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Article

Achieving a More Inclusive Financial System: What Does the MENA Region Need? A Sensitivity Analysis for GCC and Non-GCC Countries

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Abstract

Achieving a more inclusive financial system is crucial to unlocking economic opportunities, reducing inequality, and ensuring that no person will be excluded from access and usage of financial and banking services. Even if financial services are widely available in some areas, others, especially in developing nations, have low levels of financial inclusion and continue to confront obstacles that restrict economic growth and participation. This study examines the key factors influencing financial inclusion by analyzing 74 banks across 10 MENA countries from 2010 to 2021. It performs the System Generalized Method of Moments (SGMM) technique as an empirical approach. The results indicate that economic growth, education, infrastructure, and institutional quality have a significant impact on improving the level of financial inclusion in the MENA region. The results of the sensitivity analysis reveal that, in either GCC or non-GCC countries, key determinants include education, infrastructure, institutional quality, and GDP growth, leading to a more inclusive financial system.

Keywords: financial inclusion; access; usage; MENA; MENA; GCC; non-GCC; SGMM



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1. Introduction

Financial inclusion is defined as the access to and use of formal financial services by individuals and businesses (Sarma, 2016; Demirguc-Kunt et al., 2018). The World Bank defines financial inclusion as “access to useful and affordable financial products and services that meet their needs transactions, payments, savings, credit, and insurance delivered responsibly and sustainably” (The World Bank, 2022). In other words, it provides households and businesses with the opportunity to use financial services such as savings, payments, credit, and insurance under accessible and tailored conditions.

Furthermore, financial inclusion has become a central priority in global sustainable development due to its positive economic impact. It facilitates access to financial services, contributes to the development of the financial sector, and enables businesses to obtain financing at lower costs (Ahamed & Mallick, 2019). It is crucial in promoting prosperity by reducing poverty and fostering economic growth. Moreover, the objective of financial inclusion is to provide tailored financial services to the excluded, particularly disadvantaged populations, to enhance their well-being (Bruhn & Love, 2014).

A well-developed financial system plays a crucial role in improving living conditions, stimulating economic growth, and reducing poverty by facilitating access to financial

services (WBG, 2022). In this vein, Camara and Tuesta (2017) highlight that financial inclusion offers both direct and indirect benefits by enabling households to access liquidity more easily for daily needs, ensuring more stable consumption, and strengthening their ability to withstand economic shocks.

According to *financial intermediation theory*, financial institutions facilitate the transfer of funds from surplus agents to those needing financing by reducing information asymmetry and transaction costs (Kwakye, 2012; Diamond, 1984; Lel & Pyle, 1977). Through their expertise and economies of scale, these intermediaries optimize cost management and risk pooling, thereby encouraging broader participation in the financial system and fostering financial inclusion (Fama, 1980; Levine, 1997).

Several empirical studies have been focused on the determinants of financial inclusion (Pandey et al., 2023; Lotto, 2018). The work of Lotto (2018) investigates the level of financial inclusion in Tanzania and identifies its key determinants using household survey data. By focusing on a country-specific context, it highlights barriers to inclusion unique to Tanzania. The paper contributes to the literature by providing empirical evidence to inform policies aimed at enhancing financial inclusion in low-income, developing economies. However, the study of Pandey et al. (2023) focuses on how economic, demographic, and technological factors influence financial inclusion across BRICS countries. Their paper contributes to the literature by offering region-specific insights. It also enhances understanding of financial inclusion dynamics in BRICS, supporting more targeted policymaking. Similarly, Mhlanga and Denhere (2020) explore the determinants of financial inclusion in Southern Africa using panel data analysis. Their research contributes to the literature by offering region-specific insights and recommending strategies to improve financial access in Southern African economies. Rajan and Zingales (2003) examined the factors influencing financial inclusion, revealing that a growing and prosperous economy generally promotes more intensive financial inclusion. Indeed, as a country's GDP increases, economic opportunities expand, providing better financial prospects for a larger number of people.

Prior studies on the determinants of financial inclusion have classified these determinants into three main categories. The first one is relative to the macroeconomic factors covering economic growth, inflation, working population, and trade openness. For example, Qamruzzaman (2023) analyzed the impact of trade openness on financial inclusion. Empirical findings suggest that policies promoting trade liberalization should be accompanied by measures aimed at strengthening financial inclusion to ensure equitable and sustainable economic development. The study conducted by Honohan (2008) indicates that the working population bears a greater economic burden, limiting available resources for the development of financial services and, consequently, reducing access to financial services for children and the elderly. The second category is relative to infrastructure and the level of education. Access to the Internet and the use of digital technologies can play a crucial role in enhancing financial inclusion by enabling broader access to financial services (Gebrehiwot & Makina, 2019). Furthermore, the work of Haoudi and Rabhi (2018) highlights that investment in education has significant long-term effects, not only on the education sector itself but also on the overall financing of the economy. The third category is relative to institutional determinants. Several studies have highlighted the crucial role of institutions in promoting financial inclusion (Ajide et al., 2020; Eldomiaty et al., 2020; Muriu, 2020; Nguyen & Ha, 2021). These studies demonstrate that the ability of institutions to facilitate access to financial services for households and businesses is a key factor that directly influences the extent of financial inclusion. Chu et al. (2019) emphasize that institutional quality contributes to the integration of households into the financial system.

Although the global financial inclusion rate currently stands at 76%, it remains significantly lower in the MENA region, at just 20% (The MENA Financial Inclusion Report). This

disparity highlights the need for countries in this region to implement targeted strategies to enhance access to and encourage the use of financial services. The development of Fintech and digital innovations presents a promising opportunity. Still, these advancements must be accompanied by financial stability policies that ensure the soundness of the banking sector, strengthen micro-prudential supervision, improve governance practices, and integrate effective risk management mechanisms. In addition, research on financial inclusion in the MENA region remains limited, revealing a significant gap in understanding the mechanisms driving financial inclusion. Hence, the following research question could be raised: What does the MENA region need to achieve a more inclusive financial system?

The objective of this paper is to investigate the main determinants of financial inclusion in the MENA region. More precisely, we focused on the macroeconomics and institutional determinants.

Overall, the empirical results reveal significant effects of education, infrastructure, institutional quality, and inflation on financial inclusion in the MENA region. In GCC countries, education, the dependency ratio, institutional quality, GDP, and inflation significantly influence financial inclusion. In contrast, in non-GCC countries, education, infrastructure, institutional quality, Gross Domestic Product (GDP), and inflation exhibit significant effects on financial inclusion.

This research makes several contributions to the existing literature. First, to our knowledge, only a few recent studies have examined the determinants of financial inclusion in the MENA region (Neaime & Gaysset, 2018; Feghali et al., 2021). Access to financial services in this region has long been limited, and it is now considered a priority (Emara & El Said, 2021). Therefore, countries in this region must adopt specific measures to enhance financial inclusion, improving both access to and usage of financial services. This study contributes to a deeper understanding of the determinants of financial inclusion in the MENA region. Second, the findings of this study may be useful for policymakers and banking sector professionals. Additionally, previous studies have relied on the Global Findex database (2011, 2014, 2017), which presents challenges related to missing data and linear interpolation (Bartram et al., 2007; Danisman & Tarazi, 2020), or have used different measures of financial inclusion (Allen et al., 2016; Demir et al., 2020). In this study, we address these issues by analyzing both access and usage dimensions and constructing a financial inclusion index based on continuous data available throughout the study period.

The remainder of this paper is structured as follows. The Section 2 presents a literature review and the development of hypotheses. The data and methodology are described in the Section 3. The Section 4 highlights the main empirical findings. In the Section 5, we conduct a sensitivity analysis, while the Section 6 concludes with policy recommendations.

2. Literature Review

Financial inclusion is a multidimensional concept. This multidimensional nature has led to numerous studies examining its determinants, yet there is no consensus in the literature on the explanatory factors. The determinants of financial inclusion can be grouped into three categories: macroeconomic, infrastructure and education, and institutional levels. In this literature review, we will present studies that have examined the determinants of financial inclusion.

2.1. The Financial Inclusion–Macroeconomic Factors Nexus

A significant part of the literature highlights the positive relationship between GDP and financial inclusion. Studies such as those by Stakić et al. (2021) and Sarma and Pais (2011) show that a higher GDP is associated with better availability of financial services, stronger financial infrastructure, and greater economic opportunities, thereby improving

access to financial services. [Datta and Singh \(2019\)](#) and [Chithra and Selvam \(2013\)](#) also emphasize that economic growth can stimulate the expansion of financial institutions and enhance the availability of financial products, thus contributing to financial inclusion.

Empirically, [Nsiah and Tweneboah \(2023\)](#) found a positive relationship between GDP and financial inclusion in Africa, confirming that higher economic output facilitates access to financial services. Similarly, [Safoulanitou \(2019\)](#), using the GMM method, revealed a positive and significant effect of GDP on financial inclusion. This trend is further supported by [Gebrehiwot and Makina \(2019\)](#), who observed that GDP growth improves access to financial services in African countries, as well as by [Olaniyi and Adeoye \(2016\)](#), who found a significant link between GDP and financial inclusion in Africa.

However, some studies have reported non-significant effects of GDP on financial inclusion. [Gbalam and Dumani \(2020\)](#) found that although GDP has a positive effect on financial inclusion in Nigeria, the relationship was not statistically significant. This could be due to the influence of other factors, such as political stability, financial literacy, and the quality of financial infrastructure, which might have a stronger impact on financial inclusion than GDP alone. Based on the development above, we can formulate the following hypothesis:

H1: *There is a positive relationship between GDP and financial inclusion.*

By reducing purchasing power, inflation has a significant role in determining financial inclusion by making it more difficult for low-income groups to save, invest, or obtain reasonably priced financial services. The financially excluded are disproportionately affected by excessive inflation, which limits their participation in the formal sector and exacerbates economic inequality.

Using data from African countries covering the period 1970–2013, [Ndoricimpa \(2017\)](#) analyzed the impact of inflation on economic growth using a panel data approach. The study's results reveal that low inflation rates foster economic growth, whereas high inflation rates hinder it, particularly in low- and middle-income countries. Therefore, a low level of inflation may promote financial inclusion by increasing households' disposable income.

[Nsiah and Tweneboah \(2023\)](#) analyzed the determinants of financial inclusion in Africa during the period 2004–2020, employing both the GMM and OLS methods. Their findings showed that inflation has a negative and insignificant effect, even at the 10% significance level, indicating that inflation does not influence financial inclusion in Africa.

To assess household access to financial services, [Honohan \(2008\)](#) studied data from 160 countries covering the period 2000–2007. Using a multivariate regression approach, he analyzed various factors likely to influence access to financial services, including inflation. His results showed no significant relationship between inflation and financial inclusion levels.

H2: *Inflation has a negative effect on financial inclusion.*

By enabling cross-border investments, expanding access to international markets, and encouraging financial innovations that help marginalized communities, trade openness promotes financial inclusion. Access to credit, savings, and other vital financial services is facilitated for people in emerging nations by increased trade openness, which also stimulates economic growth and the construction of financial infrastructure.

[Qamruzzaman \(2023\)](#) analyzed the impacts of trade openness on financial inclusion in a selected group of 22 Arab countries. The study covers the period from 2004 to 2020, and used the Nonlinear Autoregressive Distributed Lag (NARDL) model and the System Generalized Method of Moments. The empirical results reveal that trade openness has a significant impact on financial inclusion, with varying effects depending on economic

contexts. The study found both positive and negative effects depending on the economic environment. Specifically, an increase in trade and foreign investment is associated with improved access to financial services for unbanked populations. However, the study also highlights that if not properly managed, trade openness can exacerbate economic inequalities and restrict access to financing for local communities. These findings suggest that policies promoting trade openness should be accompanied by measures to strengthen financial inclusion to ensure equitable and sustainable economic development.

Using data from sub-Saharan African countries during the period 1980–2017, [Aremo and Arambada \(2021\)](#) examined the effects of financial openness on economic growth. They applied the Generalized Method of Moments (GMM) and the System GMM (SGMM). The results showed that poorly managed trade openness can harm financial inclusion by worsening economic inequalities and limiting local communities' access to financial services.

H3: *Trade openness has a positive effect on financial inclusion.*

2.2. Financial Inclusion, Infrastructure, and Education

Studies on the determinants of financial inclusion also highlight the positive impact of infrastructure. Several studies emphasize that access to the Internet and mobile technologies promotes financial inclusion. [Stakić et al. \(2021\)](#) and [Sarma and Pais \(2011\)](#) found that Internet subscriptions are positively correlated with financial inclusion in the Balkans and in a sample of 49 countries, respectively. Similarly, [Gebrehiwot and Makina \(2019\)](#) demonstrated that the development of mobile infrastructure significantly enhances access to financial services in Africa.

Furthermore, country-specific studies confirm these findings. For example, in Africa, [Olaniyi and Adeoye \(2016\)](#) and [Kouladoun et al. \(2022\)](#) highlighted the crucial role of Internet access in financial inclusion using dynamic panel data models. Additionally, In Nigeria, [Okoroafor et al. \(2018\)](#), [Efobi et al. \(2014\)](#), and [Abdu et al. \(2015\)](#) revealed that the use of information and communication technology (ICT) strengthens financial inclusion. [Olaniyi \(2015\)](#) further confirmed these trends in sub-Saharan Africa, emphasizing the positive and significant effect of Internet subscriptions on financial inclusion. Hence, we can raise the following hypothesis:

H4: *Infrastructure has a positive effect on financial inclusion.*

Various studies have consistently highlighted the significant role of education in financial inclusion across different regions. For example, [Peña et al. \(2014\)](#) and [Camara et al. \(2015\)](#) found that education positively influenced financial inclusion in Mexico and Peru, respectively, using Generalized Linear Models (GLM) and Probit estimations. Similar findings emerged from Indonesia, where [Asyatur \(2018\)](#) employed panel data analysis for 2012–2015, and from the MENAP region, where [Shihadeh \(2018\)](#) applied the Probit model to data from 2014, both confirming the positive impact of education.

Analyzing BRICS countries, [Fungacova and Weill \(2014\)](#) also demonstrated that education significantly enhances financial inclusion, a result further reinforced by [Tuesta et al. \(2015\)](#), who examined a global dataset covering 147 countries between 1997 and 2014. In Africa, [Zins and Weill \(2016\)](#) confirmed this relationship using probit estimations on data from 37 countries in 2014. [Abdu et al. \(2015\)](#) reached similar conclusions in Nigeria based on the Global Findex 2011 dataset. These studies collectively underscore the crucial role of education in fostering financial inclusion across diverse economic and geographical contexts.

Some studies show that education does not always have a significant impact on financial inclusion. [Park and Mercado \(2015\)](#) found that primary school completion rates do not

significantly influence financial inclusion in Asia. Similarly, [Nsiah and Tweneboah \(2023\)](#) obtained similar results in Africa for the period 2004–2020. Based on this development above, we can raise the following hypothesis:

H5: *The level of education has a positive impact on financial inclusion.*

[Honohan \(2008\)](#) analyzed the determinants of access to financial services in 160 countries and found that a high dependency ratio significantly reduces financial inclusion. Similarly, [Mekouar and Robert \(2019\)](#) highlighted that a dynamic working-age population fosters access to financial services by increasing demand for banking products, credit, and insurance, thereby enhancing household savings and investment. In contrast, [Nsiah and Tweneboah \(2023\)](#), in their study on Africa from 2004 to 2020, found a negative but insignificant effect of the dependency ratio on financial inclusion. These findings align with the idea that a high dependency ratio is associated with lower savings rates, thereby reducing participation in the financial sector.

H6: *The dependency ratio has a positive effect on financial inclusion.*

2.3. The Relationship Between Financial Inclusion and Institutional Quality

Institutional quality is crucial for financial inclusion, as strong, transparent institutions ensure the stability, trust, and regulatory frameworks needed to support accessible and reliable financial services. High-quality institutions foster a conducive environment for financial innovation and equitable access, reducing risks for marginalized groups and promoting broad participation in the formal financial system.

[Nkoa and Song \(2020\)](#) analyzed the impact of institutional quality on financial inclusion. They used data from fifty African countries covering the period from 2004 to 2018. They employed the System Generalized Method of Moments (SGMM). The results showed that institutional quality has a positive and significant impact on financial inclusion. Using data from Nigeria during the period from 1998 to 2017, [Olanrewaju et al. \(2019\)](#) studied the causal interactions between institutional quality and financial inclusion. They applied the Toda–Yamamoto (TY) Granger non-causality test. The results indicated that institutional quality has a significant positive impact on financial inclusion.

To examine the impact of institutional quality on financial inclusion, [Nguyen and Ha \(2021\)](#) analyzed data from ASEAN countries during the period from 2008 to 2019. They used the SGMM method. Their results revealed that institutional quality has a positive and significant effect on financial inclusion.

[Honohan \(2008\)](#) examined the determinants of access to financial services using a sample of 160 countries. The study mainly relies on data from the 2000s, although the exact period varies depending on data availability for each country. The analysis was conducted using a cross-country approach. The results show that better institutional quality is significantly associated with increased financial access.

H7: *Institutional quality has a positive effect on financial inclusion.*

3. Data and Empirical Method

3.1. Data

We examined a sample of banks located in 10 countries in the MENA region, covering the period from 2010 to 2021. Given the absence of a uniform definition for the region, we followed the World Bank's classification while excluding Iraq, Palestine, Sudan, Somalia, Djibouti, Algeria, Mauritania, Malta, Yemen, Bahrain, Turkey, and Syria due to data un-

availability, and various macroeconomic issues that could bias the results. Consequently, our sample includes the following 10 countries: Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, the United Arab Emirates, Egypt, Tunisia, and Morocco. The initial data collection identified 124 banks. However, after excluding banking subsidiaries, our final sample consisted of 74 banks operating in 10 countries.

As a sensitivity analysis, the entire sample of 74 banks was split into two groups: GCC banks (42 banks) and non-GCC banks (32 banks). These countries present several differences in financial, economic, and social aspects. Financially, GCC countries benefit from sovereign wealth funds, low taxation, and heavy public investment supported by oil and gas revenue. However, non-GCC countries rely on diversified revenue sources and subsequently face greater fiscal pressures. Economically, GCC economies are state-driven with uncontrollable government spending, while non-GCC economies are likely to have a more developed private sector and broader industrial base. Socially, GCC societies are more conservative with strong cultural ties to Islamic traditions and sizeable expatriate communities, unlike non-GCC regions which have a more diverse social structure.

This study incorporates several variables, with financial inclusion (IFI) as the dependent variable. The financial inclusion variables include Automated Teller Machines (ATM) and bank branches (BRAN) for the access dimension, as well as bank deposits (DEPO) and bank credits (CRED) for the usage dimension.

Recent literature identifies three main approaches to measuring financial inclusion. Among these, several studies, such as [Sarma \(2008\)](#), [Ahamed and Mallick \(2019\)](#), and [Hakimi et al. \(2022\)](#), advocate for the use of a composite index, arguing that it captures the multifaceted nature of financial inclusion more effectively than single indicators. While [Rasheed et al. \(2016\)](#) and [Hakimi et al. \(2022\)](#) place particular emphasis on the *access* dimension (e.g., availability of banking services and infrastructure), [Sarma \(2008\)](#) and [Hakimi et al. \(2022\)](#) also highlight the significance of *usage*, which reflects how actively individuals engage with financial services. Following this comprehensive approach, our study adopts an index-based measure of financial inclusion, consistent with [Sarma \(2008\)](#), as it enables us to integrate multiple dimensions, such as access, usage, and availability, into a single, robust metric. This choice enhances the analytical depth of our research and allows for more meaningful cross-country comparisons within the MENA region.

The explanatory variables include education (TERT) ([Nsiah & Tweneboah, 2023](#); [Park & Mercado, 2015](#)), infrastructure (INFRA) ([Kouladoun et al., 2022](#); [Okoroafor et al., 2018](#)), the dependency ratio (DPR) ([Nsiah & Tweneboah, 2023](#); [Mekouar & Robert, 2019](#)), institutional quality (IQI) ([Nguyen & Ha, 2021](#); [Nkoa & Song, 2020](#)), trade openness (TO) ([Qamruzzaman, 2023](#); [Aremo & Arambada, 2021](#)), GDP growth (GDPG), and inflation (INF) ([Nsiah & Tweneboah, 2023](#); [Stakić et al., 2021](#)). Table 1 presents the number of banks per country. Our sample consists of 42 banks from the GCC region (56%) and 32 banks from non-GCC countries (42.67%).

Bank-specific data were obtained from the annual reports of each bank and the Refinitiv Eikon database. Financial inclusion data were sourced from the Global Financial Development Database. Institutional quality indicators were derived from the Worldwide Governance Indicators (WGI) database. Macroeconomic variables were obtained from the World Development Indicators (WDI) database.

Table 1. Sample composition by country.

MENA	N	GCC	N	Non-GCC	N
Jordan	5	United Arab Emirates (UAE)	9	Egypt	7
Kuwait	7	Saudi Arabia	10	Morocco	5

Table 1. *Cont.*

MENA	N	GCC	N	Non-GCC	N
Oman	7	Qatar	9	Tunisia	10
Lebanon	5	Kuwait	7	Lebanon	5
Qatar	9	Oman	7	Jordan	5
Saudi Arabia	10				
United Arab Emirates (UAE)	9				
Egypt	7				
Morocco	5				
Tunisia	10				
Total	74	Total	42	Total	32

3.2. Financial Inclusion Measurements (Dependent Variable)

In this study, we built a financial inclusion index (IFI) based on four indicators. The first indicator, Automated Teller Machines per 100,000 adults (ATM), measures access to financial services through Automated Teller Machines, as highlighted by [Rasheed et al. \(2016\)](#) and [Adeola and Evans \(2017\)](#). The second indicator, bank branches per 100,000 adults (BRAN), evaluates the level of banking service coverage through the number of bank branches, as suggested by [Sarma \(2008\)](#), [Gimet and Lagoarde-Segot \(2012\)](#), and [Rasheed et al. \(2016\)](#). The third indicator is bank deposits as a percentage of GDP (DEPO). It is a bank level data which represents the usage of financial services through bank deposits, based on the work of [Adeola and Evans \(2017\)](#), and [Sarma \(2008, 2012\)](#). The fourth indicator is bank credits as a percentage of GDP (CRED). It is a bank level data which measures the usage of financial services through credit to the private sector, as described by [Sarma \(2008, 2012\)](#). The first two indicators (ATM and BRAN) capture the degree of access and coverage of financial services, while the latter two (DEPO and CRED) serve as proxies for the usage dimension. These four indicators were combined to construct the IFI, offering a comprehensive measurement of financial inclusion.

Although the importance of financial inclusion is widely recognized, no formal consensus exists on its measurement ([Tram et al., 2023](#)). However, the literature generally agrees on two key dimensions: access and usage. Financial inclusion is defined as a process that ensures easy access, availability, and utilization of formal financial services across all sectors of the economy ([Sarma, 2016](#)). In this study, we constructed an IFI based on four indicators. Table 2 below summarizes the indicators used for the construction of the IFI.

Table 2. Indicators of the financial inclusion index (IFI).

Dimension	Indicator	Adjustment	Weight
Access	ATMs per 100,000 adults	Standardized value	0.25
Access	Bank branches per 100,000 adults	Standardized value	0.25
Usage	Bank deposits as a percentage of GDP	Standardized value	0.25
Usage	Bank credits as a percentage of GDP	Standardized value	0.25

Once the financial inclusion indicators were selected, the second step was calculating each indicator's standardized mean. This required determining each indicator's minimum and maximum values to ensure equal variance across all indicators. The literature identifies two main standardization methods: statistical standardization and empirical standardization.

Statistical standardization is often more reliable than empirical methods because it is based on a clear theoretical foundation and works well with common statistical techniques. When we standardize data by subtracting the mean and dividing by the standard deviation, we put all variables on the same scale centered around zero with a standard deviation of

one. This makes it easier to compare different variables or datasets directly. In addition, it keeps the original shape and a relationship within the data intact, which is really helpful for methods like regression, PCA, or clustering, which depend on understanding how data points vary. The standardized scores, or z-scores, are simple to interpret showing how far each value is from the average in terms of standard deviations. This not only helps spot outliers but also makes the analysis more precise and easier to understand.

Statistical standardization converts indicators to a common scale with a mean of zero and a standard deviation of one, preventing distortions due to differences in means. The statistical standardization formula is

$$In_{i,t} = \frac{I_{i,t} - \mu_{i,t}}{\sigma_{i,t}} \quad (1)$$

$In_{i,t}$ is the standardized value of indicator I at time t , and time $\mu_{i,t}$ and $\sigma_{i,t}$ represent the mean and standard deviation of the indicator, respectively. This process normalizes indicator values between 0 and 1.

We opted for empirical standardization in this study. The empirical normalization formula is as follows:

$$In_{it} = \frac{I_{i,t} - \min(I_i)}{\max(I_i) - \min(I_i)} \quad (2)$$

where In_{it} represents the standardized value of indicator I at time t , and $\min(I_i)$ and $\max(I_i)$ are the minimum and maximum values of the indicator, respectively.

3.3. Empirical Approach and Model Specification

The empirical methodology used in this study is based on the SGMM model. Endogeneity is a major concern in corporate and banking finance, which the SGMM approach effectively addresses (Ahamed & Mallick, 2019; Danisman & Tarazi, 2020; Hakimi et al., 2022). Moreover, OLS models, as well as fixed- and random-effects (FE and RE) models, are often subject to biases related to omitted variables and measurement errors, which can affect the reliability of estimates. We applied the SGMM method developed by Blundell and Bond (1998) to overcome these issues. Consequently, the results obtained through the SGMM approach are considered more reliable and robust (Zhou, 2014; Teixeira & Queirós, 2016; Danisman & Tarazi, 2020; Hakimi et al., 2023).

For the lagged variables, there is no fixed rule, but typically 1 to 2 lagged values of the dependent variable are used as instruments in SGMM, with higher lags added cautiously to avoid instrument proliferation. In this study, we take the 1 lagged value of the dependent variable IFI (−1).

To estimate our model, we followed the studies of Demircuc-Kunt et al. (2017) and Honohan (2008). The econometric model is formulated by the following Equation (3):

$$IFI_{i,t} = \beta_0 + \beta_1 IFI_{i,t-1} + \beta_2 TERT_{i,t} + \beta_3 INFRA_{i,t} + \beta_4 DPR_{i,t} + \beta_5 IQI_{i,t} + \beta_6 TO_{i,t} + \beta_7 GDPG_{i,t} + \beta_8 INF_{i,t} + \epsilon_{i,t} \quad (3)$$

Table 3 presents the definition of all variables used in this study.

Table 3. Definition and measurement of variables.

Variables	Definition	Measurement	Sources
<i>Dependent variable</i>			
IFI	Financial Inclusion	Financial inclusion index. See Section 3.2.	The authors' calculation

Table 3. *Cont.*

Variables	Definition	Measurement	Sources
<i>Financial inclusion variables</i>			
ATM	Access Dimension	Automated Teller Machines (ATMs) per 100,000 adults	WDI (2010–2021)
BRAN	Access Dimension	Bank branches per 100,000 adults	WDI (2010–2021)
DEPO	Usage Dimension	Bank deposits as a percentage of GDP	Annual reports of banks and WDI (2010–2021)
CRED	Usage Dimension	Bank credits as a percentage of GDP	Annual reports of banks and WDI (2010–2021)
<i>Explanatory variables</i>			
TERT	Education	Gross enrollment ratio in tertiary education (%)	WDI (2010–2021)
INFRA	Infrastructure	Internet users (% of the population)	WDI (2010–2021)
DPR	Dependency Ratio	Percentage of the working-age population	WDI (2010–2021)
IQI	Institutional Quality	The composite index measures institutional quality, including factors such as corruption control, government stability, and the rule of law. A score close to 1 indicates high institutional quality, while a score close to 0 indicates poor institutional quality.	The authors' calculation from the World Governance Indicators (WGI 2010–2021).
TO	Trade Openness	The sum of exports and imports of goods and services as a percentage of GDP	WDI (2010–2021)
GDPG	GDP Growth	Annual GDP growth rate (%)	WDI (2010–2021)
INF	Inflation	Annual growth rate of the Consumer Price Index (%)	WDI (2010–2021)

4. Empirical Findings

This section provides a descriptive analysis of all the variables studied. These variables include financial inclusion, the dependency ratio, the inflation rate, GDP growth, education, infrastructure, trade openness, and the institutional quality index. We will then present the main findings regarding the determinants of financial inclusion. These results will be briefly interpreted to conclude, addressing the objectives set throughout this study.

4.1. Summary Statistics and Correlation Matrix

Table 4 presents the descriptive statistics (mean, standard deviation, minimum, and maximum) for each independent and dependent variable in our model. Conducting a detailed descriptive analysis of the sample is essential before proceeding with econometric and economic interpretations.

Table 4. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
IFI	881	0.549	0.141	0.224	0.768
TERT	881	38.916	14.059	9.643	69.606
INFRA	888	70.432	22.259	21.600	100.000
DPR	888	39.942	15.296	16.172	66.874
IQI	888	0.528	0.216	0.055	0.907
TO	859	88.869	35.483	29.857	172.803
GDPG	888	2.462	4.078	−21.400	19.592
INF	888	4.222	10.796	−3.749	154.756

Table 4 provides an overview of the descriptive statistics of the variables examined in this study. The financial inclusion index (IFI) has a mean of 0.549. The values of this

index range between 0.224 and 0.768. Regarding education, measured by the percentage of enrollments in higher education (TERT), the mean of this variable is 38.916%. For infrastructure, represented by the percentage of Internet users (INFRA), the mean is 70.432%. On average, the dependency ratio (DPR) is 39.942%.

The institutional quality index (IQI) has a mean of 0.528. Trade openness (TO), measured as the sum of exports and imports as a percentage of GDP, has a mean of 88.869%. GDP growth (GDPG) has a mean of 2.462% and the inflation rate (INF) has an average value of 4.222%.

Table 5 highlights the level and nature of the correlations between the independent variables included in the econometric model. The correlations range within an interval of [−47.48% to 52.81%]. The correlation level between all independent variables is low (below 70%), indicating that there is no significant multicollinearity issue. This ensures the robustness and reliability of our estimates.

Table 5. Correlation matrix.

	IFI	TERT	INFRA	DPR	IQI	TO	GDPG	INF
IFI	1.0000							
TERT	0.1045 *	1.0000						
	0.0051							
INFRA	0.5005 *	0.3462 *	1.0000					
	0.0000	0.0000						
DPR	−0.4442 *	−0.1471 *	−0.4748 *	1.0000				
	0.0000	0.0001	0.0000					
IQI	0.5281 *	0.0324	0.5014 *	−0.4804 *	1.0000			
	0.0000	0.3840	0.0000	0.0000				
TO	0.4715 *	0.4047 *	0.3535 *	−0.4143 *	0.4725 *	1.0000		
	0.0000	0.0000	0.0000	0.0000	0.0000			
GDPG	−0.0016	−0.2647 *	−0.2547 *	−0.0783 *	0.1604 *	−0.0181	1.0000	
	0.9616	0.0000	0.0000	0.0196	0.0000	0.5961		
INF	−0.3631 *	0.0319	−0.1633 *	0.2902 *	−0.3598 *	−0.1865 *	−0.2142 *	1.0000
	0.0000	0.3921	0.0000	0.0000	0.0000	0.0000	0.0000	

* indicates the level of significance at 5%.

4.2. Discussion of the Empirical Findings

The results presented in Table 6 are relative to the determinants of financial inclusion in the MENA region. The Arellano–Bond test for autocorrelation reveals a z-statistic of −4.767 and a *p*-value of 0.000 for AR(1), leading to the rejection of the null hypothesis due to first-order autocorrelation. However, for AR(2), the z-statistic is 1.463 with a *p*-value of 0.143, indicating the absence of second-order autocorrelation, which is favorable for the model's validity. Compared to the 5% significance level, the *p*-values confirm that the null hypothesis is rejected for AR(1) but not for AR(2). Regarding the Sargan test, the Chi2 statistic is 35.011 with a *p*-value of 0.995, which is well above 5%. This indicates that we do not reject the null hypothesis, meaning that the identification restrictions are valid and suggest that the chosen instruments are not correlated with the error term.

Table 6 reveals a significant positive relationship between the dependent variable and the lagged variable $IFI_{(t-1)}$. This indicates that the level of financial inclusion in the current year is positively and significantly influenced by that of the previous year.

Findings also indicate that education (TERT) has a significant impact on financial inclusion. A 1% increase in education is associated with an improvement of 0.001 in IFI. Quality of education enables individuals to acquire essential skills to navigate the financial system, increasing their likelihood of participation. Educated individuals have a better understanding of financial products, interest rates, and repayment terms, helping them make informed choices. Additionally, education promotes better knowledge of financial

institutions, encouraging the use of formal financial services and facilitating access to financial information and modern technologies, such as online banking services. It also enhances trust in financial institutions, enabling individuals to engage more actively in the formal financial system. These results support the studies of [Sanderson et al. \(2018\)](#), [Kempson \(2000\)](#), [Berthoud and Kempson \(1992\)](#), and [Kempson \(1994\)](#), which show that education improves the understanding of financial products and increases market participation.

Table 6. The determinants of financial inclusion in the MENA region.

Variable	Coef	Std. Err.	Z	<i>p</i> > z
IFI(−1)	0.9710	0.1900	5.11	0.000 ***
TERT	0.0010	0.0004	2.11	0.035 **
INFRA	0.0005	0.0001	4.82	0.000 ***
DPR	0.0031	0.0025	1.21	0.224
IQI	0.6250	0.2270	2.75	0.006 ***
TO	−0.0005	0.0002	−2.50	0.012 **
GDPG	0.0131	0.0032	4.09	0.000 ***
INF	−0.0004	0.0001	−4.26	0.000 ***
_cons	−0.2950	0.3001	−0.98	0.325
AR(1) (<i>p</i> -values)		0.0000		
AR(2) (<i>p</i> -values)		0.1432		
Sargan test (<i>p</i> -values)		0.9959		
Number of instruments		69		
Obs		636		

Note: IFI = Financial Inclusion, TERT = Education, INFRA = Infrastructure, DPR = Dependency Ratio, IQI = Institutional Quality, TO = Trade Openness, GDPG = Gross Domestic Product, INF = Inflation. ***, ** indicate significance levels at 1%, 5%.

We also found that infrastructure (INFRA) has a significant impact on financial inclusion, with a one-unit increase associated with a 0.0005 rise in financial inclusion, particularly with the increased use of the Internet. This facilitates access to various online financial services, allowing individuals to access financial products without visiting a branch. The Internet also plays an educational role, providing resources to understand financial products and enhance financial management skills. Furthermore, it fosters innovation, particularly through Fintech companies, which offer tailored solutions for unbanked populations. Additionally, the Internet promotes transparency and governance, allowing users to compare financial services easily, thereby strengthening their confidence. These findings align with the work of [Duncombe and Boateng \(2009\)](#), who emphasize that increased Internet usage facilitates access to financial products while reducing travel-related costs.

The institutional quality index (IQI) has a significant impact on financial inclusion, with a one-unit increase leading to an improvement of 0.625 of the level of financial inclusion. A well-functioning economic institution strengthens household and business confidence in the financial sector, encouraging them to use more formal financial services. When institutions are perceived as transparent and efficient, individuals and businesses are more likely to open accounts, take out loans, and invest in financial products. This increased participation contributes to greater financial inclusion, allowing more people to benefit from the formal financial system. These results corroborate the studies of [Olanrewaju et al. \(2019\)](#), [Nkoa and Song \(2020\)](#), [Nguyen and Ha \(2021\)](#), [Muriu \(2021\)](#), [Ali et al. \(2022\)](#), [Aracil et al. \(2021\)](#), and [Ouechtati \(2022\)](#), which highlight the importance of institutional quality in stimulating economic actors' engagement in the financial sector.

On the contrary, as an economic factor, trade openness (TO) was found to have a significant and negative impact on financial inclusion in the MENA region, with a one-unit increase leading to a decrease of 0.0005. This relationship may be due to increased exposure to external economic fluctuations, which creates uncertainty and reduces confidence in the

financial system. Local small businesses, facing increased international competition, may struggle to access financial services, exacerbating financial exclusion. Moreover, perceived economic instability may discourage individuals from saving or investing, leading them to favor safer assets. These findings support the work of [Aremo and Arambada \(2021\)](#), who emphasize that poorly managed trade openness can exacerbate inequalities, and [Qamruzzaman \(2023\)](#), who highlights the interconnection between trade openness and financial inclusion.

Finally, inflation (INF) has a negative and significant impact at the 1% level, indicating that a one-unit increase is associated with a reduction of 0.0004 in financial inclusion. This suggests that rising inflation tends to reduce financial inclusion. Several reasons may explain this relationship: inflation reduces consumers' purchasing power, decreasing their ability to save or use formal financial services. It also creates economic uncertainty, discouraging investments in financial institutions. Financial service costs may increase to compensate for the loss of value due to inflation, making them less affordable. Our findings support those of [Nsiah and Tweneboah \(2023\)](#) and [Honohan \(2008\)](#).

5. Sensitivity Analysis

After analyzing the determinants of financial inclusion in the MENA region, it is important to compare these results with those of GCC and non-GCC countries. This comparison highlights the similarities and differences between the two regions, as well as the specific factors influencing financial inclusion in each. The following table presents these determinants for both regions.

Moreover, the Sargan and Arellano–Bond autocorrelation tests support the null hypothesis, indicating that the over-identifying restrictions are valid and that there is no correlation in the differenced errors. Additionally, the *p*-values obtained for the Sargan test and the AR(1) and AR(2) tests were all above 5%.

The results given in Table 7 reveal significant relationships between several variables and financial inclusion in the GCC and non-GCC regions. The lagged financial inclusion index (IFI_{t-1}) is significant at the 1% level in both regions, with a coefficient of 4.250 for the GCC and 0.549 for the non-GCC. This indicates that an increase in financial inclusion in the previous period is significantly linked to an improvement in financial inclusion in the current period in these two regions.

Table 7. Determinants of financial inclusion in the GCC and non-GCC regions.

	GCC			NGCC	
IFI	Coef.	Z	Coef.	Z	
IFI(−1)	4.250	2.78 ***	0.549	14.01 ***	
TERT	0.010	2.45 **	0.002	3.47 ***	
INFRA	0.001	1.40	0.001	4.80 ***	
DPR	0.039	2.77 ***	−0.019	−10.68 ***	
IQI	3.674	2.60 ***	0.141	1.83 *	
TO	−0.001	−0.96	−0.003	−10.47 ***	
GDPG	0.001	1.79 *	0.003	4.01 ***	
INF	−0.003	−3.42 ***	−0.001	−2.61 ***	
_cons	6.363	3.05 ***	1.366	11.01 ***	
AR(1) (<i>p</i> -values)	0.1061		0.1388		
AR(2) (<i>p</i> -values)	0.5041		0.2644		
Sargan Test (<i>p</i> -values)	1.0000		1.0000		
Number of instruments	59		40		
Obs	357		272		

Note: IFI = Financial Inclusion, TERT = Education, INFRA = Infrastructure, DPR = Dependency Ratio, IQI = Institutional Quality, TO = Trade Openness, GDPG = Gross Domestic Product, INF = Inflation. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively.

Regarding education (TERT), findings show that it is significant at 5% in GCC countries and 1% in non-GCC countries, indicating that higher levels of education are associated with increased financial inclusion. An increase in higher education enrollment enhances financial knowledge and opens up more employment opportunities. This leads to greater use of banking services and ATMs, thereby increasing financial inclusion. Our result is consistent with the work of [Asyatun \(2018\)](#) and [Zins and Weill \(2016\)](#) but does not support the findings of [Park and Mercado \(2015\)](#).

In contrast, infrastructure (INFRA) is not significant in GCC countries, while it is significant at 1% in the non-GCC region. This suggests that infrastructure improvements may have a more pronounced impact on financial inclusion in this sub-region. A continuously evolving Internet infrastructure facilitates access to financial services for a larger number of citizens. A high percentage of the population using the Internet accelerates the adoption of online banking services, making them more accessible and inclusive. Our findings confirm the conclusions of [Kouladoun et al. \(2022\)](#), [Okoroafor et al. \(2018\)](#), and [Sarma and Pais \(2011\)](#).

The dependency ratio (DPR) shows contrasting results between the GCC and non-GCC regions. For example, in the GCC, it is significant at 1% level and associated with an improvement in financial inclusion, due to a larger working-age population that facilitates access to financial services. Conversely, in the non-GCC region, although the dependency ratio is also significant at 1%, it has a negative coefficient, meaning that an increase in the ratio is linked to a decline in financial inclusion. This difference could be explained by higher unemployment rates in this sub-region, as well as a larger proportion of young people and elderly individuals who do not actively participate in the economy, thereby limiting access to financial services. These results support the conclusions of [Nsiah and Tweneboah \(2023\)](#) and [Mekouar and Robert \(2019\)](#).

The institutional quality index (IQI) is significant at 1% in the GCC and 10% in the non-GCC. While some GCC countries have high institutional quality indices due to effective management of their natural resources, corruption and poor governance remain challenges. In the non-GCC region, *post-Arab Spring* efforts aim to strengthen institutions, but concerns persist regarding government efficiency. In both sub-regions, a positive and significant IQI is associated with reducing barriers to financial inclusion, fostering citizens' trust, and increasing their participation in the financial system. Thus, improving institutional quality is crucial for promoting financial inclusion, stimulating economic development, and reducing poverty. These results support the work of [Nguyen and Ha \(2021\)](#), [Nkoa and Song \(2020\)](#), and [Olanrewaju et al. \(2019\)](#).

Trade openness (TO) exhibits distinct dynamics between the GCC and non-GCC regions. In the GCC, no significant effect was observed, whereas in the non-GCC region, a negative and significant relationship at 1% indicates that an increase in trade openness is associated with reduced access to financial services. This situation may stem from heightened competition that harms local businesses, leading to job losses and income reductions. Additionally, excessive dependence on imports can lower demand for local products, exacerbating economic inequalities. Consequently, households and businesses unable to adapt to these changes risk being excluded from the financial system, limiting their access to essential financial services for their development. These results corroborate the findings of [Qamruzzaman \(2023\)](#) and [Aremo and Arambada \(2021\)](#).

Gross Domestic Product (GDPG) has a positive impact on financial inclusion, significant at 10% in the GCC and 1% in the non-GCC. This shows that economic growth fosters access to financial services in both regions, with a more pronounced effect in the non-GCC. In the GCC, this effect is less robust, indicating that other factors, such as institutional efficiency, may influence this relationship. Conversely, in the non-GCC region, financial re-

forms and government initiatives facilitate access to financial services, supported by rising incomes and employment. This finding aligns with the research of [Nsiah and Tweneboah \(2023\)](#), [Stakić et al. \(2021\)](#), [Safoulaitou \(2019\)](#), and [Datta and Singh \(2019\)](#).

Inflation (INF) has a negative and significant coefficient at 1% in the GCC and at 5% in the non-GCC, indicating that an increase in inflation is associated with a decline in financial inclusion in both regions. This means that inflation reduces consumers' purchasing power, making access to financial services more difficult for households. The economic uncertainty caused by high inflation may also discourage investment and limit economic opportunities. Furthermore, the costs of financial services may rise, discouraging their use and exacerbating financial exclusion. The impact of inflation on financial inclusion is particularly pronounced in the non-GCC region, indicating a greater vulnerability of this region compared to the GCC. This finding is consistent with the work of [Ndoricimpa \(2017\)](#).

6. Conclusions and Policy Recommendations

This paper explores the key determinants of financial inclusion in the MENA region. It aims to provide a comprehensive overview of financial inclusion in this context, highlighting its crucial role in poverty reduction and economic development. To achieve this objective, we examined a sample of 74 banks from 10 MENA countries from 2010–2021, employing the System Generalized Method of Moments (SGMM) approach.

Additionally, we built a financial inclusion index (IFI) to assess the financial landscape in the MENA region, encompassing both GCC and non-GCC countries. The index was developed using normalization techniques, allowing the reduction of a large number of correlated variables into a limited number of independent factors that capture the essential information. This method overcomes the averaging approach's limitations, as [Sarma \(2008, 2012\)](#) suggested. The composite financial inclusion index (IFI) was derived by weighting the different dimensions according to their respective importance and normalizing their values within defined upper and lower limits. The index accounts for access to and usage of financial services but excludes the quality dimension due to the complexity of defining standardized quality criteria. The indicators included in the IFI calculation are the number of ATMs per 100,000 adults, the number of bank branches per 100,000 adults, bank deposits as a percentage of GDP, and bank credits as a percentage of GDP. The IFI, serving as our dependent variable, provides a central measure of financial inclusion, from which we identified the key factors influencing financial inclusion across the three sub-regions.

Our regression results indicate that education, infrastructure, GDP growth, and institutional quality play a significant role in promoting financial inclusion across the MENA region. In GCC countries, the positive and significant determinants of financial inclusion include education, dependency ratio, institutional quality index, and GDPG. For non-GCC countries, the positively significant variables also include the education level, infrastructure, institutional quality index, and GDPG. On the other hand, inflation emerges as a significantly negative determinant in GCC countries. In non-GCC countries, the negatively significant determinants include the dependency ratio, trade openness, and inflation.

The results of this paper could provide substantial policy recommendations for policymakers in the MENA region. First, governments in this region should foster an inclusive financial system through targeted investments in education, entrepreneurship, and job creation, which can expand economic opportunities, driving demand for financial services and increasing financial inclusion across the MENA region. Second, countries in this region and the two sub-regions are invited to improve infrastructure, especially in digital connectivity and payment systems, which is essential to ensure that remote and underserved populations have access to modern financial tools, boosting overall inclusion. Third, there is a strong need to strengthen institutional quality in the MENA region, by

enhancing regulatory frameworks and promoting transparency, which will build trust in the financial system, encouraging both local and international investment to support broader financial access in the MENA region. Fourth, governments in the MENA region should prioritize financial literacy programs and digital financial services to bridge the gap for underserved populations, particularly women and rural communities. Finally, central banks must balance price stability with financial access. Policies should support low-cost, inflation-protected financial products and expand digital finance infrastructure. Enhancing financial literacy and targeted support for vulnerable groups can sustain inclusion during inflationary periods.

While this study provides relevant findings and offers notable policy implications, it has some limitations. The analysis relies solely on a quantitative approach to financial inclusion, focusing on access and usage dimensions while omitting the qualitative aspect like the quality of financial services as suggested in the World Bank definition. In addition, in this study, we have introduced education as a key determinant of financial inclusion; however, we have not taken into account the role of financial literacy. In addition, there are some limitations to our study that stem from missing data for certain MENA countries. Hence, our findings might not fully represent the entire region. The countries we could not include could have different economies, social conditions, or institutions that might influence the results. To obtain a more complete picture, future studies could try to include more countries or use methods like data imputation or panel analysis, which can handle datasets with gaps.

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