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RESEARCH ARTICLE

The M/FI_Z-Score Matrix: An Original Framework Linking Financial Inclusion to Financial Stability

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Abstract

This study aims to present an innovative analytical framework, known as the M/FI_Z-Score Matrix, to examine the relationship between financial inclusion and financial stability in Arab countries during the period 2011–2021. The analysis is based on key financial inclusion indicators, including the number of ATMs and commercial bank branches per 100,000 adults, the number of borrowers per 1,000 adults, as well as broad money supply (% of GDP) and domestic credit to the private sector (% of GDP). The study's findings clearly indicate that the increase or decrease in the financial stability Z-Score is associated with the directions (increase/decrease) and values (positive/negative) of the growth rates of financial inclusion indicators. The results further show that enhancing financial stability requires a balanced management of growth in access, usage, and financial depth indicators, while considering the inverse relationships between certain indicators to ensure a positive effect on overall financial stability. The M/FI_Z-Score Matrix provides a strategic tool for policymakers and financial practitioners by offering practical scenarios to strengthen financial stability while supporting financial inclusion. The findings also emphasize that unbalanced expansion in borrowing or financial services may lead to financial risks, highlighting the critical role of sound financial policies and the adoption of fintech applications.

Citation

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Introduction

In recent years, the global financial system has undergone a rapid transformation driven by profound changes in the world economic structure, along with the emergence of modern financial transaction patterns based on innovation and efficiency. Within this evolving context, financial inclusion has emerged as an advanced concept that has attracted growing attention from researchers and policymakers due to its economic, social, and developmental dimensions.

Financial inclusion gained particular importance following the global financial crisis of 2008, which revealed the limited access of large segments of society to formal financial services. This situation prompted many international organizations and institutions to adopt financial inclusion as a key instrument for promoting economic development and reducing financial

exclusion. By expanding access to financial services, especially for marginalized groups, financial inclusion enhances their integration into the formal economic system.

On the other hand, financial stability represents one of the fundamental pillars of a sound financial system, as it reflects the system's ability to withstand financial shocks, manage risks efficiently, and ensure the continuity of its core functions. It also encompasses the capacity to adapt to economic changes and capitalize on available opportunities, making financial stability a strategic objective pursued by countries worldwide.

In the context of accelerated digital transformation, a close relationship emerges between financial inclusion and financial stability. Improved access to financial services enhances individuals' ability to manage their financial resources more effectively, thereby supporting financial stability at the individual level and generating positive spillover effects on overall financial stability. Consequently, the relationship between financial inclusion and financial stability is considered fundamental within the context of global economies, including those of Arab countries.

Accordingly, this research is structured around the following main themes:

1) Financial Inclusion and its indicators;
2) Financial Stability and its indicators;
3) The relationship between financial inclusion indicators and the Z-Score in Arab countries.

I.Financial Inclusion and its indicators

The concept of financial inclusion has evolved from simply classifying individuals and institutions as included or excluded, to multidimensional definitions and more advanced measures, reflecting the significant role that financial inclusion plays in economic and financial development as well as in financial stability.

- **Financial Inclusion**

Financial inclusion refers to the ability of individuals and businesses to access financial products and services that are useful, affordable, and tailored to their needs—such as payment services, savings accounts, credit, loans, and insurance—provided in a responsible and sustainable manner (World Bank, s.d.).

Improving high levels of financial inclusion, which strives to integrate diverse parts of society in the capitalist financial system while also achieving financial stability and economic growth, would benefit the economic (financial and banking), social, and political contexts. The program aims to achieve the following objectives:

✓ Financial inclusion for marginalized individuals (e.g., women, low-income households, and rural populations);
✓ Poverty reduction through affordable financial services and community integration into formal banking;
✓ Creating work opportunities to improve economic stability;
✓ Providing access to official money to improve residents' living conditions, particularly for the impoverished (Nadine , Nouran, & Andrew , 2023, p. 82);
✓ The objective is not only to increase access to financial services, but also to improve financial well-being;
✓ It strives to lay the groundwork for sustained and equitable national development (BANGKO SENTRAL NG PILIPINAS).

- **Financial Inclusion Indicators in Arab Countries**

Financial inclusion indicators help to illustrate the degree of vitality and activity within the financial sector. Given the diversity and variation of measurement indicators, this section relies on financial inclusion indicators that diagnose the overall condition of the financial sector in Arab countries.

➢ **Financial Access Dimension**

The financial access dimension (availability and outreach) refers to the ability to access financial services. In this study, the focus will be on demographic outreach to measure this dimension, which is quantified by: the number of commercial bank branches per 100,000 adults and the number of ATMs per 100,000 adults.

1. Number of Commercial Bank Branches per 100,000 Adults

Commercial bank branches are retail transaction sites (serving individuals) that operate as commercial banks and provide financial services to clients. These branches are physically separate from the main headquarters but are not legally organized as separate subsidiary companies. (THE WORLD BANK, 2025)

2. Number of ATMs per 100,000 adults

ATMs are computerized devices that allow customers of any financial institution to conduct financial transactions in any public place (THE WORLD BANK, 2025)

➢ Dimension of financial services usage

The dimension of financial services usage refers to the extent to which these services are utilized, measured through a set of indicators. The focus will be on an important indicator: the number of borrowers from commercial banks per 1,000 adults.

1. Number of borrowers from commercial banks per 1,000 adults

The number of borrowers from commercial banks refers to the figure reported for resident clients, including non-financial institutions (public and private) and households that have obtained loans from commercial banks or other banks operating as commercial banks. For many countries, the data cover the total number of loan accounts due to the lack of information on individual loan account holders (THE WORLD BANK, 2025).

➢ Financial depth dimension

Shaw (1973) indicates that financial depth refers to the improvement or increase in the total financial services designed for all levels of society. It also refers to the rise in the ratio of money supply to gross domestic product or other price indicators. Ultimately, financial depth assumes that the greater the liquidity available in the economy, the more opportunities exist for sustainable growth and continuity (Moses , 2013, p. 2). In this dimension, two indicators will be used: broad money supply (% of GDP) and domestic credit provided to the private sector (% of GDP) .

1. Broad money supply (% of GDP)

Broad money supply (% of GDP) is the total of currency outside banks, demand deposits excluding those of the central government, time deposits, and savings deposits (THE WORLD BANK, 2025).

2. Domestic credit to the private sector (% of GDP)

Domestic credit to the private sector refers to the financial resources provided by financial institutions to the private sector (households and companies), including loans, purchases of non-equity securities, trade credits, and other accounts receivable (THE WORLD BANK, 2025)

II.Financial Stability and its indicators

Financial stability is a key element for economic growth and sustainability, reflecting the ability of banks and financial institutions to withstand shocks and risks. The Z-Score is commonly used as a quantitative tool to assess this stability, measuring the financial safety of banks through the relationship between profits, capital, and asset volatility.

- **Financial Stability**

A financial system is regarded as stable when it is capable of absorbing internal imbalances and unexpected negative shocks. In such a stable state, the system relies on self-correcting mechanisms to mitigate these disturbances, preventing them from causing significant harm to the real economy or to other financial institutions. Thus, the importance of financial stability is often most apparent when it is lacking (BANK OF KOREA, s.d.).

Some scholars highlight that the importance of financial stability rests on two main aspects:

✓ The financial system is essential for the economy as it facilitates financial intermediation, channels funds between savers and borrowers, and ensures the efficient allocation of financial resources, thereby supporting economic growth and development (BANK NEGARA MALASIA, s.d.).

✓ The true value of financial stability is often most evident during times of financial turbulence, when its absence can have pronounced adverse effects (THE WORLD BANK, s.d.).

- **Financial Stability Indicators in Arab Countries (Z-Score indicator)**

Financial stability indicators are highly important because they reflect the stability of macroeconomic financial conditions and help detect accumulated imbalances in the financial sector at an early stage (Nasief, 2026).

The Z-Score is considered an indicator for predicting the likelihood of a company's bankruptcy, commonly referred to as the Altman Z-Score or AZ-Score. This method was developed by Edward Altman, an American financial expert, who created an indicator to assess financial stability. The Altman Z-Score model is an effective tool for identifying financial distress, with the concept of Altman emerging during the Great Depression to develop a formula for predicting corporate defaults in the United States (Tomasetti, 2023).

A study by Samrony Eka Fauzi et al. (2021) indicated that the Altman model outperforms the other three bankruptcy prediction models—Springate, Zmijewski, and Crover—being recognized as accurate, consistent, and both descriptively and statistically validated (Samrony, 2021, p. 57).

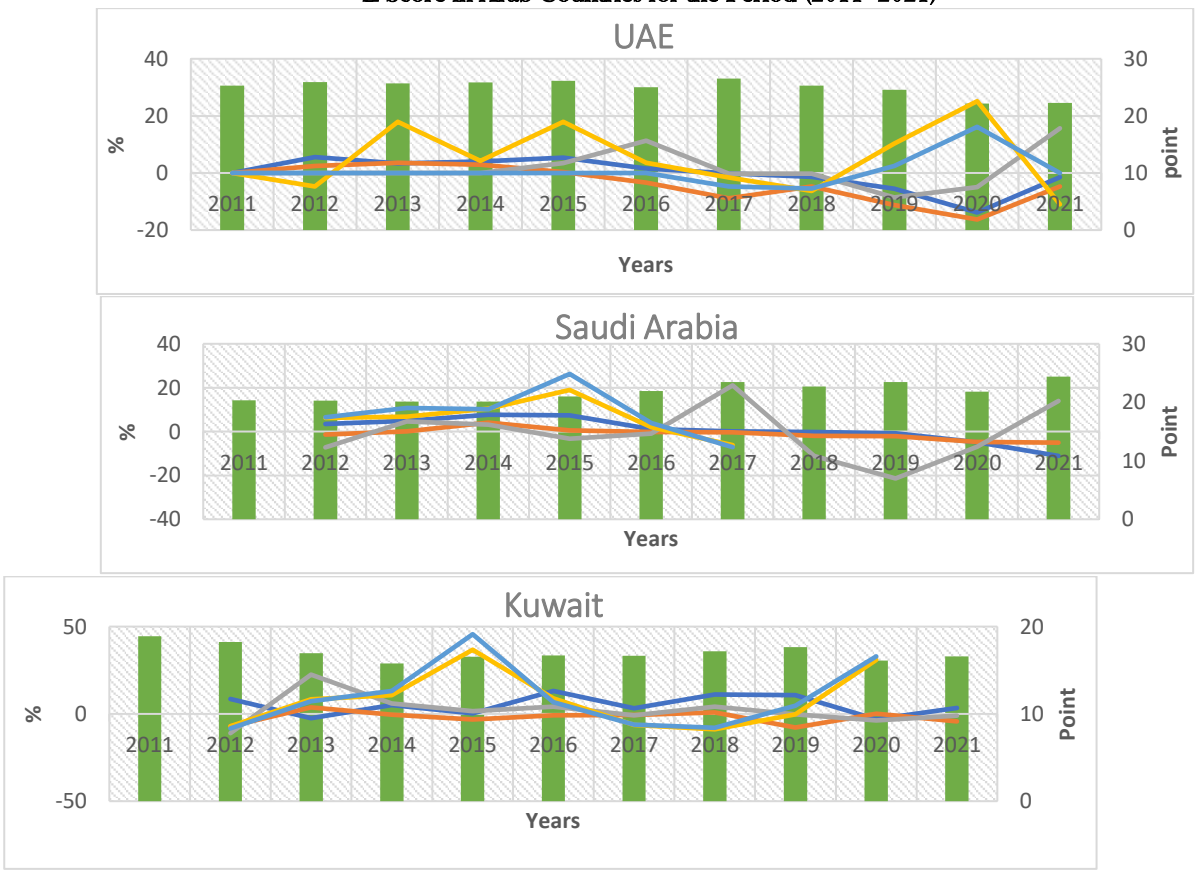
III.The relationship between financial inclusion indicators and the Z-Score in Arab countries

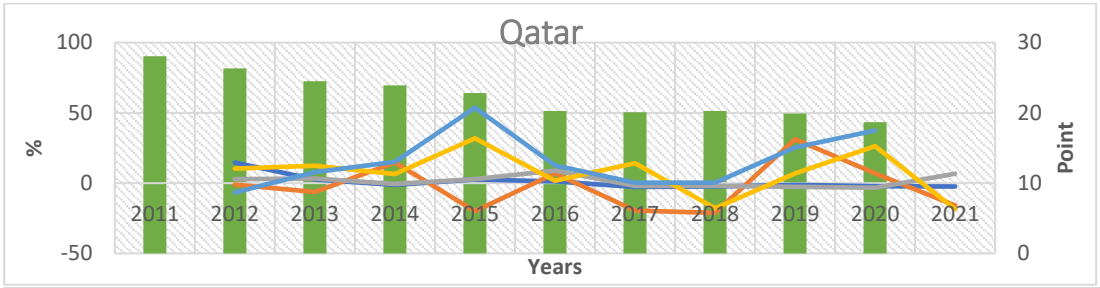
The study will examine the relationship between the growth rates of the financial inclusion indicators under consideration and the Z-Score, in order to determine: when financial inclusion indicators can positively contribute to increasing the Financial Stability Z-Score? as well as to summarize and analyze these results.

- **The relationship between the growth rates of financial inclusion indicators and the Z-Score index**

We aim to examine the relationship between the growth rates of financial inclusion indicators and the Z-Score by identifying the direction of movement of the growth rates of financial inclusion indicators (increase/decrease) and their values (positive/negative), and how these contribute to increases or decreases in the Z-Score.

Fig.1. The Relationship between the Growth Rates of Financial Inclusion Indicators and the Z-Score in Arab Countries for the Period (2011–2021)

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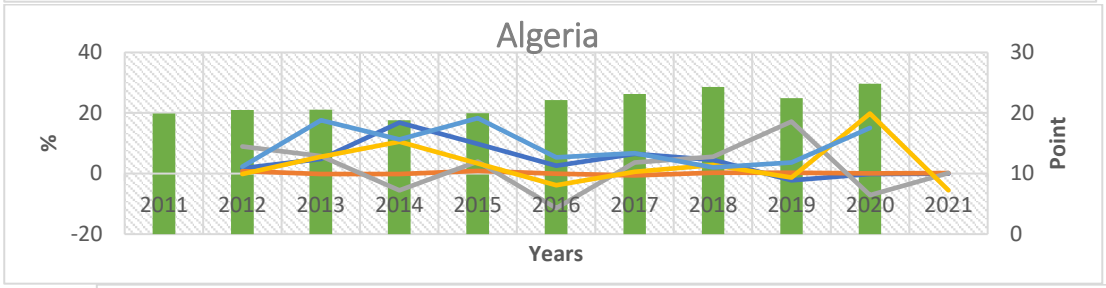
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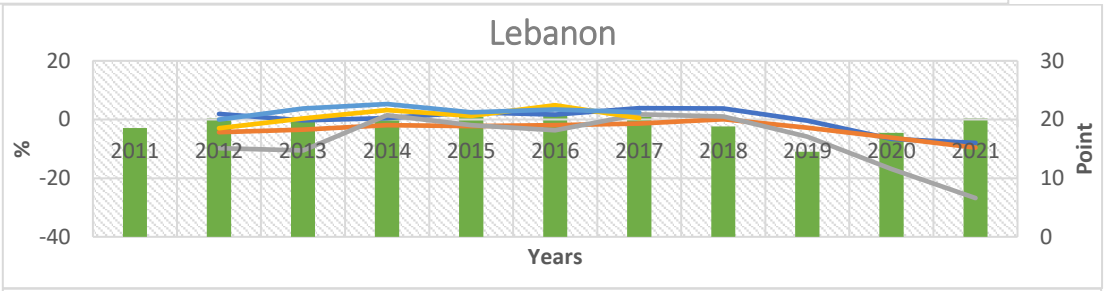
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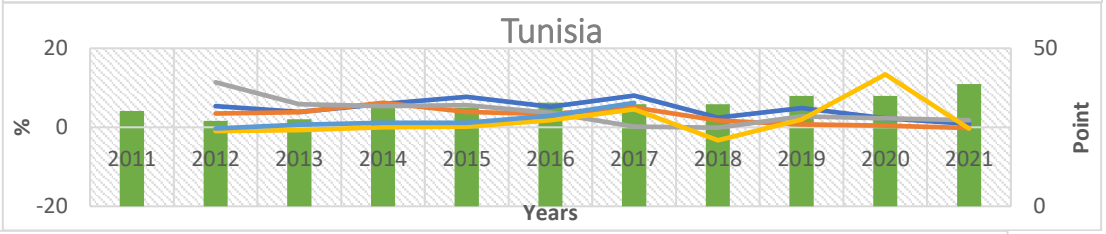
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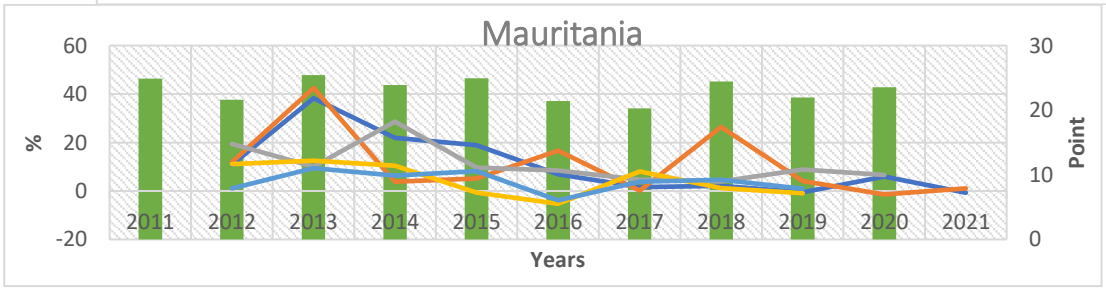
Mauritania
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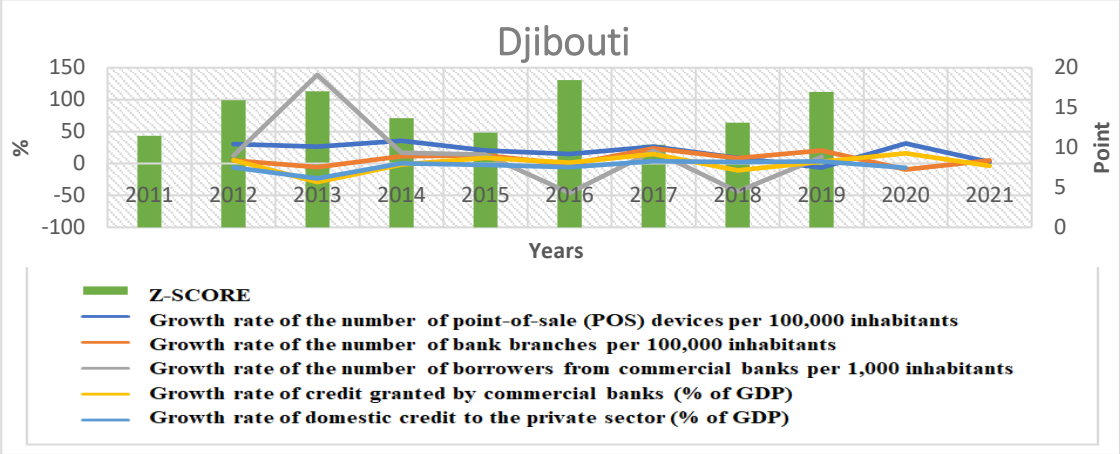

Source: Prepared by the researcher using Excel, based on the data provided in Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

Through Figure (1), we can observe the cases that lead to an increase or decrease in the Financial Stability Indicator (Z-Score) and the cases of conflicting results, as follows:

✓ **Increase in the Financial Stability Indicator (Z-Score)**

- Case of a decrease in the growth rate of the financial access dimension (growth rate of ATMs per 100,000 adults and growth rate of commercial bank branches per 100,000 adults) with negative values, along with a decrease in the growth rate of bank borrowers per 1,000 adults, representing the usage dimension with negative values, and a decrease in the growth rate of the financial depth dimension (growth rate of broad money (% of GDP) and growth rate of domestic credit to the private sector (% of GDP)) with positive values. This was observed in Qatar, Lebanon, and Saudi Arabia in 2017, 2015, and 2016, respectively;
- Case of an increase in the growth rate of the financial access dimension with positive values (or a decrease in the growth rate of ATMs per 100,000 adults with
- positive values and a decrease in the growth rate of commercial bank branches per 100,000 adults with negative values), along with an increase in the growth rate of bank borrowers per 1,000 adults with positive values, and a decrease in the growth rate of the financial depth dimension with negative values. This was observed in Kuwait in 2018, Djibouti in 2013, and Saudi Arabia in 2017;
- Case of an increase in the growth rate of one of the financial access dimension variables with negative values, while the growth rate of the other variable is positive, along with a decrease in the growth rate of the usage dimension with negative values, and an increase in the growth rate of the financial depth dimension with positive values. This was observed in Qatar in 2019, Algeria in 2020, and Lebanon in 2016;
- Case of a decrease in the growth rate of the financial access dimension with positive values (or a decrease in the growth rate of ATMs per 100,000 adults with positive values and a decrease in the growth rate of commercial bank branches per 100,000 adults with negative values), along with a decrease in the growth rate of the usage dimension with negative values, and a decrease in the growth rate of one of the financial depth variables with negative values while the other variable has positive values. This was observed in Algeria in 2016 and in Djibouti in 2016 and 2018;
- Case of a decrease in the growth rate of ATMs per 100,000 adults with positive values and an increase in the growth rate of commercial bank branches per 100,000 adults with positive values, along with an increase in the growth rate of the usage dimension with positive values, and an increase in the growth rate of one financial depth variable with positive values while the other variable decreases positively (Allahverdiyeva, 2026). This was observed in Algeria in 2015 and 2018.

✓ **Decrease in the Financial Stability Indicator (Z-Score)**

- Case of a decrease in the growth rate of ATMs per 100,000 adults with positive or negative values, and an increase in the growth rate of commercial bank branches per 100,000 adults with positive or negative values, along with a decrease in the growth rate of the usage dimension with positive or negative values (or an increase with negative values), and a decrease in the growth rate of the financial depth dimension with negative values. This was observed in Kuwait in 2017, Mauritania in 2016, and the UAE in 2018;
- Case of a decrease in the growth rate of the financial access dimension with negative values, along with a decrease or increase in the growth rate of the usage dimension with negative values, and an increase in the growth rate of the financial depth dimension with positive values. This was observed in the UAE in 2019 and 2020;

- Case of a decrease in the growth rate of the financial access dimension, along with an increase in the growth rate of the usage dimension and a decrease in the growth rate of the financial depth dimension with positive values. This was observed in Mauritania in 2014;
- Case of an increase in the growth rate of the financial access dimension with positive values (or an increase in ATMs and a decrease in branches with positive values), along with an increase or decrease in the growth rate of the usage dimension with positive values, and an increase in the growth rate of broad money with positive values and an increase or decrease in the growth rate of credit with positive values. This was observed in Saudi Arabia in 2013 and 2014, and Tunisia in 2015.

✓ **Cases of Conflicting Results**

- Case of an increase in the growth rate of the financial access dimension with positive values, along with a decrease in the growth rate of the usage dimension with positive values, and an increase in the growth rate of the financial depth dimension with positive values. This was observed in Tunisia in 2014 and 2017, and Mauritania in 2013;
- Case of an increase in the growth rate of ATMs per 100,000 adults with positive values and a decrease in the growth rate of commercial bank branches per 100,000 adults with negative values, along with a decrease in the growth rate of the usage dimension with positive values, and an increase in the growth rate of the financial depth dimension with positive values. This was observed in Kuwait in 2014 and Algeria in 2013;
- Case of a decrease in the growth rate of the financial access dimension with positive values, along with a decrease in the growth rate of the usage dimension with positive values, and an increase in the growth rate of the financial depth dimension with positive values. This was observed in Mauritania in 2017 and Tunisia in 2016;
- Case of a decrease in the growth rate of ATMs with negative values and an increase in the growth rate of bank branches with positive values, along with an increase in the growth rate of the usage dimension with positive values, and a decrease in the growth rate of the financial depth dimension with positive values. This was observed in Kuwait in 2013 and Djibouti in 2019;
- Case of an increase in the growth rate of ATMs and the usage dimension with positive values, along with an increase in the growth rate of branches with negative values, and a decrease in the growth rate of the financial depth dimension with positive values. This was observed in Lebanon in 2017 and Kuwait in 2016;
- Case of an increase in the growth rate of ATMs and the usage dimension with positive values, along with a decrease in the growth rate of branches with negative values, and an increase in the growth rate of the financial depth dimension with positive values. This was observed in Algeria in 2017 and Qatar in 2015.

- **Summary and Analysis of Results**

We discuss the main findings obtained from examining the relationship between the growth rates of financial inclusion indicators and the Z-Score for the countries under study, in addition to analyzing these results by identifying cases of Z-Score increases and decreases.

1. Case of Z-Score Increase for Financial Stability

➢ **According to the Dimensions of Financial Inclusion**

Table.1. Cases of Z-Score Increase According to the Dimensions of Financial Inclusion

	Financial Access Dimension		Financial Usage Dimension		Financial Depth Dimension	
	Condition	Value	Condition	Value	Condition	Value
An increase in the Z-Score	↘	+	↘	+	↗	+
	↘	-	↘	-	↘	+
	↗	+	↗	+	↘	-

Source: Prepared by the researcher based on Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

From the table, it is evident that both the financial access dimension and the financial depth dimension contribute to increasing the volume of financial services provided. Therefore, their growth rates should move in opposite directions (increase vs. decrease), since excessive provision of financial services can negatively affect a country's financial stability. In cases where both dimensions move in the same direction, they should be represented with opposite signs. Regarding the financial usage dimension, its growth rates should be inversely related to those of the financial depth dimension, either in direction or sign, in order to avoid increasing loan disbursements that could lead to financial crises and thus affect financial stability. It should be noted that the number of borrowers should be reduced when the volume of credit extended to the private sector increases, and vice versa.

➢ **According to Financial Inclusion Indicators**

Table.2. Cases of Z-Score Increase According to Financial Inclusion Indicators

	Financial Access Dimension	Financial Usage Dimension	Financial Depth Dimension

	Growth rate of the number of ATMs per 100,000 adult		Growth rate of the number of commercial bank branches per 100,000 adults		Growth rate of the number of borrowers from commercial banks per 1,000 adults		Growth rate of broad money supply (% of GDP		Growth rate of domestic credit to the private sector (% of GDP	
	Cond	Val	Cond	Val	Cond	Val	Cond	Val	Cond	Val
An increase in the Z-Score	↘	+	↘	-	↗	+	↘	-	↘	-
	↘	+	↘	-	↗	-	↘	+	↘	+
	↗	+	↘	-	↘	-	↘	+	↘	+
	↘	+	↘	+	↘	-	↘	-	↘	+
	↘	+	↘	-	↘	-	↘	-	↘	+
	↘	+	↘	-	↘	-	↘	+	↘	-
	↗	-	↗	+	↘	-	↗	+	↗	+
	↗	-	↘	+	↘	-	↗	+	↗	+
	↘	+	↗	-	↘	-	↗	+	↗	+
	↘	+	↗	+	↗	+	↘	+	↗	+
	↘	+	↗	+	↗	+	↗	+	↘	+
	↗	+	↗	+	↘	+	↘	+	↗	+

Source: Prepared by the researcher based on Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

From the table, the following observations can be made:

A decrease in the growth rate of the financial depth dimension with a negative value should be followed by an increase in the growth rate of the number of borrowers. This is because a decline in broad money supply leads to higher interest rates, which discourages the private sector from borrowing, thereby reducing the volume of financial services provided and negatively affecting private investment. Conversely, the increase in the growth rate of borrowers, which reached 138.75% in Djibouti in 2013 and 21.06% in Saudi Arabia in 2017, contributed positively to the financial stability indicator.

Alternatively, a decrease in financial depth with a positive value may be followed by either an increase or a decrease in the growth rate of borrowers with negative values. Similarly, a scenario where one of the financial depth variables decreases with a negative value while the other increases with a positive value, followed by a decrease in the growth rate of borrowers, or a positive increase in financial depth with a decrease in the number of borrowers (negative value), can occur. Despite a decline in financial access or any of its variables, it can still contribute to enhancing a country's financial stability.

Regarding positive values of financial inclusion growth rates, they should move in opposite directions. For instance, if the growth rate of broad money supply decreases, it should be followed by an increase in the growth rate of credit, and vice versa. Similarly, the growth rates of the number of ATMs and the number of borrowers should move in opposite directions. Therefore, the inverse relationship in growth directions between broad money supply and credit, and between ATMs and borrowers, along with positive growth in the number of bank branches, has a positive impact on financial stability.

2. Case of Z-Score Decrease for Financial Stability

- **According to the Dimensions of Financial Inclusion**

Table.3. Cases of Z-Score Decrease According to the Dimensions of Financial Inclusion

	Financial Access Dimension		Financial Usage Dimension		Financial Depth Dimension	
	Condition	Value	Condition	Value	Condition	Value
A decrease in the Z-Score	↗	+	↗	+	↗	+
	↘	+	↗	+	↘	+
	↘	-	↘	-	↗	+
	↘	-	↗	-	↗	+

Source: Prepared by the researcher based on Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

From the table, the following can be observed:

Positive cases and values recorded in the growth rates of financial inclusion dimensions indicate the injection of additional liquidity into the economy and an increase in the volume of financial services provided, which can negatively affect financial stability. Conversely, a decrease in the volume of financial services provided and a reduction in liquidity within the financial access and financial depth dimensions, accompanied by an increase in the growth rate of borrowers—or by increases in the growth rate of financial depth aimed at injecting liquidity into the economy while countries adopt financial technology applications to provide financial services with a reduction in the number of borrowers (positive or negative growth rates of borrowers)—will also negatively impact the country's financial stability.

- **According to Financial Inclusion Indicators**

Table.4. Cases of Z-Score Decrease According to Financial Inclusion Indicators

	Financial Access Dimension				Financial Usage Dimension		Financial Depth Dimension			
	Growth rate of the number of ATMs per 100,000 adult		Growth rate of the number of commercial bank branches per 100,000 adults		Growth rate of the number of borrowers from commercial banks per 1,000 adults		Growth rate of broad money supply (% of GDP		Growth rate of domestic credit to the private sector (% of GDP	
	Cond	Val	Cond	Val	Cond	Val	Cond	Val	Cond	Val
A decrease in the Z-Score	↘	+	↗	-	↘	-	↘	-	↘	-
	↘	+	↗	+	↘	+	↘	-	↘	-
	↘	-	↗	-	↗	-	↘	-	↘	-
	↘	-	↗	+	↗	+	↘	+	↘	+
	↗	+	↘	+	↗	+	↗	+	↘	+
	↗	+	↗	+	↘	+	↗	+	↘	+

Source: Prepared by the researcher based on Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

From the table, the following can be observed:

The decrease recorded in the growth rate of financial depth with negative values, followed by a negative decrease—either with negative or positive values—in the number of borrowers, along with increases in branch growth rates (either negative or positive) and a decrease in the number of ATMs (either positive or negative), indicates a rise in interest rates resulting from the decline in the growth rate of broad money supply. This, in turn, slows down private sector investment, negatively affecting financial stability.

Although positive values in the growth rates of financial inclusion indicators were recorded, they negatively impacted the Z-Score. This is due to the absence of the two necessary conditions: the inverse relationship between the growth rate of broad money supply and credit, and the inverse relationship between the growth rates of ATMs and borrowers, combined with positive growth in the number of bank branches

3. Case of Conflicting Results

- **According to the Dimensions of Financial Inclusion**

Table.5. Cases of Conflicting Z-Score Results According to the Dimensions of Financial Inclusion

	Financial Access Dimension		Financial Usage Dimension		Financial Depth Dimension	
	Condition	Value	Condition	Value	Condition	Value
An increase / A decrease in the Z-Score	↘	+	↘	+	↗	+
	↗	+	↘	+	↗	+

Source: Prepared by the researcher based on Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

From the table, the following can be observed:

Positive increases in financial depth, which inject liquidity into the economy and expand the volume of financial services provided, along with a decrease in the growth rate of borrowers, as well as increases or decreases in the growth rates of financial access with positive values, can lead either to a decrease or an increase in the financial stability indicator. This can be explained by two possibilities:

First possibility:

Case (1): The magnitude of the decrease in the growth rate of financial access in the scenario of an increase in financial stability is greater than the corresponding decrease in the scenario of a decline in financial stability. Additionally, the magnitude of the increase in the growth rate of financial depth in the scenario of increased financial stability is smaller than the corresponding increase in the scenario of decreased financial stability.

Case (2): The magnitude of the decrease in the growth rate of borrowers in the scenario of increased financial stability is greater than that in the scenario of decreased financial stability.

Second possibility:

Other variables may have contributed to the increase or decrease in the financial stability indicator.

- **According to Financial Inclusion Indicators**

Table.6. Cases of Conflicting Z-Score Results According to Financial Inclusion Indicators

	Financial Access Dimension	Financial Usage	Financial Depth Dimension

	Dimension									
	Growth rate of the number of ATMs per 100,000 adult		Growth rate of the number of commercial bank branches per 100,000 adults		Growth rate of the number of borrowers from commercial banks per 1,000 adults		Growth rate of broad money supply (% of GDP		Growth rate of domestic credit to the private sector (% of GDP	
	Cond	Val	Cond	Val	Cond	Val	Cond	Val	Cond	Val
An increase / A decrease in the Z-Score	↗	+	↗	-	↗	+	↘	+	↘	+
	↗	+	↘	-	↗	+	↗	+	↗	+
	↘	-	↗	+	↗	+	↗	+	↗	+
	↗	+	↘	-	↘	+	↗	+	↗	+

Source: Prepared by the researcher based on Appendices (6), (7), (8), (9), (10), (11), (12), (13) and (14).

From the table, it is evident that the results observed in the relationship between the growth rates of financial inclusion indicators and the financial stability indicator are attributable to the presence of other variables that contributed to these conflicting outcomes.

Based on the obtained results, a matrix, referred to as **"the M/FI_Z-Score Matrix"**, was developed. This matrix presents the scenarios illustrated in Table (7) that a country may face in the case of increases or decreases in both the country's financial stability indicator and financial inclusion indicators. Each scenario provides the country with potential solutions to help improve its level of financial stability by managing the directions and values of the growth rates of financial inclusion indicators.

Table.7. M/FI_Z-Score Matrix

Financial Inclusion Indicators			
Increase	Decrease		
Focus on improving the stability of the financial system by avoiding increases in the growth rates of financial inclusion indicators with positive values	Focus on increasing the growth rates of borrowers and bank branches in the case of a negative decrease in financial depth growth, while avoiding negative values in the growth rates of financial inclusion indicators	Decrease	Financial Stability Indicator Z-Score
Focus on reducing the growth rates of ATMs and one financial depth dimension while analyzing the directions and values of the controlling variables that align with increases in financial inclusion indicators. Additionally, emphasize the inverse relationship between ATM growth and borrower growth, as well as between broad money growth and credit extended to the private sector, alongside positive growth in the number of bank branches	Focus on reducing the growth rate of borrowers (negative value), reducing one financial depth dimension with a positive value and the other with a negative value, along with reducing the growth rate of financial access positively (or reducing ATM growth positively while reducing commercial bank branch .growth negatively)	Increase	

Source: Prepared by the researcher based on the obtained results.

Conclusion

To examine the relationship between financial inclusion and financial stability, a matrix called the **M/FI_Z-Score Matrix** was developed. This matrix illustrates the scenarios faced by a country in cases where the Z-Score rises or falls based on the directions (increase/decrease) and signs (positive/negative) of the growth rates of financial inclusion indicators. The growth rates of financial inclusion indicators—including the number of ATMs per 100,000 adults, the number of commercial bank branches per 1,000 adults, the number of borrowers from commercial banks per 1,000 adults, broad money supply (% of GDP), and domestic credit to the private sector (% of GDP)—were shown to play an active role in influencing the Z-Score.

study Findings:

- The inverse relationship in the growth rate trends between broad money supply (% of GDP) and domestic credit to the private sector (% of GDP), on one hand, and the number of ATMs per 100,000 adults and the number of borrowers per 1,000 adults, on the other hand, combined with positive growth in the number of commercial bank branches per 100,000 adults, has a positive effect on financial stability;
- An increase in the growth rates of financial inclusion dimensions with positive values, or an increase in the growth rate of the number of borrowers combined with a decrease in the growth rate of financial access, along with either a decrease or an increase in the growth rate of financial depth, and a country's shift toward fintech applications to provide financial services while the number of borrowers decreases, will negatively affect financial stability;
- Based on the results of the relationship between the growth rates of financial inclusion indicators and the Z-Score of financial stability, a matrix was developed, called the **M/FI_Z-Score Matrix**, which illustrates the scenarios faced by a country in cases where financial inclusion indicators exert either a positive or negative effect on the financial stability index. Each scenario provides the country with solutions to help improve its level of financial stability by managing the directions and values of the growth rates of financial inclusion indicators.

Recommendations:

- Work on adopting a financial system that supports financial inclusion, which in turn would enhance financial stability in Arab countries;
- Efforts should be made to ensure that the growth rates of financial access and financial depth move in different directions, or have opposite signs when moving in the same direction, and that the growth rates of financial usage are opposite to those of financial depth, either in direction or sign. Additionally, the inverse relationship condition between the growth rates of money supply and credit on one hand, and the number of ATMs and borrowers on the other, should be maintained, along with positive growth in the number of bank branches, in order to positively impact financial stability;
- The number of borrowers should be reduced when credit to the private sector is increased, and vice versa, to avoid negative effects on financial stability;
- The recommendations of the **M/FI_Z-Score Matrix** should be implemented to enhance financial stability in Arab countries;
- Countries with a high level of financial inclusion, as well as Algeria and Lebanon, which have relatively low numbers of commercial bank branches, should work on increasing the density of their branches in order to both enhance their financial inclusion levels and improve their financial stability;
- Excessive expansion of borrowing policies should be avoided, as this increases the financial risks associated with such behavior, negatively affecting financial stability.

Ethical Considerations. This study is based exclusively on secondary data obtained from publicly available and officially published sources, including international financial databases and institutional reports. No primary data collection, human participants, surveys, interviews, or personal or confidential information were involved. Consequently, ethical approval from an institutional review board was not required. The research adheres to accepted principles of academic integrity, transparency, and responsible use of data.

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Appendices

Appendix.1. Number of commercial bank branches per 100,000 adults

2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	
7,59713543	7,97604528	9,52835141	10,7362058	11,2684502	12,3653182	12,7909887	12,7477328	12,3880991	11,9620465	11,6709103	**UAE**
13,0084197	13,5956823	13,5773334	14,7249862	14,5896771	14,6748855	14,790178	15,2743983	15,3531535	14,8029702	15,9354977	**Kuwait**
7,38359291	7,77764732	8,16007163	8,3403836	8,50439983	8,53393601	8,55177843	8,50523692	8,17299777	8,17087597	8,28207733	**Saudi Arabia**
8,49704639	10,0879946	9,44003433	7,19328438	9,12332873	11,3237114	10,5806575	13,2272899	11,5327577	12,3139868	12,4330804	**Qatar**
5,26224369	5,25498194	5,25414844	5,23780197	5,22292875	5,25455537	5,25719456	5,21090988	5,21594731	5,22553374	5,18251887	**Algeria**
18,3647509	20,3152441	21,6558303	22,2709417	22,2522514	22,5628225	23,0050154	23,5490654	23,9995131	24,8572178	25,9957717	**Lebanon**
22,2778782	22,3183477	22,2308814	22,0755586	21,7019241	20,6607362	19,9876975	19,2367975	18,1119627	17,4485904	16,864898	**Tunisia**
11,3193753	11,1965392	11,3584317	10,9160209	8,63853215	8,62530738	7,39432656	7,03356425	6,77455777	4,75415314	4,24725639	**Mauritania**
8,94426882	8,54277367	9,4308141	7,84801504	7,26128525	5,87061172	5,98708994	5,3176918	4,77870477	5,05526244	4,82738645	**Djibouti**

Source: (THE WORLD BANK, s.d.)

Appendix.2. Number of ATMs per 100,000 adults

2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	
51,6981538	52,4852265	60,9142465	64,4780289	65,3668744	65,4201444	64,3825675	61,1159852	58,7773085	56,8608603	53,8617674	**UAE**
81,2147286	78,5627694	81,0700151	73,2552663	65,9829913	63,9336914	56,5137003	56,3977785	53,6632733	55,0485453	50,7150286	**Kuwait**
62,0386801	69,8004749	73,3357794	73,9630126	74,1022634	74,028377	73,2044134	68,2001323	63,353282	60,4236041	58,3864122	**Saudi Arabia**
52,4050396	53,6552703	54,8421042	55,5504505	56,9465449	58,5348772	57,8559356	56,3801504	57,0723651	55,5963402	48,4890134	**Qatar**
9,3046331	9,31070781	9,32770211	9,53991893	9,12724826	8,57084098	8,35007733	7,606854	6,51084079	6,20925064	6,10017824	**Algeria**
33,7176045	36,6417396	39,254867	39,4130571	37,9926232	36,5778849	35,9611367	35,1154901	34,9502996	35,059442	34,40159	**Lebanon**
33,223337	32,9354886	32,2065662	30,7187784	29,9885324	27,7610455	26,395967	24,5047205	23,1351092	22,2586773	21,123588	**Tunisia**
10,9386012	11,0182504	10,402706	10,4611867	10,2411558	10,0762937	9,42984342	7,93420358	6,50888884	4,70844013	4,24725639	**Mauritania**
16,6307498	16,23127	12,332603	13,1787422	12,1021421	9,57836649	8,35041492	6,92911356	5,10827062	4,04420996	3,10331986	**Djibouti**

Source: (THE WORLD BANK, s.d.)

Appendix.3. Number of borrowers from commercial banks per 1,000 adults

2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	
543,121329	469,651622	494,180865	540,490755	541,587239	543,087145	488,076711	471,916152	-	-	-	UAE
212,840599	215,03271	223,225302	223,933771	215,184873	216,968984	208,317837	204,968603	193,295838	157,815853	177,388307	Kuwait
148,31542	130,204186	139,890077	177,948675	200,177768	165,348569	166,953879	172,546818	167,335992	159,898767	172,210638	Saudi Arabia
234,847691	220,278396	227,691993	233,817917	238,500787	243,048221	223,076729	217,124556	218,416631	211,389233	205,551031	Qatar
46,7864724	46,6894767	50,2714983	42,9026156	40,6383003	39,1891699	44,2419579	42,5407938	45,0247556	42,5768205	39,0750264	Algeria
129,201597	176,463998	212,269076	225,351749	223,080419	219,250861	227,541722	232,114704	228,877662	255,839489	283,449125	Lebanon
250,370847	245,98429	240,485211	233,954741	234,181625	233,700745	225,501603	213,574502	202,775951	191,568807	171,977552	Tunisia
-	95,5618356	89,6464818	82,3780365	79,2522071	75,7653994	69,8754691	63,7154165	49,5338763	45,0114016	37,6739209	Mauritania
48,1578999	-	25,601033	23,1590482	41,2047682	34,4187785	63,7719612	56,1274312	48,093544	20,1435358	17,9354647	Djibouti

Source: (THE WORLD BANK, s.d.)

Appendix.4. Broad money supply (% of GDP)

2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	
102,549472	115,206586	92,0588982	83,4278792	88,9808296	90,3667774	87,2764379	74,0022718	70,955381	60,1534597	63,1430096	UAE
-	120,643685	92,212469	92,5123649	101,467569	108,237749	99,3213554	72,6380046	65,6455597	60,6307243	65,2512012	Kuwait
-	-	-	-	70,1022218	74,7341281	73,2666562	61,589197	55,7930366	52,2390832	49,1693807	Saudi Arabia
93,0392955	114,121316	90,3061833	84,5159363	102,887325	90,0856779	88,5601235	67,144459	62,9989915	56,0311456	50,7556355	Qatar
91,178195	96,4980394	80,5357665	81,5784093	79,3287485	78,8843691	82,0006516	79,3094812	71,7297314	67,9543982	68,0615962	Algeria
-	-	-	-	260,618311	259,293191	247,24163	244,29691	236,654964	235,819515	243,034255	Lebanon
77,6107613	77,8761385	68,6809916	67,374058	69,6659114	66,6125821	65,4210132	65,3029596	65,2741105	65,7638481	66,378122	Tunisia
-	-	27,8106973	28,0750027	27,7289327	25,6596921	27,0867796	27,2528617	24,6843683	21,943175	19,748548	Mauritania
77,2890625	80,3686019	69,3319899	67,5723842	75,4763016	65,6530205	64,8574021	59,6503839	60,7288711	85,7035474	81,3791424	Djibouti

Source: (THE WORLD BANK, s.d.)

Appendix.5. Credit to the private sector (% of GDP)

2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	
-	90,790167	78,158986	76,3249508	80,7200408	84,7052071	-	-	-	-	-	UAE
-	126,472604	95,1065868	90,919086	98,6991072	105,187145	98,5107721	67,64079	59,7519624	55,7432613	60,7902325	Kuwait

-	-	-	-	53,9733527	58,1144819	55,9167973	44,2902349	40,2187358	36,3391799	34,1007294	**Saudi Arabia**
-	138,857843	100,941606	80,4368398	80,0817008	79,7605886	70,8424801	46,0968086	40,00534	37,1284424	39,7530263	**Qatar**
-	29,6949071	25,8064938	24,9013665	24,4029577	22,8758054	21,711733	18,3519781	16,4978911	14,0253067	13,7159224	**Algeria**
-	-	-	-	106,567725	103,999348	100,566124	98,2255476	93,3172929	89,9553303	89,9878566	**Lebanon**
-	-	-	-	81,7125991	76,9508925	74,7917657	73,9469004	73,1104704	72,6067639	72,8194981	**Tunisia**
-	-	22,2408092	22,0411209	21,0665655	20,2989278	21,1155784	19,5202998	18,3458398	16,7663812	16,5934474	**Mauritania**
-	20,9080274	22,3514675	21,633222	21,1727543	20,4371266	21,7028461	22,1972663	22,1639856	28,9308988	30,908834	**Djibouti**

Source: (THE WORLD BANK, s.d.)

Appendix.6. The indicators used to measure the relationship between financial inclusion and financial stability in the UAE

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
25,32	-	-	-	-	-	**2011**
25,9	-	-4,73457	-	2,4945461	5,5681294	**2012**
25,69	-	17,957274	-	3,5617032	3,3704172	**2013**
25,85	-	4,2940941	-	2,9030582	3,9788769	**2014**
26,12	-	17,937512	3,4244555	0,3393221	5,3448902	**2015**
25,04	-	3,5408635	11,270858	-3,327894	1,6115805	**2016**
26,55	-4,704748	-1,533692	-0,276181	-8,870519	-0,081428	**2017**
25,32	-5,444856	-6,240614	-0,202457	-4,723315	-1,35978	**2018**
24,59	2,4029302	10,345485	-8,568119	-11,25029	-5,527127	**2019**
22,14	16,160881	25,144433	-4,963617	-16,29145	-13,83752	**2020**
22,29	-	-10,98645	15,643448	-4,750598	-1,499608	**2021**

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for the UAE

Appendix.7. The indicators used to measure the relationship between financial inclusion and financial stability in Saudi Arabia

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
20,33	-	-	-	-	-	**2011**
20,28	6,5642303	6,2431181	-7,14931	-1,342675	3,4891541	**2012**
20,13	10,675959	6,803246	4,6512084	0,0259677	4,8485653	**2013**
20,11	10,123389	10,388681	3,1139904	4,0650831	7,6505119	**2014**
20,99	26,250848	18,960239	-3,241404	0,54721	7,3376414	**2015**
21,93	3,9302762	2,0029192	-0,961529	-0,20864	1,1255655	**2016**
23,46	-7,125813	-6,197846	21,064106	-0,346103	0,0998082	**2017**
22,7	-	-	-11,10468	-1,928604	-0,187917	**2018**
23,47	-	-	-21,3874	-2,161915	-0,848036	**2019**
21,82	-	-	-6,92393	-4,686531	-4,820709	**2020**
24,37	-	-	13,90987	-5,066499	-11,11997	**2021**

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Saudi Arabia

Appendix.8. The indicators used to measure the relationship between financial inclusion and financial stability in Kuwait

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
18,89	-	-	-	-	-	2011
18,25	-8,302273	-7,08106	-11,03368	-7,106948	8,5448372	2012
16,96	7,1913644	8,2711124	22,48189	3,7167088	-2,516455	2013
15,79	13,202625	10,651817	6,0388081	-0,512957	5,0956735	2014
16,55	45,638116	36,734697	1,6340232	-3,170144	0,2055431	2015
16,71	6,7773021	8,9773174	4,1528595	-0,779521	13,129544	2016
16,66	-6,16809	-6,254916	-0,822289	-0,580641	3,2053521	2017
17,18	-7,882565	-8,825681	4,0657587	0,9274307	11,021439	2018
17,64	4,6057445	-0,324169	-0,316374	-7,793915	10,667832	2019
16,1	32,979857	30,83229	-3,6701	0,1351438	-3,092692	2020
16,58	-	-	-1,019431	-4,319479	3,3755928	2021

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Kuwait

Appendix.9. The indicators used to measure the relationship between financial inclusion and financial stability in Qatar

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
28,05	-	-	-	-	-	2011
26,32	-6,602224	10,39394	2,8402685	-0,957877	14,657602	2012
24,52	7,7485008	12,435666	3,3243882	-6,344241	2,6548958	2013
23,92	15,226639	6,5802123	-0,591565	14,693209	-1,212872	2014
22,81	53,681963	31,89491	2,7413634	-20,00888	2,6175615	2015
20,26	12,588645	1,72262	8,9527456	7,0227573	1,1735039	2016
20,11	0,4025951	14,210525	-1,871001	-19,43164	-2,71348	2017
20,29	0,4434709	-17,85583	-1,963461	-21,15505	-2,451588	2018
19,9	25,49176	6,8510712	-2,619955	31,233993	-1,275141	2019
18,68	37,562546	26,371542	-3,255976	6,8639614	-2,164093	2020
-	-	-18,47334	6,6140371	-15,77071	-2,330117	2021

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Qatar

Appendix.10. The indicators used to measure the relationship between financial inclusion and financial stability in Algeria

Z-Score	Growth rate of domestic credit to the private	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from	Growth rate of the number of commercial bank	Growth rate of the number of ATMs per	Years

	sector (% of GDP)		commercial banks per 1,000 adults	branches per 100,000 adults	100,000 adults	
19,91	-	-	-	-	-	2011
20,49	2,2556577	-0,157501	8,961719	0,8299992	1,7880198	2012
20,55	17,62945	5,5556864	5,7494548	-0,183454	4,8571103	2013
18,82	11,238327	10,567096	-5,51688	-0,096578	16,833666	2014
19,97	18,307318	3,3932518	3,9989007	0,8882266	9,7704428	2015
22,14	5,36149	-3,800314	-11,42081	-0,050202	2,6438516	2016
23,12	6,6758407	0,56333	3,6977827	-0,60189	6,4918634	2017
24,29	2,0424112	2,8358708	5,5718751	0,2847679	4,5213043	2018
22,44	3,63485	-1,278087	17,175836	0,3120865	-2,224514	2019
24,82	15,067577	19,820104	-7,125353	0,0158635	-0,182192	2020
-	-	-5,512904	0,2077463	0,1381879	-0,065244	2021

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Algeria

Appendix.11. The indicators used to measure the relationship between financial inclusion and financial stability in Lebanon

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
18,57	-	-	-	-	-	2011
20,17	-0,036145	-2,96861	-9,740597	-4,379766	1,912272	2012
19,71	3,737369	0,3542747	-10,53857	-3,450526	-0,311307	2013
19,99	5,2597482	3,2291511	1,414311	-1,876903	0,4726441	2014
20,47	2,382859	1,2053856	-1,970139	-2,310283	2,4081868	2015
20,62	3,4138974	4,8744061	-3,643666	-1,922159	1,7150409	2016
20,47	2,4696086	0,5110506	1,7466556	-1,376472	3,8677423	2017
18,8	-	-	1,0181665	0,0839926	3,7387098	2018
14,52	-	-	-5,805445	-2,761946	-0,401365	2019
17,74	-	-	-16,86778	-6,190417	-6,656824	2020
20,19	-	-	-26,78303	-9,601131	-7,980339	2021

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Lebanon

Appendix.12. The indicators used to measure the relationship between financial inclusion and financial stability in Tunisia

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years

30,21	-	-	-	-	-	2011
27,04	-0,292139	-0,925416	11,391751	3,4609899	5,373563	2012
27,52	0,693746	-0,744691	5,8501921	3,8018677	3,9374838	2013
31,45	1,1440631	0,0441969	5,3253612	6,2104523	5,9200558	2014
31,17	1,1425297	0,1807783	5,584515	3,9034564	7,7178862	2015
32,76	2,886851	1,8213857	3,6359576	3,3672644	5,171542	2016
32,31	6,1879809	4,5837125	0,2057675	5,0394524	8,0237862	2017
32,29	-	-3,289777	-0,096884	1,7216653	2,4350839	2018
34,98	-	1,9398173	2,7913392	0,703596	4,8432519	2019
34,96	-	13,388198	2,28666	0,3934453	2,2632726	2020
38,68	-	-0,340768	1,7832669	-0,181328	0,8739765	2021

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Tunisia

Appendix.13. The indicators used to measure the relationship between financial inclusion and financial stability in Mauritania

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
24,9	-	-	-	-	-	2011
21,62	1,0421813	11,112852	19,476287	11,934687	10,858392	2012
25,43	9,4203909	12,492236	10,047398	42,497677	38,238751	2013
23,91	6,401778	10,405344	28,629983	3,8232235	21,897973	2014
24,95	8,1724084	-0,609412	9,6680725	5,1291534	18,850535	2015
21,4	-3,867527	-5,268576	8,4291817	16,647639	6,8553657	2016
20,3	3,7816663	8,0641677	4,6021109	0,1533253	1,6361383	2017
24,45	4,6260765	1,2480463	3,9441545	26,364303	2,1484973	2018
21,98	0,9059806	-0,941426	8,8232805	4,0528572	-0,559026	2019
23,53	-	-	6,5985343	-1,425307	5,9171559	2020
-	-	-	-	1,09709	-0,722884	2021

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Mauritania

Appendix.14. The indicators used to measure the relationship between financial inclusion and financial stability in Djibouti

Z-Score	Growth rate of domestic credit to the private sector (% of GDP)	Growth rate of broad money supply (% of GDP)	Growth rate of the number of borrowers from commercial banks per 1,000 adults	Growth rate of the number of commercial bank branches per 100,000 adults	Growth rate of the number of ATMs per 100,000 adults	Years
11,46	-	-	-	-	-	2011
15,91	-6,399255	5,3138984	12,3112	4,7204837	30,318824	2012

17,06	-23,38992	-29,14077	138,75423	-5,470689	26,310718	**2013**
13,69	0,1501568	-1,775905	16,70471	11,278935	35,644998	**2014**
11,86	-2,227392	8,7292282	13,619953	12,588134	20,512023	**2015**
18,45	-5,832044	1,2267196	-46,02835	-1,94549	14,705276	**2016**
10,35	3,5994673	14,962421	19,715952	23,688733	26,348706	**2017**
13,12	2,1748126	-10,47205	-43,79522	8,0802472	8,8959472	**2018**
16,97	3,3201041	2,6040309	10,54441	20,168145	-6,420485	**2019**
-	-6,457921	15,918499	-	-9,416371	31,612685	**2020**
-	-	-3,831769	-	4,699822	2,4611744	**2021**

Source: Prepared by the researcher based on (TRADING ECONOMICS, 2023) And Appendices (1), (2), (3), (4) and (5) for Djibouti