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RESEARCH ARTICLE

The Role of Consumer loans in Stimulating Public Banking Activity in Algeria: A Case Study of CPA Bank

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Abstract
This study investigates the role of consumer credit in revitalizing the operations of public banks in Algeria, with a particular focus on the CPA Bank. The paper explores the economic and legal dimensions of consumer lending and its influence on financial performance indicators such as liquidity, profitability, and outreach. Using a mixed-methods approach that combines empirical analysis of financial indicators with theoretical assessment, the study assesses the evolution of consumer credit in Algeria—especially following its legal relaunch in 2015. The results reveal that consumer credit not only contributes significantly to the financial performance of public banks but also plays a strategic role in supporting domestic production and consumption. However, this expansion is accompanied by legal, operational, and risk management challenges. The findings offer valuable insights for policymakers and financial institutions aiming to enhance the effectiveness and sustainability of consumer lending frameworks in Algeria.
JEL Classification Codes : D14 ; G28 ; G58 ; C10.

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1. Introduction.

Consumer credit constitutes a fundamental component of contemporary financial systems, offering individuals the means to fulfill consumption needs and improve their living standards while enabling banks to diversify their income sources. Broadly defined, consumer credit refers to the various financial products extended to households for non-investment

purposes, including personal loans, automobile financing, credit cards, and installment-based purchasing agreements. (Mishkin & Stanley G, 2008). These products serve as not only tools for facilitating consumption but also as mechanisms for social inclusion, allowing access to essential goods and services through deferred payments,because it is a mechanism that allows individuals to exceed the level of consumption above their current income (Maria & Blandyna , 2021).

According to (Beck, Demirguc, & Honohan, 2008).Consumer credit plays a dual role in modern economies: it enhances financial inclusion by integrating low- and middle-income households into the formal financial system, and simultaneously contributes to banking sector profitability by expanding the volume and variety of lending activities. In developing economies, where access to credit remains uneven, consumer lending becomes a vital driver of both household welfare and aggregate demand.

In Algeria, consumer credit products have experienced significant policy shifts over the last two decades. Initially liberalized in the early 2000s, consumer credit faced suspension in 2009 due to mounting concerns over household over-indebtedness and rising trade deficits linked to imported goods. The government's response included a moratorium on non-housing(Official Journal, 2009). Consumer credit in order to protect foreign exchange reserves and encourage domestic production.

A major turning point came in 2015 with the legal reintroduction of consumer credit(Official Journal, 2014).but under newly defined conditions. Most importantly, consumer credit is now exclusively for products produced locally in Algeria (Official Journal , 2016). This regulation aimed to stimulate national industries, reduce reliance on imports, and channel household consumption toward domestically manufactured goods. Public banks, especially the CPA Bank, were designated as key institutions in implementing this policy.

Given these developments, this study aims to explore the role of consumer credit in activating public banking operations in Algeria. It focuses on the CPA Bank as a case study and investigates whether consumer credit enhances financial performance indicators such as liquidity, profitability, and outreach. The paper also evaluates the legal and institutional framework-surrounding consumer lending, highlighting both its contributions and constraints. By adopting a mixed-methods approach, this study seeks to provide evidence-based insights into how consumer credit can serve as a lever for economic development and financial inclusion in Algeria.

- **Research Problem**

The central research problem addressed in this study lies in the limited effectiveness of consumer credit in achieving sustained financial dynamism within Algeria's public banking sector, despite regulatory reforms intended to promote its use. While consumer credit has been reintroduced under specific legal frameworks aimed at supporting domestic production and enhancing household consumption, its actual contribution to improving the financial performance of public banks remains insufficiently studied.

This issue is compounded by institutional inefficiencies, inconsistent credit practices, and an underdeveloped consumer credit market. Therefore, a clear gap exists in understanding how consumer credit affects public banks' operational outcomes and their broader economic role in Algeria.

- **Research Focus**

This study focuses on examining the economic and legal dimensions of consumer credit in Algeria, with a particular emphasis on its contribution to activating the operations of public banks. The CPA Bank is used as a case study to assess how consumer credit affects core financial indicators such as liquidity, net banking income, and loan-to-deposit ratios. In addition, the researchevaluates the legal framework introduced in 2015 and its implications for both lenders and borrowers. The study also seeks to understand the practical challenges that hinder the full utilization of consumer credit as a tool for financial inclusion and industrial support.

- **Research Aim and Research Questions**

The primary aim of this study is to evaluate the role of consumer credit in enhancing the performance and efficiency of public banks in Algeria, particularly under the regulatory reforms introduced in 2015. The study also aims to explore whether consumer credit can serve as an instrument for economic inclusion and industrial development within a state-led banking system.The research aims to answer the following questions:

1. To what extent can consumer credit be used as a strategic lever to enhance overall financial performance in Algerian public banks, given its stronger link to net income rather than efficiency indicators like ROA?
2. How can public banks in Algeria improve their credit allocation frameworks to ensure that consumer lending contributes to both profitability and financial stability, especially in light of the post-2015 institutional reforms?

2. Literature Review

The literature on consumer finance and credit risk has seen significant evolution over the past two decades, with analytical approaches ranging from micro-level data simulations to macroprudential policy analysis. The reviewed studies span diverse contexts and focus areas, offering insights into the role of consumer credit in financial systems, bank performance, and economic development. These can be classified into the following thematic domains:

2.1 Consumer Lending and Financial Stability

Several studies explored how the expansion of consumer credit affects the resilience of financial systems. The Central Bank of Russia (2019) observed that consumer loans grew significantly between 2015 and 2019, driven by declining interest rates and increased household demand. However, this expansion coincided with rising delinquency rates, particularly among low-income borrowers, signaling growing credit risks (Central Bank of the Russian Federation, 2019).

In the European context, the European Banking Authority (2020) noted similar trends and emphasized the need for enhanced supervisory frameworks to mitigate systemic vulnerabilities. Using supervisory bank data, the study found a significant share of loans was granted to high debt-to-income borrowers (The EU Banking Sector, 2020). raising concerns over financial fragility.

2.2 Quantitative Risk Modeling

A more technical lens was adopted by (Soylu D.f, 2017). who developed several statistical models to estimate recovery rates on non-performing consumer loans, concluding that a two-stage beta mixture model with logistic regression yielded the best predictive power.

Likewise, Herrala and Kauko (2007) used Finnish household-level microdata to simulate loan loss risks under macroeconomic shocks, confirming that economic downturns substantially impair households' debt servicing capacity, thus stressing the importance of micro-simulation in credit risk assessment (Herrala & Kauko, 5/2017).

2.3 Household Indebtedness in Emerging Markets

Studies in emerging economies added further nuance. The SEACEN report(Cacnio, 2014).and (Wahyu & Shinta, 2014). analyzed the relationship between mortgage and consumer credit growth and financial stability in Southeast Asia, cautioning that household indebtedness—while fueling short-term economic expansion—could threaten financial resilience without robust regulation. Both studies called for strengthened oversight and greater financial literacy.

2.4 Credit Risk and Bank Profitability

(Afaque & Shah, 2021), examined Pakistani commercial banks and found a strong negative correlation between non-performing loans and profitability(Timothy, Astrid, Beverly, Kevin J, & Robard, 2007). focusing on the U.S., identified a strategic shift among major banks towards retail banking, aiming to stabilize revenues through more predictable consumer-based income streams.

2.5 Credit Scoring and Collateral Efficiency

The use of credit scoring as a tool for credit quality enhancement was underscored by (Loretta J., 1997). who highlighted its ability to improve lending accuracy and reduce defaults. Meanwhile(Allen N & Gregory F, 1990). analyzed the role of collateral, concluding that it significantly reduces credit risk and enhances the performance of bank loan portfolios.

2.6 Institutional and Sociocultural Dimensions

Theoretical contributions, such as(James, 1968). framed consumer credit within a broader corporate and institutional logic, viewing it as an economic tool aligned with the expansion strategies of large firms in the early 20th century. This historical lens illustrated how consumer credit evolved from a financial practice into a cultural norm.

2.7 Complementary International Studies

Despite differences in geographical and temporal contexts, previous studies have addressed consumer loans from various perspectives, particularly their impact on financial stability, banking performance, and economic growth. For example, (Meng, 2014) found that consumer loans in Cambodia enhanced the quality of the banking system without threatening financial stability. Similarly, (Rodney d, timothy m, & richard l., 2023) focused on U.S. credit card lending and concluded that it improved credit unions' returns following the 2008 financial crisis. In a historical context, (calder, 1999), in his doctoral thesis, highlighted the dual nature of consumer credit in mid-20th century America, where it simultaneously promoted productivity and fostered excessive consumption.

In contrast, findings from developing economies have been more varied. (Muhannad & Fathi, 2013), in the Palestinian context, revealed a negative impact of consumer loans on GDP growth and borrower stability, pointing to an increased risk of non-performing loans. Conversely, (Nasreddine & Lamia, 2017)argued that consumer credit can support economic growth in Algeria, provided it is accompanied by comprehensive banking reforms. Further comparative research from

Jordan and Turkey (Dinc, 2018); (Al-Zoubi, 2013)revealed mixed outcomes regarding the influence of consumer credit on both Islamic and conventional banks, emphasizing differences in performance, governance structures, and borrower behavior.

Additionally, (Beverly J. & Kevin J, December 2005)observed that consumer loans in the U.S. generated relatively low but stable returns, contributing to the consistency of banks' overall portfolios.

While prior research has examined consumer lending from financial, economic, and sociocultural dimensions, few studies have offered comparative insights across Islamic, conventional private, and public banking models, while also incorporating consumer behavior and preferences. Accordingly, the present study distinguishes itself through an integrated approach—combining quantitative financial performance indicators with behavioral insights gathered through surveys—to provide a comprehensive understanding of the role of consumer credit in diverse banking environments.

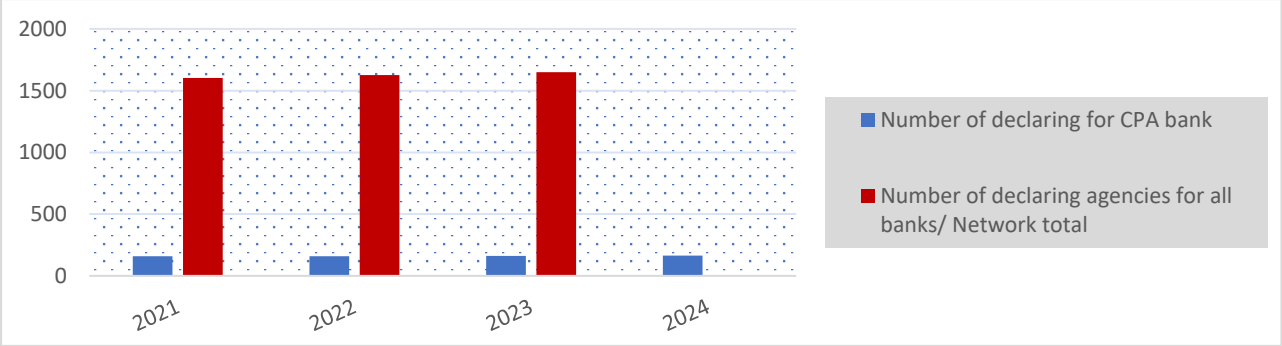
3. Theoretical Framework

3.1 The development of CPA Bank's branch network and its role in enhancing banking coverage in Algeria.

The CPA Bank is among the most prominent public commercial banks in Algeria. It was established in 1966 and officially licensed as a bank under new banking legislation in 1997.

Data on the banking infrastructure shows a significant development in the bank's branch network. By the end of 2022, the total number of branches in the banking system nationwide reached 1,626, compared to 1,604 in 2021, reflecting a gradual expansion in banking coverage. In this context, CPA Bank maintained its contribution to this network at approximately 10%, with the number of its branches reaching 158 in 2021 and 159 in 2022. By the end of 2023, the bank's branches had increased to 161, 2024 in addition to its expansion into alternative banking services through the opening of 98 dedicated Islamic banking windows and 20 digital spaces, reflecting the bank's drive to diversify its services and keep pace with digital transformations in the financial sector.

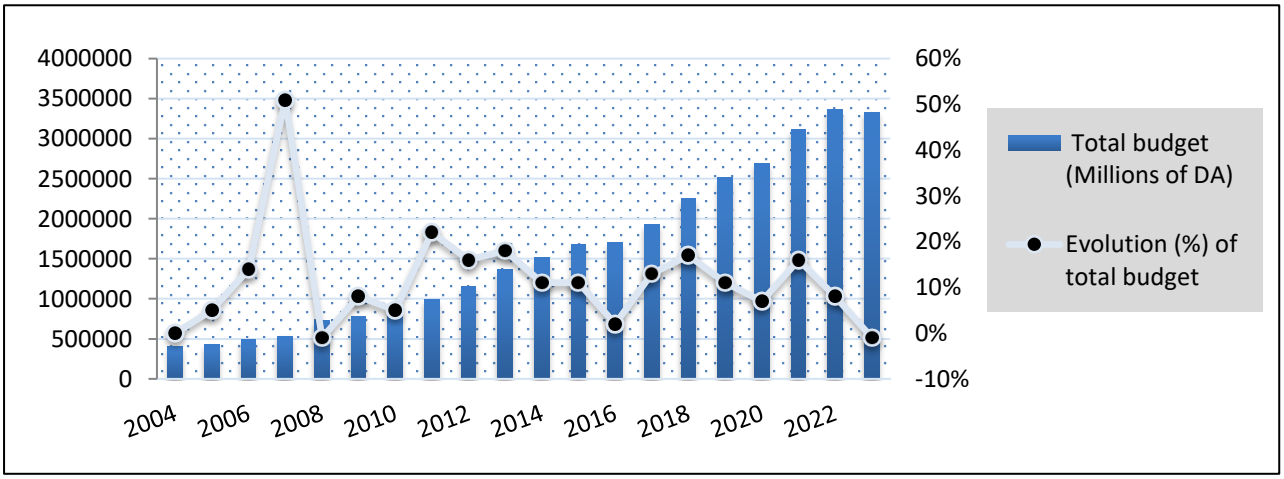
Figure 1: *Number of declaring agencies for CPA Bank and all others banks.*



Source: *Prepared by researchers based on CPA, notice d'information, January 2024, p58*

3.2 Development of the CPA Bank's budget

Figure 2: *Development of the CPA Bank's budget during the period (2004-2023)*

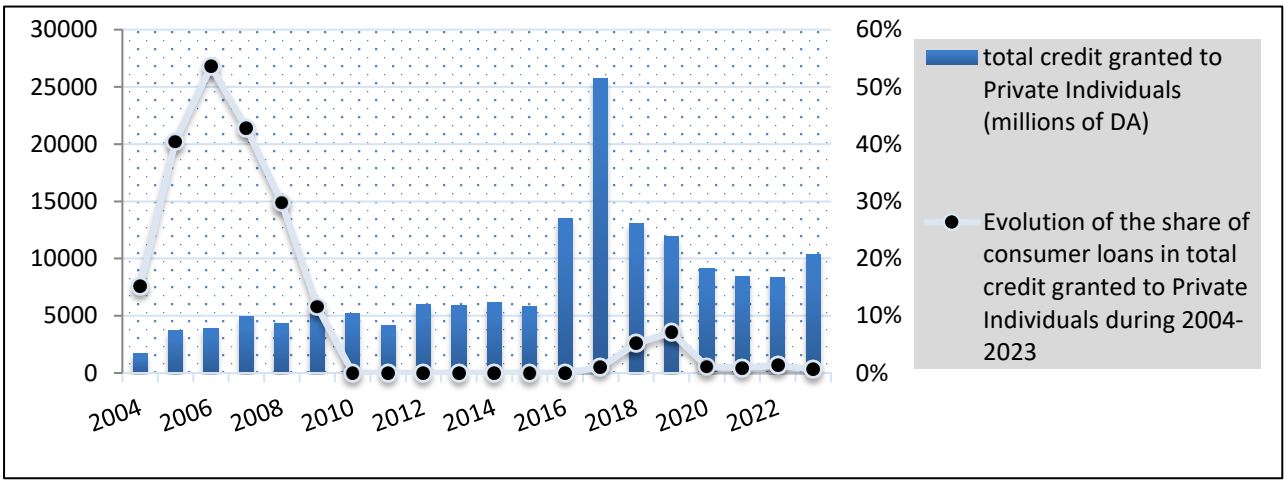


Source: *Prepared by researchers based on CPA, The bank's annual reports.*

The figure presents the evolution of total credit granted to private individuals in Algeria from 2004 to 2023, along with the share of consumer loans within that total. The data indicate a sharp increase in consumer lending between 2004 and 2007, with its share peaking at over 55% in 2007. However, following the regulatory reforms introduced by the Bank of Algeria in 2009, particularly the suspension of consumer credit, this share declined drastically, reaching nearly 0% by 2010 and remaining consistently low—below 5%—through 2023. Despite some fluctuations, total credit to individuals continued to grow moderately, with a notable spike in 2018, potentially linked to temporary policy adjustments or specific lending initiatives. However, this increase did not reflect a resurgence of consumer lending, as its share remained negligible. By 2023, total credit rebounded slightly after a pandemic-related decline, but consumer loans continued to represent a minimal portion of individual credit. This persistent marginalization of consumer credit suggests a structural and sustained shift in Algeria's banking policy, prioritizing other forms of personal lending over consumption-oriented financing, in line with broader efforts to mitigate household debt risks and reinforce financial stability.

3.3 Share of consumer loans in individual loans in the CPA BANK for the during 2004-2023

Figure 3: *Share of consumer loans in individual loans in the CPA BANKduring the period (2004-2023)*



Source: *Prepared by researchers based on CPA, the bank's annual reports, internal documents provided by the Private and individual Loans Department, and the Loan Risk Monitoring Department, at the CPA.*

The figure illustrates the evolution of total credit granted to private individuals in Algeria (in millions of DA) and the share of consumer loans within that total from 2004 to 2023. The analysis reveals distinct trends over this 20-year period:

Between 2004 and 2007, there was a sharp rise in the share of consumer loans, reaching a peak of over 55% in 2007, while total credit to individuals increased moderately. This period reflects a phase of active consumer lending, likely driven by favorable policies and a liberal credit environment.

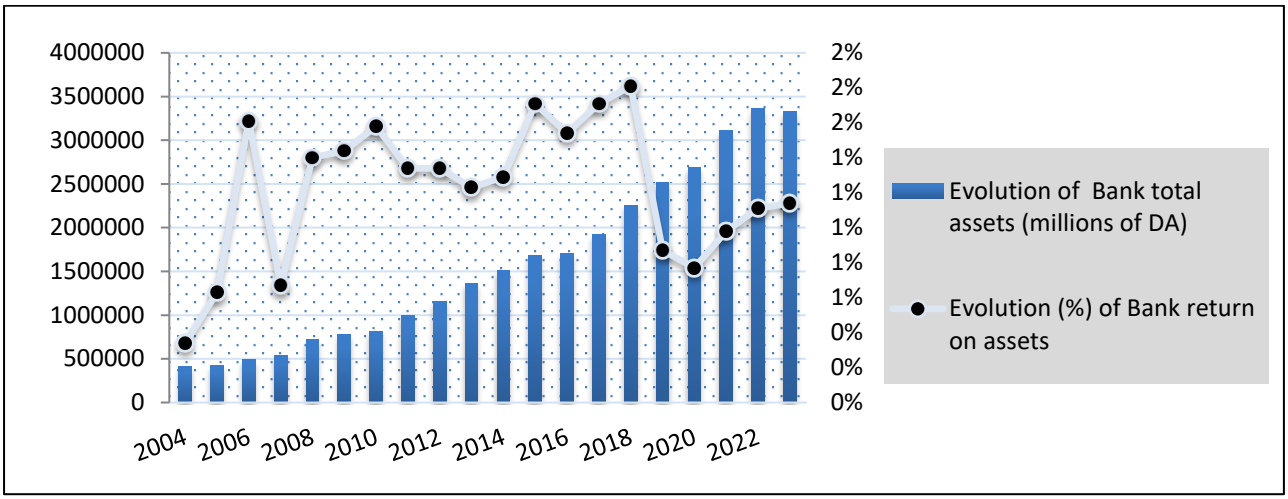
However, starting in 2009, there is a dramatic drop in the share of consumer loans—falling to almost 0% by 2010—which aligns with the regulatory restrictions imposed by the Bank of Algeria on consumer lending. This turning point marks a structural shift in the banking sector's orientation, with a visible withdrawal from consumption-focused credit.

From 2010 onwards, while total credit to individuals continued to grow gradually, especially peaking in 2018 at over 25,000 million DA, the share of consumer loans remained extremely low, consistently under 5%, and nearly negligible in the later years (2020–2023). This divergence between rising total credit and stagnant consumer credit indicates that the growth was likely driven by other forms of individual financing, such as housing or personal investment loans.

In 2023, total credit slightly recovered after pandemic-era declines, but the share of consumer loans remained close to zero, reaffirming the lasting impact of restrictive policies and possibly reflecting a cautious banking stance toward household credit risk.

3.4 The evolution of the (ROA) index for (CPA)

Figure 4: *The evolution of the (ROA) index for (CPA) during the period (2004-2023)*



Source: *Prepared by researchers based on CPA, The bank's annual reports.*

4. Data Analysis

The data for this study spans from 2004 to 2023 and focuses on the financial performance of the Algerian public bank, the CPA Bank. The variables examined include consumer credit (CC) as the independent variable, and two dependent variables: net income (RN) and return on assets (ROA). The aim is to assess the influence of consumer credit on bank profitability, especially in light of the regulatory reform introduced in 2015. The data were collected from CPA's annual financial statements and official reports published by the Bank of Algeria. This section provides an overview of the data sources and variable measurements, offering a clear foundation for the descriptive and comparative analysis conducted before and after the reform.

Table 1. *Data Source*

Variables	Descriptions	Sources
		Independent variables
CC	consumer loans	The bank's annual reports, internal documents provided by the Private and individual Loans Department, and the Loan Risk Monitoring Department, at the CPA
		Dependent variable
ROA	return on assets	The bank's annual reports
RN	net income	The bank's annual reports

Source: *Author's development.*

4.1 Research Methods: The Vector Error Correction Model (VECM)

The Vector Error Correction Model (VECM) is employed in this study to analyze the dynamic relationship among non-stationary time series variables that are cointegrated. Unlike the Vector Autoregression (VAR) model, which is suitable for stationary series, the VECM captures both the short-term fluctuations and long-run equilibrium relationships among variables. The inclusion of the error correction term allows the model to adjust for deviations from long-term equilibrium, ensuring that any disequilibrium in the short run is corrected over time. This feature makes VECM particularly appropriate for macroeconomic data where variables often exhibit a common stochastic trend(Johansen, 1998); (Granger & Engle, 1987).

4.2 General VECM Equation:

$$\Delta Y_t = \alpha\beta' Y_{t-1} + \sum(i = 1 \text{ to } k-1)\, \Gamma_i \Delta Y_{t-i} + \varepsilon_t$$

Where: ΔY_t: First difference of the vector of endogenous variables at time t; Y_{t-1}: Lagged level of the vector of variables; $\alpha\beta' Y_{t-1}$: Error correction term, where: $\beta' Y_{t-1}$represents the long-run cointegration relationship(s); α is the adjustment coefficient matrix (speed of correction toward equilibrium); Γ_i: Short-run dynamic coefficient matrices for lag I ; k: Number of lags in the model ; ε_t: Vector of white noise error terms

The model specification begins with testing for unit roots using the Augmented Dickey-Fuller (ADF) or Phillips-Perron tests to confirm the integration order of the variables. Once all variables are found to be integrated of order one, I(1), the Johansen cointegration test is applied to detect the existence and number of cointegrating relationships. If cointegration is confirmed, the VECM is estimated with a restricted VAR structure that incorporates both differenced terms and the error correction component. The number of lags included in the model is determined using standard information criteria such as the Akaike Information Criterion (AIC) or Schwarz Bayesian Criterion (SBC).

The VECM not only provides insights into short-run dynamics through the coefficients of the differenced terms but also reveals long-run relationships through the cointegrating equations. Moreover, the significance and sign of the error correction term (ECT) reflect the speed of adjustment toward long-run

4.3 Summary of VECM Estimation Steps

Figure 5: *VECM Estimation Steps*

Source: *Author's development.*

5. Results and discussion

5.1 Unit root tests:

We conduct unit root tests to ensure that none of the variables carry second-order characteristics (I (2)), as the results of the F-test can be misleading if there are variables with integrated order I (2). Therefore, we examined the time series for stationarity using unit root tests, especially the Augmented Dickey-Fuller test (G, Breson & A, Pirotte, 1995); (R.Bourbonnais & M.terraza , 2004). and the results are as follows:

Table 2: *Augmented Dickey-Fuller Unit Root Test*

series of study variables	Model		Test on level		Test on Δ1	
			Probability	Decision	Probability	Decision
CC	3	trend	0.4975	Non-stationary	0.3219	Stationary
		constant	0.2976		0.2113	
		Unit Root	0.1335		0.0705	
	2	constant	0.2295		0.3634	
		Unit Root	0.0935		0.0238	
	1	Unit Root	0.0535		0.0023	

RN	3	trend	0.0086	Non-stationary	0.9930	Stationary
		constant	0.5877		0.5424	
		Unit Root	0.0937		0.0098	
	2	constant	/		0.1868	
		Unit Root	/		0.0017	
	1	Unit Root	/		0.0002	
ROA	3	trend	0.6897	Non-stationary	0.2617	Stationary
		constant	0.0033		0.2355	
		Unit Root	0.0800		0.0005	
	2	constant	0.5075		0.6791	
		Unit Root	0.0064		0.0001	
	1	Unit Root	0.4828		0.0000	

Source: *Author's development.*

5.2 Testing the Causal Relationship between the Variables Using the Granger Causality Approach

Table 3: the Causal Relationship

Pairwise Granger Causality Tests
Date: 02/01/25 Time: 13:36
Sample: 2004 2023
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
DRN does not Granger Cause DCC	17	3.54266	0.0117
DCC does not Granger Cause DRN		3.67146	0.0499
DROA does not Granger Cause DCC	17	4.10241	0.0433
DCC does not Granger Cause DROA		3.92785	0.0263

Source: *Author's development.*

To examine the causal relationship between the consumer credit variable (DCC) and both the net result (DRN) and return on assets (DROA), a Granger causality test was conducted using two lags (lags = 2) over the period from 2004 to 2023. The results revealed a bidirectional causal relationship between the variables under study.

Specifically, the findings indicate that the net result Granger-causes consumer credit (F = 3.54266, p = 0.0117), while consumer credit also Granger-causes the net result (F = 3.67146, p = 0.0499). This reciprocal causality suggests a short-term bidirectional relationship between consumer credit and the bank's net result.

Similarly, the analysis shows that return on assets Granger-causes consumer credit (F = 4.10241, p = 0.0433), and consumer credit also Granger-causes return on assets (F = 3.92785, p = 0.0263). These results reinforce the hypothesis of a mutual causal relationship between consumer lending and financial performance, as measured by ROA.

Overall, the evidence suggests that consumer credit is not only influenced by financial profitability but also acts as a determinant of it. This highlights a complex dynamic interaction that warrants consideration of both directions of causality when analyzing the economic impact of consumer lending.

5.3 Johansen Cointegration Test

Table 4: Johansen Cointegration Test.

Johansen Cointegration Test

Date: 02/01/25 Time: 13:48
Sample (adjusted): 2007 2023
Included observations: 17 after adjustments
Trend assumption: Linear deterministic trend
Series: CC RN ROA
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.865118	42.83424	29.79707	0.0009
At most 1	0.332542	8.777256	15.49471	0.3864
At most 2	0.105982	1.904507	3.841465	0.1676

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.865118	34.05698	21.13162	0.0005
At most 1	0.332542	6.872749	14.26460	0.5043
At most 2	0.105982	1.904507	3.841465	0.1676

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

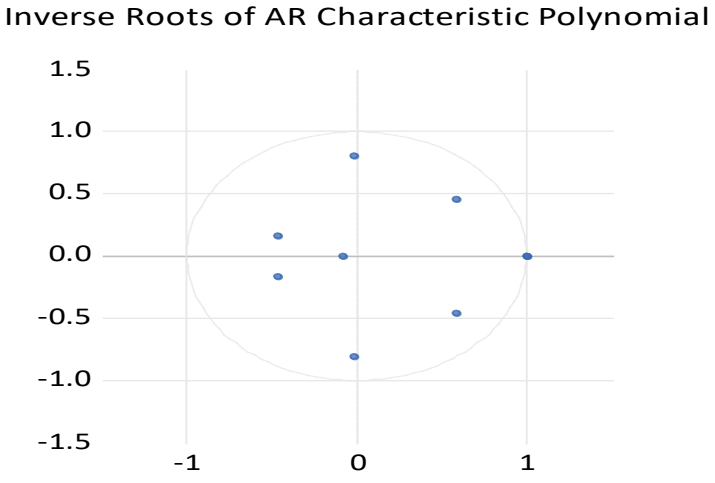
Source: *Author's development.*

The results of the Johansen cointegration test indicate the existence of a long-term relationship among the three study variables: consumer credit (CC), net result (RN), and return on assets (ROA) over the period 2004–2023. Both the Trace Statistic and the Max-Eigenvalue Statistic revealed the presence of one cointegrating equation at the 5% significance level. This suggests that although the variables may be individually non-stationary, they move together in a common direction that reflects a long-run equilibrium relationship. In other words, any short-term deviations among these variables tend to be corrected over time, supporting the hypothesis of a structural long-term link between bank financial performance (as represented by RN and ROA) and the level of consumer credit. These findings provide a strong foundation for constructing a Vector Error Correction Model (VECM) to analyze short-term dynamic relationships and estimate the speed of adjustment toward equilibrium following a shock, for the theory of cointegration testing see (S.lardic & V.Mignon, 2002).

5.4 Stability of the model:

From the above figure, we notice that all coefficients are smaller than one, and all roots lie within a single circle, and accordingly, the model achieves stability conditions.

Figure 6: *Stability graph for VECMmodel*



Source: *Author's development.*

6. VECM Model and Shock Response Functions

Given the evidence of a long-run equilibrium relationship among consumer credit (CC), net result (RN), and return on assets (ROA), as confirmed by the Johansen cointegration test results—which revealed one cointegrating equation at the 5% significance level—it becomes appropriate to employ the Vector Error Correction Model (VECM). This model is particularly suited for systems of non-stationary but cointegrated variables, as it captures both the long-term equilibrium dynamics and short-term adjustments. The inclusion of the error correction term allows us to quantify the speed at which short-term deviations from equilibrium are corrected. Therefore, the VECM provides a comprehensive framework to analyze the dynamic interactions among CC, RN, and ROA, and to understand how shocks affect the system in the short run while ensuring convergence to the long-run path.

6.1 Equation for the Net Income Variable (ΔRN):

$$\Delta RN = 1742.73 - 0.45et-1 - 3.64\Delta CC(-1) + 0.16\Delta RN(-1) - 3148.21\Delta ROA(-1)$$
$$(\mathbf{0.98}) \quad (\mathbf{2.23}) \quad (\mathbf{-3.05}) \quad (\mathbf{0.37}) \quad (\mathbf{-0.56})$$
$$R2 = 0.57 \bar{R}.^2 = 0.37 FC = 0.69 \quad tc = (..)$$

The estimated VECM equations reveal important insights into the short-run dynamics and long-run adjustments among net income (ΔRN), return on assets (ΔROA), and consumer credit (ΔCC). In the first equation, the error correction term ($et-1$) is negative (-0.45) and statistically significant ($t = 2.23$), indicating the presence of a stable long-run equilibrium and the system's tendency to correct deviations from that equilibrium. Notably, lagged consumer credit ($\Delta CC(-1)$) has a strong and statistically significant negative impact (-3.64, t = -3.05) on net income, suggesting that increased consumer lending in the previous period tends to reduce bank profitability, possibly due to higher credit risk or declining asset quality. In contrast, the lagged change in ROA exerts a large but statistically insignificant negative effect on net income (-3148.21, t = -0.56), while the lagged value of ΔRN itself is insignificant, indicating limited short-run momentum.

6.2 Equation for the Return on Assets Variable (ΔROA):

$$\Delta ROA = -0.01 - 0.00016et-1 - 0.00005\Delta CC(-1) + 0.000032\Delta RN(-1) - 0.57\Delta ROA(-1)$$
$$(\mathbf{-0.12}) \quad (\mathbf{2.39}) \quad (\mathbf{-2.26}) \quad (\mathbf{0.69}) \quad (\mathbf{-1.76})$$
$$R2 = 0.41 \quad \bar{R}.^2 = 0.23 \quad FC = 2.30 \quad tc = (..)$$

In the second equation, explaining ΔROA, the error correction term (-0.00016) remains negative and statistically significant (t = 2.39), though the speed of adjustment appears very slow. The effect of lagged consumer credit (-0.00005, t = -2.26) is again negative and significant, reinforcing the finding that consumer loans can weaken asset returns in the short term. Meanwhile, the impact of lagged ΔRN is positive but negligible and statistically insignificant. The lagged ΔROA has a negative coefficient (-0.57, t = -1.76), suggesting some short-term negative persistence in profitability.

- **Analysis Summary:**

The ΔRN equation shows that consumer loans have a strong, negative impact on net profit, while the impact from ROA is insignificant.

The ΔROA equation shows that consumer loans also have a negative, significant impact on return on assets, but by a small amount.

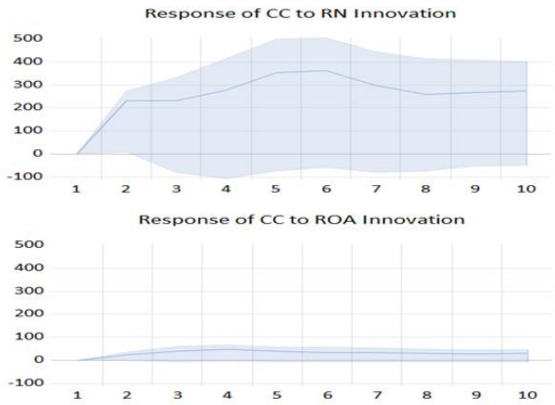
The error correction coefficient is negative and significant in both equations, confirming a long-run relationship between the three variables.

- **Analyze of Impulse response functions**

Shock analysis allows measuring the unsurprising effect of a particular random variable on the rest of the variables composing the autoregressive beam, and according to estimates of the immediate response function extending over a ten-year horizon, as shown in the following figure:

6.3 Results of estimating impulse response functions

Figure 7: *Results of estimating impulse response functions*



Source: *Author's development.*

Focusing on shock analysis as revealed by impulse response functions, the reaction of the consumer loans (CC) variable to sudden shocks in both net profit (RN) and return on assets (ROA) offers valuable analytical insights into a public bank's behavior in relation to its internal financial performance indicators.

First, the impulse response to RN shocks indicates a clear, temporary, and positive effect on consumer loans. Consumer lending responds rapidly, rising sharply following the shock, peaking during intermediate periods, and then gradually declining. This pattern suggests that the bank reacts to improved financial outcomes by expanding consumer lending—an expansionary approach driven by overall financial performance as a key catalyst for portfolio growth.

In contrast, the impulse response to ROA shocks reveals a negligible impact on consumer loans. The response remains confined within a narrow range and lacks a clear or sustained pattern. This implies that the bank does not heavily rely on ROA when formulating credit decisions related to consumer loans—possibly because ROA reflects relative efficiency, which may not directly translate into lending capacity, or because its variations are insufficient to warrant major changes in credit policy.

Accordingly, the shock analysis indicates that consumer loans are more responsive to improvements in net profit than to changes in relative efficiency. This reflects the bank's focus on comprehensive performance metrics when determining the extent of consumer financing, while de-emphasizing or delaying the influence of more technical or relative indicators.

6.4 Analysis of variance

Table 05: *Analysis of variance*

Period	S.E.	CC	RN	ROA
1	180.9396	100.0000	0.000000	0.000000
2	400.7737	66.35546	33.28262	0.361924
3	499.5029	56.43664	42.70967	0.853689
4	581.6386	44.40654	54.27317	1.320290
5	690.0036	33.64889	65.08296	1.268150
6	788.6026	27.82391	71.01701	1.159081
7	848.4627	25.10613	73.74533	1.148537
8	891.3073	23.53623	75.30443	1.159340
9	937.6857	22.55126	76.31098	1.137762
10	985.3380	22.02252	76.86209	1.115392
Cholesky One S.D. (d.f. adjusted) Innovations				
Cholesky ordering: CC RN ROA				

Source: *Author's development.*

In the first period, it appears that the variance in the target variable (CC) is entirely attributable to its own shocks, consistent with the characteristics of VAR models that initially reflect complete self-shock drive. However, what is striking in this context is the rapid decline in the contribution of CC, which retains only 22% of the variance explanation in the long run (period 10), indicating that the variable suffers from weak self-adaptability and is becoming more susceptible to external factors.

Structurally, the RN variable stands out as the most influential driver, with its contribution increasing from 0% to over 76%. This means that CC fluctuations are now almost entirely related to revenues or related variables, reflecting a strong long-term causal relationship. This relationship may be explained in terms of the effects of earnings on the cost of capital or financing, or through their impact on investment and allocation decisions within institutions. Thus, this dynamic reveals

a structural shift in the sources of variance from internal to external, necessitating a reconsideration of the policies for managing the targeted variable.

As for the ROA variable, despite its relative stability, its contribution remains weak (maximum 1.3%), indicating that return on assets is not a key factor in explaining CC behavior within this model. This may reflect either the limited nature of the relationship between the two variables, or the weak temporal correlation between internal financial performance and the studied variable. It may also indicate that ROA exhibits a nonlinear effect or is delayed in the long run, a hypothesis that merits further testing using nonlinear models or additional structural constraints (such as SVAR or VECM).

Overall, this analysis highlights that the time dimension plays a pivotal role in explaining variance, as effects shift from internal to external shocks over time, reflecting the importance of fiscal and economic policies related to revenues as a means of controlling CC behavior.

These findings point to the need to enhance the model components by introducing other fiscal and economic variables that may be more closely related to fiscal return, as well as conducting advanced tests such as impulse response factor (IRF) analysis and Granger causality tests to confirm the direction of the effect and ensure that the results reflect not only the Cholesky ordering structure but also actual causal economic relationships that can be built upon in public policy.

6.5 Diagnostic Tests:

These diagnostic tests are conducted to assess and measure the quality of the model, as follows:

Table 6: *Results of the Diagnostic Tests:*

LM TestTest WhiteNormal Distribution of Residuals

VEC Residual Heteroskedasticity Tests (Levels and Squares)
Date: 02/01/25 Time: 21:12
Sample: 2004 2023
Included observations: 18

Joint test:

Chi-sq	df	Prob.
63.92291	48	0.0618

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 02/01/25 Time: 21:15
Sample: 2004 2023
Included observations: 18

Component	Skewness	Chi-sq	df	Prob.*
1	0.575478	0.993524	1	0.3189
2	-1.026864	3.163347	1	0.0753
3	-0.298795	0.267835	1	0.6048
Joint		4.424706	3	0.2191

Component	Kurtosis	Chi-sq	df	Prob.
1	2.378361	0.289827	1	0.5903
2	4.305696	3.987176	1	0.1458
3	3.688424	0.355446	1	0.5510
Joint		4.632448	3	0.2008

Component	Jarque-Bera	df	Prob.
1	1.283351	2	0.5264
2	4.150523	2	0.0680
3	0.623280	2	0.7322
Joint	9.057155	6	0.1704

*Approximate p-values do not account for coefficient estimation

VEC Residual Serial Correlation LM Tests
Date: 02/01/25 Time: 21:04
Sample: 2004 2023
Included observations: 18

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	25.30091	9	0.2326	4.332008	(9, 19.6)	0.0531
2	14.42798	9	0.1079	1.888891	(9, 19.6)	0.1144
3	2.972026	9	0.9654	0.299044	(9, 19.6)	0.9663
4	6.154630	9	0.7243	0.664903	(9, 19.6)	0.7302

Source: *Author's development.*

Based on the results presented in Table 6, the diagnostic tests confirm that the estimated model does not suffer from econometric problems. The LM test for serial correlation shows that all probability values (p-values) are above the 5% significance level, indicating the absence of autocorrelation in the residuals. Similarly, the White test for heteroscedasticity

yields a p-value of 0.0618, which is also above the 5% threshold, suggesting that there is no evidence of heteroscedasticity. Furthermore, the Jarque-Bera test for normality confirms that the residuals are normally distributed, as the p-values are not statistically significant at the 5% level. Therefore, the model satisfies the fundamental assumptions of econometric analysis and can be considered reliable for inference.

7. Conclusion

This study investigated the dynamic relationship between consumer credit and financial performance indicators—net result (RN) and return on assets (ROA)—using quarterly data from the Algerian public bank Caisse Populaire d'Algérie (CPA) over the period spanning the first quarter of 2004 to the fourth quarter of 2023. By employing a robust time-series dataset and applying the Vector Error Correction Model (VECM), the analysis was able to capture both the short-term fluctuations and long-term equilibrium relationships among the variables.

The Granger causality tests revealed a bidirectional causal relationship between consumer credit and the two financial indicators, underlining the mutual influence between lending activity and bank profitability. The Johansen cointegration test further confirmed the existence of a stable long-term relationship among the variables. Additionally, impulse response analysis demonstrated that shocks to net result exert a clear and positive impact on consumer credit, whereas the effect of return on assets was minimal and statistically insignificant. This suggests that the bank responds more to overall profitability than to relative efficiency when making credit-related decisions.

These findings highlight the strategic importance of consumer credit in shaping banking performance, particularly when managed within a sound institutional and regulatory framework. Accordingly, it is recommended that public banks strengthen their internal financial analysis capacities and adopt more targeted credit strategies that align with profitability goals and long-term sustainability. By doing so, banks can better navigate the trade-off between growth and financial prudence, ensuring that lending practices contribute positively to institutional performance and economic stability.

Ethical Considerations

This study was conducted in accordance with internationally accepted ethical standards for academic research. The research relies on secondary data, publicly available financial reports, institutional documents, and aggregated banking information. No human participants, personal data, interviews, surveys, or confidential customer information were involved in the research process. Consequently, formal ethical committee approval was not required. The authors ensured academic integrity through accurate citation of sources, objective data interpretation, and adherence to principles of transparency and scholarly responsibility.

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Author Contributions

All authors contributed significantly to the conception, development, and completion of this research.

- **Smail Boulariah** contributed to the study design, theoretical framework, data analysis, and interpretation of results.
- **Omar Boulahlib** contributed to data collection, literature review, methodological development, and empirical analysis.
- **Imane Said** contributed to the case study formulation, discussion of findings, policy implications, and manuscript revision.

All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Conflict of Interest

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