the value of real income in a given economy over an extended period. It is often measured by the percentage increase in real national product (GNP) or real GDP per capita.

2.2 Types of economic growth

There are three types of economic growth, which are summarized in the table below:

Table 4

Types of economic growth

Type	Definition
spontaneous natural economic growth	It is the growth that occurs as a result of market forces (supply and demand) without any state intervention.

temporary or transient economic growth	It is the growth that occurs as a result of emergency circumstances or a special situation that the economy is going through. This growth disappears when the influence disappears. Examples of this include economic growth linked to rising oil and petroleum prices.
planned economic growth	This type of project is targeted within a comprehensive planning process. Achieving economic growth in this case depends on the realism of the specific plans, the availability and integration of the methods used, the concerted efforts of economic agents, and the extent of commitment to the plans they have developed.

Prepared by the researcher on(لعقاب و درويش، 2022، الصفحات 615-616)

2.3 Theories of economic growth:

Many different theories in the field of economic growth explain the necessary conditions for achieving growth. We summarize them in the table below.

Table 5

Theories explaining economic growth

Theories of economic growth	Pioneers of the theory	The basis of growth
classical theory	Adam Smith David Ricardo Thomas Malthus John Stuart Mill Jean-Baptiste Say	Classical theory emphasizes that the division of labor leads to increased production and thus growth. The free market and capital accumulation promote economic growth up to the limits of natural resources, after which growth reaches a plateau as a result of declining profitability and pressures on resources and population.
Schumpeter's theory	Joseph Schumpeter	Schumpeter believed that innovation is the primary driver of growth, and that growth does not occur gradually and continuously, but rather through irregular "leaps" of prosperity followed by a temporary slowdown or recession. Economic growth also depends on two essential elements: organization and bank credit, which provide the organization with the financial capabilities necessary for innovation, invention, and renewal.
Keynes's theory of economic growth	John Maynard Keynes	Keynesian theory holds that economic growth is directly linked to the level of aggregate demand. The state should intervene through fiscal policy to stimulate aggregate demand. The theory also places great importance on investment as a factor influencing growth, such that every increase in investment spending leads to a greater increase in national income by a multiple.
New Keynesian model	harrod domar	The New Keynesian theory explains economic growth as a dynamic process affected by several variables: aggregate demand, price and wage rigidities, state intervention, expectations, institutional innovation, human capital, and macroeconomic policies.
Neoclassical theory of economic growth	Robert Solow	The neoclassical theory of economic growth considers capital accumulation, population growth, and technological progress to be the

		primary drivers of growth, and that markets can gradually achieve equilibrium through supply and demand mechanisms. It emphasizes the importance of structural and gradual factors in driving growth.
Modern growth theory	Paul Romer Robert Lucas	The modern theory holds that economic growth is determined primarily by factors internal to the economy, not solely by unexplained external or technological factors, as is the case in traditional neoclassical models. The theory also places great importance on investment in education, training, scientific research, and development. It considers that these factors lead to knowledge and technological accumulation that support long-term growth.

Note. **Source:** Prepared by the researcher at (Oana Simona, 2015, pp. 310-311)

(Emami Langroodi, 2021, p. 67)

(Commendatore, Paico, & Pinto , 2003)

(2013 ،ساطور)

3. The relationship between financial inclusion and economic growth

Among the theories explaining the relationship between financial inclusion and economic growth, financial development stands out. This finding suggests that expanding financial inclusion increases the efficiency of the financial sector and supports a better allocation of financial resources within the economy. When savings, borrowing, and investment services are made available to broader segments of society, including individuals and SMEs, this leads to higher savings and investment rates and contributes to the accumulation of capital necessary to stimulate economic growth. (Chehayeb & Taher, 2024, p. 155)

Some believe that the process of developing bank accounts, which is primarily intended to enhance financial inclusion, will lead to a secondary result, which is savings. The above equation can be formulated as follows:

Economic growth = Improving bank accounts → leads to an increase in domestic savings → This leads to increased financial inclusion → which, leads to an increase in the rate of capital Formation → leading to increased economic growth

According to the previous equation, if serious improvements are made to this banking system, it will lead to the accumulation of savings in banking institutions, which will enhance the process of financial inclusion and ultimately lead to the capital formation necessary for production processes, resulting in a boom in economic growth rates. (عبد العزيز السن، 2019، صفحة 65)

Financial inclusion contributes to economic growth through several vital mechanisms, including:

- Enabling various segments of society, especially poor, SMEs, and start-ups, to access financial services and products such as savings, loans, and investments, which increases productivity and GDP.

-It enhances financial stability by expanding the customer base of the financial system, reducing banking risk, diversifying funding sources, and encouraging competition among financial institutions.

-It supports human development by facilitating the financing of education and health, which increases the quality of human capital and thus promotes sustainable economic growth.

-It helps integrate the informal economy into the formal economy, increasing social justice, improving income distribution, and reducing poverty and unemployment rates.

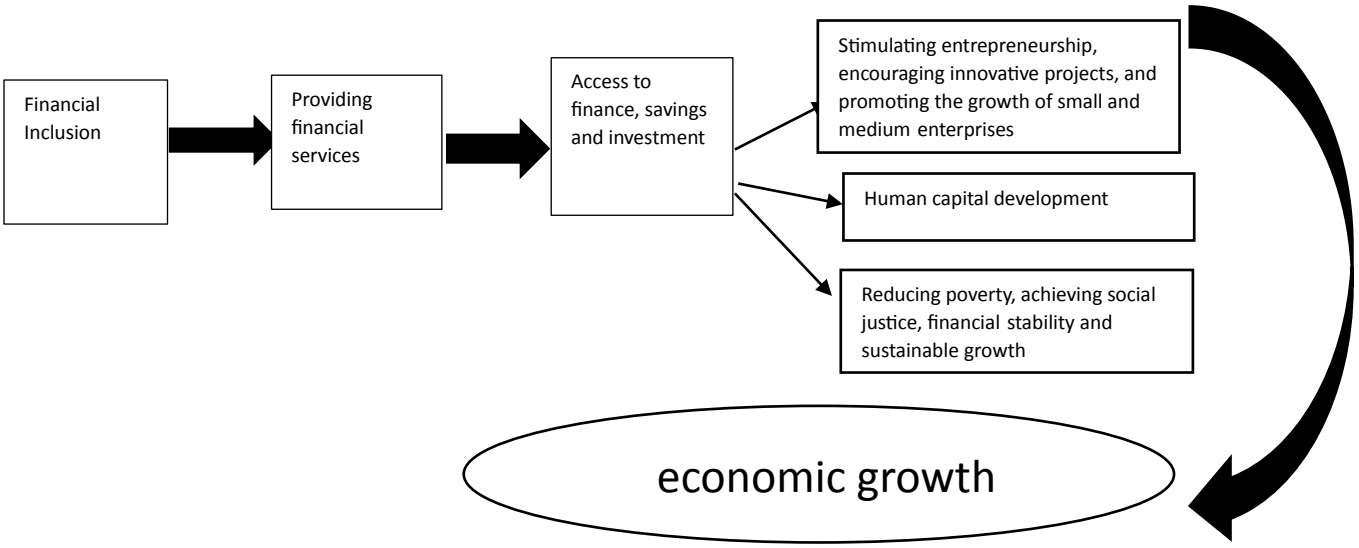
-It increases the standard of living and supports economic and social development by providing job opportunities and empowering marginalized groups.

This contributes to improving the efficiency of the financial sector, enhancing the ability to absorb financial crises, and reducing the risk of financial distress.

The following diagram illustrates the relationship between financial inclusion and economic growth.

Figure 1

The relationship between financial inclusion and economic growth



. Source: Prepared by the researcher

4. Previous studies

Many studies have addressed the impact of financial inclusion on economic growth. (بن زواي، 2024) This study sought to measure the impact of financial inclusion on economic growth. The researcher relied on a cross-sectional study of 70 countries in 2017 and used the least squares method to study the relationship between a composite index of the three dimensions of financial inclusion (access to banking services, availability of banking services, and use of banking services) and gross domestic product. The study concluded that there is a strong relationship between the level of financial inclusion and economic growth.

The research of Christopher & eunice (2024) aimed to demonstrate the impact of financial inclusion and human capital on financial inclusion in 47 sub-Saharan African countries from 2010--2020. The researchers used Driscoll-Kray error and concluded that financial inclusion has a positive effect on economic growth through human capital.

The study by (حلايلي، مدروس، و بن بوزيان، 2023) . The aim of this study was to identify the impact of financial inclusion on economic growth in Algeria during the period extending from the last quarter of 2007--December 2019. Researchers have relied on the autoregressive (VAR) model. They used two indicators of financial inclusion: the volume of domestic loans and deposits as independent variables and the gross domestic product as a dependent variable representing economic growth. One of the most significant findings in this study is the existence of a relationship between financial inclusion and economic growth, with financial inclusion accounting for 97% of economic growth. This finding indicates that financial inclusion benefits both the economy and society.

The studies by (رسول و مولوج، 2023), Wafaa, and others sought to demonstrate the impact of financial inclusion variables on economic growth in Algeria during the period of 2004--2019. To achieve the study's objective, researchers have relied on the least squares method. The study concluded that financial inclusion variables, represented by commercial bank branches, ATMs, and the volume of bank loans, are directly related to economic growth expressed by gross domestic product, except for the volume of deposits, which is associated with an insignificant inverse relationship with economic growth.

(Nasir, Mahwish, Abiodun, Zeman, & Magda, 2022) This study sought to clarify the impact of financial inclusion on financial sustainability, financial efficiency, gross domestic product (GDP), and human development in G20 countries. To achieve the study's objective, data were collected from 15 advanced and emerging economies over the period from 2004--2017. The researchers adopted an Ardel model to study the relationship between a composite indicator of financial inclusion (ATMs per 100,000 adults, bank branches per 100,000 adults, and loans to commercial banks) and the independent variables. Four models were constructed, including a model of the impact of financial inclusion on GDP. The study yielded several key findings, with the most significant positive and significant impact being that of financial inclusion on economic growth in G20 countries.

Previous studies agree that financial inclusion has a positive effect on economic growth. However, the sample, study period, and study method differ from one researcher to another. What distinguishes the current study from previous studies is the use of the Cobb–Douglas equation to study the relationship between financial inclusion and economic growth and the reliance on three indicators of financial inclusion, which are ATMs per 100,000 adults, account ownership per adult, and the number of depositors per 1,000 adults, instead of relying on a composite indicator of financial inclusion to determine the importance of each of the aforementioned variables in influencing economic growth. The study sample and period covered by the research differ from those of previous studies.

5. Standard study:

To test the study hypotheses and address this problem, a sample of Arab countries, including Algeria, Egypt, Morocco, Tunisia, Jordan, and Lebanon, was selected during the period from 2004--2023. The only criterion for selecting this sample and the period was the availability of data that would allow testing the study's hypotheses.

This study uses panel data analysis. After all, it is the most appropriate because it takes into account the effect of time change and the effect of cross-country variation. In this study, the panel data are represented by combining a sample of six countries (the cross-sectional dimension) over a period extending from 2004--2023 (the time dimension).

The first step in determining the impact of financial inclusion on economic growth is to identify the variables included in the model on the basis of economic theory and previous studies. The study variables are as follows:

Dependent variable: The dependent variable is the variable whose behavior is to be explained, and the effect of a group of factors on it is yet to be determined. It is represented by:

Economic growth is expressed as real gross domestic product (GDP), which reflects the value of all goods and services produced by an economy in a given year, expressed at base-year prices, taking into account the effects of inflation or deflation when measuring economic output.

Independent variables: These are the variables whose impact on economic growth is known. They are as follows:

ATMs for 100,000 adults: ATMs are used as banking and financial indicators to measure the prevalence of automated teller machines (ATMs) in a country relative to the adult population (over 15 years old). It is calculated by dividing the total number of ATMs in a country by the total adult population and then multiplying the result by 100.000.

Adult bank account ownership refers to the percentage of adults (usually aged 15 and over) who have a bank account at a bank or formal financial institution or through digital financial services (such as e-wallets). This indicator is used globally to measure financial inclusion and the degree of population integration into the formal financial system.

Deposits per 1,000 adults: This indicator is used to measure the extent of use of banking services by the population and is considered one of the basic indicators of financial inclusion. "Deposits per 1,000 adults" or "Deposit accounts per 1,000 adults" refers to the number of active bank deposit accounts registered in commercial banks (or formal financial institutions) per 1,000 adults (usually aged 15 years and above) in a given community or country.

Capital formation refers to the process of increasing or adding capital goods (such as buildings, equipment, machinery, and transportation assets) to the capital stock of a particular country or sector over a specific period.

Labor force: This force is usually expressed as the number of workers, total working hours, or individuals in the labor force and includes permanent and temporary employment in all economic sectors.

This study attempts to demonstrate the impact of financial inclusion on economic growth by relying on the Cobb–Douglas model to formulate the relationship between financial inclusion and economic growth. The Cobb–Douglas function can be expressed in the following mathematical form:

$y_t=A_tK_t^{\alpha}.L_t^{\beta}.FI_{1t}^{\gamma}.\ FI_{2t}^{\delta}.\ FI_{3t}^{\theta}.e^{Ut}$

y_t: Real GDP at time t

K_t: capital

.L: Labor

FI_{1t}: ATMs per 100,000 adults

FI_{2t}: Bank account ownership

FI_{3t}: the number of depositors per 1,000 adults

A_t: Total productivity or technological progress

α, β, γ, δ, θ: Elasticity coefficients that reflect the effect of each variable on growth

Ut: random model error

After the logarithm is entered into the model, it becomes as follows:

$Ln\ (yt)=\ln(At)+\alpha\ \ln(K)+\beta\ln(Lt)+\gamma\ln(FI_1t)+\delta\ \ln(FI_2t)+\theta\ln(FI_3t)+\ Ut$

To estimate the impact of financial inclusion on economic growth, we utilized the EViews program, version 13, and employed several tests available within it. The data for the variables used in the tests to study the relationship between economic growth and financial inclusion in the Arab countries sampled for the study were collected from international sources such as the World Bank, the International Monetary Fund, and the central banks of the countries sampled for the study.

Before beginning to analyze and test hypotheses and estimate the model, it is necessary to describe the data of the study variables and clarify their main features via descriptive statistical analysis methods, which are summarized in the table below.

Table 6

Descriptive analysis of the study sample

	Y	K	L	FI1	FI2	FI3
Mean	121.417	27.278	10140173	21.614	31.473	648.273
Median	60.415	15.030	7196755	24.700	27.000	621.450
Maximum	470.89	89.380	33137441	41.400	73.600	1246.00
Minimum	23.150	0.130	188126.0	1.260	5.000	129.00
Std.Dev	110.552	24.355	9654515	11.102	14.921	219.713

Skewness	1.371	0.978	1.137	-0 .182	0.945	0.504
Kurtosis	4.034	2.867	3.092	1.728	3.456	3.231
Jarque-Bera	43.000	19.243	25.908	8.752	18.909	5.367
Probability	0.000	0.000066	0.000002	0.0125	0.000078	0,068
Sum	14570.12	3273.410	1216820714	2593.790	3776.800	77792.79
Sum Sq. Dev.	1454407	70589.50	1109195051017893	14669.66	26496.29	5744617
0bservations	120	120	120	120	120	120

Note. **Source:** Prepared by the researcher on the basis of the outputs of EViews 13.

By reading the numbers in the table above, it becomes clear that the average real GDP for 120 observations amounted to approximately $121.417 billion, the average capital formation index amounted to $27.27842 billion, the average employment was estimated at approximately 10140173 workers, the average number of ATMs per 100,000 adults was 21.61 ATMs per 100,000 adults, the average account ownership per adult was 31.47 accounts, and the average number of depositors per 1,000 adults was 648.273 accounts.

The table above shows that the highest standard deviation was recorded for the employment variable, indicating a high risk of dispersion of the values of this variable from the arithmetic mean, unlike the values of ATMs for 100,000 adults, which are characterized by a slight standard deviation compared with the rest of the variables, which indicates a low dispersion of ATM values and a high degree of homogeneity.

For the skewness coefficients, most of them were positive, meaning that the shape of their statistical distribution was skewed to the right, except for the series of ATMs for a thousand adults, which achieved a negative skewness coefficient, meaning that the distribution was asymmetrical to the left.

The table above shows that the probability of significance corresponding to the Jarque-Bera statistic is equal to 0.068 for the variable of the number of deposits per thousand adults, which is greater than the significance level (0.05). Accordingly, the data for this variable follow a normal distribution. The remaining variables have a probability value less than 0.05, indicating that they do not follow the customary distribution law, which is consistent with the skewness results. However, these results do not affect the validity of the model, given that the sample size exceeds thirty.

Stability study of the study variables:

To test the stability of the study variables and determine their degree of integration, the most important tests developed for this purpose will be used, namely, the LLC test (LLC: Levin, Lin and Chu), the IPS test (IPS: Im, Pesaran and Shin), the Breitung test, the augmented Dickey Fuller (ADF) test, and the Phillips Perron (PP) test. The null hypothesis for each of these tests states that the series under study is not stationary. The table below

Table 7

Stability test for the study variables

Variables	**Test type**

	LLC	IPS	ADF	PP
LY	-7.747	-3.280	38.791	55.369
Prob	0.0000	O. OOO5	O.0001	0.0000
L_k	-4.065	-2.526	27.245	37.928
Prob	0.0000	0.0058	0.0071	0.0002
L_L (At the level)	-4.975	-3.704	35.232	40.326
Prob	0.0000	0.0001	0.0004	0.0001
L_FI1 (At the level)	-6.887	-6.140	59.688	89.836
Prob	0.0000	0.0000	0.0000	0.0000
L_FI2 (At the level)	-1.928	0.482	7.344	7.398
Prob	0.0269	0.685	0.834	0.830
At the first difference	-5.313	-6.882	65.708	119.061
Prob	0.0000	0.0000	0.0000	0.0000
L_FI 3(At the level)	-1.946	1.766	13.181	16.080
Prob	0.02	0.961	0.356	0.187
At the first difference	-8.008	-7.892	72.584	79.873
Prob	0.0000	0.0000	0.0000	0.0000

Note. **Source:** Prepared by the researcher on the basis of the outputs of EViews 13.

The table above clearly shows that the logarithms of the GDP variable, capital formation, labor, and the number of ATMs per 100,000 adults are stable at level I(0) because the probabilities of testing LLC, IPS, ADF, and PP are less than 0.05. In comparison, the logarithms of the bank account ownership index and the number of depositors per 1,000 adults are stable at the first difference (I1).

Since some variables are stationary at the level and others are stationary at the first difference, a cointegration test cannot be performed. Therefore, we move directly to estimate a model of the impact of financial inclusion on economic growth.

Estimating the impact of financial inclusion on economic growth:

Model estimation using panel data is typically performed through three primary methods that depend on the characteristics of the data and the assumptions of the model:

-Pooled OLS: Coefficients and constants are assumed to be constant for all cross-sectional and time units; that is, all individuals, countries, or firms are treated as a single sample.

-Fixed Effects Model: Allows for the variables to vary between units (individuals, countries, etc.) while imposing constant coefficients.

-Random effects model: This model assumes that differences between cross-sectional units are caused by random factors unrelated to the independent variables.

The table below summarizes the results of the three tests:

Table 8

Panel model coefficient estimation results

Estimation method			
	The Pooled OLS Regression Model	The Fixed Effects Regression Model	The Random Effects Regression Model
C	-1.497	2.320	-1.497
	O.094	0.0000	0.0000
L_K	0.273	0.066	0.272
	0.0000	0.0000	0.0000
L_L	0.436	0.042	0.436
	0.0000	0.047	0.0000
L_FI1	-0.002	0.163	-0.0022
	0.965	0.0000	0.8799
L_FI2	0.167	0.095	0.167
	0.022	0.0023	0.0000
L_FI5	-0.345	0.071	-0.345
	O.0004	0.00457	0.0000
C_1	0.775		
C_2	1.293		
C_3	0.088		
C_4	-0.676		
C_5	-0.781		

C_6	-0.700		
R^2	0.878	0.990	0.878
F-Statistic	164.634	127.805	164.364
		0.0000	

Note. **Source:** Prepared by the researcher on the basis of the outputs of EViews 13.

After evaluating the three models, we compare them and select the most appropriate model on the basis of two tests, which will be explained in the next section.

The appropriate model is as follows:

To compare the pooled OLS model with the random effects model, we rely on the Lagrange multiplier test, which determines whether there are unobserved differences between the units of the study sample countries that significantly affect the dependent variable. The null hypothesis states that the differences between the units are insignificant (there are no random effects), and your data are suitable for the pooled OLS model. The alternative hypothesis is that there are significant differences between countries, and the random effects model is more appropriate. The results of this test are shown in the table below:

Table 9

Lagrange multiplier test

Test Hypothesis

	Cross-section	Time	Both
Breusch -Pagan	102.6537	0.6928	103.3466
	0.0000	0.4052	0.0000
Honda	10.131	-0.832	6.575
	0.0000	0.7974	0.0000
King-Wu	10.131	-0.832	6.575
	0.0000	0.7974	0.0000
Standardized Honda	16.907	-0.671	4.485
	0.0000	0.749	0.0000
Standardized King-Wu	16.907	-0.671	8.946
	0.0000	0.749	0.0000
Gourieroux, et al.			102.653
			0.0000

Note. **Source:** Prepared by the researcher via EViews 13.

The above table clearly shows that the probability for the above tests is less than 0.05. Therefore, we reject the null hypothesis, indicating significant differences between countries in the study sample, and conclude that the random effects model is the most appropriate. According to the Breusch–Pagan test, the section is significant, with a probability value of less than 0.05. In contrast, the time is not significant, with a value greater than 0.05, indicating that the model is one-sided.

Now, we move on to choosing between the fixed effects regression model and the random effects model. For that, we rely on the Hausman test. Table 10 shows the results of the Hausman test. According to the Hausman test (1987):

The null hypothesis is as follows: the random effects model is appropriate.

The alternative hypothesis is that the fixed effects model is appropriate.

Table 10

Hausman test

Test Summary	Chi-Sq Statistic	Chi-Sq.df	Prob
Cross-section random	1276.14	5	0.0000

Note. Source: Avios program EViews 13 outputs.

On the basis of the results of the table above, we reject the null hypothesis and accept the alternative. Therefore, the fixed effects model is appropriate because the p value of the test is less than 0.05.

Accordingly, the proposed model can be formulated as follows:

LY = 2.32066236736 + 0.0660066409577*L_K + 0.0432284902449*L_L + 0.163840059056*L_FI1 + 0.095506169861*L_FI2 + 0.07163396381*L_FI5

It is clear from the equation and Table above.

-The results indicate the significance of the model as a whole. The probability value of the F test reached 0.0000, which is less than 0.05, which means that the model as a whole is statistically significant. The proposed model can be used for prediction.

-All the algebraic signs of the estimated coefficients are positive, which is consistent with economic theory and previous studies, which state that there is a direct relationship between economic growth and indicators of financial inclusion and the capital–labor index.

- The results indicated that the constant was significant at a level of 1%. Notably, the values of the constant differed from one country to another, and the difference was due to the specificity of each country.

- The explanatory power of the estimated model is strong, with the adjusted coefficient of determination reaching 98.9%. This means that the changes in economic growth in Arab countries during the period 2004–2023 are due to financial inclusion indicators, namely, ATMs per 100,000 adults, account ownership per adult, the number of depositors per 1,000 adults, and the capital and labor index.

- Every increase in the number of ATMs per 100,000 adults is statistically linked to a significant increase in real GDP. Therefore, every 1% increase in ATMs will result in a 16.83% increase in real GDP. The spread of ATMs allows wider segments of individuals and institutions to access banking services (opening accounts, withdrawals, deposits, and paying bills). This financial inclusion supports consumption and investment and contributes positively to real GDP. Therefore, supporting the spread of ATMs is a mechanism for improving the business environment and enhancing financial inclusion, which is reflected in tangible growth in real GDP.

- The variable L_FI2 has a significant positive effect, meaning that a 1% increase in adult financial account ownership will result in a 9.5% increase in real GDP. Increasing account ownership helps expand financial inclusion, as we provide access to financial services to a larger segment of the population, including vulnerable and marginalized groups. This increases financing efficiency and stimulates economic activities, small and medium-sized enterprises, and startups, resulting in increased real GDP and increased economic growth. Having financial accounts facilitates savings and investment processes, which provide more capital for companies and projects, increasing productivity and contributing to increasing real GDP. Furthermore, the high percentage of adults who have bank accounts helps move liquidity within the economy more efficiently, reducing the informal economy, enhancing transparency, and ultimately leading to economic growth.

- The logarithm of the number of depositors per thousand adults has a positive sign, as a 1% increase in the number of depositors per thousand adults will result in a 7.1% increase in real GDP. Deposits are considered one of the most important forms of savings within the economy and thus finance investment, enhancing economic capacity and economic growth. Increasing deposits mean that banks have greater financial resources to finance projects and investment activities, thus stimulating the economy and increasing production and real output.

-The capital variable has a positive effect on economic growth and is statistically significant, as an increase in capital of 1% is accompanied by an increase in real GDP of 6.6%. Therefore, capital is considered the main driver of economic growth.

- The variable L_L has a positive and significant effect, as increasing the labor force by 1% increases the real GDP by 4.3%. However, the contribution of capital to real GDP is greater than the contribution of labor.

- The number of ATMs per 100,000 adults is one of the most important financial inclusion indicators. Compared with other financial inclusion indicators, it has the most significant impact on economic growth in the countries included in the study sample. This is because the coefficient for this indicator was higher than the coefficients for account ownership per adult and the number of depositors per thousand adults.

6. Conclusion:

Countries have recently become increasingly interested in financial inclusion because of its positive impact on sustainable development, economic growth, and financial stability. Financial inclusion provides advanced and affordable financial services and products, such as transactions, savings, payments, insurance, credit, and other diverse financial services, sustainably and responsibly. This contributes to job creation, reducing inequality, encouraging emerging and small and medium-sized enterprises (SMEs), and achieving financial stability and economic growth. Therefore, this research aims to shed light on the impact of financial inclusion on economic growth in six Arab countries from 2004--2023. Panel data were used, as they are considered the most appropriate for the study topic. The study reached the following conclusions:

- There is a significant positive relationship between the ATM index per 100,000 adults and real GDP. An increase in the number of ATMs will lead to an increase in real GDP of 16.83%.

-The effect of adult account ownership on economic growth was significant and positive. Increasing account ownership by 1% results in an increase in real GDP of 9.55%.

The study shows that the indicator of the number of depositors per thousand adults has a positive role in increasing the level of economic growth, as a 1% increase in the number of depositors per thousand adults will result in a 7% increase in real GDP.

-The ATM index per 100,000 adults has the highest impact on real GDP in the countries studied.

- Financial inclusion has a significant positive effect on economic growth, as expressed by real GDP. This makes us finally accept the study hypothesis, which is that financial inclusion enhances economic growth in the six countries sampled in the study during the period of 2004--2023.

In light of the results obtained, the following points are proposed:

- Promotion of financial literacy through awareness and education campaigns is crucial, especially among lower-income groups, women, and youth. This initiative highlights the importance of financial inclusion and its role in boosting economic growth, ultimately benefiting all segments of society.

- Supporting financial innovation and digital transformation by investing in digital infrastructure to facilitate electronic payments and remote bank account opening and encouraging financial technology (FinTech) solutions that increase financial inclusion, such as e-wallets, mobile payments, and online payments.

- Encouraging banks and financial institutions by offering tax or regulatory incentives to banks that open branches or provide convenient services in remote or marginalized areas and that have ATMs in every location, especially after the study revealed that the increased spread of ATMs has a significant impact on economic growth.

- Update laws to facilitate the entry of innovative financial institutions and encourage digital financial services while ensuring consumer protection and preventing monopolies.

- Develop and build performance indicators to measure the progress of financial inclusion and its impact on economic growth and economic indicators while improving transparency and making data available to decision-makers.

References

1. Commendatore, P., Paico, C., & Pinto, A. (2003). Keynesian theories of growth. *[Book chapter]*, 100–146. [Publisher not identified].
2. Nasir, K., Mahwish, Z., Abiodun, F., Zeman, Z., & Magda, R. (2022). Effects of financial inclusion on economic growth, poverty, sustainability, and financial efficiency: Evidence from the G20 countries. *Sustainability*, 14, 1–19. https://doi.org/10.3390/su141610
3. Adele, A., & Flore-Anne, M. (2013). *Promoting financial inclusion through financial education: OECD/INFE evidence, policies and practice*. OECD. https://www.oecd.org/content/dam/oecd/en/publications/reports/2013/10/promoting-financial-inclusion-through-financial-education_g17a2384/5k3xz6m88smp-en.pdf
4. Banque d'Algérie. (2022). *Brochure sur l'inclusion financière*. Banque d'Algérie. https://www.bank-of-algeria.dz/wp-content/uploads/2022/10/inclusion7.pdf
5. Central Bank of Jordan. (n.d.). *National financial inclusion strategy 2023–2028*. Central Bank of Jordan.
6. Chehayeb, R., & Taher, T. (2024). The relationship between financial inclusion and the economy. *Global Business & Finance Review*, 29(2), 153–167. https://doi.org/10.17549/gbfr.2024.29.2.153
7. Christopher, B., & Eunice, A.-D. (2024). The effect of financial inclusion on economic growth: The role of human capital development. *Cogent Social Sciences*, 10(1), 1–18. https://doi.org/10.1080/23311886.2024.1234567
8. Emami Langroodi, F. (2021). Schumpeter's theory of economic development: A study of the creative destruction and entrepreneurship effects on economic growth. *Journal of Insurance and Financial Management*, 4(2), 65–81.
9. Central Bank of Egypt. (2024, October 31). *Financial inclusion overview*. https://www.cbe.org.eg/ar/financial-inclusion/overview
10. Global Partnership for Financial Inclusion (GPFI). (2011). *The G20 principles for innovative financial inclusion*. GPFI.
11. Oana Simona, H. (2015). Classical, neoclassical and new classical theories and their applications. *Procedia Economics and Finance*, 26, 309–312. https://doi.org/10.1016/S2212-5671(15)00934-1
12. Pierre, R. (2010). *Croissance et crises: Analyse économique et historique*. Pearson.
13. Samuelson, P., & Naurdhos, W. (2009). *Economics*. McGraw-Hill International.
14. World Bank Group. (2025). *Financial inclusion*. World Bank Group. https://www.worldbank.org/en/topic/financialinclusion/overview