

Measuring the Relationship between Financial Inclusion and Environmental Dimension in Iraq for the period (2010-2019) By Using the ARDL Model

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Abstract

This research aims to measure and analyze the impact of financial inclusion on sustainable environmental development in Iraq, as the research methodology has based on the applied theories and studies which have been addressed and supported by quantitative analysis through using the simple linear regression methodology for periods of time represented by the quarterly data contained in the research for (2010-2019). Also, the research has used modern methods of standard analysis in studying the relationship between the economic variables in question, as well as identifying the characteristics of these time chains. In order to formulate a quantitative diagnosis of specific factors (independent illustrative variables) for financial inclusion and variables adopted for sustainable environmental development (in Iraq), the research methodology has relied on the use of (ARDL) methodology and has adopted quarterly data as a result of the recent adoption of the financial inclusion program in Iraq. Stability tests and Co integration test for the border approach have been applied by using (Long Run Form and Bounds Test) and (Length Optimal Lag). According to the standards of (SBC-Schwarz Bayesian Criteria) and (AIC - The Akaike Information Criterion), (ARDL) eliminates problems related to self-association and therefore gives efficient and impartial results, also the Error Correction Model (ECM) gives the speed of adjusting the balance in the short term. The results of Iraq's model showed opposition to the hypothesis of a direct relationship to financial inclusion in environmental development as a result of the impact of the wars and internal shocks suffered by the economy during the research period. The results of the model have indicated that there is a direct relationship between independent variables and the environmental factor in the short and long term and there is the possibility of modifying and achieving balance within two and a half seasons, i.e., for a very short period. The results support the success of financial inclusion in Iraq for the coming years as a future vision to achieve this through the settlement of salaries and the development of accelerated technology. Rather, the research has found a positive relationship between the explanatory variables (illustrative) and the rate of arable land where the long-term flexibility reached ((0.03)) so this corresponds the logic of economic theory. The determinant coefficient equal to (0.99), which explains 99% of the changes resulting in the environmental development index, is explained by the variables of financial inclusion, while the remaining 1% is explained by other variables that are not included in the standard model and included in random variable. In addition, the signal of the slowing dependent variable is negative, which means that there is a significance relationship, so the short-to-long-term adjustment speed is 1.03 percent.

Introduction

Increased financial awareness and the need to finance and provide opportunities in all private and public sectors have led many countries to take serious and effective attention to the issue of financial inclusion. Policymakers and regulators have begun to give financial inclusion a priority in the development of the financial sector. Several Governments are taking comprehensive and significant measures to improve access to financial services and widespread use of them.

Technology has become a key and assistant factor for promoting financial inclusion in a commercially viable way in both developing and developed markets. There has also recently been a revolution in consumer financial services around the world, powered by mobile phones and multiple and diverse technological innovations, which change consumer mindsets. Many countries have begun to use digital financial services as a development tool to support inclusive economic growth and seek to reduce income inequalities and achieve environmental development goals. China and India are taking the lead in this aspect and setting an example for other countries in supporting inclusive growth.

Research Importance

The importance of the research comes from addressing an important topic in analysing the impact of financial inclusion on economic activity in Iraq, and its consequent tendencies in solving the problems of low living standards, class differences between groups of Iraqi society, economic vulnerability and the fragility of the banking sector, in addition to find sources of income other than oil revenues.

Research Problem

Given the changing effects of the economic and banking sector in Iraq, the problem is determined by the degree to which negative and positive financial inclusion affects the level of economic activity and environmental development in its sustainable form in this country and the extent to which our Iraqi economy is able to cope with financial and economic crises and try to keep pace with other countries in the extent to which financial inclusion is applied.

Research Goals

The research aims to:

- Presenting a theoretical rooting of the nature of the relationship between variables of financial inclusion and sustainable environmental development
- Analysing the nature of the relationship between financial inclusion and sustainable environmental development, and the degree to which they affect each other.
- Building a quantitative model to measure the effects of financial inclusion on sustainable environmental development.

Research Hypothesis

There is a correlation between the dimensions of financial inclusion and the sustainable environmental dimension in Iraq for the duration (2010-2019)

Research Limits

- Time limits: 2010-2019, the duration of the research includes everything related to financial inclusion from its first beginning in Iraq to the present.
- Spatial borders: republic of Iraq

Research Methodology

To measure the impact of financial inclusion on sustainable environmental development in Iraq, the research has been divided into seven paragraphs: (1) the concept of financial inclusion. (2) the requirements of financial inclusion. (3) sustainable environmental development. (4) the literature of the relationship between financial inclusion and sustainable environmental development. (5) practical side of the research to measure the relationship between the indicators of financial inclusion and sustainable environmental development. (6) The assessment of ARDL. (7) Analyzing the relationship between financial inclusion and the environmental development index. The research has concluded with the most important conclusions and recommendations.

First: The Concept of Financial Inclusion

Financial inclusion means providing financial services at a reasonable cost to disadvantaged and low-income groups. They include banking services, credit, and financial advice and awareness.' Financial inclusion aims reach individuals who do not benefit from financial and banking services, through the expansion and development of banking infrastructure in addition to doubling the number of banking branches. It should be noted that all of these initiatives and plans were not able to include all segments of society in the financial inclusion program, as a large number of families still live below the poverty line and are thus deprived of basic financial and banking services (Chakrabarty, 2011:3). The beginning of interest in financial inclusion date back to the post-financial crisis of 2008, after which G-20 leaders tried to mainstream financial inclusion as a major development strategy. Not only as a means of getting out of the ongoing global recession environment but also as an important blueprint for stabilizing the global economy.

The 2019 Consolidated Arab Economic Report has defined financial inclusion as "the access of individuals, including low-income earners and companies, to a wide range of high quality financial and official services (payments, transfers, savings, borrowing, insurance, etc.) provided in a responsible and sustainable manner by a variety of financial service providers in an appropriate and affordable legal and regulatory environment" (ARAB MONETARY FUND, 2019:

191).

Financial inclusion is "the process of ensuring access to appropriate financial resources, financial products and services, needed by vulnerable groups, namely the weaker and low-income groups at a reasonable cost and in a fair and transparent manner by institutional actors, and here comes the role of financial institutions in applying financial inclusion. Which means providing low-cost financial services to the disadvantaged or low-income people from different segments of society, that needs to be financially sustainable.

On the basis of this, a definition of financial inclusion can be: ((availability of financial services of various types to different segments of society, whether individuals or institutions, and work to enable these groups to use these services, which must be provided with appropriate quality and reasonable prices through the official channels of the formal financial system)). Therefore, it necessary to determine the dimensions of financial inclusion. Figure (1) shows the dimensions of financial inclusion.

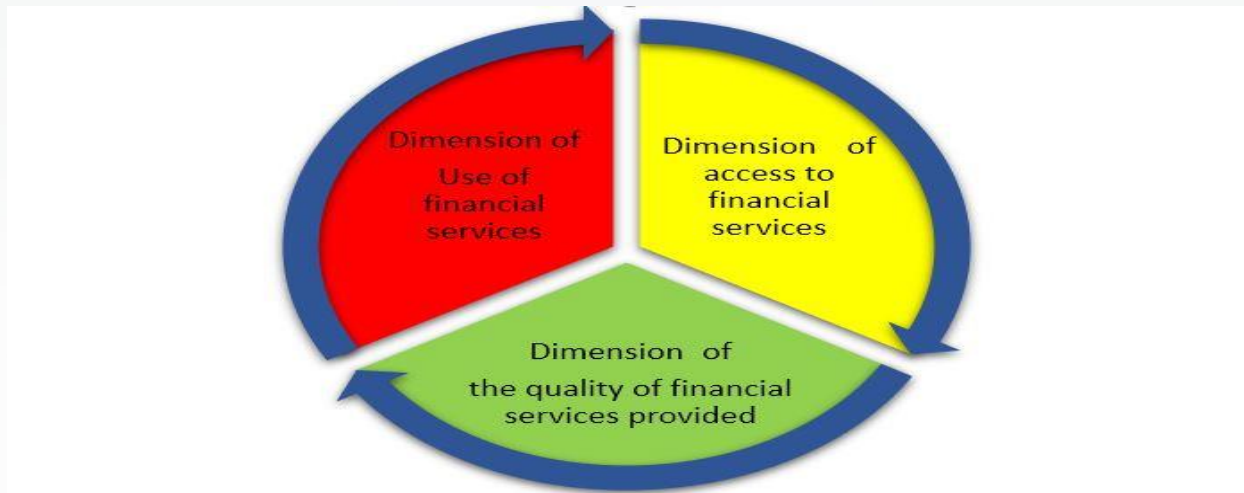


Figure 1: The dimensions of financial inclusion

Source: Prepared by the two researchers

In the early years of the emergence of financial inclusion, the G20 and the Global Partnership (GPI) recommendation for financial inclusion has issued a basic set of indicators measuring financial inclusion that take into account the achievement of the dimensions of financial inclusion:

- 1- **Availability or access:** Access to financial services is one of the most important dimensions of financial inclusion. It means the ability to use the financial services and products available from official financial organizations which reflects the depth of access to financial services within the framework of a comprehensive and integrated financial system. (Gamito, 2018: 9)
- 2- **Usage of banking services:** it is the actual use of financial products and services which can fail if these accounts are rarely used or not used at all. (Yoshino & Morgan, 2016: 4)
- 3- **Quality or Penetration:** it is the ability of financial services or products to meet the requirements of financial consumers, and the process of developing indicators to measure quality dimensions. It is a theoretical challenge in itself because the dimension of quality in financial inclusion is not a clear and direct dimension as many factors affect the quality and kind of financial services. (AFI, 2013:4)

Second: Financial Inclusion Requirements

Technological innovation has significantly reduced fixed costs from accessing the low-income sector and attracted a wider range of new suppliers:

- 1- **Banking Agent:** It is the policies that enable the bank to contract with non-banking retail agents as financial outlets, as these services have proved very successful in promoting financial inclusion as the bank's branches are not economically feasible. Such policies strengthen the current retail infrastructure, financial inclusion agents. The cooperation between banks and agents becomes possible as the technology has reduced costs and risks of remote information exchange to execute financial transactions beside simplifying account opening procedures

and other incentives such as delivering cash transfers and communicating with the financial system .

- 2- **Mobile payments:** payments through using mobile.
- 3- **Diversity of financial service providers:** Policymakers have adopted various regulatory and supervisory strategies to manage the risks of licensing a wide range of institutions to provide deposit and insurance products including:
 - ✓ Licenses for specialized institutions dedicated to taking small deposits.
 - ✓ Banking licenses for the effective and successful transformation of financial NGOs.
 - ✓ Licenses for non-banking financial institutions.
- 4- **Reform of the State Bank:** In many countries, state-owned banks continue to play a key role in the banking system and in providing financial services to the poor. It is located in about 73 of the 102 countries, where it owns approximately 15% of the bank assets. Public banks are often financial institutions in rural areas with large branch networks, government banks are the least expensive option.
- 5- **Consumer protection:** Asymmetry of information between consumers and banks regarding financial products and services puts new customers at a disadvantage. This imbalance is even greater when customers are less experienced and the products are more sophisticated, as progress in financial inclusion carries the risk of producing more inexperienced customers as many financial institutions ensure that these customers are well served.
- 6- **Digital identity:** it is a virtual identity representing the identity documents required to open a bank account. Policymakers have begun to address these barriers to access by narrowing the gap between the threshold of documents associated with bank accounts and the quality of documentation among low-income customers. As a result, these policies give clients a financial history and convert their transaction history into financial origin. To activate financial integrity, it is essential that financial institutions need to know who their clients are. A financial system in which customers are anonymous is one that can easily be misused and corrupted. This system is also at greater risk of financial nepotism and related financial instability. In addition, financial institutions unable to clearly identify their clients will be less willing to lend, which hampering financial inclusion.

Third: Sustainable Environmental Development

Development is a conscious process, i.e., not random, targeted, long-term strategy, phased objectives, specific plans and programs, and is guided by a development will that is aware of the community's objectives and is committed to achieving them and has the ability to achieve the adequate use of the resources of society in production and distribution in order to preserve the energies of society (Hassan, 2011: 5)

During the second decade between 1970-1980, the concept of development acquired social, political and cultural dimensions along with the economic dimension, reflecting a clear and positive picture of the awareness of governments, institutions, bodies and individuals about environmental and community issues. This period has culminating in the 1972 Stockholm Conference in Sweden on the environment, which is the starting point for explaining the role of governments in adopting the concept of sustainable economic development. The conference issued two documents, the first of which was the Stockholm Declaration of Environmental Principles, in addition to the establishment of the United Nations Programme for Environment and development. (Calver & Calvert, 2007: pp. 404-405)

Economic development in the traditional sense is defined as society progression by inventing and discovering new, more effective production methods, as well as raising production levels by investing and developing skills, environmental energies, establishing effective and innovative organizations, as well as increasing the accumulated capital in society over time. (Ajamia and Laithi, 2004:20). Because the development process is the engine of all sectors of the national economy, science and technology are the first and main place as a basis for accelerating this process and advancing its development. (Abd al-Rida, 2013:169)

Charles Darwin's theory of evolution was one of humanity's greatest discoveries. Thomas H. Huxley was one of Darwin's most ardent supporters, who famously said: 'Irrationally held facts may be more damaging than reasoned errors'. Population and economy can continue to grow without threatening the sustainability of human life, and this is an irrational fact.

In fact, the development process is complementary, i.e. it includes all levels of economic, political, human and environmental; the economy is bearing the burden of making changes easily and dynamically which automatically reflects on patterns of behaviour and ethics in work and investment in all areas where the economy forms its infrastructure (Nasr, 2004:32). Science and technology are the first to be the main driver of accelerating the process of economic development.

The sustainability requirement for development necessarily includes a diversified and dynamic economy that enables it to deal flexibly with shocks, depends on technology and cumulative in the environmental factor and its impact on the environmental dimension in addition to possessing the competitiveness and economic stability. (Nasr, 2004: 25)

Fourth: Literature on The Relationship Between Financial Inclusion and Sustainable Environmental Development

The study of (Soyemi, K.A., Olowofela, O. E., & Yunusa, L.A. (2020) has clarified that the financial inclusion is an incentive for sustainable development. The study has attempted to assess the impact of financial inclusion on sustainable development. The study has used error correcting model (ECM) and the fully modified least squares method (FMOLS) to test the relationship on the short and long terms between variables of (2001-2016). The data of HDI (human development index) was available about Nigeria for the period (2001-2016) only. The study has found that there is short term causal relationship on the short-term from the number commercial banks branches, on-demand deposits from rural areas and rural lending to HDI. In the long run, it has revealed that the interpretive variables represented by a loan to rural areas and the number of commercial banks branches and on-demand deposit from all rural areas had a significant positive impact on Nigeria's environmental development index. In doing so, it has revealed that financial inclusion has an impact on Nigeria's sustainable development, suggesting that economic development can be more feasible and sustainable if environmental development is at the heart of sustainable development plans. With this conclusion, the study has recommended that in order to achieve the greater level of importance assumed by financial inclusion of economic development around the world, coordination between all banks and private non-banking factors must be sacred and essentially designed to facilitate Nigeria's rapid and sustainable economy.

(Ma'ruf1, Aryani, 2019) have clarified in their study the financial inclusion and sustainable development achievements as well as SDGs goals in ASEAN where the financial inclusion is on an essential ASEAN agenda. The study has showed the analyzing of the relationship of financial inclusion with achieving the sustainable development goals (SDGs) in the poverty alleviation side of the Association of Southeast Asian Nations (ASEAN). The study has adopted a quantitative approach and secondary data for the period (2010-2018) according to multiple regression data. The dimensions of financial inclusion have been analyzed: the human and economic dimension and the dimensions of infrastructure. They have found that financial integration has a negative relationship with the achievement of the Sustainable Development Goals (SDGs) in the poverty alleviation side of South-East Asian countries. They have asserted that the development of countries in Southeast Asian nations to achieve the Sustainable Development Goals to eradicate poverty is very important, which means that if financial inclusion improves, poverty levels will decline. In ASEAN countries where poverty levels remain high, it is necessary to increase financial inclusion. Poverty rates in Malaysia, Brunei and Singapore are low, and the population has high access to financial services. While, Myanmar is a poor country in ASEAN, and financial coverage remains low, so it needs collective efforts to improve financial access, including microfinance, in order to increase population productivity. The availability of financial services helps the poor to obtain health insurance for education, health and other needs that will improve the quality of life of the poor.

Financial inclusion is the process that ensures access and use with the formal financial system available to all individuals in society (Do, 2013). On a large scale several initiatives have been launched globally to promote the financial inclusion of the population and linking it to achieve development. The comprehensive financial system allows families to organize their income and plan for future expenses. On the macro level, it builds entrepreneurship and creates job opportunities, as well as allowing governments to have financial system with greater clarity and transparency, in addition to facilitate the legitimacy of improved transactions. For this reason, it

can be said that financial inclusion is linked to development. To test whether financial inclusion and development are interrelated or to assess the correlation ratio based on the dimensions of the Mandira Sarma Financial Inclusion Index 2011, the study has adopted a simplified average of numerical domestic returns (Sandy), along with updated data from the World Bank Findex report 2011. Sandy and Sarma dimensions were adopted but included a modified formula for providing full financial coverage. The countries were ranked between 1 - 0, if financial inclusion is full it takes the value of 1 and if the exclusion is full it takes the value of 0. The study also has linked the Environmental Development Index (HDI) of 2011 by using the Pearson Coefficient for 20 OECD countries (OECD, Europe, Asia and Africa, Canada received the highest rating (0.96) and Egypt offered a total financial exclusion (0.00). The new financial and environmental development index was $r = 0.86$, indicating the strong positive correlation between financial inclusion and development.

Fifth: The Reality of Financial Inclusion in Iraq

The government has begun to make the required reforms. The imposition of development policies is based on three pillars that at the same time shape the objectives of the development programme for the inclusiveness process, namely, improving:

(1) Spending management; (2) sustainability of energy supplies; and (3) transparency of State-owned enterprises. The programme's development goals support the key elements of Iraq's medium-term development priorities. (<https://projects.albankaldawli.org/ar/projects>)

The number of banks have participated in the settlement process in Iraq was (26) banks classified by the type of banking sector: (5) banks from the government sector, (10) banks from the private sector, (6) Islamic banks and (5) banks from the foreign sector in 2017 as shown in table (1) in annex1.

The number of banks have increased in the settlement process until they reached 73 banks in 2019, with (7) government banks and (66) private banks, according to their respective divisions, there are: (3) specialized government banks, (3) government commercial banks and (1) government Islamic banks, and the largest share is for private banks with (66) banks (whether local or foreign, including (26) Islamic banks and (40) commercial banks. (Central Bank of Iraq, 2019: 17),

Statistics for 2011 have showed that the number of accounts for adults over the age of 15 was 11%, male ownership of financial accounts was (13%) and for females was (8%). The income account index for (40%) among the poorest adults was (7%), while the income account index for (60%) of the richest adults reached 13%. The credit card ownership index for adults over the age of 15 was (3%), and the ratio of ownership of Debit cards (credit) was (4%) for males, and (2%) for females. Also, the index of ownership of these cards for (60%) of the most richest adults was (4%), while 40% of the poorest adults had a ratio (2%).

Statistics for 2014 have indicated that the number of accounts for adults over the age of 15 was (11%), the ownership of financial accounts was (15%) for males and (7%) for females, while the income account index for (40%) among the poorest adults was (8%). The financial accounts index of (60%) of the richest adults was (12%). The credit card ownership index for adults over the age of 15 was (43%). The ownership rate from debit cards (credit) was (5%) for males and (5%) for females, in addition, the index of possession of these cards for (60%) of the richest adults was (4%), while (40%) of the poorest adults had a ratio (3%).

Statistics for 2017 also indicate that the number of accounts for adults over the age of 15 was (20%), and the proportion of ownership of financial accounts was (22%) for males and (19%) for females, while the income account index for (40%) of the poorest adults was (8%). The income calculation index for (60%) of the richest adults was (12%), while the credit card ownership index for adults over the age of 15 was (43%). The ownership ratio of the debit cards (credit) was (5%) for males, and (5%) for females. The index of ownership of these cards for (60%) of the richest adults was (4%), while (40%) of the poorest adults had a ratio (3%). (World Bank ' 2017)

Iraq has witnessed a rise in the number of banks and their branches, credit cards, ATMs and pos in the period after 2010, which is a positive indicator, but this rise is still not enough to create a good reality to the extent hoped for for financial inclusion in Iraq.

Table (1) shows this change in respect of the extent of banking spread and banking density in Iraq between (2010-2019): (Annual Report on Financial Stability in Iraq, 2019-2010)

The number of bank branches in 2010 was (48), the number of branches of the bank was (912), the density of the bank was (35.6%), and the banking spread amounted to 2.8%. In 2011, the

number of bank was (50), the number of branches was (929), the number of branches in the provinces reached (547), while in the capital Baghdad it numbered (370), the bank density was (35.9%), and the banking spread rate was (2.78%).

Table 1

Indicators of Financial Inclusion in Iraq for duration (2010-2019)

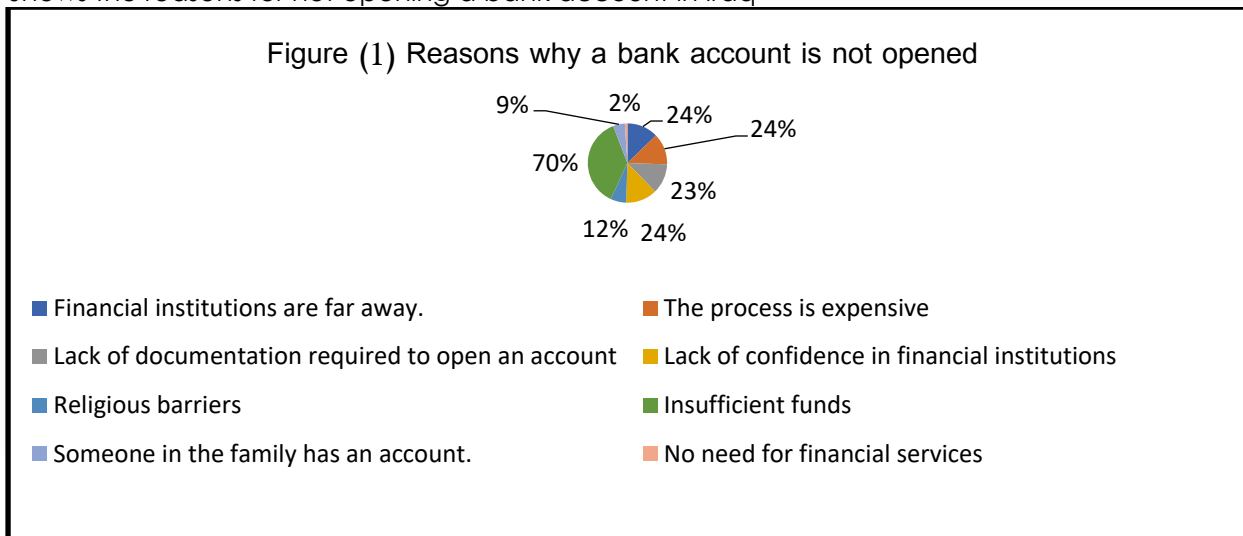
Banking spread 3/1 %	Banking density 1/3 %	Number of ATMs	Number of bank branches	Number of banks	Population (in 1000)	Year
2.8	35.6	415	912	48	32489	2010
2.78	35.9	467	929	50	33338	2011
2.89	34.6	467	990	57	34207	2012
2.96	33.7	647	1042	54	35095	2013
3.34	29.9	337	1204	64	36004	2014
2.31	43.24	580	854	57	36933	2015
2.29	43.74	660	866	57	37883	2016
2.27	44.05	669	843	70	37140	2017
2.26	44.16	879	865	71	38200	2018
2.25	44.25	1100	888	73	39300	2019

Source: Central Bank of Iraq: Financial Stability Report 2019, (Iraq: Baghdad,2020)

Perhaps the lack of high rates of financial inclusion indicators in Iraq is due to the reluctance of individuals to open bank accounts in the Iraqi banks due to main reasons ranging from debt, cost, dimension, financial confidence. Figure 2 explains the impact of these factors in numbers.

Figure 1

Shows the reasons for not opening a bank account in Iraq



Source: Prepared by the researcher, Ministry of Planning: National Development Plan 2018-2022: 29)

The Arable Land Index is one of the most important indicators of environmental development. The rate of arable land was (47.3) in 2010 rising to (52.2) in 2014 due to the improved economic situation, and then returned to decline again to (23.4) in 2018 due to deteriorating economic, social and political conditions and lack of interest in the agricultural sector. (Ministry of Planning: National Development Plan 2022-2018). In 2018 a high committee for financial inclusion headed by the Governor of the Central Bank and the membership of a number of entities in the public and private sectors constituted, so the Central Bank of Iraq launched this initiative with (1) trillion to grant small and medium loans to benefiting citizens through civil banks and at a low interest rate so that it does not constitute a mess for citizens and is still being amended in accordance with the service of the public interest and the national economy as a whole as in 2015, (6) billion Iraqi dinars were spent on this initiative at that stage as a stimulus step for the development process in Iraq, which is the largest lending initiative in Iraq's history, in order to stimulate the country's real

economic sectors and expand credit by supporting the liquidity of specialized commercial banks (housing fund, industrial bank and agricultural bank) and allocating (1) trillion dinars to private commercial banks to finance medium and small enterprises and for the purposes of expanding the local production base. Thus, creating several jobs and stimulating the economy in the country in 2017 and within the plan of the initiative (1) trillion banks lent the amount (18.6) billion dinars to finance (616) projects and agencies as follows:

1- Financing (14) agricultural projects, with the percentage of funding in this sector (1.8%) of the total amount granted (333) million dinars

The plan of the loan initiative (5) trillion Iraqi dinars was allocated to support the liquidity of specialized commercial banks (industrial bank, agricultural bank, housing fund, real estate bank) and for 5 years. Within this initiative, the Central Bank of Iraq took several measures when distributing the amounts of the initiative to the four mentioned banks in the following form (Central Bank of Iraq, 2017, 31-30): (1,666) billion dinars was allocated for the Agricultural Bank, and (15.1) billion dinars was spent for the same year to finance agricultural projects and by (1%) of the allocated amount. Thus, the amount of 1 trillion dinars spent in 2015-2017 is 45.2 billion dinars, or 4% of the amount of the initiative. The amount exhausted from the initiative (5) trillion dinars for the period 2016-2017 amounted to (1512.3) billion dinars with ratio of 30% of the amount of the initiative. The monetary authority represented by the Central Bank succeeded in containing the economic recession during (2016-2017), under difficult and extremely complex circumstances by supporting real activities i.e. pursuing a monetary policy represented by stimulating supply despite the obstacles faced the implementation policy by the banking system, but it is an important step in activating the development process and stimulating the Iraqi economy.

These loans then grew increasingly to reach (2.79) billion Iraqi dinars in 2019 and the total amount disbursed to beneficiaries from 2015 to 2019 was (114.145 billion dinars), which constituted (51.14%) of the amount allocated by the Central Bank of Iraq, which amounted to (1 trillion dinars). This does not mean that the initiative did not reach the required level in achieving the central bank's objectives in spreading and financing small and medium-sized enterprises, so that this percentage remains small, even if the grant process increases. The amount allocated is even very large, as shown in table 2: - (Annual Financial Stability Report, 2019, 87)

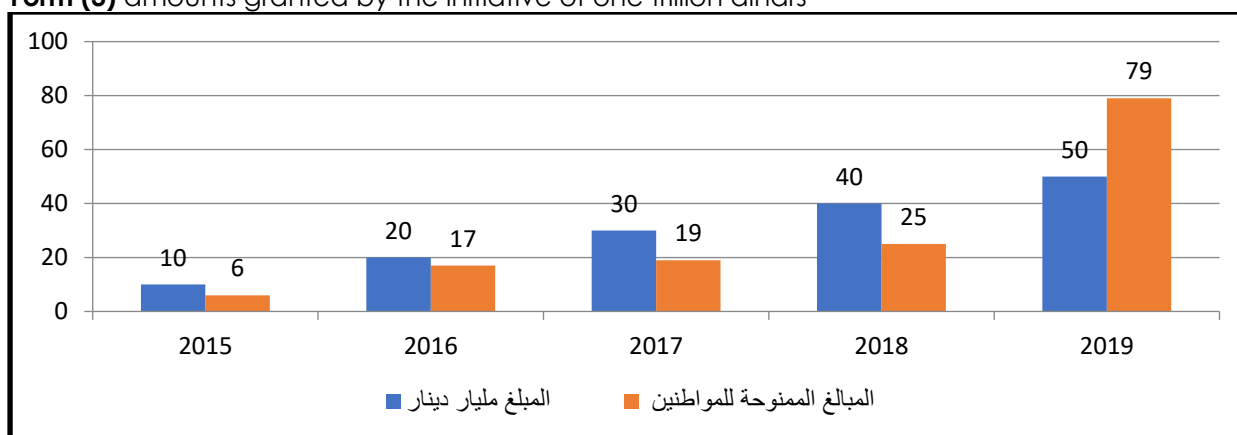
Table 2

Amounts granted in one trillion-dinar initiative

Amounts granted to citizens	Amount (billion Dinars)	Year
6	10	2015
16.5	20	2016
18.5	30	2017
25.1	40	2018
79.2	50	2019

Source: Prepared researcher/bank Darat al-Din. Central Bank of Iraq, Financial Operations Department, Central Bank of Iraq: Annual Report on Financial Stability, 2019

Form (3) amounts granted by the initiative of one trillion dinars



Source: Central Bank of Iraq Researcher: Annual Financial Stability Report, 2019

The amounts of money increased continuously during the period (2015-2019) and this is clear in figure 3, where (33) private banks (18 Islamic bank, 15 traditional bank and 2 branches of foreign bank) participated to grant the amount of the initiative. These loans contributed to the creation of 4,776 small projects, which contributed to the creation of jobs for unemployed youth as the Central Bank facilitated and simplified grant procedures and completed transactions as quickly as possible and in short of time, as well as directing banks to expand this activity which is an important tool for achieving financial inclusion. In addition, the central bank has carried out many media campaigns, promotions and awareness of financial education through the media and social media.

Sixth: Measuring the Relationship Between Indicators of Financial Inclusion and Sustainable Environmental Development

1- Specification description

In order to establish the basic research hypotheses and to achieve its basic objectives, based on previous studies of many economists, and in order to formulate a quantitative diagnosis of the specific factors (independent explanatory variables) of financial inclusion and adopted variables for sustainable economic development (in Iraq), the research methodology has based on the theoretical premises and applied studies, which have supported by quantitative analysis based on the use of the methodology of self-regression of distributed time gaps (ARDL) for time series of the past 10 years, which are quarterly data as a result of our lack of financial inclusion data, due to the recent adoption of the Financial Inclusion Programme in Iraq. The data have been adopted about the available indicators of inclusion and sustainable economic development within the bulletins and reports of the Central Bank and the Central Bureau of Statistics for the period (2010-2019) to bring the total views to 40 (watch).

Y: The dependent variable that represents the environmental development index, which is the proportion of arable land in Iraq for the period (2010-2019), which is quarterly data.

X: Independent variables: - As follows

A. Usage variables: X1 represents the volume of credit in the private sector.

B- Access variables: Focus on the most important foundations of inclusion that represent the infrastructure of the inclusion project

X3: represents the number of ATMs

X4: represents the number of banks across Iraq

X5: represents pos numbers

In order to achieve more accurate and realistic results and to obtain a sound and logical analysis of the determinants of financial inclusion and their impact on the variables of sustainable economic development in Iraq, which can be used to make the right decisions, the study adopted what is known as the self-regression methodology of the time chains (Autoregressive Distributed Lag), through which the complementary relationship is diagnosed in the short and long term as well as deciding the size, value and direction of the impact of this relationship. (Pesaran, M. Hashem., Yongcheol Shinn, & Richard J. S, 2001)

This methodology differs from other methods by being used in models that contain variables at different levels of integration to stabilize the chain. They can also be applied in the case of small samples. In addition, ARDL methodology is characterized by the "Schwarz Bayesian Criteria" (The Akaike Information Criterion) (AIC) feature needed to optimize time slowdowns (Length Optimal Lag). Also ARDL eliminates issues related to self-association and therefore gives efficient and impartial results and results to correct the Error Correction Model (ECM) which measures the model's ability or the speed of balance adjustment to return to balance.

After any defect appears as a result of an emergency order (Morimune, 1995:9) this model is based on the ARDL regression equation where the dependent variable is sloped on itself, i.e. we take Lag to the dependent variable and the independent variable sloped for the current period and previous periods of ARDL (p,q) as in equation (1):

$$\hat{y}_t = \alpha_0 + \alpha_1 y_{t-1} + \dots + \alpha_p y_{t-p} + \beta_0 x_t + \beta_1 x_{t-1} + \dots + \beta_q x_{t-q} + \varepsilon_t \dots \dots (1)$$

The general equation of common integration is

$$\Delta \hat{y}_t = \alpha_0 + \sum_{i=1}^p \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^q \alpha_{2i} \Delta x_{1t-i} + \dots + \sum_{i=0}^{qk} \alpha_{k+1i} \Delta x_{kt-i} + B_1 y_{t-1} + B_2 x_{1t-1} + \dots + \beta_{k+1} x_{kt-1} + \varepsilon_t \dots \dots (2)$$

Where ε_t represents the limit of random error.

$\alpha_1, \alpha_2, \dots, \alpha_k$ in the three previous equation reflect long-term relationship while B_1, B_2, \dots, B_k reflect short-term mobility of the three models. On the other hand, previous equations indicate that financial inclusion is explained and influenced by previous values. By estimating of the Unrestricted Error Correction Model, the long-term flexibility becomes a single time slowing factor for interpretive variables (multiplied by the negative signal, divided by the dependent variable coefficient of one slowing down, and short-term effects are captured by the first difference coefficients of variables in the aforementioned equations.

After estimating previous equations, the long-term relationship between financial inclusion and illustrative variables (x_1, x_3, x_4, x_5) is verified using the Long Run Form and Bounds Test as procedured (Pesaran), M. Hashem., Yongcheol Shinn, & Richard J. S,2001; Pesaran, M. Hashem, & Yongcheol Shin. 1999; (Pesaran et al. 2001) which based on test Wald test(F) that tests the hypothesis of non-integration of variables versus the existence of co- integration between variables to reveal the balance between Long-term variables, on the other hand, can characterize the dynamic relationship in the short term in the ARDL model by deriving the Error Correction Model (ECM).

2- Model assessment and testing

a) Determining the best model for the method of estimation

The multiple regression relationships between indicators of financial inclusion and sustainable environmental development have been estimated to determine the appropriate formula, so the semi-logistic formula of the variable for the environmental development indicator's function is the best according to statistical indicators (R^2) and (\bar{R}^2) the highest value and lowest value of indicators (AIC, S C, H-Q) and the significance of the F census as shown in table (3)

Table 3

Choose the appropriate function to estimate the usual micro-square method.

Function	Equation	Statistical indicators					
		R^2	\bar{R}^2	F	AIC	SC	H-Q
Linear	$y=f(x_1, x_2, x_3, x_4, x_5)$	0.54	0.47	7.95	7.56	7.81	7.65

Source: Preparing the researcher and using the program (Eviews-12)

b) Optimal lag length

To show the impact of inclusion on sustainable economic development in Iraq, a key step must be taken, namely, determining the optimal lag length of the variables according to the VAR model.

The var model shows that the optimal degree of lag length is the third period according to AIC, SC and HQ standards as the lowest total squared line for the choice of lag length duration by adopting var method as shown in table(4)

Table 4

Optimal slowing down duration

HQ	SC	AIC	FPE	LR	LogL	Lag
47.80434	48.33684	47.52876	8.89e+16	NA	-789.9890	0
37.31787	38.11662	36.90451	2.22e+12	278.8416	-600.3766	1
30.82661	31.89160	30.27546	3.11e+09	157.4862	-478.6828	2
28.00133*	29.33257*	27.31239*	1.77e+08*	66.35708*	-419.3106	3

Source: Prepared by the researcher using the Eviews 12 program

c) Stability:

Before estimating the study model, the stability of the time series of variables must be tested. Table (4) summarizes the results of the application of the Extended Dickie-Fuller ADF test and table (5) shows Phillips-Byron PP (for the stability of the variables used in the study (at the level and the first difference) that the unit root test for variables at level I (0). From the results of the extended Dickie-Fuller ADF Test, the series was unstable at the level of most independent variables, because the calculated value is lower than the scheduling i.e. acceptance of the non-existent imposition that it provides for the presence of the unit root in a series at the three models (intercept, trend and intercept general direction, None) which means that the variables are integrated in the degree (1)I, except the variable (x₁,x₂) which is stable at the level of integration I (0). According to the PP test shown in table (5), variables came after the first difference, i.e. integrated at I (1) for (x₃,x₄,x₅) and the variable x₁ integrated at level I (0) while the variable x₂ integrated at the second degree I (2).The dependent variable has stabilized at the first difference i.e. integrated at I (1). The difference in the degree of integration between independent and dependent variables determines the adoption of the ARDL model and there are integrated variables I (2) in a significance level of 5%. In the case of integrated variables of the second rank (Pesaran et al,2001), the count of F is of rank ii or more, so the critical value of the ARDL test cannot be applied, because the model method depends on grades I (0) and I (1) to apply co- integration in ARDL manner so the variable x₂ is deleted.

Table 5
Ducky Fuller Unit Root Test for Stability Variables under Study

ADF Teams			ADF level			Variables
Section and temporal direction	Sadistic clip	Section and temporal direction	Section and temporal direction	Sadistic clip	No section and direction.	
			3.18*	2.71*	1.05	X ₁
			-4.28*	-3.68*	-3.40*	X ₂
-2.29	-1.60	-0.90	-0.63	-1.03	.155	X ₃
-1.69	-1.77	-1.80*	-3.06	-2.34	-0.28	X ₄
-1.90	-1.86	-1.48	-3.03	-1.71	-1.08	X ₅
			-3.42*	-3.13*	-0.55	Y ₃
Scheduling values						Error ratios
		-3.67		-2.64		1% level
		-2.96		-1.95		5% level
		-2.62		-1.61		10% level

The mark (*) indicates the level of morale

Source: Prepared by the researcher, depending on the variables data and using the (12- Eviews) progr

Table 6
Phillips-Perron PP unit root test for the stability of the variables under stud

PP I (1) at teams			PP I (0) at the level			Variables
Section and temporal direction	Sadistic clip	No section and direction	Section and temporal direction	Sadistic clip	No section and direction	
			6.46*	6.35*	4.91*	X ₁
-1.12	-1.18	-1.27	-1.69	-1.55	-1.31	X ₂
			-1.26	0.25	1.63*	X ₃
-2.39	-2.40	-2.41*	-1.92	-1.61	-0.24	X ₄
-2.67	-2.72*	-2.58*	-1.44	0.03	1.08	X ₅
-1.90	-1.93	-1.95*	-1.95	-1.99	-1.26	Y ₃
Scheduling values						Error ratios
		-3.61		-2.62		1% level

-3.53	-2.94	-1.94	5% level
-3.19	-2.60	-1.61	10%level

Prepared by the researcher using the eviews 12 program

Seventh: Analysis of The Relationship Between Financial Inclusion and The Environmental Dimension

1. ARDL assessment and analysis

The relationship between the Arable Land Index and the use index represented by the size of credit in the private sector and access indicators has estimated both the number of banks, the number of tellers and pos in the manner of small squares as shown in the table (7) according to the ARDL model. A model of the rank of (ARDL (2, 4, 4, 4, 4) has been chosen and some parameters is significantly estimated according to t statistics, while the variable (x3) is insignificant and the model is significant according to the F test because the probability level is very few and the match quality of the f model is approximately 99%, i.e. the illustrative variables have explained 99% of the changes in the dependent variable, but the model needs standard tests that support this model, namely, the serial link test and the homogeneity test as shown in the table.20. Figure 4 is illustrated by the AIC standard, which is selected on the basis of the lowest total error squares, the model that achieved the lowest error squares was selected.

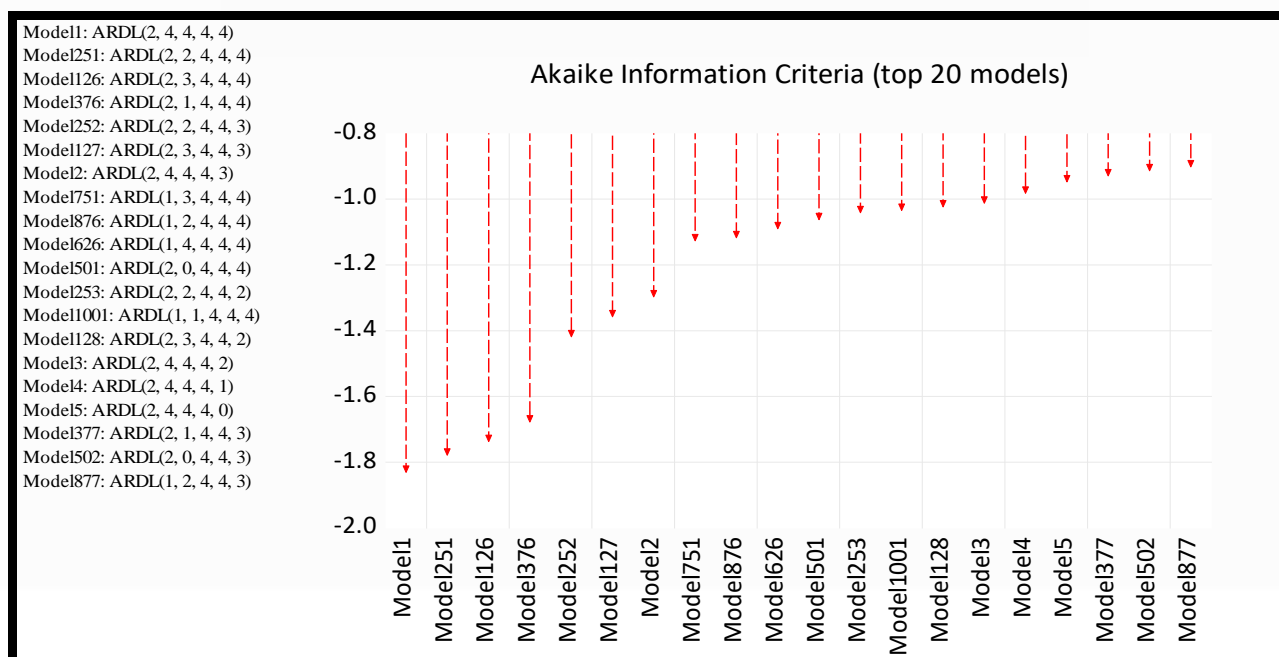


Figure 4: AIC standard for more than (20 forms)

Source: prepared by the researcher using the Eviews 12 Program

2- Serial correlation and heterogeneity test.

Table 8 shows that a model does not suffer from the problems of self-association (serial) and heterogeneity because the probability value is greater than 5%, which means accepting the imposition of nothingness, which stipulates that there is no problem of self-association and the problem of heterogeneity according to the F census

3-Bounds Test

Table (9) shows the equation of co- integration for long-term balance.As the signal of the dependent variable is negative and since the F* value is greater than the largest value of critical values i.e. scheduling at the level of 5%, this means that there is a long-term relationship and the variables are not integrated according to the t* bounds test as the estimated value is less than

the largest value of critical values i.e. illogical integration.

4- Error correction factor

The error correction equation shows that the signal of the slowing dependent variable is negative, which means that there is significant relationship, i.e. the short-to-long-term adjustment speed is 1.03 percent

Table 7

The relationship between indicators of financial inclusion and environmental dimension according to the ARDL model

Child variable:Y			Sample (adjusted)2011Q4- 2019Q4	
Method: ARDL			Post-edit views: 33	
Greatest slowing down of lags: 4 (automatic selection)			Slowing down interpreted variables (3 lags, auto): X1 X3 X4 X5	
Model selection: Standard Akaike (AIC)			Constant slope: C and time:@TREND	
Number of models evaluated:1250			Selected Model (ARDL(3, 0, 3, 3, 2)	
Prob.*	T-	Standard deviation	Parameters	Variables
	statistics			
0.0000	8.005024	0.261482	2.093166	Y(-1)
0.0082	-3.376616	0.326803	-1.103488	Y(-2)
0.0158	2.964531	5.87E-08	1.74E-07	X1
0.6628	0.450830	7.57E-08	3.41E-08	X1(-1)
0.5699	0.589661	6.75E-08	3.98E-08	X1(-2)
0.1212	-1.711263	1.35E-07	-2.31E-07	X1(-3)
0.1711	1.487286	1.19E-07	1.78E-07	X1(-4)
0.5513	-0.618973	0.061534	-0.038088	X3
0.9224	0.100153	0.082443	0.008257	X3(-1)
0.7359	-0.347952	0.056526	-0.019668	X3(-2)
0.2472	1.237617	0.035099	0.043439	X3(-3)
0.0056	-3.618127	0.051357	-0.185815	X3(-4)
0.0424	2.363237	0.047883	0.113159	X4
0.5719	-0.586635	0.107920	-0.063310	X4(-1)
0.9575	0.054851	0.071742	0.003935	X4(-2)
0.1320	1.656507	0.050630	0.083870	X4(-3)
0.0017	-4.427006	0.035880	-0.158841	X4(-4)
0.0283	2.608665	0.002979	0.007770	X5
0.0261	-2.659745	0.005149	-0.013696	X5(-1)
0.2543	1.217699	0.003258	0.003967	X5(-2)
0.0751	2.011948	0.005134	0.010329	X5(-3)
0.0333	-2.510843	0.003456	-0.008677	X5(-4)
0.1653	1.510184	56.57837	85.44374	C
0.0285	2.605648	0.630781	1.643592	@TREND
0.999951	R ²		0.999986	R ²
-1.819958	Akaike Standard		0.073104	Total trumpet squares
-0.731589	Schwarz Standard		54.02930	Log likelihood
-1.453755	Hannan-Quinn Standard		28186.48	F-statistics
2.553844	Durbin-Watson -statistic		0.000000	Prob(F-statistic)

Source: Prepared by the researcher, Eviews 12 resul

Table 8

Serial link test and heterogeneity.

Heterogeneity test: Breusch-Pagan-Godfrey				Breusch-Godfrey Serial LinkLM Test			
The null hypothesis: There is no heterogeneity problem				null hypothesis: no correlation at deceleration (1)			
0.9206	Prob. F (23,9)	0.487	F*	0.326	Prob. F (1,8)	1.093	F*
0.7407	Prob. $\chi^2(23)$	18.305	Obs*R ²	0.046	Prob. $\chi^2(1)$	3.967	Obs*R ²

Source: Prepared by the researcher, Eviews 12 results

5 Testing the structural stability of the estimated ARDL model

The Cusum test has been adopted, which shows that errors are divided between the two lines of confidence limits, which means that the errors are stable, and the total accumulated error squares are also stable in the long term. Also, the slowing values of independent variables and dependent variable are not synchronized in direction which means that the integration is unnatural and degraded. This test therefore reflects short- and long-term transactions in which the data used do not have any structural changes over time. Two tests are used for this purpose:

- A) CUSUM cumulative total test
- B) Test the cumulative total of successive trumpet boxes CUSUMSQ

Table 9

Joint integration and F* and t test

EC = Y - (0.0000*X1 -18.5891*X3 -2.0526*X4 -0.0297*X5)				
mposing nothingness: there is no relationship			F-Bounds Test	
I(1)	I(0)	Signif.	Value	Test Statistic
4.06	3.03	10%	17.92265	F-statistic
4.57	3.47	5%	4	K
5.07	3.89	2.5%		
5.72	4.4	1%		
mposing nothingness: there is no relationship			t-Bounds Test	
I(1)	I(0)	Signif.	Value	Statistical test
-4.04	-3.13	10%	-0.138699	t – statistic
-4.36	-3.41	5%		
-4.62	-3.65	2.5%		
-4.96	-3.96	1%		

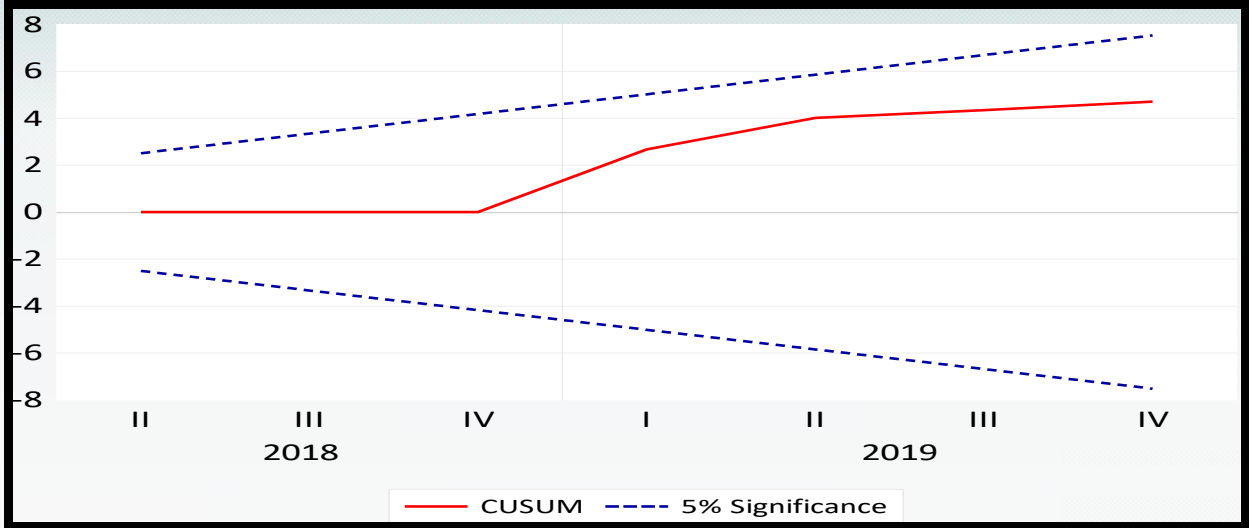
Source: Prepared by the researcher, Eviews 12 results

The equation of correcting the error

$$D(Y3) = 85.4437 + 1.644 * @TREND - 0.0103 * (Y3(-1) - (0.000019 * X1(-1) - 18.589 * X3(-1) - 2.0526 * X4(-1) - 0.0297 * X5(-1)))$$

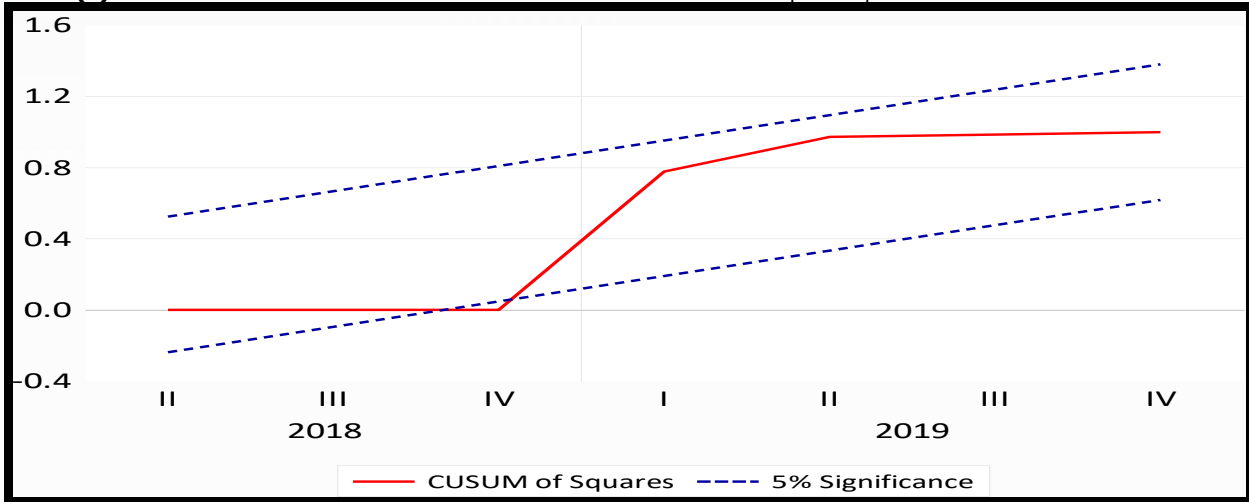
If coefficients occur within the above-mentioned chart of the critical boundary model at a moral level of 5%, they will be stable, but if the graph of the statistics of the two tests moves beyond these limits at the level of 5%, these coefficients will be unstable. It is clear from form (5) and (6), that the estimated coefficients of the ARDL model used for financial inclusion variables are stable and in harmony with the results of the short- and long-term error correction.

Form (5) CUSUM cumulative total test



Source: Prepared by the researcher using the Eviews 12 program

Form (6) Cumulative total test of CUSUMSQ consecutive trumpet squares



Source: Prepared by the researcher using the Eviews 12 program

The natural distribution of the model has tested according to JB test, which gave that the natural distribution of its value is more than 5% as shown in the following graph (7):

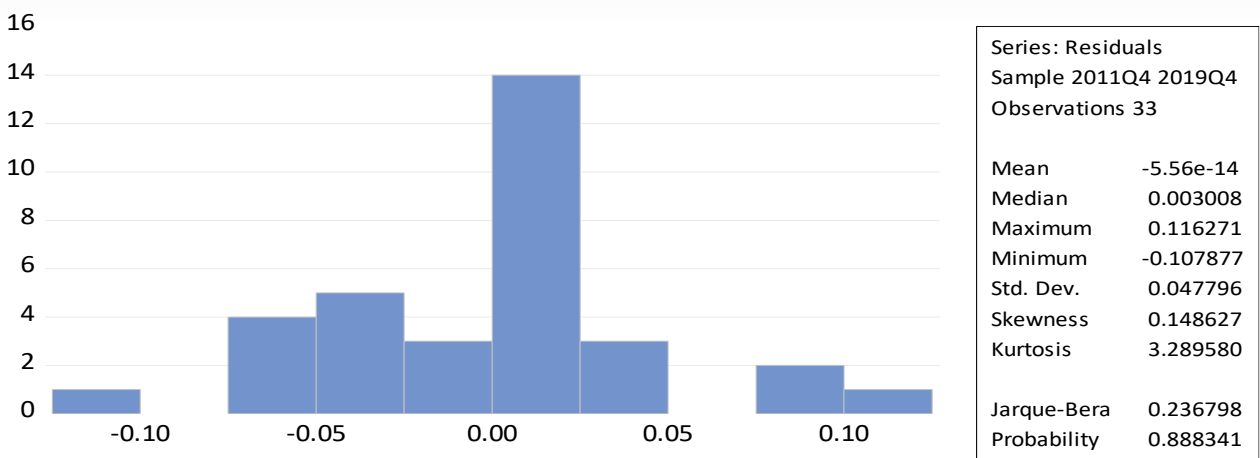


Figure 7: The natural distribution of the relationship between financial inclusion and the environmental dimension

Source: Prepared by the researcher

Standard Short-Term Interpretation of The Environmental Dimension

The fixed limit value of 12.65 indicates that with the stability of the values of all model variables, this means that the rate of arable land is increasing naturally through the impact of independent variables of financial coverage $X_1 X_2 x_3 x_4 X_5$, which indicates that there is a positive and strong impact, i.e. a parcel relationship between interpretive variables (illustration) and arable land rate in Iraq. This means that the partial flexibility of good land was (0.03) and the number of ATMs amounted to partial flexibility (0.17). This coincides with to the logic of economic theory. while the relationship between land, the number of banks and the number of points of sale has partial flexibility (1.99, 0.98) respectively, and this does not agree to economic theory because of lack of financial education on the one hand, poverty and distrust of electronic and banking financial transactions on the other. This shows that the selection factor equal to ($R^2=0.99$), i.e. 99% of the resulting changes in arable land is explained by the change in financial inclusion, while the remaining 1% is explained by other variables that are not included in the standard model and included in the random variable U.

standard explanation of the environmental dimension in Long-term: - We can demonstrate the positive and strong long-term relationship between the interpretive variables (illustration) of financial inclusion and the environmental dimension represented by the rate of arable land in Iraq, which means that the increase in the use of financial inclusion, namely the volume of credit and the dimensions of access, both the number of ATMs and the number of bank branches is positive. While the dimensions of access to the financial inclusion represented by the number of pos points of sale has inverse relation. The long-term flexibility has reached (1.62^{E-08}) according to the first slow period and this coincides with the logic of economic theory.

Conclusions

- 1) The concept of financial inclusion is a modern term and concept in Iraq and contributes significantly to raising the standard of living of many individuals below the subsistence limit by increasing the number of deposit accounts to adult numbers, which will increase per capita GDP.
- 2) The great and influential role of the financial inclusion on sustainable economic development indicators is clear by the relationship between them. Increasing the areas of lending to marginalized and poor groups at low interest rates will finance many projects. The individual who has the ability to access financial services is one of the most important goals of the World Bank.
- 3) The banking sector in Iraq did not contribute to the process of sustainable economic development before the start of the financial inclusion program due to the limited banks in Iraq on the one hand and the other reason is due to the characteristic of the rent economy of Iraq. Rather the possibility of increasing the ratio of loans to the number of adults will lead to the opening of several areas of investment and thus encourage positive savings and get rid of the state of hoarding (the amounts of cash are stored idle without interest and negative hoarding is idle stock amounts plus idle running amounts) It then moves the country's economic development, thereby reducing dependence on oil imports.
- 4) Due to the adoption of the financial inclusion program in Iraq in a serious and effective manner, access points to banking services, especially for rural and remote areas, have increased, as well as increased demand for banking services during the research period, which is evidence of the application of financial inclusion mechanisms in Iraq. The research also has led to the result of increased banking awareness for the Iraqi individual by noting the high rate of lending and deposits, and the adoption of this program is considered inexpensive for the state.
- 5) The prevalence of ATM machines was limited during the study period due to the security weakness in the country as well as the reluctance of banking agents to accept them because of the profit margin they receive on the one hand and on the opposite side that increasing the number of (ATM) leads to the elimination of many banking agents and thus increase unemployment.
- 6) We conclude from all statistical and standard data and results that financial inclusion has a positive impact on the dimensions of sustainable environmental development, which in turn raises the level of economic activity and drives economic development within Iraq in a way

that dismantles and solves many of the outstanding economic and financial problems in the country.

- 7) There is a positive relationship between the explanatory variables (illustrative) and the rate of arable land and the long-term flexibility amounted to (0.03) and this coincides with the logic of economic theory.
- 8) It is clear that the determinant coefficient equal to (0.99), i.e. 99% of the changes resulting in the environmental development index is explained by the variables of financial inclusion, while the remaining 1% is explained by other variables that are not included in the standard model and are included in the random variable U.
- 9) The slowing dependent variable signal which is negative in this error correction model means that there is a significant relationship and that the short-term to long-term adjustment speed is 1.03%.

Recommendations

- 1) The importance of financial education and its inclusion in the regulations of primary and secondary education and the application of the Plato program applied in Poland and India like other Arab countries in which it succeeded, including Morocco and Jordan, it adopts education and financial education for the ages of 6-16 years by 56 hours of education throughout the year, with the need to celebrate World Money Week and Plato Day which is more important than ever, as international data have indicated that the majority of children do not understand the basics.
- 2) Recognizing that innovative financial technology for financial services bodes well for the progress of financial inclusion, especially among vulnerable groups in society, including micro, small and medium-sized enterprises, where innovative financial inclusion provides a significant chance for developing and emerging economies and thus achieves the sustainable economic development goals that developing countries, including Iraq, are seeking to achieve.
- 3) Promoting strategies to reduce the gender gap in finance, include and promote women's participation in politics and implementation in technology driven by financial services.
- 4) Welcoming innovative solutions, modern business models and successful cooperation between sectors in the provision of financial services, while harnessing and nurturing the potential elements of financial technology and alleviating the inconsistency of information and management costs for financial institutions in dealing with SMEs as well as promoting the feasibility study for development.

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