

The Impact of Banking Density on Competitiveness in Iraqi Commercial Banks (2005-2024): A Panel Data Analysis

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Abstract: This research examines how banking density affected the competitiveness of Iraqi commercial banks between 2005 and 2024. Using panel data from Rafidain Bank, Bank of Baghdad, and the Iraqi Islamic Bank, we made a composite competitiveness index. We used Principal Component Analysis (PCA) to combine deposits, profits, customer activity, and operational performance.

We ran several econometric tests to check the relationship between density and competitiveness. These included unit root tests, pooled and fixed-effect models, Hausman and Breusch–Pagan tests, Granger causality, and Driscoll–Kraay robust standard errors.

Our results show that banking density helped bank competitiveness during most of the years. This effect grew stronger after 2014, when Iraqi banks began adapting to technological shifts. However, the data reveals a clear non-linear trend. The gains from expanding branches start to drop after a certain point, probably because of high operational costs and market saturation.

Therefore, we believe that Iraqi banks should focus on service quality, efficiency, and digital channels instead of just opening more physical branches..

Keywords: Banking Density, Bank Competitiveness, Financial Deepening, Structural Change, Iraqi Commercial Banks

Introduction

Iraq's banking sector went through massive changes after 2003. In the first few years, most banks focused on opening new branches in different provinces to expand physically. Over time, competition became much tougher as private and Islamic banks gained more market share.

In the past, people measured banking density simply by counting branches relative to population size. But modern financial studies look at it much more broadly. Today, it includes financial inclusion, customer reach, and how well a bank maintains its presence in the market.

However, this continuous expansion in Iraq brings up a big problem. Having more branches does not always mean a bank will be more competitive. Sometimes, expanding too much just increases overhead costs without improving performance.

Because of this issue, we wanted to see if banking density really improved the competitiveness of Iraqi commercial banks from 2005 to 2024, and how this relationship changed over time..

Literature Review:

Books and papers on banking density usually connect it to financial intermediation and market structure theories. Old banking models assumed that opening more branches was the easiest way to improve financial access, bring in more deposits, and grow profits.

But recent studies show a different side. Many researchers found that expanding branch networks too much creates heavy operational burdens and lowers efficiency, especially now that markets are moving toward digital banking. This means the link between density and competitiveness is not always positive.

International data also proves that bank competitiveness today depends more on service quality, technology, and easy access for customers, rather than just the number of physical buildings.

Data and Methodology:

3.1 Data:

The study used annual panel data covering the period 2005–2024 for three Iraqi commercial banks:

Rafidain Bank.

Bank of Baghdad.

Iraqi Islamic Bank.

Variables include:

Bank density (BD).

Total Deposits (TD).

Total Profits (TP).

Number of Customers (NC).

Number of Employees (NE).

Number of Bank Accounts (NB).

The study constructed a composite competitiveness index (COMP_INDEX) using Principal Component Analysis (PCA).

3.2 Econometric Framework:

The baseline regression model is expressed as follows:

$$COMP_{it} = \alpha + \beta BD_{it} + \epsilon_{it}$$

The analysis followed several econometric steps:

Unit root tests (Levin–Lin–Chu).

Pooled OLS estimation.

Breusch–Pagan Lagrange Multiplier test.

Hausman test.

Fixed Effects model.

Robust standard errors (Driscoll–Kraay).

Structural break test (Chow test). Granger causality test.

Empirical Framework and Variable Design:

4.1 Definition of Variables:

Table (1): Definition of operational variables

Variable	Sym bol	Measurement	Type
Banking Density	BD	(Branches + Employees + Accounts) / Population	Indepen dent
Total Deposits	TD	Total deposits (1 Billion IQD)	Compon ent
Total Profits	TP	Total income (1 Billion IQD)	Compon ent
Customers	NC	Number of customers (millions)	Compon ent
Employees	NE	Number of employees	Compon ent
Composite Competitiveness Index	CO MP	PCA (TD, TP, NC, NE, NB)	depende nt

4.2 Building a Competitiveness Index (PCA):

Principal Component Analysis (PCA) was used to derive the competitiveness index.

Table (2): BCP Analysis Results

Component	Eigenvalue	Variance Explained (%)	Cumulative (%)
PC1	3.87	77.4	77.4
PC2	0.62	12.4	89.8
PC3	0.28	5.6	95.4

The first principal component (PC1) was selected because it explains more than three quarters of the total variation in the dataset.

Econometric Results:

5.1 Stationarity Tests:

Both BD and COMP_INDEX are integrated of order I(1).

5.2 Unit Root Tests:

Table (3): Stability Results (Livin-Lin-Chu)

Variable	Level Prob.	First Difference Prob.	Order
BD	0.112	0.0000***	I(1)
COMP	0.067	0.0000***	I(1)

5.3 Pooled OLS Estimation:

Model selection criteria

LM test indicates the presence of panel effects.

Hausman test favors the Fixed Effects model.

Table (4): Combined Regression Results

$$\text{COMPit} = \alpha + \beta \text{BDit}$$

Variable	Coefficient	t-Statistic	Prob.
BD	0.842	6.91	0.0000
C	0.115	2.44	0.017

5.4 LM Test:

Fixed Effects Results

BD = 0.91 (significant at 1%).

$R^2 = 0.74$.

Significant F statistics

These results indicate that higher banking density contributed positively to the competitiveness of the sampled banks.

Table (5): Breusch-Pagan Test

Statistics	Value	Prob.
LM	28.41	0.0000

The pooled regression model is rejected in favor of panel estimation techniques.

5.5 Hausman Test:

Adding the squared term of banking density (BD^2) produced a negative coefficient, which indicates the presence of an inverted U-shaped relationship between banking density and competitiveness.

The estimated saturation threshold was approximately 0.88, while the actual level recorded in 2024 remained around 0.68.

This suggests that the Iraqi banking market is approaching saturation, although it has not yet reached a fully saturated stage.

Table (6): Hausmann Test

Chi-Square	Prob.
11.73	0.003

The results support the use of the Fixed Effects model.

5.6 Fixed Effects Model:

Table (7): Fixed Effect Results

Variable	Coefficient	Statistics	Prob.
BD	0.913	8.11	0.0000
C	0.270	3.37	0.0014

| R² | 0.74 | | F-stat | 59.6 | | DW | 1.92 |

5.7 Nonlinear Relationship Test:

Table (8): Results Including BD²

Variable	Coefficient	Prob.
BD	1.72	0.0000
BD ²	-0.73	0.0000

The results confirm the existence of an inverted U-shaped relationship between banking density and competitiveness.

Saturation point = 0.88

5.8 Granger Causality Test:

Table (9): Results of Granger Causality

Direction	F-Statistic	Prob.
BD → COMP	6.94	0.01
COMP → BD	1.22	0.31

5.9 Robustness Tests:

Table (10) Robustness Tests:

Testing	Conclusion
Driscoll-Kraay SE	Stable
Pesaran CD	Cross-sectional dependence exists
VIF	< 3
Chow (2014)	Structural break confirmed

Discussion:

From 2005 to 2024, the evolution of the Iraqi banking industry was characterized by three transitional stages:

Quantitative Expansion (2005-2013).

Transitional Adjustment Phase (2014-2018).

Competitive Maturity Phase (2019–2024).

At the beginning of the period, expanding branch networks helped banks strengthen their market presence and attract more customers. In later years, however, competitiveness depended more on operational performance and digital banking services than on branch expansion alone.

Our empirical analysis robustly confirms that banking density exerts a positive effect on the competitiveness of Iraqi commercial banks. Crucially, this relationship exhibits non-linear characteristics; after crossing a specific threshold, structural improvements in operational efficiency become far more vital for sustaining market power than continuous physical expansion.

Furthermore, the data reveals significant institutional variance, as state-owned banks demonstrate notably lower strategic flexibility in translating banking density into competitive advantages when compared to their more agile private and Islamic counterparts.

Conclusion:

Ultimately, our empirical assessment reveals that the nexus between banking density and institutional competitiveness is far from static, undergoing pronounced structural shifts over the examined period. Early operational phases demonstrated that network expansion effectively fueled market share gains and baseline profitability. Post-2014 data, however, highlights a clear inflection point characterized by diminishing marginal returns on physical footprints. These dynamics indicate that moving forward, the competitive edge of Iraqi commercial institutions will rest squarely on structural efficiency, internal governance, and digital execution rather than conventional brick-and-mortar growth.

Policy implications

Digitization Over Asset Expansion: Commercial entities across Iraq must shift strategic focus away from high-overhead branch construction, redirecting capital toward scalable financial technologies to secure long-term market viability.

Operational Network Rationalization: Enhancing the internal efficiency of active physical branches is paramount, requiring immediate measures to lower administrative friction and optimize turnaround times.

Regulatory Rigor and Oversight: Sector regulators should enforce comprehensive governance mandates alongside sophisticated risk mitigation protocols to protect institutional stability.

Value-Driven Competition Metrics: Strategic frameworks need to prioritize service excellence, continuous technological refinement, and long-term client retention over raw physical presence.

Agile Omnichannel Ecosystems: Policymakers should incentivize the deployment of hybrid models that seamlessly blend streamlined physical touchpoints with comprehensive digital service environments

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