

Electronic Payment Methods and Their Impact on Financial Inclusion Using the ARDL Methodology for Iraqi Commercial Banks

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Abstract: The research aims to highlight the impact of electronic payment methods on financial inclusion, especially through an applied analysis based on real data from the Iraqi banking sector using the ARDL model, which allows us to study the relationship between economic variables in the short and long term. The research concluded that there is a joint integration relationship, and the presence of a long-term direct equilibrium relationship that moves from all independent variables (number of ATMs, number of cards, points of sale) towards the dependent variable (the aggregate index of financial inclusion) for Iraqi banks.

Keywords: Electronic payment methods, financial inclusion

Introduction: In recent years, the Iraqi banking sector has witnessed a significant shift towards the use of electronic payment methods. This represents part of the Central Bank of Iraq's efforts towards digital transformation and reducing cash transactions. The Central Bank of Iraq has encouraged banks, particularly private commercial banks, to operate and adopt modern payment services such as bank cards, point-of-sale (POS), and others, with the aim of enhancing financial inclusion and enabling wider segments of the population to access formal financial services. Despite this trend, financial inclusion rates in Iraq remain low, amid challenges related to infrastructure, banking culture, and the unbalanced distribution of services.

Research Problem

The research problem can be formulated with the following questions:

- 1- What is the impact of electronic payment methods on financial inclusion in Iraq?
- 2- What is the nature of the relationship in the short and long term between the variables under study, using the ARDL model?

Research Importance

The research derives its importance from determining the impact of electronic payment methods on financial inclusion in Iraqi commercial banks, as follows:

1. It focuses on the relationship between electronic payment methods and financial inclusion in Iraq, a topic of great importance in light of the digital transformation witnessed by the banking sector.
2. It relies on quantitative analysis using the ARDL model, which allows for accurate quantitative results that contribute to a dynamic understanding of the relationship in the short and long term.
3. It provides practical recommendations for policymakers and banks on how to leverage financial technology to enhance financial inclusion.

Research Objectives

1. The research seeks to explore the potential of electronic payment methods to achieve financial inclusion, thereby ensuring access to financial and banking services for all individuals regardless of their level of education and location.
2. Develop a conceptual framework that addresses electronic payment methods and their importance.
3. Explain the concept of financial inclusion, its characteristics, and its importance.

Research Hypotheses

1. There is a statistically significant long-term relationship between electronic payment methods and the aggregate financial inclusion index in Iraq.
2. There is a short-term relationship between some electronic payment methods (electronic cards, ATMs, and points of sale) and the aggregate financial inclusion index.

Research Methodology

The research will rely on the inductive approach to describe the study variables. It will also rely on a quantitative analytical approach using a statistical analysis program.

Research Limits

Spatial Limits: The Iraqi banking sector, due to its availability of electronic payment methods.

Temporal Limits: The financial data of Iraqi banks for the period (2017-2023) will be used.

Section One

Theoretical Framework (Electronic Payment Methods and Financial Inclusion)

First: Electronic Payment Systems

1- Definition of Electronic Payment Methods:

Electronic payment methods are defined as the processes through which payments are executed and processed using electronic media. They include a set of digital tools and transfers issued by banks and credit institutions, such as bank cards and automated payment devices¹. They are also defined as a method used by institutions and individuals to receive payments for services and goods. The payment process is carried out by transferring funds from one person's or company's account to another². Electronic payment methods are also defined as an integrated system of systems and

¹Reserve Bank of New Zealand, 'payment system', Bulletin, Vol. 71, No. 4, December 2008, P 28.

²Les nouveaux instruments 4-J.P Goulaoven, Monetaires, Libraire vuibert paris: 1998., P6

Software aimed at facilitating the implementation of electronic payment and shopping transactions through digital tools issued by banks and credit institutions. This system operates within a framework of regulating laws and regulations that guarantee the protection of user data and ensure the security and confidentiality of transactions, leading to the provision of a reliable and secure service to consumers.

These methods aim to facilitate and accelerate payment processes and financial transactions through the use of various electronic technologies, and come with the aim of shifting towards a digital economy, as banks seek to Enhancing efficiency, expanding the customer base, and reducing reliance on paper money can be summarized as follows³:

1. Ease and speed of use, as it facilitates immediate financial transactions without the need to handle paper money or visit bank branches.
2. Saving customers time and effort, through the ability to shop and pay bills electronically 24/7, from anywhere.
3. Enhancing the principle of confidentiality and security for banking and commercial transactions, by protecting user data and reducing the risks of theft or fraud associated with carrying cash or disclosing banking information.
4. Benefiting from offers and discounts offered by companies and stores when paying electronically. This enables customers to obtain goods and services at a lower price, such as purchasing a specific item from a specific company or staying in a specific hotel.
5. Increasing banking efficiency and reducing operational costs, by reducing the need for labor and minimizing errors associated with manual transactions.
6. Increasing sales volume for merchants by increasing spending, as customers tend to spend more when using cards or electronic wallets compared to cash.
- 7- Flexibility in obtaining loans, with the ability to withdraw or pay at any time, even during holidays or emergencies.
- 8- Promoting financial inclusion by integrating more individuals and merchants into the formal financial system and encouraging them to open bank accounts⁴.

3. Characteristics of electronic payment methods:

³Abdul Qader Buhaih, The Comprehensive Guide to Business and Banking, Dar Al-Khalduniya for Publishing and Distribution, Algeria, 2013, p. 234.

⁴Muhammad Abd al-Husayn al-Ta'i, E-Commerce, Dar Al-Thaqafa for Publishing and Distribution, Amman, 2013, p. 185.

Electronic payment methods have several characteristics that make them a flexible and advanced financial tool capable of meeting the requirements of modern transactions, especially in light of the expanding digital economy. The most prominent of these characteristics can be summarized as follows⁵:

- 1- International Acceptance: Electronic payment methods are financial instruments of an international nature. They can be used to settle financial transactions between various parties around the world via cyberspace and using electronic money, which is usually stored on smart cards or digital wallets.
- 2- Remote Transaction Completion: These methods enable commercial transactions to be conducted via wireless communication, allowing contracting parties to disperse from the same location. Contracts are concluded and payments are executed electronically over the internet.

3- Expanding the Scope of Operation for Small Banks: Electronic payment methods contribute to providing banks with limited geographical reach with the opportunity to enter global markets and expand their operations without the need for a physical presence in those markets, enhancing their competitiveness.

4- Encrypted Cash Value: Electronic money represents cash value stored in the form of encrypted digital data, saved on electronic cards or on the hard drives of users' devices. A unique serial number is used for each monetary unit to ensure the authenticity of transactions and verify their source through the issuing bank's systems.

5- Reducing operational costs: Electronic payment methods allow for a reduction in expenses associated with traditional purchasing transactions, such as transportation and administrative costs, compared to the very low costs charged by electronic payment services.

6. Controlling personal spending: These methods contribute to enhancing the user's financial awareness, as they allow him to monitor his consumer behavior, which reduces unnecessary spending and promotes moderation in making purchasing decisions.⁶

⁵Ikram Hijab, et al., Challenges of the Electronic Payment System and the Reality of its Application in Algerian Banks, Journal of International Economics and Globalization (JIEG), Vol. 3, No. 2, 2020, p. 134.

⁷Peter J. Morgan, Victor Pontines, 2014, Financial Stability and Financial Inclusion, Asian Development Bank Institute (ADB), ADBI Working Paper Series, No. 488, p 5.

⁸The World Bank, 2014, Global Financial Development Report: Financial Inclusion, 818 H Street NW, Washington, DC, USA, p 15.⁹

Second Section: The conceptual framework for financial inclusion.

1- Definition of financial inclusion:

The concept of financial inclusion is to provide access to and use of diverse, convenient, and affordable financial services. Access to and use of financial services is one of the key drivers of economic growth. Financial inclusion includes sustainable, relevant, cost-effective, and meaningful financial services for the financially disadvantaged, particularly rural populations⁷. The World Bank (2014) described financial inclusion as the scope and quality of financial services provided to the financially disadvantaged and excluded⁸. The Arab Monetary Fund defined it as the actions taken by regulatory bodies to promote access to and use of financial services and products that are appropriate to their needs, including marginalized and affluent groups, and that are provided fairly, transparently, and at reasonable costs⁹.

2- Objectives of Financial Inclusion:

Achieving financial inclusion is not a goal in itself, but rather a means to an end, given its significant developmental role in human development, improving living standards, promoting equal opportunities, and financing small businesses.

and medium-sized enterprises, reducing poverty, promoting equality, and ensuring well-being, thus achieving comprehensive and sustainable economic growth. The objectives of financial inclusion lie in the following points:¹⁰

1. Promoting social and economic development.
2. Supporting entrepreneurial projects and freelance businesses.
3. Facilitating and supporting ways to benefit from financial services and products for all members of society at various levels.
4. Reducing poverty levels.
5. Clarifying the means and methods of accessing financial services and products, explaining their costs, benefits, financing methods, and how to develop access to financial institutions.
- 6- Improving financial literacy and awareness in the country, supporting the banking sector by diversifying banking assets, attracting new customers, stabilizing deposits, and reducing liquidity risk. This is in addition to providing a large database for banks, useful for analysis, which impacts the possibility of introducing new products that meet the needs of these segments, and building credit assessment models to facilitate access to financing.
- 7- For women, when women control their financial affairs, they invest in healthcare, nutrition, and education for their families. These investments bring about intergenerational change that has a positive impact on the society in which they live.¹¹

¹⁰Saif Al-Islam Khamis Abdul Khaliq Qafisha, The Reality of Financial Inclusion in Islamic Banks in Palestine, Master's Thesis, Hebron University, Palestine, 2020, p. 22.

¹¹ Hart M. (2016). What is the mainstream of financial services for women and girls today? Global Women's Banking Network, an article available on the CGAP website, Published: 03/2016 (www.cgap.org), P 177.

Characteristics of Financial Inclusion:

Financial inclusion is characterized by a number of characteristics that enable it to play an effective role in supporting economic and social development and achieving financial justice for all segments of society, particularly excluded and financially disadvantaged groups. The most prominent of these characteristics can be summarized as follows: ¹²

- 1- Time: This refers to the financial system's ability to provide banking services and products at all times and throughout the year, enhancing ease of access and continuous benefit.
- 2- Price: Financial inclusion requires that financial services be provided at low and affordable prices, allowing all individuals to benefit from them without significant financial burdens.
- 3- Generality: This refers to targeting all segments of society without discrimination, including those with limited income, in order to achieve true and equitable inclusion.
- 4- Diversity: This refers to providing a diverse range of banking services and products, such as savings, credit, insurance, and electronic payment services, to meet the needs of various segments.
- 5- Quality: Financial inclusion focuses on achieving high quality in the provision of banking services, in terms of efficiency, speed, and transparency in transactions.
- 6- Geographic expansion: This includes reaching all geographical areas, especially remote ones, to bring services closer to individuals and businesses, thus contributing to reducing the financial gap¹³. Diversification of savings and credit patterns: Financial inclusion provides diverse and innovative savings and financing options that suit the diverse needs and circumstances of individuals.¹⁴
- 7- Risk Resilience: Financial inclusion contributes to enhancing individuals' ability to cope with potential financial shocks and risks through flexible insurance and credit tools.
- 8- Digital Technology: Digital transformation is a key enabler of deepening financial inclusion, as smart applications, mobile phones, and the internet contribute to reducing the number of unbanked individuals and improving the use of bank accounts.

¹²Meldina Kokorović Jukan, Amra Softić, 2016, COMPARATIVE ANALYSIS OF FINANCIAL INCLUSION IN DEVELOPING REGIONS AROUND THE WORLD, Economic Review – Journal of Economics and Business, Vol. XIV, Issue 2, November, p 57.

¹³Farah, Osama; Abdel Aziz, Rahma. (2021). Financial inclusion and its role in promoting social responsibility in banks. University of Chlef, Algeria. Tabna Journal of Academic Scientific Studies. 4(2), p. 648.

¹⁴Ikram Malousi, Financial Inclusion as a Mechanism for Accelerating Economic Development: A Case Study of Algeria, Master's Thesis, Abdelhafidh Boussouf University Center, Mila, Algeria, 2021, p. 7.

Section Three

Analysis of Electronic Payment Methods Indicators and the Comprehensive Financial Inclusion Index in Iraq (2017–2023)

Table (1)
Electronic Payment Methods Indicators and the Comprehensive Financial Inclusion Index in Iraq
for the period (2017–2023)

) 2023-2017(The period

Aggregate Index	POS devices	ATMs	ElectronicCards	Years
20.87	6061	656	12464008	2017
22.09	8825	865	15449612	2018
25.4	13903	1014	12326626	2019
25.8	21336	1340	13134085	2020
33.5	23033	1566	14906294	2021
41.6	10718	2223	16202771	2022
48.58	23066	4921	19754229	2023

Source: Prepared by researchers based on

- Central Bank of Iraq, Payments Department, for the years (2017-2023)
- Central Bank of Iraq, Economic Report, for the years (2017-2023)
- Central Bank of Iraq, Financial Stability Report, for the years (2017-2023)

It is noted from Table (1) and the data that there has been a gradual growth in the use of electronic payment methods in Iraq during the period (2017-2023), which is positively reflected in the improvement of the aggregate index of financial inclusion. Electronic cards witnessed a significant increase from (12,464,008) cards in 2017 to approximately (19,754,229) cards in 2023. This increase reflects the increased reliance of individuals on digital means to conduct their financial transactions, in addition to government decisions to localize employee salaries. Meanwhile, automated teller machines (ATMs) witnessed an increase from (656) machines

in 2017 to (4,921) in 2023, which indicates Banks' efforts to expand the infrastructure for banking services, the number of points of sale (POS) also witnessed a significant increase, rising from (6061) devices in 2017 to (23066) or technical changes in the market or a redistribution of devices. As for the aggregate index of financial inclusion, it witnessed a significant growth, rising from (20.87) in 2017 to (48.58) in 2023, more than doubling during this period. This increase reflects a clear improvement in the extent of access to digital financial devices in 2023, despite recording a decline in 2022 to reach () devices. This fluctuation may reflect regulatory services and their use by individuals.

Section Three

The Standard Aspect of the Research

Second: Model Description and Formulation

:1 Model Description

This study relied on annual data for the independent variables (EC, ATM, POS) and the dependent variable (the aggregate financial inclusion index). The data was standardized and converted into monthly data using the statistical program (Eviews 12), with (69) observations. This data allows us to identify the impact of the independent variables on the dependent variable. The model variables are divided according to the following table :

Table () Functional description of the variables used in the model and their codes

type	symbol	Variable name in English	Variable name in Arabic	ت
مستقل	EC	Electronic Cards	البطاقات الالكترونية	1
مستقل	ATM	ATM machines	اجهزة الصراف الالى	2
مستقل	POS	Points of sale	نقاط البيع	3
تابع	AFL	Financial Inclusion Aggregate Index	المؤشر التجميعي للشمول المالي	4

Source: Prepared by the researchers

2: Model formulation

The model was used to determine the extent of the impact of the independent variables (number of electronic cards, number of ATMs, and points of sale) on the dependent variable (the aggregate financial inclusion index) for Iraqi banks. After describing the variables, they can be expressed using the following formula:

$$AFL = \beta_0 + \beta_1 (EC) + \beta_2 (ATM) + \beta_2(POS) + U_1..... (1)$$

Third: Estimating and measuring the impact of electronic payment method variables on

1- Results of the stability test for the study variables (Phillips-Perron)

To verify the stability of the time series for the independent variables (EC, ATM, POS) and the dependent variable (AFL), in light of the Phillips-Perron test, it is clear from the results of Table (2) that the time series are not stationary at the original level for all independent and dependent variables. The results of the unit root test showed that the probability value (Prob) was greater than 5%, indicating that the results are not significant. Therefore, the null hypothesis, which states the presence of a unit root in the time series, is accepted, and the alternative hypothesis is rejected. To avoid the problem of spurious regression, the researchers took the first difference of the time series. The results showed that the probability value became less than 5%, in the absence of a constant term and a general trend, which means rejecting the null hypothesis and accepting the alternative hypothesis, which states It states that the data become stationary at the first difference of the integral I(1).

Table (2) Phillips-Perron (P.P) test results

Unit Root Tesst (ADF)						
Variables	Level			1 differences		
	Constant	Constant & Trend	Non	Constant	Constant & Trend	Non
	Prob.	Prob.	Prob.	Prob.	Prob.	Prob.
EC	0.8113	0.6629	0.9325	0.0000	0.0000	0.0000
ATM	0.1330	0.3341	0.2115	0.0155	0.0603	0.0009
POS	0.6849	0.1068	0.9496	0.0031	0.0236	0.0001
AFL	0.8994	0.4617	0.8739	0.0313	0.1060	0.0025

Source: Prepared by the researchers based on the outputs of the statistical program (Eviews 12)

2- Bound Test for Cointegration

To test the existence of a long-term equilibrium relationship and cointegration between the variables, the bound test (F-statistic) was used. The results of Table (3) show that the calculated F-statistic value reached (9.208706), which is greater than the upper critical values (4.66) and the lower (3.65) at a significance level of 1%. Accordingly, the null hypothesis is rejected and the alternative hypothesis is accepted. This clearly indicates the existence of a long-term equilibrium relationship and cointegration between the independent and dependent variables, which supports the research hypothesis.

Table (3) Bound Test Results

(Test results) Bound Test		
F- Statistic = 9.208706		
Morale level	Bound 1~(0) Minimums	Bound 1~ (1) upper limits
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source: Prepared by the researcher based on the results of the statistical program (Eviews 12)

3- Autocorrelation and Heteroskedasticity Test.

The estimated model was tested to ensure the absence of autocorrelation using the Breusch-Godfrey Serial Correlation LM Test, in addition to the Heteroskedasticity test (ARCH) to verify the absence of heteroskedasticity at a 5% significance level. Table (4) shows that the model does not suffer from the problem of heteroskedasticity or autocorrelation, as the probability value exceeds 5%. This supports the validity and accuracy of the results of the model used.

Table (4) Results of testing the problem of self-correlation and the lack of stability of variance homogeneity

Breiusch –Godfrey Serial Corrlation LM Test			
F- Statistic	0.001658	ProP.F	0.9983
Obs*R-Squared	0.003718	Prob.Chi-Squared	0.9981
Heterioskedasticity test: AR.CH			
F- Statistic	0.052944	ProP.F	0.8186
Obs*R-Squared	0.054232	Prob.Chi-Squared	0.8159

4.Error Correction Model (ECM) according to the ARDL methodology

The Error Correction Model (ECM) is an important method for describing the relationship between variables over the long and short term, as it demonstrates the time-regression effect of the variables included in the model. The ECM model can be applied to small samples, unlike previous methods, which cannot be used for such samples. Table (5) shows that the CointEq error term is (-1)* and the error correction coefficient value reached (-0.069878), which is negative and significant, which are the two basic conditions of this methodology. The error term value also indicates a correction from the short term to the long term at a rate of (14%), which is consistent with the actual reality of electronic payment methods, as they represent the increase in the market value of the stock of the bank in the research sample.

Table (5) Short-term estimators and error correction (ECM)

ECM Reegression				
Case 2: Resitricted Conistant and No Treend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEC)	18.89846	0.807885	23.39251	0.0000
D(LATM)	-4.060351	0.333904	-12.16025	0.0000
CointEq(-1)*	-0.069878	0.029072	-2.403580	0.0187

Source: Prepared by researchers based on the results of the statistical program (Eviews 12)

Estimating the long-term relationship using the ARDL methodology

It is noted from the results of Table (6) that the independent variable (EC) has a positive and statistically significant relationship at the 1% level, indicating that an increase in this variable leads to an increase in the

dependent variable (AFL) in the long run. The independent variable (ATM) has a negative and significant effect, meaning it has an inverse relationship with the dependent variable. Finally, the variable (POS) has no effect and is not statistically significant.

Table (6) Results of estimating the long-term relationship according to the (ARDL) methodology

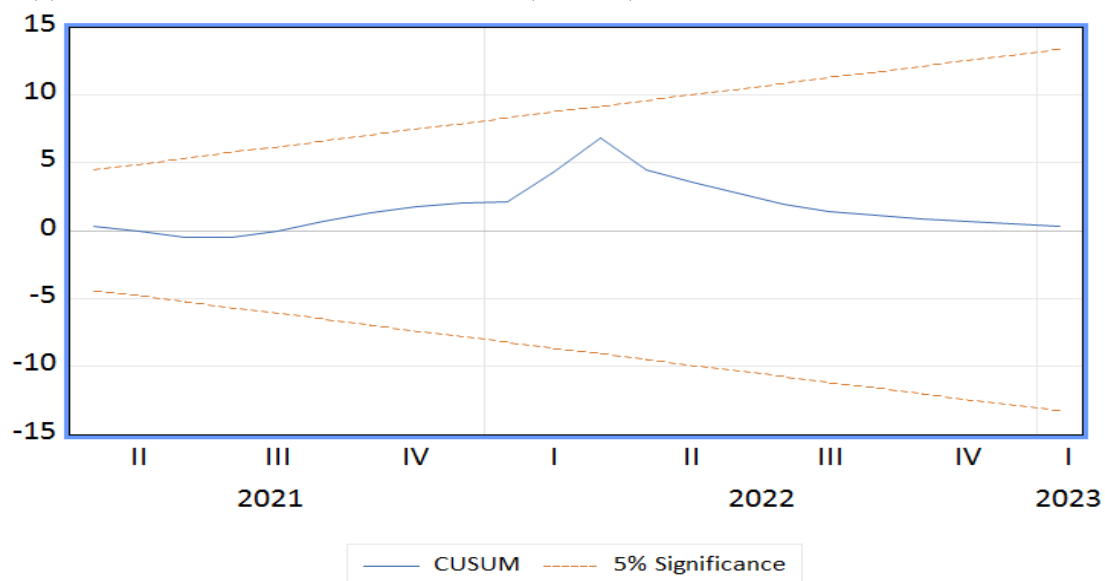
Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EC	22.64415	6.600872	3.430479	0.0010
ATM	6.192151	2.016577	-3.070625	0.0030
POS	0.404224	1.396494	0.289456	0.7730
C	328.4144	100.2166	-3.277045	0.0016
EC = L AFL - (22.6442*LEC -6.1922*LATM + 0.4042*LPOS - 328.4144)				

Source: Prepared by researchers based on the results of the statistical program (Eviews 12)

Model Stability Test: Cumulative Sum of Residuals

The CUSUM test was used to verify the stability of the model coefficients estimated using the ARDL method in the short and long runs. This test was developed by Brown et al. and relies on a graph to determine stability. If the line remains within the critical limits at a 5% significance level, the null hypothesis of stable parameters is accepted. If the line exceeds these limits, the alternative hypothesis of instability is accepted. Referring to Figure (1), it is clear that the line falls within the critical limits and oscillates around zero, indicating the stability of the model coefficients in both the short and long runs.

Figure (1) Results of the cumulative sum of residuals (CUSUM) test



Source: Prepared by researchers based on the results of the statistical program (Eviews 12)

Conclusions and Recommendations.

1. The analysis revealed a direct relationship between the development of electronic payment methods and the improvement of financial inclusion in Iraq. The increased prevalence of cards, ATMs, and points of sale (POS) contributed to raising the aggregate financial inclusion index.
2. The ARDL model demonstrated the existence of a cointegrating relationship and a long-term, positive equilibrium relationship that moves from all independent variables (number of ATMs, number of cards, POS) toward the dependent variable (the aggregate financial inclusion index) of Iraqi banks.
3. There is an effect of the number of electronic cards and ATMs on the dependent variable, the aggregate financial inclusion index, in the long run, given that the prob value (probability) was less than 10%.
4. There was no clear effect of the independent variable, POS, on the dependent variable, the aggregate financial inclusion index, in the long run, given that the prob value was greater than 10%.
5. Electronic payment methods face a number of challenges, including social and cultural ones, which hinder individuals. The differences in cultural and social levels, as well as the lack of banking awareness in Iraqi society, lead most customers to continue to rely on traditional banking transactions.

Recommendations

1. Banks should strengthen financial education campaigns to raise citizens' awareness of the importance and advantages of using electronic payment methods in their daily transactions, as well as the importance of engaging in the formal financial system and reducing reliance on cash. This should be done by launching national awareness campaigns, especially in remote areas.
2. Marketing policies and strategies should be implemented to increase the spread of direct points of sale (POS) in markets, shops, restaurants, hotels, pharmacies, and other commercial activities.
3. Special programs should be developed to enable women, youth, and rural residents to access financial services through customized services tailored to their economic and social circumstances.
4. The Central Bank of Iraq and commercial banks should adopt a clear policy focused on providing electronic payment services at reduced prices and of high quality, including reducing fees imposed on electronic transactions such as withdrawals, transfers, and payments, and encouraging banking competition in service provision.

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