DETERMINANTS OF FINANCIAL INCLUSION IN THE ARAB COUNTRIES FOR THE PERIOD 2014-2019 - A HOLISTIC VIEW-

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Abstract: Most of the Arab countries seek to achieve acceptable levels of financial inclusion, within a strategy that takes a number of factors, including supply side factors, and according to this perception, we aim within the rationale of this research to count the determinants of financial inclusion from a macroeconomic perspective for a sample of Arab countries during the period 2014- 2019, using Panel models, based on the deductive approach in order to describe and analyze the various dimensions of the study, and the inductive approach by using statistical and econometric tools in order to estimate the relationship between the study variables.

We found that both real factors and the investment environment positively affect the level of financial inclusion, while openness to trade has a negative impact on financial inclusion, Therefore, we recommend identifying all opportunities and threats at the level of the economic structure in order to build an effective policy for financial inclusion in the Arab countries.

Key words: Macroeconomic environment, Financial Inclusion, investment environment, economic stability, panel Data.

Jel Classification Codes : B22,C23,C33,G21 ,E62

Introduction:

The global financial crisis of 2008 allowed the enhancement of empirical research findings supporting the adoption of the financial inclusion policy, and International organizations and governments were put in the inevitability of working to reduce the various obstacles that prevent the access of different segments of society, especially the poor, to various financial services, given the negative effects of the crisis on low-income individuals, and individuals who do not deal with the formal financial system, with deepening poverty levels.

The success of this policy is based on a clarify of the relationship between the official financial system, the structure of the economic system, and the level of development in any country, which was the subject of a theoretical debate about the content of the direction of the causal relationship between them, as the dependent demand hypothesis sees that the relationship is heading from the real circle to the financial system, Continuous economic expansion stimulates more services and financial instruments, The financial system adapts itself to the financial needs of different economic sectors, in other words, the improvement of incomes and the rise in the state of economic activity, accompanied by other important factors, encourage the growth of demand for financial instruments and financing, Which in turn automatically forces financial institutions to respond to this demand, making them more comprehensive and efficient. Within this direction, we can ask the following main question: **What is the impact of factors related to the aggregate supply side on the levels of financial inclusion in the Arab countries after the global financial crisis?**

To simplify and clarify the content of the main problematic presented above, a set of sub-questions is shown in the following points:

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- What do we mean by financial inclusion as a strategic objective?
- What are the most important indicators for measuring financial inclusion within the dimension of using financial services?
- Do the external and real sectors' indicators in the Arab countries contribute to reaching the goal of financial inclusion?
- Does the investment environment in the economies of Arab countries give the possibility of expanding the financial services?

Hypotheses: The hypotheses from the main problematic as well as the sub-questions were given above, allow us to give the initial perception of the nature of the relationship between the study's variables as shown below:
- The openness of the external sector, expressed in the trade openness index, contributes positively to the levels of financial inclusion in the Arab countries;
- The weakness of the investment's environment and attractiveness makes it difficult to expand financial services in Arab countries;
- The structure of the real sector, which is measured by the per capita GDP index at constant prices, enhances financial inclusion in the Arab countries;
- Economic instability limits the financial institutions' ability to support financial inclusion in Arab countries.

Research importance: The importance of the research is coming from the efforts of the governments of Arab countries, like the rest of the world, to build effective strategies to reach the desired goals of implementing the financial inclusion policy, in order to achieve this, it is necessary to define and understand the nature of the relationship that binds the financial and banking institution to the environment in which it provides its services. Especially those that include all the factors that lie outside its borders and the scope of management's control over them, determining the impact of these factors, which are characterized by complexity and change, permits to identify the size and type of opportunities and threats that affect their ability to reach the target groups within the established strategy.

Research objective: We aim through this research to test hypotheses in some Arab countries by building a standard model to know the nature of the relationship between the independent variables and the dependent variable. we also aim to know the indicators of measuring financial inclusion within the dimension of use as a dependent variable, as reported by most international organizations and bodies in this regard, In addition to listing the macro-environment factors as independent variables affecting the financial inclusion index, as highlighted by empirical studies in this field.

Search Limits: The components of the problem, especially the question posed and the hypotheses formulated in the research, in light of achieving the desired goal, provide us with the ability to limit the time and spatial framework as follows:
- Spatial Delimitation: we use a panel of Arab countries: the United Arab Emirates, Tunisia, Algeria, Saudi Arabia, Sudan, Iraq, Oman, Qatar;
Time frame: The study period extended from 2014 to 2019;
The scientific method: The nature of the research subject requires us to rely on the deductive approach in order to describe and analyze the various dimensions of the study, and the inductive approach by using statistical tools and econometric tools to estimate the determinants of financial inclusion in the Arab countries.
Study Sections: The division of research - in our concept of its treatment - comes from two aspects, one of which is theoretical, which includes both: the concept of financial inclusion and literature reviews, The other Application side, which includes both the research methodology used in constructing the Standard Model, and the analysis of the results.

1.The Content Of Financial Inclusion

Financial inclusion is a key factor for policy makers, governments and international institutions in achieving the most important sustainable development goals, especially in light of the development in financial technology and what it has brought about due to financial innovations in contributing to the provision and provision of financial services to the community.

1.1 Definition Of Financial Inclusion

financial inclusion has gained a large space within the financial literature, confirmed by the large multiplicity of definitions provided to it by researchers, institutions and international organizations alike, but what is noted is that most of them intersect within the definition that includes its main objective, which means financial inclusion The possibility for adults in the community to access and effectively use a range of appropriate financial services, taking into account the responsible and secure provision of these services to the consumer in a sustainable manner to the service provider in a well-regulated environment, manifested at its most basic level in obtaining a deposit account and a transaction in a bank or other institution It also involves accessing credit from formal financial institutions, which allow adults to invest in educational and business opportunities, as well as using formal insurance products to better manage their financial risk (Klapper & Singer, 2017, p. 02),When talking about a working definition based around a simple and relatively stable quantitative measurement of financial inclusion in a wide range of countries, we resort to the definition found in the 2014 Global Financial Development Report issued by the World Bank, which means within this perception the percentage of individuals and institutions that use financial services, and therefore of This metric (use) is likely to reflect access, cost, and quality and vice versa (Barajas, Beck, & Belhadj, 2020, pp. 5-6). By this, financial inclusion refers to the degree to which households and institutions, especially poor households, and small and medium-sized enterprises have access to financial services. Proceeding from the foregoing, it can be said that financial inclusion is a process of promoting affordable, timely and adequate access to a wide range of financial products and services, while expanding their use by all segments of society by implementing existing and innovative curricula designed specifically for this, taking into account financial awareness and education. In order to promote financial well-being and economic and social integration, then we find that financial inclusion passes through four stages: access, quality, use and well-being as seen by the Alliance for Financial Inclusion (Yoshino & Morgan, 2016, pp. 4-5).

1.2 Effects of promoting financial inclusion

The implications of adopting a policy of financial inclusion can be limited to: (Berné, slaves, & Give him, 2019, pp. 4-6):

- Creating new job opportunities that will achieve sustainable economic and social growth, thus reducing unemployment rates and raising the standard of living;
- Enhancing the ability of individuals to obtain financial services through official channels subject to supervision and control, and thus contain shadow institutions and banks, which reflects positively on financial stability;
- Enhancing the effectiveness of financial intermediation by increasing the effectiveness of pooling the savings of individuals deprived of dealing with the formal system, which would increase the resources of banks and improve their performance;
- Contribute to enhancing competition opportunities between financial institutions by working on the diversity of their products and paying attention to their quality, to enhance their ability to retain their customers and attract new categories of them, which helps in reducing leakage and dealing with informal channels;
-Enhancing social stability in terms of attention to low-income people on the one hand and to targeted groups on the other, such as caring for women and youth, with a focus on accessing small and medium enterprises and integrating them into the formal sector by providing them with appropriate financial services.

1.3 Pillars Of Financial Inclusion

Financial inclusion is based on a number of pillars that can be summarized as follows: (Matouq, Ali, & Sid, 2021, pp. 87-90):

- **Access to banking facilities:** This is done by mapping each of the sub-service areas that meet the needs of (1,000-5,000), families, in a way that allows them to access banking services within five kilometers, while providing digital payment systems that reduce costs and increase quality.

- **Providing basic bank accounts:**They represent a basis for dealing with the official channels and making the community approach them, as well as an effective mechanism for receiving funds and paying various obligations and payments.

-**credit Providing basic bank accounts:** This pillar aims to support and develop self-employment and small projects that have important economic impacts, which can be summed up in creating activities that generate income and job opportunities and reduce social exclusion.

- **Provision of partial insurance:**This pillar seeks to protect those with lower eligibility from specific risks in exchange for premium payments commensurate with the probability and cost of the risks involved.

- **Unorganized sector pension programs**: These programs help secure future incomes for the elderly, by encouraging workers to save to benefit from it in old age.

1.4 Standards For Enhancing Financial Inclusion

The Group of Twenty (G20) issued what is known as the innovative principles of financial inclusion, which are nine (09) international standards that can be followed by policy makers and governments to work to enhance financial inclusion within developed or developing societies, we can Its summary is as follows(Bernie, Abed, & Give it, 2019, pp. 4-5)

-**Leadership:** It aims to create a broad commitment from the various high levels of government and the participating parties to achieve financial inclusion to reduce poverty;

-**Diversity:** adopting incentive policies and methods to compete in the market and encourage access to and use of diversified financial services correctly;

-**Innovation and innovation**: expanding access to financial services by promoting financial and technological innovations;

-**Protection:** finding comprehensive ways to protect the financial consumer based on clear government directions and effective participation of financial service providers and customers;

-**Cooperation:** creating a participatory institutional structure with clear and specific responsibilities and coordination of various government agencies;

- **Proportionality**: setting and adopting a policy and legislation commensurate with the risks related to innovative financial services and products (the balance between the expansion of financial services and risks).

1.5 Determinants Of Financial Inclusion

The Alliance for Financial Inclusion has developed three dimensions through which we can measure or quantify inclusion, highlighted by the table below:

Table 1. Dimensions of measuring financial inclusion.

dimension	Concept
Access	The ability to use the services and products provided by the official financial institutions, and to determine the levels of access, it is necessary to identify and analyze potential obstacles to opening and using bank accounts such as cost, collective proximity to banking service points (branches, ATMs, etc.)
the use	It affects the depth or extent of use of financial services, and to measure this it is necessary to collect information about the regularity, frequency and duration of communication over time.
quality	It expresses an assessment of how financial services meet the needs of their users from several angles, including affordability, convenience, fair treatment and choice, as well as other aspects related to consumer protection, financial education...etc

Source(Alliance For Financial Inclusion, 2019, p. 4)

The Group of Twenty (G20) agreed - on the dimensions shown in the table above - on the core indicators that define financial inclusion, at the Los Nightmare Summit in 2012, the new indicators were: proposals reviewed and the current one, and given what comes after the use of financial services as a framework for measuring inclusion Financial, the indicators related to it - within the vision of the Group of Twenty (G20) are divided into:

Table 2. Indicators for measuring financial inclusion within the dimension of use.

Category	Pointer
Indications for use: Adults	
Adults with an account	Bank accounts as a percentage of the category more than 15 years, Deposit accounts per 1000 adults ,
Number of accounts	Electronic money accounts for every 1,000 adults, Mobile money transactions per 1000 adults.
Credit in regulated institutions	Borrowing from a financial institution last year as a percentage of the category over 15 years, Unpaid loans per 1,000 adults.
Insurance	Insurance policy holders per 1000 adults classified by life and other insurance.
Non-monetary transactions	Retail cashless transactions per 1000 adults: number of checks, credit transfers, direct debit, payment card transactions, payments with electronic money instruments.
Use of digital payments	Receipt of digital payments as a proportion of the group above 15 years.
mobile payment	Mobile payment by calculating as a percentage of the category over 15 years.
Online payment	Online payment as a percentage of the category over 15 years old.
Pay by bank card	Payment using a debit card as a percentage of the category for more than 15 years.
Pay by bank account	Salaries received or government transfers to account as a percentage of the category over 15 years old.
Savings tendency	The amount of savings in a financial institution as a percentage of the category over 15 years.
Indications for use: Institutions.	
official banking institutions	Percentage of small and medium-sized enterprises that have an account in an official financial institution.
lines of credit	The percentage of small and medium-sized enterprises that have an outstanding loan or line of credit, Percentage of SME loan accounts.
Payments	Percentage of small and medium-sized enterprises that send or receive digital payments in an account.

Source:(GlobalPatnership For Financial Inclusion, 2016, pp. 4-5)

2. Literature Review

The literature that deals with the subject of financial inclusion agrees that it is affected by many variables, which can be classified into two aspects: demand-side variables and supply-side variables, as indicated by the study (Al-Iraqi and Al-Nama, 2019, pages 188-193)which it highlighted as follows:

- demand-side variables: These variables affect the financial products demand of individuals. They are summarized in Income, education and financial education, age.

- supply-side variables: Includes all variables that affect the financial institution's ability to provide financial services and are limited to distance between financial institutions and individuals, regulations and laws, risks, and the provision of electronic and digital services.

The division of the aforementioned study supports what she came up with some experimental and applied studies that included a sample of developing countries (Arab and African) and some Asian and developed countries, as shown in the following:

- study(Bashar A & Sameer F, 2020) This study aimed to address the most important determinants of financial inclusion in the Arab countries using theoretical foundations and applied studies that dealt with these factors. These theoretical and applied factors have been divided into two main directions: demand-side factors (income, age, education, gender, urbanization, employment, etc.) and supply-side factors (distance, regulation, inappropriate products, risks, etc.). In addition to these two main trends, the country's economic, financial and legal environment (institutional frameworks, legal systems, political stability, etc.) in order to support theoretical frameworks and principles, the research used quantitative analysis based on

the ARDL methodology. An imbalance in the Authority's data in 17 Arab countries for the years 2011, 2014 and 2017, and the research found that the changing financial structure had a positive impact on financial inclusion indicators, as well as for each of the income variables. and industrialization, that is, there is a positive relationship between these variables and the level of financial inclusion. As for the education variable, it had a negative impact on financial inclusion.

- study(Okoroafor O, Adeniji Sesan, & Awe, 2018)This study examined the determinants of financial inclusion in Nigeria using a time series data for the period of 1990 to 2016. The study employed Error Correction Model (ECM) after conducting unit root test and cointegration test. The estimated result revealed positive and significant relationship between the financial inclusion and the proposed variables. Specifically, the higher a country's GDP per capital, the more the financial inclusion in their financial system. Likewise the broad money given the continuous increase in the amount of money in circulation which will definitely improve financial inclusion in the country. Credit and internet users per 100 people also have positive and significant impact on financial inclusion. While the significant impacts of internet access have very vital implication for financial inclusion as the more the use of internet, the more the financial inclusion through extension of financial services to larger number of people living in the rural area.

- study(Je-Al & Cassimon, 2021)This study aimed to search for the factors affecting the level of financial inclusion for a sample of Asian regions during the period 2013-2017, using the panel model, and concluded that per capita GDP, population, infrastructure and degree of mobile phone penetration is one of the most important factors affecting levels of Financial inclusion in study areas.

- study (Evans & Adeoye, 2016)This study documents the determinants of financial inclusion in Africa for the period from 2005 to 2014, using panel models. The study finds that per capita income, broad money (% of GDP), domestic liquidity, literacy and Internet access are important factors explaining the level of financial inclusion in Africa. Deposit rates, inflation, and population all have no significant implications for financial inclusion.

-Studies by (Rojas-Suárez, 2016), (Pearce, 2011), (Franklin, Asli, Leora, & Maria Soledad Martinez, 2016)found that improving levels of financial inclusion depends on reducing corruption, transparency of legal frameworks, the integrity of judicial procedures, developing the structure of the financial sector, and providing political and economic stability.

Based on the foregoing, the determinants of financial inclusion can be defined according to a macroeconomic view (economic, financial and legal variables) within the table below:

Table 3. Economic, Financial and Legal Factors for Countries Affecting Financial Inclusion.

dimension	Relationship direction
GDP per capita	economic growth is one of the real macroeconomic variables, it has a direct relationship with financial inclusion, as the simultaneous economic growth with a fair distribution of income reduces the poverty rate and thus enhances the demand for financial services (Nandru, Ryram, & Rentala, 2016)(Ajide, 2017, pp. 69-89) (Zins & Weill, 2016, pp. 1-12) (Benrageb, 2018, pp. 1-30)(Iraqii & Grace, 2019, pp. 184-214)
Attractive investment environment	The presence of an adequate financial infrastructure, institutions and good governance of government (government effectiveness, rule of law and justice, control of corruption contribute to improving and increasing the attractiveness of the investment environment for small and medium enterprises, thus enhancing levels of financial inclusion (Rojas-Suárez, 2016)(Ajide, 2017, pp. 69-89)(Oyelami & Saibu, 2017, pp. 104-116)

External sector	Trade openness is considered one of the important factors to enhance financial inclusion, as removing restrictions on foreign trade and finding foreign markets for small and medium-sized enterprises to sell their products leads to an increase in demand for financial services, as sees (Rajan & Zingales, 2003, pp. 5-50) that openness Simultaneous commercial and financial development is necessary for financial development. Stimulating foreign capital flows and trade openness at the same time leads to an improvement in the development of financial and banking institutions, with the condition that an appropriate institutional structure is available. According to them, increasing financial openness without trade leads to the existence of a sector A less deep bank, while increasing commercial openness without increasing financial capacity alone is sufficient to increase the volume of banking intermediation (Hosseininasab, Yavari, Abarguee, & Basakha, 2012)(Al-Fayoumi & Abuzayed, 2014, pp. 318-332).
Economic and political stability	Whenever the society has a high level of political stability, it contributes to providing The appropriate environment for business activity, thus increasing the rates of investment and capital accumulation, and thus, achieving high growth rates and enhancing financial inclusion, in addition to the state's adoption of economic policies (monetary and financial) that reduce large fluctuations in macroeconomic variables and the financial system (inflation, rate of interest, exchange rate, Money supply, financial and banking crises, etc.) increase investment attractiveness, increase confidence in the financial and banking system, and enhance financial inclusion (Ajide, 2017, pp. 69-89), (Evans & Adeoye, 2016, pp. 1-23), (Claessens & Rojas-Suarez, 2016), (K. David, Sesan Oluseyi, & Emmanuel, 2018, pp. 19-25)

Source: Prepared by researchers.

3.Methodology research

Arab countries are characterized by economic, financial, and legal characteristics that reflect the economic policies adopted there, and given the empirical studies, that have highlighted most of them, these characteristics have a significant impact on financial inclusion levels. To highlight this, we will attempt to conduct a standard study in the following steps:

3.1 The Method And Tools Used

To test the hypotheses of the study, the method and tools used should be determined as follows:

3.1.1 Sample And Study Period

The study community consists of a total of 22 Arab States. We have tried to collect as many Arab States as possible, which provide us with statistics on indicators of financial inclusion as well as macroeconomic indicators, The method of data accounting and sample selection is to use the method of non-random sampling by selecting certain countries for entry into the sample as representing a well-studied society. The sample is derived from the availability of data to some Arab States: Algeria, Iraq, Oman, Qatar, Saudi Arabia, Sudan, Tunisia and United Arab Emirates for the period 2014 to 2019.

3.1.2 Identification Of Study Variables

The study variables can be determined on the basis of empirical studies, as shown in the following table:

Table 4. Standard study variables.

symbol	index	variables	Explanation
dependent variable			
y	Amount of domestic credit granted to the private sector	financial inclusion	Domestic private sector credit refers to financial resources provided by financial institutions to the domestic sector and companies in the form of loans.
independent variables			

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x_1	Degree of trade openness	external sector	Compute by relationship: (Arab Monetary Fund, 2019, p. 24): ((Exports + imports)/ GDP)*100
x_2	Cell phone subscriptions per 100 people	Attractiveness and investment environment	This indicator is considered one of the advanced infrastructure indicators, it measures the number of Internet users (Arab Monetary Fund, 2019, p. 35).
x_3	GDP per capita	real sector	we mean the average per capita GDP after dividing the GDP by the population (General Statistics, 2017).
x_4	Administrative corruption (index from -2.5 to +2.5)	Attractiveness and investment environment	Administrative corruption means that administrators use the functional authority associated with their roles in achieving certain personal.(Hafnaw, 2019, pp. 110-113)
x_5	Ratio of tax revenue to total revenue	political and economic stability	The state's adoption of a fair and transparent tax policy that contributes to reducing the tax burden on the incomes of individuals and institutions, which means increasing the amount of savings on their part and enhancing financial inclusion levels.

Source: Prepared by researchers.

3.1.3 Study Data And Tools

This study employs annual time-series data for the period 2014 to 2019, to analyze the relationship between Macroeconomic Environment Indicators and The Level Of Financial Inclusion in a panel of country Arab. Thereby, the data used in this study were collected from various sources such as the Arab Economic Competitiveness Report 2014-2019, issued by the Arab Monetary Fund, in addition, weuse (stata.15) program, The purpose of the applied study is to construct a standard model showing the nature of the relationship between the variables in the multiple regression model of a sample of Arab states over the specified time period, and to use panel models or so-called panel data models that combine the characteristics of panel data with time series.

3.2 Presentation And Analysis Of Results

In this regard, based on the method and tools used in the empirical study, we seek to extract and analyze the results of the optimal panel model as shown below:

3.2.1 Differences Between The Panel Models

there are three models well used which are the aggregative model, the fixed model and the random model, so it is necessary to start building the panel model for each of the three types using the program (stata.15) as shown in the table 5.

Table 5. Estimation results of the panel model.

explanatory variables	Pooled Regression Model (PME)	Fixed Effects Model (PEM)	Random Effects Model (REM)
X1	-3.325851 (0.000)	0. 8026158 (0.538)	0. 0442298 (0.956)
X2	0. 4553503 (0.175)	-0. 0473714 (0.845)	-0. 0151585 (0.948)
X3	7.812105 (0.000)	5.759759 (0.212)	5.689071 (0.031)
X4	131.2787 (0.001)	5.298801 (0.891)	9.576753 (0.772)
X5	0. 906693	81920890.	70414510.

	(0.078)	(0.163)	(0.179)
Constant (c)	203.5738 (0.008)	-71.78507 (0.640)	-6.775524 (0.939)
Number of obsevation	48	48	48
R-squared	0.6345	0.9159	-
Adjusted R-squared	0.5910	0.8871	-
Prob (F-Stat)	0.0000	0.127	0.1562

Source: Prepared by researchers based on the results of the program (stata.15), see Appendix 1

In order to choose the appropriate panel model for our study (the differentiation between the three models), we conduct a set of the following necessary binary tests:

- **Breusch and Pagan test**: we use it to compare between the Pooled Regression Model and the random effects model. The hypothesis of this test is formulated as follows:

$$\begin{cases} H_0: \text{no randam effect (Pooled Regression Model)} \\ \quad H_1: \text{There is a random effects model (REM)} \end{cases}$$

This test within the program (stata.15) leads to the calculation of both chibar2 (01) and Prob>chibar2, the results of which are summarized in the following table:

Table 6. Breusch and Pagan test results.

chibar2(01)	25.07
Prob> chibar2	0.0000

Source: Prepared by researchers based on the results of the program (stata.15), see Appendix No2.

We note from the table that the value of Prob> chibar2 is statistically significant, i.e. less than 5%, so we accept the alternative hypothesis (H1) which indicates the presence of random effects, meaning that we choose the a random effects model.

- **Hausman test:** It is used to compare between the fixed effects model and the random effects model, within two hypotheses:

$$\begin{cases} H_0: \text{Random Effects Model (REM)} \\ \quad H_1: \text{Fixed Effects Model (PEM)} \end{cases}$$

This test is based on a differentiation tool by calculating chi2(10) and Prob>chi2, which were results using the program (stata.15) in the table below:

Table 7. Hausman test results.

chi2(10)	4.18
Prob>chi2	0.5231

Source: Prepared by researchers based on the results of the program (stata.15), see Appendix No. 3

It is evident from the value of Prob>chi2 in the above table that the probability value of the test is not statistically significant at 5%, which leads us to accept the null hypothesis (H_0) and consider the random effects model to be the best compared to the fixed effects model.

- **Constrained Fisher test:** It represents a test to compare between the Pooled Regression Model and the fixed effects model, by verifying the presence of individual effects within two hypotheses given as follows:

$$\begin{cases} H_0: \text{No Fixed Effects Mode (Pooled Regression Model)} \\ \quad H_1: \text{There is a fixed effects model} \end{cases}$$

Table 8. Results of the restricted Fisher test.

F(7, 35)	16.73
Prob> F	0.0000

Source: Prepared by researchers based on the results of the program (stata.15)

It is clear from the results of this test that the value of F(7, 35) which is equal to 16.73 is statistically significant at the level of significance 5% (because: Prob> F = 0.0000 < 0.05). Therefore, we accept the alternative hypothesis (H1) which indicates that there are fixed effects in The model, according to which the best model in this test is a fixed effects model.

3.2.2 Studying The Validity Of The Optimal Model

It is evident to us, based on the inventory and comparison of the results of the previous three tests, that the best model for expressing the relationship between the study variables is the random effects model, but before adopting its results, it should be ensured that it is free from the standard problems represented in each of the problems Autocorrelation of errors and the problem of variance instability:

- **Wooldridge test:** The autocorrelation of errors measures the degree of correlation between values for the same variable during a specified period of time and not between one or more variables. (stata.15), where the results of this test were as follows:

```
.xtserial y x1 x2 x3 x4 X5

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(  1,      7) =   1992.449
Prob > F =      0.0000
```

Source: Prepared by researchers based on the results of the program (stata.15)

The results of the test to detect the autocorrelation problem within the Wooldridge test showed that the probability value is less than 0.05, so we can reject the null hypothesis and accept the alternative hypothesis (the presence of an auto-correlation problem).

- Modified Wald test: It aims to find out the heterogeneity of the variance, the latter affects the estimates of the variance of the model capabilities, the use of the Modified Wald test to determine whether or not this problem exists within the property provided by the command (xttest3) in the program (stata.15), as indicated the command results below:

```
xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)^2 = sigma^2 for all i
chi2 (8)  =    99841.75
Prob>chi2 =       0.0000
```

Source: Prepared by researchers based on the results of the program (stata.15)

We conclude from the results of the Modified Wald test that the random effect model hasthe problem of heterogeneity of variance, given that the statistical significance Prob> F is less than 5% (rejecting the null hypothesis and accepting the alternative hypothesis).

3.2.3 The Estimated Model And Analysis Of The Results

The tests of the existence of standard problems in the random effects model that we have done indicate that it contains the two problems of autocorrelation of errors and homogeneity of variance. (xtpcse)(Danie, 2007, p. 285), we use it if the cross-sectional data series is greater than the number of time periods, It is also one of the most important methods used in cross-sectional time-series data in which the number of observations is few, and by entering the data into the command (xtpcse), the results are as follows:

```
xtpcse y x1 x2 x3 x4 X5
Linear regression, correlated panels corrected standard errors (PCSEs)
Group variable:   ind                     Number of obs     =        48
Time variable:    YEAR                    Number of groups  =         8
Panels:           correlated (balanced)   Obs per group:
Autocorrelation:  no autocorrelation                        min =       6
avg =        6
max =        6
Estimated covariances      =        36    R-squared         =    0.6345
Estimated autocorrelations =         0    Wald chi2(5)      =    144.88
Estimated coefficients     =         6    Prob > chi2       =    0.0000
--------------------------------------------------------------------------
 |Panel-corrected
y|    Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval[
--------------------------------------------------------+------------
x1|  -3.325851   .6840907    -4.86   0.000   -4.666644   -1.985058
x2|   .4553503   .2361398     1.93   0.054   -.0074751    .9181757
```

x3|	7.812105	1.572251	4.97	0.000	4.73055	10.89366
x4|	131.2787	29.93076	4.39	0.000	72.61553	189.9419
X5|	.906693	.3631563	2.50	0.013	.1949198	1.618466
cons|	203.5738	64.37494	3.16	0.002	77.40121	329.7464

Source: Prepared by researchers based on the results of the program (stata.15)

4. Interpretation Of Results

On the basis of most of the previous statistical tests and after addressing the problems of errors autocorrelation and heterogeneity of variance the optimal model can be formulated as follows:

$$y = 203.5738 - 3.325851x_1 + 0.45535037x_2 + 7.812105x_3 + 131.2787x_4 + 0.906693x_5$$

As a result, we find that the financial inclusion measured by the size of the domestic credit granted to the sector (a holistic view) is impacted by the indicators of the macroeconomic environment with a coefficient of determination of 0.6345, where:

- There was an inverse relationship between the external sector represented by trade openness degree index (x1) and financial inclusion (y) in the Arab countries, the study sample during the study's period, as whenever the trade openness index decreased by one unit, the level of financial inclusion increased by 0.0332 units. This is attributed to the characteristics of the external sector of the Arab countries, which is characterized by the dominance of the hydrocarbon exports (United Arab Emirates, Algeria, Saudi Arabia, Iraq, Oman and Qatar), the tourism sector (Tunisia) and the agricultural sector (Sudan) within the total exports, with great dependence on imports of Commodities and services from advanced industrial countries, and with the problems that the private sector suffers from, this leads to its inability to compete in the foreign markets. Therefore, the increase in the degree of openness leads to the failure of the private sector, which leads to the reluctance of banks to finance it due to the high degree of risk. In addition, the synchronization of the policy of commercial openness with the policy of financial liberalization in the Arab countries, the study sample, negatively affects the development of financial intermediation in them and the enhancement of the levels of financial inclusion, as the application of these two strategies should not be done simultaneously because the financial institutions did not work effectively in providing financial resources in an appropriate manner, and contributed to the flight of capital and the reduction of the size of the financial sector in these countries, as indicated by(Hosseininasab, Yavari, Abarguee, & Basakha, 2012)(Al-Fayoumi & Abuzayed, 2014):

- The relationship between the attractiveness of the investment environment is represented by both cell phone subscriber indicators per 100 persons (x2) administrative corruption (x4) and financial coverage (y), increasing cell phone subscriptions per 100 persons and the corruption index by one unit each so as to increase the level of financial coverage in the Arab States, the sample study by 0.0045 units and 1,3127 units respectively, as it is clear that The impact of digital infrastructure remains very low in the increase and expansion of financial services in the Arab States, the study sample, due to the slow progress in the use of cell phones for financial and banking transactions. In parallel, the index of administrative corruption clearly affects the increase of the level of financial coverage. The Arab States, sample the study, under the influence of mostly non-democratic governance systems, contribute to increasing the volume of administrative corruption(such as bribery, fraud, embezzlement, mediation, nepotism and administrative laxity) in the economic sectors, especially the financial and banking ones, which contribute to the formation of a negative image in dealing with financial and banking institutions. Thus, a transparent and effective democratic system, institutions and good governance will increase the role of the judiciary in addressing this phenomenon, respecting the rule of law and guaranteeing the rights of individuals, thereby strengthening confidence in financial and banking institutions and expanding the volume of treatment of individuals.

- The relationship between the real sector, expressed as an indicator of GDP per capita at constant prices (x3) and financial inclusion in the Arab countries, has taken a direct trend, so the increase in the indicator expressed by the real sector by one unit results in an increase in the

level of financial inclusion by 0.0781 units. This relationship is consistent with the results of the studies that examined the direction of this relationship, such as (Iraqii & Grace, 2019), (Benrageb, 2018), It can be said that the Arab countries, the study sample, are classified among the Arab countries with the highest levels of GDP per capita, except for Sudan, If this is accompanied by a fair distribution of income, the volume of family and institutional savings in banks and financial institutions will increase, and thus increase the demand for financial services and enhance financial inclusion in these countries;

- Political, economic and financial stability directly affects the level of financial inclusion, since an increase in the percentage of tax revenues by one unit results in an increase in the financial inclusion index by 0.0096 units, and despite the weak impact, the Arab countries, the study sample, are trying hard to follow moderate tax policies that seek through them to reduce the tax burden on the private sector by providing tax exemptions and privileges to the SME sector, In order to encourage it and increase its contribution to the GDP and create job opportunities, this is reflected in the expansion of the number of small and medium enterprises and the increase in demand for various forms of financial services, particularly bank loans.

Conclusion

Arab economies face several challenges that affect their growth and fulfill the requirements of their societies, especially the poor ones , through reducing unemployment and poverty levels, raising the standard of living of individuals and improving income distribution, which can be summed up in a basic objective of the current Arab economic policies, or is to achieve more comprehensive economic growth. This will not be possible, according to many international bodies and organizations, and various empirical studies, except by facilitating access to various financial services for different segments of society, especially the disadvantaged groups, also known as financial inclusion, which leads to the changing the structure of the financial system and helps the economy to benefit from lost savings by collecting them in the official financial system and directing them towards the consumer and productive sectors. For the success of this strategy, several of factors must be reunited, some of which are concentrated in the presence of political and economic stability, adequate infrastructure and financial infrastructure to attract savings, encourage investments, a type of trade openness, good governance standards, these factors were the focus of the applied study that we conducted to find out t impact on the levels of financial inclusion in a sample of Arab countries for the period 2014-2019, which allowed us to answer the following hypotheses:

- It turns out that the first hypothesis is incorrect because the openness of the external sector, represented by the trade openness, has a negative effect on financial inclusion levels, which is appeared by the inverse relationship between the trade openness's indicators and the financial inclusion level due to the occurrence of trade and financial openness in the Arab countries at the same periods;

- It is evident from the equation of the optimal regression model that the second hypothesis is incorrect because the Arab countries have an acceptable structure and attractiveness for investment due to the availability of digital financial infrastructure and the fight against corruption that enhances the levels of financial inclusion in the Arab countries;

- It is clear that the third hypothesis is correct because the sector represented by GDP per capita index at constant prices is characterized by a kind of rise in the Arab petroleum countries, the study sample, where it positively affects financial inclusion indicators;

- It appears to us that the fourth hypothesis is correct. The Arab countries, through the tax policy adopted by them, work on encouraging the achievement of financial inclusion, helped by their reliance on petroleum and tourism revenues, which constitute a significant percentage of the state's revenues, thus reducing the tax's burden on the private sector.

Based on the above experimental hypotheses, we can provide the following conclusions:

- Trade openness does not contribute to supporting the trend of Arab countries in promoting financial inclusion due to the absence of a large set of conditions for the success of the foreign

trade liberalization policy in them, in particular the existence of sound macroeconomic policies that enhance the role of the private sector, the existence of realistic exchange rates that reflect economic reality, and taking measures to increase exports consistent with decreasing exchange rates;

- Expanding the scope of digital services ensures the achievement of the dimensions of financial inclusion in the Arab countries, especially in terms of increasing the ability to use financial services and products and facilitating resorting to them while meeting the needs of different categories of customers;

- The real sector in the Arab state, expressed as a per capita GDP in general, is characterized by the presence of acceptable levels of income for individuals that enable them to access and use financial services, and these incomes increase the volume of family and institutional savings, which results in an increase in the volume of bank accounts in Arab banks and an increase in the volume of credit to the private sector;

- The availability of a coherent, transparent and fair legal and legislative environment in the Arab countries results in the adoption of the rule of law and the building of financial institutions capable of reducing all forms of administrative corruption, fraud, embezzlement, bribery, nepotism and others, which are discouraging in achieving financial inclusion, and it is noted that the Arab Spring revolutions created An environment that has supported the trend of financial institutions in expanding their services;

- Tax policy in the Arab countries has a positive impact on achieving the dimensions of financial inclusion through a positive contribution to the gross domestic product, increasing the competitiveness of Arab economies, raising the purchasing power of private economic agents, In addition to redistributing income by reducing disparities between different groups of society.

Given of the aforementioned results and in order to enhance opportunities and reduce threats related to the adoption of the financial inclusion policy in the Arab countries, we present the following set of recommendations:

- Work to improve the efficiency level of the regulatory and judicial system and their institutions in the Arab countries, and grant them sufficient powers to enable them to develop strategic plans that include standards of transparency and accountability;

- Creating innovative financial instruments to build infrastructure and develop financial education programs in the Arab countries, with a focus on areas that experience difficulty to access financial and banking services;

- Achieving equivalent with economic resources distribution through the establishment of a cash transfer system associated with a registry for poor families, while encouraging the capacity of generating future income accordingly;

- Enhancing the progressive advantages of the personal income tax because it directly takes into account the capacity of households and shifts the tax burden to the wealthier family;

- Granting tax credits to small and medium-sized enterprises that lend to finance their activities by granting a tax deduction equivalent to the value of the interests paid by the project over the number of years of the loan term instead of tax exemption;

- Facilitating the procedures and deadlines for individuals and small and medium-sized enterprises to obtain loans by financial institutions and Banks, with the provision of types commensurate with the Arab environment.

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Appendices

Appendix 1: Estimate of the three panel models

- Pooled Regression Model

```
reg y x1 x2 x3 x4 X5
Source  |        SS          df       MS          Number of obs   =        48
F(5, 42)        =      14.58   ------------------------------------+------------
Model   |  555201.615          5  111040.323   Prob > F         =    0.0000
Residual |  319833.297         42  7615.07849   R-squared        =    0.6345
Adj R-squared   =     0.5910   ------------------------------------+------------
Total  |  875034.912          47  18617.7641   Root MSE         =    87.264
--------------------------------------------------------------------------------
[y     |     Coef.   Std. Err.      t     P>|t|     [95% Conf. Interval
--------------------------------------------------------+-----------------------
x1     | -3.325851    .6679393   -4.98   0.000    -4.673807   -1.977895
x2     |  .4553503    .3298798    1.38   0.175    -.2103741    1.121075
x3     |  7.812105    1.59494     4.90   0.000     4.593385   11.03082
x4     |  131.2787   35.14874     3.73   0.001     60.34569   202.2118
X5     |  .906693    .5026141     1.80   0.078    -.1076234    1.921009
cons   |  203.5738   73.26769     2.78   0.008     55.71359    351.434

--------------------------------------------------------------------------------
```

- Fixed Effects Model
```
xtreg y x1 x2 x3 x4 X5 , fe
Fixed-effects (within) regression          Number of obs    =        48
Group variable: ind                        Number of groups =         8
R-sq:                                      Obs per group:
within  = 0.0913                                    min =          6
between = 0.3519                                    avg =        6.0
overall = 0.3272                                    max =          6
F(5,35)         =          0.70
corr(u_i, Xb)  = -0.2463                    Prob > F         =    0.6250
--------------------------------------------------------------------------------
y  |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-------------------------------------------------------------------
     x1 |  .8026158   1.291953    0.62   0.538    -1.820189    3.425421
     x2 | -.0473714    .2410988   -0.20   0.845    -.5368281    .4420852
     x3 |  5.759759    4.5346     1.27   0.212    -3.445967   14.96549
     x4 |  5.298801   38.42661    0.14   0.891    -72.71137   83.30897
     X5 |  .8192089    .5743497    1.43   0.163    -.346783    1.985201
   _cons | -71.78507  152.2441   -0.47   0.640    -380.857    237.2868
------------+-------------------------------------------------------------------
sigma_u |  114.26825
 sigma_e |  45.856345
rho |  .86129293   (fraction of variance due to u_i)
--------------------------------------------------------------------------------
F test that all u_i=0: F(7, 35) = 16.73                  Prob > F = 0.0000
```
- Random Effects Model
```
xtreg y x1 x2 x3 x4 X5 , re
Random-effects GLS regression              Number of obs    =        48
Group variable: ind                        Number of groups =         8
```

```
R-sq:                                         Obs per group:
within  = 0.0804                                    min =          6
between = 0.4426                                     avg =        6.0
overall = 0.4088                                     max =          6
                                              Wald chi2(5)     =       8.00
corr(u_i, X)    = 0 (assumed)                 Prob > chi2      =     0.1562
------------------------------------------------------------------------------
y |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
x1 |   .0442298   .8013913     0.06   0.956   -1.526468    1.614928
x2 |  -.0151585   .2335153    -0.06   0.948    -.47284     .4425231
x3 |   5.689071   2.633921     2.16   0.031    .5266808    10.85146
x4 |   9.576753   33.06789     0.29   0.772   -55.23512    74.38863
         X5 |   .7041451   .5236447     1.34   0.179   -.3221797    1.73047
       _cons |  -6.775524   88.68069    -0.08   0.939   -180.5865    167.0354
-------------+----------------------------------------------------------------
    sigma_u |  107.66289
    sigma_e |  45.856345
rho |   .84644453    (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix 2: Trade-off between a Pooled Regression Model and a Random Effects Model

```
xttest0
Breusch and Pagan Lagrangian multiplier test for random effects
y[ind,t] = Xb + u[ind] + e[ind,t]
Estimated results:
                       |        Var      sd = sqrt(Var)
---------+-----------------------------
y  |   18617.76          136.4469
e  |   2102.804          45.85635
u  |   11591.3           107.6629
Test:   Var(u) = 0
chibar2(01) =     25.07
                    Prob > chibar2 =    0.0000
```

Appendix 3: Trade-off between a Fixed Effects Model and a Random Effects Model
hausman fe re

```
---- Coefficients ----
|      (b)          (B)          (b-B)     sqrt(diag(V_b-V_B))
|      fe           re        Difference          S.E.
-------------+----------------------------------------------------------------
x1 |    .8026158     .0442298      .758386        1.013368
x2 |   -.0473714    -.0151585     -.032213        .0599938
x3 |    5.759759     5.689071      .070688        3.691213
x4 |    5.298801     9.576753     -4.277952        19.57343
X5 |    .8192089     .7041451      .1150638        .235953
-------------+----------------------------------------------------------------
b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test:  Ho:  difference in coefficients not systematic
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
=        4.18
Prob>chi2 =       0.523
```