

# “The impact of financial inclusion on stimulating entrepreneurship: Empirical evidence from the Iraqi economy”

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# THE IMPACT OF FINANCIAL INCLUSION ON STIMULATING ENTREPRENEURSHIP: EMPIRICAL EVIDENCE FROM THE IRAQI ECONOMY

## Abstract

Financial inclusion has become a key policy instrument for promoting inclusive growth, particularly in oil-dependent economies where traditional growth channels may not effectively support entrepreneurial activity. This study aims to analyze the impact of financial inclusion on stimulating entrepreneurship in Iraq by examining the relationship between indicators of financial access, financial usage, and financial infrastructure and entrepreneurial activity, as well as investigating the short-run and long-run dynamics of this relationship in a manner that supports economic diversification. The study employs monthly data covering the period 2020–2024 and applies the autoregressive distributed lag methodology to test for cointegration, estimate short-run and long-run coefficients, and measure the speed of adjustment toward long-run equilibrium. The empirical results show that bank accounts and automated teller machines have positive and statistically significant long-run effects on entrepreneurship, with elasticities of 1.415 and 0.539, respectively, while electronic payment cards have a positive but statistically insignificant effect. Education expenditure and economic growth also exert positive and significant effects, with elasticities of 0.536 and 0.332, respectively. These findings indicate that financial access, financial infrastructure, human capital development, and favorable economic conditions contribute to entrepreneurial activity in Iraq. The findings confirm that financial inclusion and human capital development represent more effective channels for stimulating entrepreneurial activity and advancing economic diversification. They also highlight the importance of expanding digital financial services and enhancing access to the formal financial system as effective mechanisms for supporting entrepreneurship and reducing dependence on oil-related economic activity.

## Keywords

financial inclusion, entrepreneurship, human capital, economic diversification, Iraq

## JEL Classification

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## INTRODUCTION

Financial inclusion has become a key component of economic development strategies due to its role in expanding access to formal financial services and integrating broader segments of society into the financial system. By facilitating access to bank accounts, electronic payment services, and financial infrastructure, financial inclusion enhances economic participation, improves the efficiency of resource allocation, and supports the development of private sector activities. Consequently, it has received growing attention from policymakers as a tool for promoting inclusive growth, reducing economic disparities, and strengthening economic resilience.

The importance of financial inclusion is particularly evident in developing economies, where limited access to financial services often constrains entrepreneurial activity and restricts opportunities for busi-



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ness creation and expansion. Entrepreneurship is widely recognized as a key driver of job creation, innovation, and private sector development, making it an essential element of sustainable economic growth and economic diversification.

In Iraq, efforts to enhance financial inclusion have accelerated in recent years through the development of digital financial services, the expansion of electronic payment instruments, and improvements in financial infrastructure. These initiatives are particularly important given the structural characteristics of the Iraqi economy, which remains highly dependent on oil revenues and continues to face persistent challenges related to economic diversification. In such an environment, expanding access to financial services may provide new opportunities to stimulate entrepreneurial activity and strengthen the role of the private sector.

Despite the growing attention given to financial inclusion and the expansion of financial services in Iraq, empirical evidence regarding the extent to which these developments have contributed to stimulating entrepreneurial activity remains limited. This issue is particularly important in the context of the Iraqi economy, where dependence on oil revenues continues to constrain economic diversification efforts. Consequently, an important research problem arises concerning whether improvements in financial inclusion have translated into meaningful support for entrepreneurship and whether financial inclusion can serve as an effective mechanism for promoting private sector development and economic diversification in Iraq.

## 1. LITERATURE REVIEW AND HYPOTHESES

Financial inclusion has emerged as a central concept in contemporary economic literature, particularly in developing economies characterized by structural and financial constraints. It refers to the ability of individuals and businesses, especially small and micro enterprises, to access and use formal financial services in a secure, affordable, and sustainable manner (Urueña-Mejía et al., 2023). From a theoretical perspective, financial inclusion is closely linked to endogenous growth theory (Romer, 1990), which emphasizes the role of financial systems in mobilizing savings, allocating resources efficiently, fostering innovation, and stimulating entrepreneurial activity. By reducing transaction costs, mitigating information asymmetries, and easing credit constraints, financial inclusion enhances individuals' ability to establish and sustain business ventures (Zogning, 2023). Likewise, credit constraints theory (Evans & Jovanovic, 1989) argues that limited access to finance represents a major obstacle to entrepreneurship, particularly in developing economies, while the institutional perspective highlights the importance of regulatory quality, financial literacy, and institutional effectiveness in determining the developmental outcomes of financial inclu-

sion (Dutta & Meierrieks, 2021). These theoretical foundations suggest that financial inclusion can play a crucial role in promoting entrepreneurship, particularly in economies facing structural and institutional challenges such as Iraq. These theoretical propositions have been widely tested in the empirical literature across different countries, institutional environments, and methodological approaches, providing substantial evidence on the role of financial inclusion in promoting entrepreneurship.

A substantial body of empirical literature supports the view that financial inclusion contributes positively to entrepreneurial activity through expanding access to financial services and reducing financing constraints. Recent evidence from Asia emphasizes the growing role of digital financial inclusion in stimulating entrepreneurial activity and innovation. Studies conducted in China show that digital financial inclusion promotes rural entrepreneurship, facilitates business creation, and reduces credit constraints, although the magnitude of these effects varies according to psychological characteristics, gender, and human capital endowments (Chen et al., 2023; Wei, 2024; Yue, 2024). Similar evidence indicates that financial inclusion enhances entrepreneurial performance by improving access to finance and encouraging

the effective utilization of human capital, particularly among small and medium-sized enterprises (Cao & Zhang, 2022; Fan & Zhang, 2017; Wei & Sutunyarak, 2025). Collectively, these studies suggest that expanding financial access and usage can strengthen entrepreneurial ecosystems by facilitating investment, innovation, and business formation.

The literature further highlights the importance of institutional quality, financial literacy, and technological advancement in strengthening the relationship between financial inclusion and entrepreneurship. Evidence from African economies demonstrates that financial inclusion positively influences entrepreneurship and small-business development, particularly when supported by appropriate regulatory frameworks and digital financial services (Ajide, 2020; Teju, 2025). Institutional quality, access to banking services, and savings mechanisms have also been found to reinforce entrepreneurial sustainability and microenterprise development (Fomum & Opperman, 2023; Gakpa, 2023). Moreover, financial literacy, debt management, and business registration appear to be important determinants of financial inclusion and entrepreneurial success, emphasizing the complementary role of institutional and knowledge-based factors (Tia et al., 2023). Recent studies also underline the contribution of financial technology and digitalization in expanding financial access and supporting entrepreneurial activity. Bibliometric evidence identifies financial technology, financial literacy, and the regulatory environment as the principal drivers shaping the evolution of financial inclusion research and strengthening its contribution to entrepreneurship (Pranajaya et al., 2024).

Another important strand of the literature focuses on women's entrepreneurship and sustainable livelihoods. Evidence from Latin America and Asia indicates that financial inclusion plays a significant role in supporting female entrepreneurship and enhancing business performance. Studies from Latin America suggest that financial inclusion can be achieved through multiple institutional and political pathways rather than a single necessary condition, with political freedom representing an important enabling factor (Kimmitt & Muñoz, 2017). Likewise, evidence from Mexico reveals a

positive relationship between financial inclusion and women's participation in formal entrepreneurial activities (Fareed et al., 2017). Research from India further demonstrates that financial inclusion improves the efficiency and performance of women-owned enterprises and contributes to sustainable livelihoods through both direct and indirect channels (Mahato & Jha, 2023; Rani & Sundaram, 2023). Moreover, entrepreneurship, financial inclusion, and economic growth appear to reinforce one another within entrepreneurial ecosystems (Sharma et al., 2023), while government-supported financial inclusion programs strengthen women's entrepreneurial participation and economic independence (Goel & Madan, 2019). Collectively, these findings suggest that financial inclusion not only expands entrepreneurial opportunities but also contributes to broader socio-economic empowerment through institutional support and gender-inclusive development.

Evidence from developing economies provides further support for the positive association between financial inclusion and entrepreneurship. Studies from Nigeria indicate that access to financial services promotes small-business growth, employment generation, and entrepreneurial development (Ibekwe et al., 2021; Inegbedion et al., 2022; Ogidi & Pam, 2021). Financial inclusion has also been found to improve profitability, productivity, and employment in small enterprises, while financial literacy enhances the effectiveness of financial integration (Ibrahim, 2024). Similar findings emerge from Colombia, where financial inclusion facilitates the integration and growth of microenterprises, although outcomes differ according to gender and educational attainment (Urueña-Mejía et al., 2023). In Vietnam, human capital moderates the relationship between financial inclusion and entrepreneurship (Pham et al., 2025), while evidence from Bangladesh highlights the complementary role of entrepreneurship education and business incubators in strengthening entrepreneurial intentions (Asaduzzaman et al., 2026).

The relationship between financial inclusion and entrepreneurship has also been examined within broader institutional and economic environments. Evidence from Saudi Arabia indicates that financial inclusion stimulates entrepreneurship, particularly when supported by strong econom-

ic conditions and effective intellectual property protection systems (Babiker & Albouzidi, 2025). Similarly, financial technology has been shown to enhance both financial inclusion and entrepreneurial activity, although structural challenges such as weak infrastructure and limited digital literacy may constrain its effectiveness (Atta, 2025). Studies focusing on micro-industrial enterprises further reveal that financial inclusion contributes to sustainable business growth by facilitating the use of financial products, strengthening financial management practices, and supporting digital transformation among small businesses (Suárez Mayorga et al., 2024).

Research from advanced economies, together with broader cross-country evidence, offers additional insights into the mechanisms through which financial systems affect entrepreneurial activity. Comparative evidence from Europe and the United States suggests that financial constraints represent a major obstacle to latent entrepreneurship, whereas administrative burdens negatively affect both latent and actual entrepreneurial activities (Grilo & Thurik, 2005). From a broader perspective, the development of efficient financial systems promotes innovation and economic growth by allocating resources more effectively and reducing financing frictions (King & Levine, 1993). Likewise, cross-country evidence indicates that the interaction between technological development and institutional quality contributes to improving business environments by reducing start-up costs and facilitating entrepreneurial activity, despite introducing additional regulatory complexities (Asongu et al., 2018).

Recent empirical evidence further emphasizes that the relationship between financial inclusion and entrepreneurship extends beyond financial access alone to encompass digital payment systems, institutional quality, financial development, and broader socio-economic conditions. Studies from Asia indicate that mobile payment technologies and effective regulatory frameworks significantly strengthen entrepreneurial activity, while the interaction between institutional quality and digital payment systems amplifies the contribution of financial innovation to new business creation (Chen & Tran, 2025). Likewise, financial development and financial openness have been

shown to stimulate entrepreneurship by improving resource allocation, facilitating financial transactions, and expanding access to capital for new ventures, thereby supporting innovation and business creation (Amin et al., 2021).

The literature also suggests that financial inclusion promotes entrepreneurship by expanding economic opportunities for disadvantaged and socially excluded groups. Evidence from India indicates that improving access to financial services and affordable credit enhances entrepreneurial participation among marginalized communities, reduces the adverse effects of social discrimination, and supports employment creation and economic growth (Garg et al., 2026; Arora & Khanal, 2024). Similar findings reveal that financial inclusion and fintech contribute to greater labor market participation among young people, while education, income, mobile-phone usage, and internet access facilitate financial inclusion, whereas weak documentation systems, religious constraints, and high financial service costs continue to hinder its expansion (Elmasmari & Amaghous, 2024).

Beyond entrepreneurship creation, financial inclusion also reinforces the broader developmental impact of entrepreneurial activity. Evidence from Ghana demonstrates that financial inclusion moderates the relationship between entrepreneurship and energy poverty, reducing its adverse effects once financial inclusion reaches sufficient levels, thereby highlighting its role in maximizing the socio-economic benefits of entrepreneurial development (Asongu & Odhiambo, 2023). Likewise, studies from Mali show that financial inclusion among young people is strengthened by education, employment, household income, and bank account ownership, while savings and access to credit significantly increase entrepreneurial intentions, particularly in the agricultural sector (Koloma, 2021). Collectively, these findings reinforce the view that financial inclusion promotes entrepreneurship not only by easing financial constraints but also by strengthening institutional capacity, expanding digital financial services, and improving economic opportunities for vulnerable population groups.

Overall, the empirical literature provides substantial evidence that financial inclusion promotes entrepreneurship, although the magnitude and

transmission channels of this relationship vary across institutional, technological, and socio-economic contexts. Despite this extensive body of research, several important gaps remain. First, empirical evidence on the Iraqi economy remains very limited. Second, most previous studies rely on annual or other low-frequency data that are unable to capture recent developments in financial inclusion and entrepreneurial activity. Third, relatively few studies employ econometric approaches capable of simultaneously examining both the short-run and long-run dynamics of this relationship. These limitations provide a strong justification for the present study, which investigates the impact of financial inclusion on entrepreneurship in Iraq using monthly data for the period 2020–2024 and the ARDL model, thereby offering both methodological and context-specific contributions to the existing literature.

Based on the foregoing theoretical and empirical discussion, the study aims to analyze the impact of financial inclusion on stimulating entrepreneurship in Iraq by examining the relationship between indicators of financial access, financial usage, and financial infrastructure and entrepreneurial activity, as well as investigating the short-run and long-run dynamics of this relationship in a manner that supports economic diversification.

Accordingly, the following hypotheses are proposed:

*H1: Financial inclusion has a positive and statistically significant effect on entrepreneurship in the Iraqi economy.*

*H1a: The number of bank accounts positively affects entrepreneurship.*

*H1b: The number of electronic payment cards positively affects entrepreneurship.*

*H1c: The number of ATMs positively affects entrepreneurship.*

*H2: Education expenditure positively affects entrepreneurship.*

*H3: Economic growth positively affects entrepreneurship.*

## 2. METHODOLOGY AND DATA

### 2.1. Description of variables and data

This section presents the data employed in the econometric analysis and describes the variables included in the research model used to examine the impact of financial inclusion on stimulating entrepreneurship.

The study relies on monthly secondary data covering the period 2020–2024. The dataset was compiled from official Iraqi sources, including the Central Bank of Iraq, the Ministry of Planning, and other official statistical publications. These sources provide consistent and reliable information on financial inclusion indicators, entrepreneurial activity, education expenditure, and macroeconomic performance. The monthly frequency allows capturing both short-run fluctuations and long-run dynamics more effectively than annual observations, making it appropriate for the ARDL approach adopted in this study.

Entrepreneurship represents the dependent variable in the model and is measured by the number of newly registered businesses or firms (ENT). The main independent variables, reflecting financial inclusion indicators, include the number of bank accounts (ACC), the number of electronic payment cards (CARD), and the number of automated teller machines (ATM). These variables represent some of the key indicators used by the Central Bank of Iraq to measure the level of financial inclusion, as they capture access to financial services, the use of financial products, and the development of financial service infrastructure.

To control for the effects of macroeconomic factors that may influence entrepreneurship independently of financial inclusion, a set of control variables was incorporated. These include the economic growth rate (EG), which reflects the level of economic activity and aggregate demand, and education expenditure (EDU), which represents investment in human capital and entrepreneurial capabilities. Including these variables helps control for broader macroeconomic and social influences, thereby reducing potential bias in coeffi-

**Table 1.** Model variables and measurements

| Variable                  | Symbol | Measurement                                           | Variable type             | Expected sign |
|---------------------------|--------|-------------------------------------------------------|---------------------------|---------------|
| Entrepreneurship          | ENT    | Number of newly registered projects/<br>firms         | Dependent variable        |               |
| Bank accounts             | ACC    | Total number of bank accounts                         | Main independent variable | +             |
| Electronic payment cards  | CARD   | Total number of issued electronic cards               | Main independent variable | +             |
| Automated teller machines | ATM    | Total number of operating ATMs                        | Main independent variable | +             |
| Education expenditure     | EDU    | Education expenditure/public spending<br>on education | Control variable          | +             |
| Economic growth           | EG     | Change in Gross Domestic Product (GDP)                | Control variable          | +             |

cient estimation and enhancing the robustness of the econometric results.

The logarithmic transformation was adopted to standardize the scale of the variables and reduce large differences in their magnitudes, thereby improving data consistency and the interpretation of the econometric results.

## 2.2. Model specification

Based on the theoretical foundations and previous empirical studies, an econometric model was constructed to analyze the impact of financial inclusion on stimulating entrepreneurship in the Iraqi economy, according to the following specification:

$$\begin{aligned}
 \Delta ENT_t = & \alpha_0 + \sum_{i=1}^n \beta_1 \Delta ENT_{t-i} \\
 & + \sum_{i=1}^n \beta_2 \Delta ACC_{t-i} + \sum_{i=1}^n \beta_3 \Delta CARD_{t-i} \\
 & + \sum_{i=1}^n \beta_4 \Delta ATM_{t-i} + \sum_{i=1}^n \beta_5 \Delta EG_{t-i} \\
 & + \sum_{i=1}^n \beta_6 \Delta EDU_{t-i} + \gamma_1 ENT_{t-1} \\
 & + \gamma_2 ACC_{t-1} + \gamma_3 RCARD_{t-1} \\
 & + \gamma_4 ATM_{t-1} + \gamma_5 EG_{t-1} \\
 & + \gamma_6 EDU_{t-1} + \varepsilon_t,
 \end{aligned} \quad (1)$$

where  $\Delta$ : the first difference of the time series;  $\beta$ : short-run coefficients;  $\gamma$ : long-run coefficients;  $\alpha_0$ : the constant term (intercept);  $\varepsilon_t$ : the random error term.

## 3. RESULTS

### 3.1. Unit root test

The unit root test represents one of the fundamental methodological steps in time series analysis, as it aims to verify the degree of stationarity of the variables before estimating the econometric model. This step is particularly important when using Autoregressive Distributed Lag (ARDL) models, since including non-stationary variables at their levels may lead to spurious relationships and misleading econometric results.

Accordingly, the study employs the Augmented Dickey–Fuller (ADF) test to examine the presence of a unit root in the time series of the study variables, both at the level and the first difference, in order to determine the order of integration for each variable (Dickey & Fuller, 1979). The ADF test is among the most widely used tests in economic literature due to its ability to address the problem of autocorrelation in the model residuals by incorporating appropriate lag lengths.

The results reported in Table 2 for the Augmented Dickey–Fuller (ADF) test indicate that all study variables are non-stationary at their level form (I0) across all specifications (with intercept, with intercept and trend, and without both). However, the variables become stationary after taking the first difference, indicating that they are integrated of order one (I1). Accordingly, these results support the appropriateness of applying the ARDL model to analyze both the short-run and long-run relationships among the study variables.

**Table 2.** Unit root test results (ADF)

|                          |             | At level            |          |         |         |         |               |
|--------------------------|-------------|---------------------|----------|---------|---------|---------|---------------|
|                          |             | ENT                 | ACC      | CARD    | ATM     | EDU     | EG            |
| With constant            | t-statistic | -1.1415             | -2.5237  | -0.9177 | -0.7773 | -1.2808 | 0.2403        |
|                          | Prob.       | 0.6936              | 0.1154   | 0.7759  | 0.8180  | 0.6329  | <b>0.9730</b> |
|                          |             | n0                  | n0       | n0      | n0      | n0      | n0            |
| With constant & trend    | t-statistic | -2.0417             | -3.0660  | -3.1590 | -1.4334 | 0.2115  | -1.6046       |
|                          | Prob.       | 0.5667              | 0.1244   | 0.1028  | 0.8407  | 0.9976  | <b>0.7794</b> |
|                          |             | n0                  | n0       | n0      | n0      | n0      | n0            |
| Without constant & trend | t-statistic | -0.984              | -1.0245  | 0.4925  | -0.3700 | 1.8974  | 2.1979        |
|                          | Prob.       | 0.2871              | 0.2716   | 0.8188  | 0.5470  | 0.9853  | <b>0.9928</b> |
|                          |             | n0                  | n0       | n0      | n0      | n0      | n0            |
|                          |             | At first difference |          |         |         |         |               |
|                          |             | d(ENT)              | d(ACC)   | d(CARD) | d(ATM)  | d(EDU)  | d(EG)         |
| With constant            | t-statistic | -7.5226             | -11.9003 | -7.5144 | -7.0031 | -6.6583 | -7.0048       |
|                          | Prob.       | 0.0000              | 0.0000   | 0.0000  | 0.0000  | 0.0000  | <b>0.0000</b> |
|                          |             | ***                 | ***      | ***     | ***     | ***     | ***           |
| With constant & trend    | t-statistic | -7.4615             | -11.7940 | -7.4441 | -6.9494 | -6.9066 | -7.0556       |
|                          | Prob.       | 0.0000              | 0.0000   | 0.0000  | 0.0000  | 0.0000  | 0.0000        |
|                          |             | ***                 | ***      | ***     | ***     | ***     | ***           |
| Without constant & trend | t-statistic | -7.5654             | -11.9812 | -7.3411 | -6.9855 | -6.2912 | -6.5428       |
|                          | Prob.       | 0.0000              | 0.0000   | 0.0000  | 0.0000  | 0.0000  | <b>0.0000</b> |
|                          |             | ***                 | ***      | ***     | ***     | ***     | ***           |

Note: (\*) Significant at the 10%; (\*\*) Significant at the 5%; (\*\*\*) Significant at the 1% and (no) Not Significant

### 3.2. Cointegration test using the bounds testing approach

The bounds test, within the framework of the Autoregressive Distributed Lag (ARDL) model, is used to detect the existence of a long-run cointegration relationship among the study variables. This test relies on comparing the calculated F-statistic with the critical values of the lower bound (I0) and upper bound (I1) at different sig-

nificance levels, following the methodology of (Pesaran et al., 2001). The null hypothesis assumes no cointegration relationship among the variables, while the alternative hypothesis indicates the presence of a long-run equilibrium relationship.

The results of the bounds test, as presented in Table 3, show that the calculated F-statistic is 7.947871, which clearly exceeds all upper bound critical values at all significance levels. Accordingly, the

**Table 3.** Bounds test results

| Test statistic     | Value     | Signif. | I(0)                  | I(1)  |
|--------------------|-----------|---------|-----------------------|-------|
|                    |           |         | Asymptotic: n = 1000  |       |
| F-statistic        | 7.947871  | 10%     | 2.26                  | 3.35  |
| K                  | 5         | 5%      | 2.62                  | 3.79  |
|                    |           | 2.5%    | 2.96                  | 4.18  |
|                    |           | 1%      | 3.41                  | 4.68  |
| Actual sample size | 56        | Signif. | I(0)                  | I(1)  |
|                    |           |         | Finite sample: n = 60 |       |
|                    |           | 10%     | 2.385                 | 3.565 |
|                    |           | 5%      | 2.817                 | 4.097 |
| Test statistic     | Value     | 1%      | 3.783                 | 5.338 |
|                    |           | Signif. | I(0)                  | I(1)  |
|                    |           | 10%     | -2.57                 | -3.86 |
| t-statistic        | -5.320790 | 5%      | -2.86                 | -4.19 |
|                    |           | 2.5%    | -3.13                 | -4.46 |
|                    |           | 1%      | -3.43                 | -4.79 |

null hypothesis is rejected and the alternative hypothesis is accepted, confirming the existence of a long-run cointegration relationship among the study variables. Furthermore, the t-test results indicate that the calculated t-statistic ( $-5.320790$ ) is lower than all critical values at different significance levels, which further supports the existence of a long-run equilibrium relationship among the model variables.

### 3.3. Error correction model results and short-run relationship analysis

The results of the Conditional Error Correction Regression, as shown in Table 4, support the existence of a long-run equilibrium relationship among the study variables, consistent with the Bounds Test results based on the methodology of Pesaran et al. (2001). The coefficient of the lagged dependent variable,  $ENT(-1)$ , is negative and statistically significant at the 1% level (coefficient =  $-0.540445$ ,  $p = 0.0000$ ), indicating a strong adjustment mechanism toward the long-run equilibrium following short-run deviations.

In the short run, the results reveal heterogeneous effects of the financial inclusion indicators on entrepreneurship. The change in the number of bank accounts,  $D(ACC)$ , has a positive and statistically significant effect (coefficient =  $0.439716$ ,  $p = 0.0064$ ), indicating that greater access to formal bank accounts contributes positively to entrepreneurial activity. Electronic payment cards also exhibit a positive short-run effect. The contemporaneous change in cards,  $D(CARD)$ , is positive and statistically significant (coefficient =  $0.503361$ ,  $p = 0.0076$ ). Although its first lag is statistically insignificant, the second and third lags are positive and significant (coefficients =  $0.513159$  and  $0.449941$ , with p-values of  $0.0117$  and  $0.0304$ , respectively), suggesting that the positive effect of electronic payment cards on entrepreneurship persists across subsequent periods.

In contrast, the short-run effect of ATMs is relatively weak. The contemporaneous change in ATMs,  $D(ATM)$ , is negative but statistically insignificant (coefficient =  $-0.012929$ ,  $p = 0.9181$ ), while its first lag is also negative and only weakly significant at the 10% level (coefficient =  $-0.218239$ ,  $p =$

$0.0805$ ). This finding may reflect the gradual shift from traditional cash-based banking infrastructure toward digital payment channels.

Education expenditure exhibits mixed short-run dynamics. Its contemporaneous change,  $D(EDU)$ , is positive and weakly significant at the 10% level (coefficient =  $0.202999$ ,  $p = 0.0858$ ), whereas its first lag is negative and statistically significant at the 5% level (coefficient =  $-0.314471$ ,  $p = 0.0365$ ), and the second lag is statistically insignificant. This suggests that the short-run effect of education expenditure on entrepreneurship is not uniform across periods.

Finally, economic growth does not exert a significant contemporaneous short-run effect on entrepreneurship, as  $D(EG)$  is statistically insignificant (coefficient =  $0.018837$ ,  $p = 0.8817$ ). However, its first lag is negative and statistically significant at the 5% level (coefficient =  $-0.286952$ ,  $p = 0.0364$ ). This result may reflect the structural characteristics of the Iraqi economy, where economic growth is largely driven by the oil sector and may not immediately translate into stronger entrepreneurial activity.

**Table 4.** Error correction model and short-run estimation results

| Variable    | Coefficient | Std. Error | t-Statistic | Prob.  |
|-------------|-------------|------------|-------------|--------|
| C           | -47.75390   | 10.55219   | -4.525495   | 0.0001 |
| ENT(-1)*    | -0.540445   | 0.101572   | -5.320790   | 0.0000 |
| ACC(-1)     | 0.764587    | 0.172427   | 4.434269    | 0.0001 |
| CARD(-1)    | 0.157205    | 0.245425   | 0.640539    | 0.5261 |
| ATM(-1)     | 0.291426    | 0.068603   | 4.248018    | 0.0002 |
| EDU(-1)     | 0.289800    | 0.093340   | 3.104796    | 0.0038 |
| EG(-1)      | 0.179160    | 0.077586   | 2.309173    | 0.0271 |
| D(ENT(-1))  | -0.260762   | 0.129400   | -2.015172   | 0.0518 |
| D(ENT(-2))  | -0.177194   | 0.128596   | -1.377916   | 0.1772 |
| D(ENT(-3))  | -0.181976   | 0.121904   | -1.492780   | 0.1447 |
| D(ACC)      | 0.439716    | 0.151372   | 2.904878    | 0.0064 |
| D(CARD)     | 0.503361    | 0.177424   | 2.837052    | 0.0076 |
| D(CARD(-1)) | 0.312662    | 0.217114   | 1.440083    | 0.1590 |
| D(CARD(-2)) | 0.513159    | 0.192543   | 2.665164    | 0.0117 |
| D(CARD(-3)) | 0.449941    | 0.199227   | 2.258432    | 0.0304 |
| D(ATM)      | -0.012929   | 0.124813   | -0.103591   | 0.9181 |
| D(ATM(-1))  | -0.218239   | 0.121145   | -1.801477   | 0.0805 |
| D(EDU)      | 0.202999    | 0.114733   | 1.769322    | 0.0858 |
| D(EDU(-1))  | -0.314471   | 0.144431   | -2.177311   | 0.0365 |
| D(EDU(-2))  | -0.215005   | 0.140596   | -1.529244   | 0.1355 |
| D(EG)       | 0.018837    | 0.125627   | 0.149941    | 0.8817 |
| D(EG(-1))   | -0.286952   | 0.131717   | -2.178545   | 0.0364 |

Note: \* p-value incompatible with t-Bounds distribution.

### 3.4. Results (long-run estimates and hypotheses testing)

Table 5 reports the estimated long-run coefficients derived from the ARDL model, examining the effects of financial inclusion indicators – bank accounts (ACC), electronic payment cards (CARD), and automated teller machines (ATM) – together with education expenditure (EDU) and economic growth (EG) on entrepreneurship (ENT) in Iraq. The results show that the effects of financial inclusion indicators on entrepreneurship vary across their individual dimensions. At the disaggregated level, the empirical evidence supports sub-hypotheses *H1a* and *H1c*, while sub-hypothesis *H1b* is not supported due to the statistical insignificance of the CARD coefficient. Regarding the control variables, both hypotheses *H2* and *H3* are supported. Overall, these findings are broadly consistent with the theoretical framework grounded in endogenous growth theory, credit constraints theory, and institutional economics.

Specifically, the coefficient of bank accounts (ACC) is positive and statistically significant ( $\beta = 1.415$ ,  $p = 0.0000$ ), indicating a strong positive long-run association between access to bank accounts and entrepreneurial activity. This result supports sub-hypothesis *H1a*, confirming that improved access to formal financial services is associated with greater entrepreneurial activity by facilitating financial transactions and reducing financing constraints. This finding is consistent with credit constraints theory and endogenous growth theory.

The coefficient of electronic payment cards (CARD) is positive ( $\beta = 0.291$ ) but statistically insignificant ( $p = 0.5107$ ). Although the estimated coefficient indicates a positive association with entrepreneurial activity, the lack of statistical significance means that there is insufficient empirical evidence to confirm a systematic long-run relationship. Therefore, sub-hypothesis *H1b* is not supported in the long run. This result may indicate that the expansion of electronic payment cards has not yet translated into a sufficiently strong long-run association with entrepreneurship in Iraq, possibly due to the continued reliance on cash-based transactions.

Likewise, the coefficient of automated teller machines (ATM) is positive and statistically significant

( $\beta = 0.539$ ,  $p = 0.0014$ ). This finding indicates a positive long-run association between the expansion of financial infrastructure and entrepreneurial activity. Accordingly, sub-hypothesis *H1c* is supported, suggesting that greater availability of ATMs facilitates access to banking services and liquidity and is associated with stronger entrepreneurial activity.

Regarding the control variables, education expenditure (EDU) has a positive and statistically significant coefficient ( $\beta = 0.536$ ,  $p = 0.0002$ ). This result supports hypothesis *H2* and indicates that higher investment in education is positively associated with entrepreneurial activity in the long run. It also highlights the importance of human capital development in strengthening entrepreneurial skills, innovation capacity, and opportunity recognition, consistent with endogenous growth theory.

Finally, economic growth (EG) has a positive and statistically significant coefficient ( $\beta = 0.332$ ,  $p = 0.0358$ ). Therefore, hypothesis *H3* is supported. This finding indicates that improved economic conditions are positively associated with entrepreneurial activity in the long run, as stronger economic performance may expand market opportunities, strengthen aggregate demand, and create a more favorable environment for the establishment and development of new businesses.

**Table 5.** ARDL long-run estimation results

| Variable                                                                                                    | Coefficient | Std. error | t-statistic | Prob.  |
|-------------------------------------------------------------------------------------------------------------|-------------|------------|-------------|--------|
| ACC                                                                                                         | 1.414734    | 0.297317   | 4.758335    | 0.0000 |
| CARD                                                                                                        | 0.290879    | 0.437619   | 0.664686    | 0.5107 |
| ATM                                                                                                         | 0.539234    | 0.155243   | 3.473472    | 0.0014 |
| EDU                                                                                                         | 0.536224    | 0.129860   | 4.129242    | 0.0002 |
| EG                                                                                                          | 0.331504    | 0.151683   | 2.185501    | 0.0358 |
| $EC = ENT - (1.4147 \cdot ACC + 0.2909 \cdot CARD + 0.5392 \cdot ATM + 0.5362 \cdot EDU + 0.3315 \cdot EG)$ |             |            |             |        |

### 3.5. Diagnostic tests and model stability of the ARDL model

The results of the serial correlation test, as shown in Table 6, indicate that the probability values of both the F-statistic (0.1845) and the Chi-square statistic (0.0604) are higher than the 5% significance level. Accordingly, the null hypothesis of no serial correlation cannot be rejected, suggesting that the model is free from this problem and that

**Table 6.** Results of diagnostic tests

| <b>Breusch-Godfrey serial correlation LM test</b>     |          |                      |        |
|-------------------------------------------------------|----------|----------------------|--------|
| F-statistic                                           | 1.782828 | Prob. F(2,32)        | 0.1845 |
| Obs × R-squared                                       | 5.614314 | Prob. Chi-Square(2)  | 0.0604 |
| <b>Heteroskedasticity test: Breusch-Pagan-Godfrey</b> |          |                      |        |
| F-statistic                                           | 1.061370 | Prob. F(21,34)       | 0.4279 |
| Obs × R-squared                                       | 22.17443 | Prob. Chi-Square(21) | 0.3895 |
| Scaled explained SS                                   | 7.146362 | Prob. Chi-Square(21) | 0.9978 |

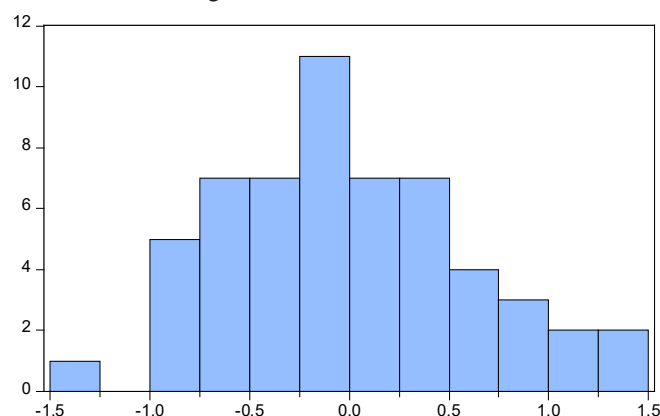
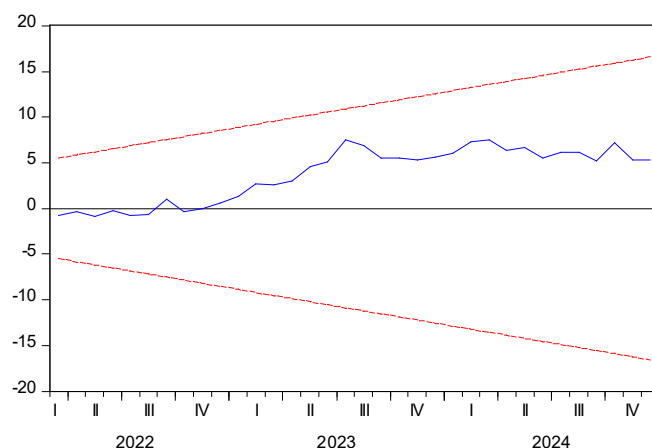
the estimates are reliable and efficient (Gerrard & Godfrey, 1998).

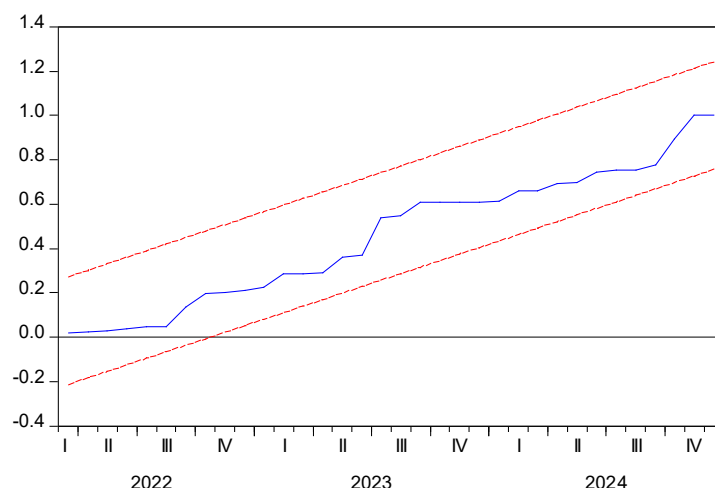
Similarly, the results of the heteroskedasticity test in Table 6 show that the probability values exceed the 5% significance level, indicating that the null hypothesis of homoskedasticity cannot be rejected. This means that the model does not suffer from heteroskedasticity.

The Jarque-Bera test is used to examine whether the residuals of the regression model follow a normal distribution. As illustrated in Figure 1, the

probability value of the Jarque-Bera statistic is 0.5005, which exceeds the significance level of 5%. Accordingly, the null hypothesis that the residuals are normally distributed cannot be rejected (Gerrard & Godfrey, 1998).

The CUSUM and CUSUMSQ tests are used to check whether the model remains stable over time. The results shown in Figures 2 and 3 indicate that both tests stay within the critical bounds at the 5% level throughout the study period, without crossing them.

**Figure 1.** Residual normality test (Jarque-Bera test)**Figure 2.** CUSUM stability test



**Figure 3.** CUSUM of squares test of model stability

This suggests that there are no structural changes in the model, and both the coefficients and residual variance remain stable. As a result, the relationship between entrepreneurship and financial inclusion indicators appears consistent, and the model can be considered reliable for analysis.

### 3.6. Results of the Granger causality test

The Granger causality test was used to examine potential reverse causality between financial inclusion and entrepreneurship. Table 7 shows unidirectional causality from ACC to ENT, no significant causality between CARD and ENT, and reverse causality from ENT to ATM. Thus, reverse causality is not general across financial inclusion indicators but is limited to the ATM–entrepreneurship relationship.

### 3.7. Selection of optimal lag orders for the ARDL model

Figure 4 illustrates the process of selecting the optimal lag orders for the ARDL model based on the Akaike Information Criterion (AIC) by compar-

ing the twenty best estimated models. The model with the lowest AIC value is considered the optimal specification. The results indicate that the optimal lag orders are (4,1,4,2,3,2), which were subsequently adopted in the econometric analysis.

## 4. DISCUSSION

The findings demonstrate that financial inclusion constitutes an important driver of entrepreneurial activity in Iraq, although its effects vary across different dimensions. Improvements in financial access and financial infrastructure contribute significantly to stimulating entrepreneurship in the long run, while financial usage shows a positive but statistically insignificant relationship. These results may be explained by mechanisms such as reducing financing constraints, lowering transaction costs, improving liquidity, and facilitating entrepreneurs' access to formal financial services. Such mechanisms are consistent with endogenous growth theory, which emphasizes the role of financial systems in promoting productive investment and innovation, as well as credit constraints theory, which argues that easier access to finance

**Table 7.** Results of the Granger causality test

| Null hypothesis                 | Obs. | F-statistic | Prob.  |
|---------------------------------|------|-------------|--------|
| ACC does not Granger cause ENT  | 58   | 3.55014     | 0.0357 |
| ENT does not Granger cause ACC  | 58   | 0.93075     | 0.4006 |
| CARD does not Granger cause ENT | 58   | 1.94129     | 0.1536 |
| ENT does not Granger cause CARD | 58   | 0.37679     | 0.6879 |
| ATM does not Granger cause ENT  | 58   | 1.00587     | 0.3726 |
| ENT does not Granger cause ATM  | 58   | 4.07212     | 0.0226 |

encourages business creation by relaxing borrowing constraints.

The positive effect of bank accounts indicates that expanding access to formal banking services facilitates entrepreneurial activity by integrating individuals into the formal financial system and improving access to financial resources. This finding is consistent with the results reported by Ajide (2020), Fan and Zhang (2017), Yue (2024), all of whom concluded that broader financial access reduces financing constraints and promotes entrepreneurial activity. The Iraqi evidence therefore supports the argument that expanding bank account ownership represents an essential prerequisite for entrepreneurial development in developing economies.

The coefficient of electronic payment cards (CARD) was positive but statistically insignificant, indicating insufficient evidence of a long-run effect on entrepreneurship. Nevertheless, the positive sign of the coefficient is consistent with the findings of Inegbedion et al. (2022), Teju (2025), Wei (2024), which emphasized the role of digital financial services in improving business performance and supporting small enterprises. It is also directionally consistent with Chen and Tran (2025), who highlighted the role of digital payment systems and institutional quality in supporting entrepreneurial activity. The statistical insignificance in Iraq may be explained by the continued reliance on cash transactions and the limited effective use of payment cards in business activities, highlighting the importance of promoting the effective use of digital payment services and further developing the supporting infrastructure and institutional environment.

The significant impact of ATMs further confirms the importance of financial infrastructure in supporting entrepreneurship. Greater availability of ATMs improves access to liquidity and banking services, particularly in an economy where cash transactions continue to dominate commercial activities. This finding is consistent with Fomum and Opperman (2023), Gakpa (2023), who also emphasized the role of financial infrastructure and banking accessibility in sustaining entrepreneurial activity and improving microenterprise performance.

The positive effect of education expenditure indicates that investment in human capital strengthens entrepreneurial capabilities by improving knowledge, innovation, and opportunity recognition. This result is consistent with the findings of Cao and Zhang (2022), Mahato and Jha (2023), Pham et al. (2025), all of whom emphasized that education and human capital enhance entrepreneurial performance and increase the effectiveness of financial inclusion. The Iraqi evidence therefore suggests that financial inclusion policies become more effective when accompanied by continuous investment in education and entrepreneurial skills.

The positive and statistically significant effect of economic growth indicates that improved economic activity is associated with stronger entrepreneurship in Iraq in the long run, as it contributes to expanding markets, increasing demand, and creating new investment opportunities. This result is broadly consistent with Babiker and Albouzidi (2025), who emphasized the importance of the economic environment in supporting entrepreneurial activity in oil-dependent economies. However, Iraq's dependence on the oil sector means that the benefits of economic growth for entrepreneurship depend on the extent to which its effects are transmitted to non-oil sectors and the private sector, highlighting the importance of economic diversification and the development of the business environment.

Overall, the discussion indicates that the Iraqi evidence is largely consistent with the international literature regarding the positive contribution of financial inclusion to entrepreneurship, while also highlighting the importance of country-specific structural characteristics. These findings contribute to the existing literature by providing evidence from an underexplored, oil-dependent economy and demonstrating that different dimensions of financial inclusion have varying relationships with entrepreneurship within a dynamic long-run framework. In Iraq, the benefits of financial inclusion depend not only on expanding access to financial services and improving financial infrastructure but also on promoting the effective use of digital financial services, strengthening human capital, and implementing institutional reforms that can translate financial inclusion into sustainable entrepreneurial development and economic diversification.

## CONCLUSIONS

This study aimed to analyze the impact of financial inclusion on stimulating entrepreneurship in the Iraqi economy by examining the role of financial access, financial usage, and financial infrastructure, as well as their short-run and long-run dynamics.

The findings indicate that financial inclusion plays an important role in promoting entrepreneurship in the long run, although its effects vary across dimensions. Bank accounts and automated teller machines have positive and statistically significant effects, while electronic payment cards have a positive but statistically insignificant effect. Education expenditure and economic growth also have positive and significant effects, highlighting the roles of human capital and favorable economic conditions in supporting entrepreneurship.

Overall, financial inclusion represents an important mechanism for promoting entrepreneurship and economic diversification in Iraq. Expanding financial access and infrastructure, increasing the effective use of financial products, and investing in human capital are essential for strengthening entrepreneurial activity. The insignificant effect of electronic payment cards suggests that expanding digital payment instruments alone may be insufficient without greater effective usage, improved digital infrastructure, and institutional support. The positive effect of economic growth also highlights the importance of transmitting growth benefits to private and non-oil sectors.

Future research could employ longer time-series data, incorporate institutional variables such as financial literacy, governance quality, and digital financial innovation, and conduct comparative analyses across oil-dependent economies to provide broader evidence on the relationship between financial inclusion and entrepreneurship.

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