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The role of financial technology in enhancing financial inclusion in selected Arab countries a theoretical and applied study for the period (2013-2020)

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Abstract

This research paper addresses the contribution of financial technology (FinTech) to enhancing financial inclusion by testing the relationship between the Financial Inclusion Composite Index (IFI) and total financial technology, which includes both digital lending and total digital capital, for some selected Arab countries during the period from 2013 to 2020. Using the linear regression model according to the least squares (OLS) method under panel data (panel), based on fixed and random effects models, and in order to choose the appropriate model for the study, we conducted the Hausman test. The results showed a positive relationship between financial inclusion, digital lending, total digital capital, and total financial technology. Accordingly, we concluded that the overall impact of financial technology is positive and of high statistical significance in the selected Arab countries, which demonstrates the contribution of financial technology to enhancing financial inclusion in the studied countries. Accordingly, policymakers must develop an appropriate regulatory framework that balances between promoting innovation and ensuring fair treatment for individuals and groups. This demands better financial tuition, strong regulatory establishments, and well-computed prudential regulations to ensure equal opportunities and effective supervision.

Keywords: Fintech, Financial Inclusion, Digital Lending, Panel Data

introduction

Financial technology (Fintech) has become one of the main drivers for the development of financial sectors around the world and a powerful tool to promote financial inclusion in Arab countries, as it contributes to the provision of financial services to disadvantaged and unbanked communities, helping to achieve sustainable development and reduce economic gaps.

Although bank accounts are widely available in Arab countries, an increasing number of Arab individuals and businesses rely on expensive financial services to manage their needs for remittances, payments, savings,

credit and insurance. A combination of factors, including the small size of many Arab countries, a turbulent macroeconomic environment, and underdeveloped regulatory and governance frameworks, continue to discourage domestic banks and foreign financial institutions from providing affordable financial services. Our analyses suggest that rapid advances in FinTech platforms can overcome such constraints and improve modern financial services that are compliant with Islamic finance principles. Arab countries are well positioned to accelerate the development of financial technology to better the delivery of financial services. Fintech has seen particularly rapid growth in some Arab countries, being delivered under diverse business models developed on the basis of technological innovation, as well as supply chain-based collaboration with regulated financial institutions.

The analyses of this study indicate that there is a remarkable potential for a significant increase in the number of professional FinTech entities operating in Arab countries by providing sound and reliable financial centers, creating opportunities for many small and young specialized initiatives. We offer some actions for policymakers and regulators in some Arab countries on how to create an enabling environment for fintech platforms. We believe that fintech innovations should reinforce two important pillars that support financial inclusion. The first and most important pillar is the efficiency of financial interventions. For this reason, fintech-based financial services that have a significant impact mainly include remittances, payments and savings. These services offer the highest potential in terms of market coverage and public interest. In terms of credit and insurance, more specific attention to the needs of a fragmented population that usually has imposed networks of relationships has contributed to making this segment of the market more restrictive. Companies that provide credit-related fintech platforms are allowed to exploit the largest business opportunities, but at the same time are more vulnerable to the issue of over-leveraging by sectors less accustomed to formal credit. The improvements that can be achieved in the credit process with the use of technologies, which have already begun, depend heavily on the ability of the regulatory and supervisory system to collect data on core customer segments, thus modifying the existing models developed for traditional banking services. There are many factors to consider in a comprehensive assessment, mainly depending on the regional realities of each country and the accompanying needs in order to achieve adequate contractual protection.

What is the relationship between financial inclusion and financial technology in the selected Arab countries during the period 2013- 20 20 20?

- ✓ **Sub-Questions**

- Does the size and importance of statistical financial technology on financial inclusion vary according to the type of instrument?

- How does the sum of digital capital affect the expansion of financial inclusion?
- What is the impact of digital lending on financial inclusion in selected Arab countries?

- ✓ **Research hypotheses:**
  - The quick growth of financial technology achieves size and importance according to the type of tool in expanding financial services, especially for the disadvantaged population and at the lowest costs
  - Total digital capital positively affects the promotion of financial inclusion by increasing the accumulation of capital, which in turn contributes to the financing of small, medium and micro enterprises, families and individuals, including financial constancy in the selected Arab countries.
  - Digital lending allows access to a large segment of society that lacks traditional banking services, such as rural or low-income residents.
- ✓ **Literature Review**

A study aimed (Muhammed, Murugesan, & Satyanarayana, 2024) to explore the prospects of financial technology (FinTech) to promote financial inclusion. This study focused on comprehending the reason people use fintech and how it affects their access to financial services by considering the mediating role of digital financial literacy and the moderate influence of perceived regulatory support. This study used partial least squares structural equation modeling (PLS-SEM) to test the research model by obtaining data from 608 fintech users in India. The results stated the role of trust, quality of service and perceived security in enhancing the use of fintech services. This study also showed that fintech positively affects financial inclusion, making it easier for individuals to enter formal financial services. Moreover, digital financial culture has emerged as an important mediator between the use of fintech and financial inclusion and that perceived regulatory support has a significant moderating effect on the relationship between fintech and financial inclusion.

Focus (Rezk & Mona, 2022) on highlighting the most important FinTech opportunities in Arab countries , Egypt and Saudi Arabia. Challenges The positive contribution in this field of previous studies The future and the importance of financial technology in the Arab countries in an analytical and descriptive manner The study used in collecting, analyzing and describing data and various aspects of financial technology .

Despite increasing global digitization, access to basic financial services remains limited for many populations in the MENA region. However, growing fintech innovations are beginning to disrupt traditional models and expand access.

The research (Mohammad & Yousef, 2025) study assessed the role of fintech in promoting financial inclusion in the MENA region in the midst of digital transformation. It analyzes how emerging technologies are transforming traditional banking and financial services delivery. It then assesses the effectiveness of critical fintech models such as digital payments, lending platforms, insurance technology and wealth management tools in driving inclusion in the GCC. The study uses a mixed-methods, comparative case approach to trends in FinTech adoption and integration in developed and emerging markets. The findings suggest that while fintech solutions have improved access to previously disadvantaged segments, sustained

efforts are needed to address the barriers of marginalized communities.

Examining (Zakaria & Elouaourti, 2024) levels of digital financial inclusion in all MENA countries, identifying sectors facing digital financial exclusion, examining the role of the digital divide, often exacerbated by a lack of financial literacy, as a obstruction to financial inclusion, and looking at how FinTech acts as an stimulus for inclusive development used a holistic approach from micro-level data from 9,053 individuals, derived from the World Bank's latest Global Findex 2021 database. Using comparative analysis, which is based on a two-step key component analysis method to create the DFI in the MENA region, the results showed that DFI in the region stays relatively low. Furthermore, our estimates, based on Heckman's selection methodology, underscore the fundamental role played by determinants such as educational attainment, workforce participation, ICT, and internet access as key drivers of digital financial inclusion in the MENA region.

I. Theoretical Framework for Financial Inclusion and FinTech

The FinTech industry continues to grow rapidly and innovate globally. With more than 29,000 FinTech startups around the world, revenue in the sector is expected to reach $201.91million this year. Adoption rates are increasing, with 64% of consumers using FinTech services globally.One of the most prominent trends in this field is increasing investments, integrating blockchain technology, and expanding digital payment solutions. As FinTech reshapes financial services, it creates opportunities and challenges for traditional institutions and regulators in the years to come (Kumar, 2024). With the exception of the Gulf Cooperation Council (GCC) countries, two-thirds of adults in the Arab world do not have an official bank account, according to a CGAP analysis of Findex data. Closing this gap could advantage millions of low-income people and small businesses. New research suggests that fintech companies in the region could generate billions of dollars in revenue by serving these excluded customers. (Chehade, 2021)

First: Definition and Importance of Financial Technology

- Fintech refers to a wide variety of technological developments in the financial sector that enhance or shift the way financial services are delivered (Philippon, 2016). Innovations typically include crowdfunding, insurance, budgeting software, blockchain (and cryptocurrencies), electronic payments and transfers, robo-advisors, and trading applications, helping to reduce costs and risks, as well as expanding and expanding services to the unbanked population.
- Fintech cites the use of innovative technology to improve and deliver financial services, including smartphone applications, e-finance, digital currencies, and artificial intelligence

Second :Uses of Financial Technology

A new financial industry is using technology to enhance and deliver financial services, and financial technology is being used to aid businesses and consumers better manage their financial operations, operations, and lives through

specialized software and algorithms that have use cases in almost every industry, geographic market, and business model.

- **Banks:** Fintech is used for both back-end operations and consumer-facing solutions such as behind-the-scenes account activity moderating and checking account balances on customer applications..
- **Businesses**: rely on fintech to process payments, e-commerce transactions, and accounting as well as seek abettance with government assistance programs such as payroll protection..
- **Individuals**: They use fintech platforms for tasks such as depositing checks, accessing funds abroad, or applying for financial aid as well as more complex concepts such as peer-to-peer lending or cryptocurrency exchanges. Digital finance points to the delivery of traditional financial services digitally, through devices such as computers, tablets, and smartphones. Digital finance has the capability to make financial services available to underprivileged populations in areas lacking financial infrastructure and provide wider options and increased efficiency of operations - provided that these populations also have access to the required digital technologies (United Nations, 2023)

2-The Digital Financial

Use cases develop with new and emerging technologies and overlap with other core mandates for regulatory and policy-making objectives related to market behavior, consumer protection, financial inclusion data and strategies, not to mention SME financing. Moreover, rapid technological developments of digital financial services have significantly expanded the scope of work in this area. The proliferation of digital ID systems, data-driven financial products/services, cryptocurrencies, blockchain applications, and new ways for governments to increase oversight of the financial industry and for the industry to automate (afi, 2024).

3- Financial Technology Industry (FinTech) for companies for 2025

There are about 30,000 FinTech startups around the world, including the following statistics:

- Of these, 13,100 are FinTech startups in the United States.
- FinTech industry revenue is expected to reach $201.91 billion.
- Revenues from the fintech industry grew by almost 100% between 2017 and 2023.
- 36.75% of FinTech investment deals were in the US in 2022.
- 4 in 10 financial services organizations say blockchain technology will change the way a service is provided.
- Visa is the leading FinTech company in the United States, with a market capitalization of $547 billion.
- Globally, 64% of consumers have adopted FinTech services.
- 46% of U.S. consumers have adopted FinTech services.
- 75% of global customers use the FinTech payment and money transfer service.
- 75% of FinTech companies hire employees and create jobs related to this field.
- 25% of SMEs worldwide have adopted FinTech services.

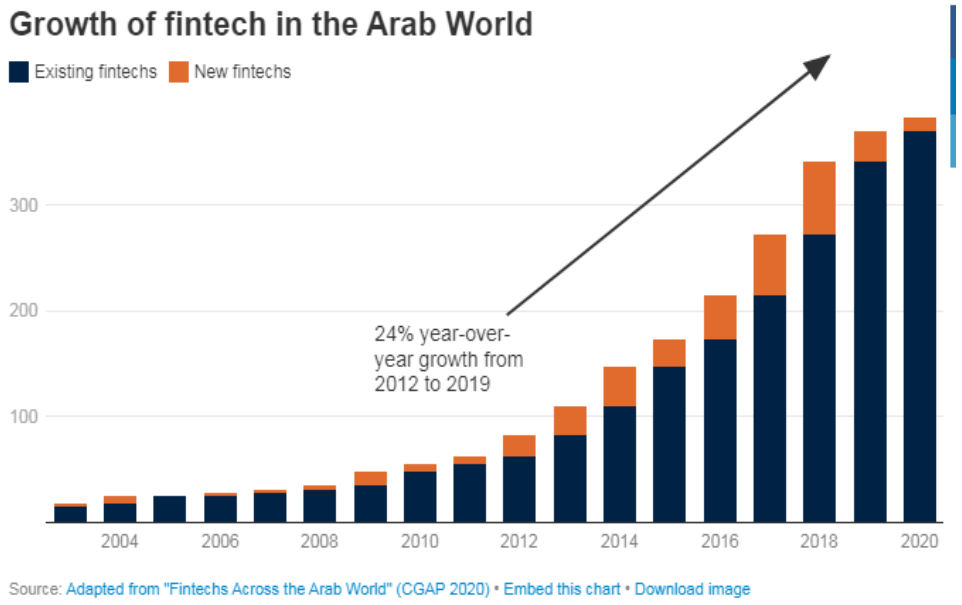
- Two-thirds of financial transactions are made via electronic payment (Kumar, 2024)

4.Importance and areas of FinTech:

The ongoing digital transformation of financial services and money produces opportunities to build more inclusive and potent financial services and promotes economic development. Countries should seize these opportunities and implement policies that enable and encourage secure financial innovation. Therefore, it is necessary to ensure that market outcomes remain consistent with basic policy objectives as the financial sector proceeds to transform and evolve. Financial technology is the application of digital technology to financial services, which is forming the future of finance. Digital technologies are revolutionizing payments, lending, investment, insurance and other financial products and services so that the process has been accelerated by the COVID-19 pandemic. In 2018, the World Bank Group and the International Monetary Fund (IMF) released the Bali Fintech Agenda, a set of 12 policy elements aimed at assisting member countries take advantage of the benefits and opportunities of the rapid advancement of fintech and 8 transforming the delivery of banking services while managing inherent risks. (Erik, Harish, & Matthew, 2023).

5. Growth of FinTech Levels in the Arab World

Figure (01) The growth of financial technology in the Arab world



Graph 01 shows the development of modern financial technology solutions in the Arab world, where it reached its lowest value in 2004 with less than 100 technological solutions and its highest value in 2020 with 400 technology solutions, as it was increasing by 24percent for each year, which has increased and increased in recent years, reaching 44 percent as solutions of payment products, half of which is a stock of value. Therefore, modern financial technology offers new opportunities to expand financial

coverage as a result of the legal and regulatory changes witnessed by some Arab countries. (Chehade, 2021)

II. Financial Inclusion and Fintech Relationship Test (fin_tech)

We test a relationship between financial inclusion (the Financial Inclusion Index (IFI)calculated according to the Sarma methodology), and financial technology

1.Classification of the selected Arab countries according to the values of the Calculated Financial Inclusion Index (IFI)

We use financial inclusion index values according to a methodology for selected Arab(Sarma, 2015) countries for three years (2017,2018,2019) where countries are classified into three categories depending on the following IFI values:

1. 0.5 < IFI ≤ 1 High Financial Inclusion
2. 0.3 ≤ IFI <0.5 Financial Inclusion Average
3. 0.3 IFI <≤0 Poor financial inclusion

Table No. (01): Classification of the selected Arab countries according to the Financial Inclusion Index For three years (2017,2018,2019)

Ranking of Countries IFI Values	2017	2018	2019
Financial Inclusion 0.5 < FI ≤ 1			
01 Kuwait	533	0.529	0.465
Financial inclusion Average	0.3 ≤ IFI <0.5		
02 Saudi Arabia	0.415	0.393	0.411
03 Qatar	0.352	0.340	0.363
Poor financial inclusion 0 ≤ IFI <0.3			
04 Lebanon	0.414	0.290	0.281
05 Egypt	0.198	0.209	0.221
06 Algeria	0.194	0.194	0.194
07 Djibouti	0.120	0.136	0.148
08 Libya	0.081	0.126	0.156
09	0.417	0.030	0.035
10 Mauritania	0.087	0.095	0.098
11 Comoros	0,064	0,064	0.070

Source: Prepared by the researcher based on World Bank data

Table No. (01) shows the classification of the selected Arab countries according to the levels of financial inclusion through the values of the composite index of three-dimensional financial inclusion for the three years (2017,201 8, 2019), where Kuwait topped thegroup , with the highest value exceeding 0.5in evidence of having a high level of financial inclusion. Four countries (Qatar and Saudi Arabia) also formed an average level of financial inclusion limited to between 0.3 and 0.5 ,where each of the

countries (Egypt, Djibouti, Algeria, Mauritania, Comoros and Libya), values for the financial inclusion index ranged between 0.3and 0, which is the minimum level of financial inclusion. Algeria ranked sixth among eleven countries in this group with a low level. We note that each of the countries Tunisia, Mauritania and Comoros had the lowest values. As for Yemen and Syria, there were no results as a result of the wars.

2.Estimate the relationship ofthe Financial Inclusion Index (IFI) with FinTech

In this section, we test the impact of financial technology on financial inclusion. We define the variables of the study and then estimate the relationship model with the analysis of its results. The data used in this test include the Financial Inclusion Index (IFI) previously calculated according to the Sarma method (2005), as a dependent variable and the independent variables: financial technology (Fintech), which is measured through digital lending and total net capital, total technology money, which includes all financial technology tools (digital lending, numerical capital raising) as a percentage of GDP where they are estimated separately .

Using the OLS method, a simple linear regression model under panel data,for only eight Arab countries that possess the data,represented by (Tunisia, Algeria , Mauritania, Saudi Arabia, Qatar, Kuwait, Lebanon,Egypt) for an eight-year period from2013 to 20 20 depending on World Bank data through panel tests for fixed and random effects, which are statistical models of cross-sectional observations for time periods. The Panel GMM method follows a study Our (Serhan, 2024) model takes the following form:

$$ifi_{it} = \beta_0 + \gamma digil_{it-1} + |\text{-}\beta_1 dr_{it-1} + \beta_2 fint_{it-1} + \varepsilon_{it} \text{----(01}$$

where:

ifi_{it}Calculated index of financial inclusion, for country i for the period t.

dl_{it-1}o Digital lending as a percentage of GDP, for a country for the period t -1.

dr_{it-1}The sum of digital capital as a percentage of the GDP of a country for the periodt -1.

fin_{it-1}Total statistical financial technology, for country i for the period t-1.

ε_{it}: Random error.

The null hypothesis is as follows:

H_0: The random effects model is the appropriate model.

H_1:The fixed effects model is the appropriate model.

Assessment Results

Table No. (02): Results of estimating the relationship of financial technology to financial inclusion

Hausman .	RE			FE		IFI	
Chi-Sq. prob	t-Statistic prob	Coefficient	**R-squared**	t-Statistic prob	Coefficient	**R-squared**	**Variable**
(0.0000)	1.882038 * * * (0.0745)	5.35 E-08	0.038951	7.194515 * * * (0.0450)	**2.07E-07**	0.227062	DL(t-1)
(0.0000)	-0.189669 ***(0.8502)	-6.73E-09	000008	187.8678 ***(0.0000)	3.05 E-08	0.772329	DR(t-1)
(0.1902)	2.329525 * * * (0.0235)	2.70E-07	0.286382	1.950035 **(0.0557)	1.69E-07	0.003851	FIN(t-1)

moral score at 10% * * moral score at 5% * * * moral score at 0% source: prepared by researchers based on the outputs of(eviews8)

The World Bank

It is clear from Table No. (02), which includes the results of estimating the relationship of financial technology and the financial inclusion index. The results showed that the statistical value of t-Statistic in most of the tests used is statistically significant. For the Hausman test,we note that the probability of any square is less than 0.05 for The sum of digital capital and digital lending one Exploring the alternative hypothesis H_1 And reject H_0 Which weighting was in favor of the fixed effects model , where we note the coefficient of determination is more than 50percent for the sum of digital capital, and therefore the model of effects for independent variables is explained by more than 50 percent of the dependent variables and the coefficient of the variable DR is statistically significant and its signal is positive, which explains the existence of a positive relationship with the financial inclusion index, as for digital lending, we note that the coefficient of determination is less than 50percent and the coefficient of the variable DIGIL is statistically significant because the probability of the coefficient is less than 5percent and its signal is positive, which explains the existence of a positive relationship with the financial inclusion index and the variable explained by the sum of financial technology, we find that the probability of any square is smaller For the Hausmann test, we have to explore the alternative hypothesis $_0H$, and we reject$_1$ H, that is, the weighting was in favor of the random effects model, where we note that the coefficient of determination is less than 50 percent and the probability of the coefficient of

the variable fin is less than 5percent, and from it, it is statistically significant and its positive reference is evidence of a positive relationship with the financial inclusion index.

Analyze the outcomes.

We note the positive impact of financial technology in terms of size and statistical significance by type of instrument Digital lending against total digital capital, where the coefficient of digital lending volume shows a positive and statistically significant impact on financial inclusion, while the coefficient of total digital capital volume shows a positive and statistically significant impact. In other words, the increase in digital lending is associated with an increase in the index of financial inclusion and total digital capital and leads to an increase in the level of financial inclusion. It is noticeable in the samples of countries that reveal that the data details show a positive and increasing consensus in how the developments of financial technology (Fintech) affect financial inclusion in the economies of the selected Arab countries. The impact of financial technology on financial inclusion becomes positive, which achieves the rapid growth of financial technology in terms of size, importance and total digital capital that positively affects the promotion of financial inclusion. Digital lending allows the arrival of a large segment of society that lacks traditional banking services, especially rural or low-income residents, which is consistent with our hypothesis. Financial technology efforts in the selected Arab countries have also contributed to the expansion of financial inclusion significantly.

IV. Conclusion

Fin tech plays a pivotal role in promoting financial inclusion in Arab countries, providing innovative solutions to overcome traditional challenges. With sufficient investments and appropriate legislative support, Arab countries can make significant progress in this area, facilitating comprehensive economic and social development. Policymakers must develop an appropriate regulatory framework that balances promoting innovation with ensuring fair treatment for individuals and groups.This requires better financial education, building strong regulatory institutions, and well-calculated prudential regulations to ensure equal opportunities and effective supervision. Arab countries now have the opportunity to encourage local fintech companies to solve the unique local challenges faced by their underprivileged or under-served populations.

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