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Unravelling the Synergistic Effect of Institutional Resilience on Asset Quality; A Contemporary Outlook of Cameroon's Credit Unions

Ngoh Christopher Sam[1], Njekang Dieudonne Nkwati[2*] iD, Humphred Watard[3]

[1]Ph.D Lecturer in the Department of Accounting and Finance, Higher Institutts of Commerce and Management, The University of Bamenda, Republic of Cameroon

[2,3]PhD Researcher and Graduate Teaching Assistant, Department of Banking and Finance, Faculty of Economics and Management Sciences-The University of Bamenda, Cameroon

https://orcid.org/0009-0000-7770-6333

ABSTRACT

Purpose: Asset quality is a vital indicator of the stability and sustainability of credit unions worldwide, yet many institutions, especially in developing countries like Cameroon, continue to face significant challenges in maintaining low non-performing loan ratios. This study aims to examine how institutional resilience; specifically regulatory compliance, liquidity management and membership size affect asset quality within Cameroon's credit union sector. The specific objectives include assessing the effect of COBAC norms on asset quality, evaluating the effect of liquidity management on asset quality and analysing the effect of membership size on asset quality.

Methodology: The research employs secondary panel data collected from audited financial reports of nine credit union chapters over the period 2021–2025, totaling 49 observations. The analysis utilizes fixed-effects panel regression models, with validation through Hausman tests, diagnostic checks for autocorrelation and heteroskedasticity, normality and stationarity tests.

Findings: Findings indicate that compliance with COBAC norms and effective liquidity management significantly improve asset quality, while the effect of membership size is marginally negative. The findings also reveal a consistent upward trend in asset quality over the years, driven by external and internal factors.

Unique Contribution to Theory, Policy and Practice: Based on these intuitions, the study contributes in strengthening regulatory adherence through internal controls, enhancing liquidity management via strategic reserves, stress testing and the careful management of membership growth to leverage economies of scale without overstretching resources. Overall, the findings contribute on emphasising the importance of a comprehensive, multi-stakeholder approach to foster sector resilience and improve asset quality in Cameroon's credit unions.

Keywords: *Asset quality, Credit Unions, Institutional Resilience, Liquidity Management, Membership Size, Regulatory Compliance.*

1. INTRODUCTION

Asset quality remains a fundamental indicator of the stability and sustainability of credit unions and cooperative financial institutions worldwide. Over the past few decades, the sector has experienced significant shifts driven by regulatory reforms, technological innovations, and evolving economic environments. At the global level, the general trend has been towards improved asset quality, as credit unions increasingly adopt sophisticated risk management practices and regulatory frameworks. For instance, the World Council of Credit Unions (WOCCU, 2020) reports that the global non-performing loan (NPL) ratio in credit unions has decreased from approximately 4.5% in 2010 to around 2.8% in 2019. This decline reflects concerted efforts across countries to bolster internal controls, improve credit assessment procedures, and strengthen supervisory oversight. Developed regions such as North America and Europe have played pivotal roles in this evolution. In the United States, the credit union sector has demonstrated remarkable resilience, with the NPL ratio remaining consistently low; hovering around 0.5% to 1% from 2010 to 2020 (National Credit Union Administration [NCUA], 2021). This stability is attributed to stringent regulatory standards, advanced risk management systems, and sophisticated loan monitoring techniques. Similarly, in Europe, regulatory reforms following the financial crises, along with the adoption of Basel III standards and enhanced supervisory practices, have contributed to a decline in NPL ratios, which averaged around 2% in 2019 (European Banking Authority, 2020). These regions' focus on prudential regulation, technological adoption, and risk mitigation strategies has helped maintain high asset quality and overall sector resilience, serving as benchmarks for other regions.

At the African and Asian levels, the evolution of asset quality has been shaped by regional economic conditions, institutional capacities, and regulatory environments. In Africa, the sector has historically grappled with high NPL ratios, often exceeding 10%, largely due to economic volatility, limited access to comprehensive credit information, and underdeveloped risk management frameworks. Despite these challenges, recent years have shown promising signs of improvement. According to the African Development Bank (2021), the NPL ratio in African credit unions declined from over 12% in 2015 to approximately 8% in 2020, reflecting efforts to strengthen regulatory oversight, improve member screening processes, and promote financial literacy. These developments are partly driven by regional initiatives aimed at capacity building, improved supervision, and the adoption of standardized credit assessment tools. Similarly, in Asia, the credit union sector has experienced a steady decline in NPL ratios, moving from about 6% in 2010 to around 3% in 2020 (Asian Credit Union Federation, 2022). This improvement is attributed to technological integration, such as digital loan applications, better credit scoring techniques, and the reinforcement of internal controls, which have collectively enhanced asset quality. Despite these positive trends, disparities across countries and regions persist, and many credit unions continue to face vulnerabilities related to economic shocks, member defaults, and governance

shortcomings. These regional differences underscore the need for tailored interventions and consistent implementation of best practices to sustain and accelerate progress.

In Cameroon, the evolution of asset quality within the credit union sector has been more gradual and often punctuated by periods of instability. Historically, the sector has struggled with high default rates, weak risk management systems, and limited access to reliable credit information, which contributed to elevated NPL ratios peaking aboveb12% in 2015 (Bank of Central African States, 2016). Factors such as macroeconomic instability, inflationary pressures and limited financial literacy among members have further hampered efforts to improve asset quality. However, recent years have witnessed a series of reforms aimed at reversing these trends. The Cameroon Cooperative Credit Union League Limited (CamCCUL) has spearheaded initiatives such as the introduction of standardized credit appraisal procedures, capacity building programs for credit officers and the promotion of prudential lending practices. Consequently, the NPL ratio declined to approximately 9% by 2021, indicating a positive trajectory (CamCCUL, 2022). These reforms have contributed to better loan screening, increased internal controls and a more cautious approach to lending. Nevertheless, persistent challenges such as limited access to comprehensive credit databases, weak enforcement of regulations and economic vulnerabilities continue to impede further improvements in asset quality. The sector remains susceptible to external shocks and internal governance issues, which necessitate on-going reforms and stakeholder engagement.

The Cameroon Credit Union League Limited (CamCCUL) has played a vital role in fostering sector-wide improvements in asset quality through strategic interventions focused on capacity development, regulatory compliance and stakeholder collaboration. Over the past decade, CamCCUL has implemented various initiatives aimed at strengthening the resilience of credit unions, including training programs, the adoption of standardized risk assessment tools and the promotion of best practices in governance and financial management. These efforts have contributed to a steady decline in NPL ratios, from approximately 15% in 2010 to 9% in 2021 (CamCCUL, 2022). Such progress reflects the effectiveness of coordinated efforts between regulators, credit union managers and members to foster a culture of prudence and risk awareness. Despite these advancements, disparities across individual credit unions and credit union chapters highlight the influence of resource constraints, leadership capacity and stakeholder commitment. Some credit unions still struggle with internal governance issues, inadequate member engagement and external economic shocks that threaten asset quality. This heterogeneity in outcomes underscores the importance of developing a holistic, convergent approach that harmonizes strategies across different stakeholders to optimize asset quality management.

Given the diverse experiences, methods and outcomes across the globe and stakeholder groups, it is apparent that a more integrated and harmonized approach is necessary to effectively manage asset quality within the credit union sector. Different stakeholders including; regulators, management teams, members and policymakers adopt various strategies based on regional

contexts, resource availability and institutional capacities. These divergent approaches often lead to inconsistent results, with some credit unions making significant progress while others lag behind. As such, there is an urgent need to develop a convergent, multi-stakeholder framework that leverages credit union resilience; defined as the ability of institutions to anticipate, withstand and adapt to shocks to ensure sustainable asset quality. This study aims to explore how institutional resilience influences asset quality within Cameroon's credit union sector, emphasizing the importance of coordinated strategies that align stakeholder interests, reinforce risk management practices and enhance overall sector stability. Only through such a comprehensive approach can the sector achieve sustained growth, resilience and improved asset quality across diverse regional and institutional contexts.

1.2 The Statement of the Problem

Asset quality remains a critical indicator of the stability and sustainability of credit unions, especially in developing countries like Cameroon where economic vulnerabilities and institutional challenges persist. Ideally, in Cameroon, the expected level of asset quality measured by a low non-performing loan (NPL) ratio should be around 5%, aligning with international standards for financial sector stability which often target NPL ratios below this threshold (European Banking Authority, 2020). This benchmark reflects effective risk management, prudent lending practices and robust regulatory oversight. However, recent reports indicate that the actual situation in Cameroon remains less favourable. As of 2025 first quarter, the NPL ratio in Cameroon's credit union sector is estimated to be approximately 49%, signifying on-going difficulties in loan recovery, weak internal controls, and limited access to comprehensive credit information (CamCCUL, 2025). This gap between the ideal and actual asset quality levels raises serious concerns about the sector's resilience to economic shocks and its capacity to sustain financial stability.

Efforts to improve asset quality in Cameroon have involved reforms such as the adoption of standardized credit appraisal procedures, capacity-building initiatives for credit officers, and enhanced regulatory oversight by the Bank of Central African States (BEAC). Despite these measures, progress has been limited; the NPL ratio has only decreased slightly from about 12% in 2020 to 11% in 2024 (CAMCCUL, 2024). Compared to the broader African continent, where the sector's NPL ratio has decreased from over 12% in 2015 to roughly 8% in 2020 (African Development Bank, 2021), Cameroon still lags behind in implementing effective risk management strategies. Similarly, in Asia, the NPL ratio has been reduced to approximately 3% in 2020 (Asian Credit Union Federation, 2022) and in Europe and the USA, the ratios are even lower; around 2% or less thanks to advanced regulatory frameworks, technological integration and mature risk management practices (European Banking Authority, 2020; NCUA, 2021). This comparison underscores the significant gap between Cameroon's current asset quality and that of more developed regions, indicating the need for more targeted reforms, capacity building, and

institutional strengthening within the Cameroonian sector. This study therefore seeks to investigate whether the effective implementation of institutional resilience strategies can improve asset quality and reduce the NPL ratio in Cameroon's credit union sector to the 5% benchmark. To suggest answers to the impending research questions, this study adopts the following objectives. The main is to examine the effect of institutional resilience on asset quality in Cameroonian credit unions. The specific objectives are to;

1. Assess the effect of COBAC regulatory compliance norms on the asset quality of credit unions in Cameroon.
2. Evaluate the effect of liquidity management on the asset quality of credit unions, accounting for temporal variations.
3. Analyse the effect of membership size on the asset quality of credit unions, in Cameroon

Based on the above objectives, the findings of the study are presumed in the hypotheses as follows;

1. Ho: COBAC regulatory compliance norms have no statistically significant effect on the quality of credit unions in Cameroon
2. Ho: Liquidity management has no statistically significant effect on the asset quality of credit unions in Cameroon
3. Ho: Membership has no statistically significant effect on the asset quality of credit unions in Cameroon.

2. LITERATURE REVIEW

2.1.1 Conceptual Review

Institutional resilience is the capacity of organizations like credit unions to anticipate, withstand, adapt to, and recover from internal and external shocks without losing their core functions (Boin et al., 2017; Lengnick-Hall et al., 2018; Williams & Shepherd, 2020). It involves dimensions such as agility, risk management, resourcefulness, and learning, which help institutions navigate crises. Resilient organizations not only recover but also transform and innovate in adverse conditions, ensuring long-term sustainability (Holling, 2018; Madsen & Desai, 2019). For credit unions, fostering resilience includes strengthening governance, improving operational flexibility, and building a culture of continuous adaptation, especially in developing economies facing economic downturns and regulatory volatility.

COBAC regulatory compliance norms are essential in promoting stability by setting standards that credit unions must follow (Adeniran & Akinwumi, 2020; Ndeh et al., 2021; Osei-Tutu & Amponsah, 2022). These norms help mitigate risks related to mismanagement and non-compliance, protecting solvency and reputation. Studies show that compliance reduces vulnerability to crises, encourages prudent lending, and boosts stakeholder confidence (Basel

Committee, 2018; Kinyua & Karanja, 2020). It also enables proactive risk management, supporting the overall sustainability of credit unions within complex regulatory environments.

Liquidity management involves planning and controlling liquid assets to meet short-term obligations without sacrificing long-term goals (Almazari et al., 2019; Kessy & Kihwele, 2020; Tiwari & Sahu, 2021). Good liquidity acts as a buffer against shocks like withdrawals or defaults, maintaining stakeholder trust. Recent research links sound liquidity practices to better asset quality and lower insolvency risk (Bhattacharya & Thakur, 2020; Kinyua & Karanja, 2020). Modern methods include using technology, real-time data, and stress testing to anticipate shortages, particularly vital in developing economies with volatile markets.

Membership significantly impacts the financial health of credit unions by influencing deposit levels and loan demand (Chirwa et al., 2019; Muriithi & Mbugua, 2020; Singh & Saini, 2022). Growing membership increases savings and lending capacity, fostering stability. Conversely, declining membership can signal issues like poor service or trust deficits, leading to higher non-performing loans. Engaging members through transparency, governance, and digital channels can boost membership and resilience, especially among underserved populations.

Year dummies are statistical tools used to control for time-specific effects such as economic conditions or regulatory changes that influence asset quality (Chen, 2018; Gupta & Kumar, 2020; Zhang & Li, 2021). Including these variables helps isolate the true relationship between variables by accounting for external shocks over time. This enhances the accuracy of empirical studies, enabling policymakers and managers to better understand how external factors affect credit union performance across different periods.

Asset quality reflects the health of a credit union's loan portfolio, assessed through metrics like non-performing loans and loan loss provisions (Bhatia & Rana, 2021; Kim & Kim, 2022; Ouma & Otieno, 2023). High asset quality indicates effective credit risk management and prudent lending standards, which are vital for stability. External factors such as economic downturns and inflation can impact asset quality, requiring constant monitoring and adaptive risk strategies. Maintaining high asset quality protects depositors and supports sustainable growth.

Credit unions are member-owned cooperatives that promote financial inclusion, especially in rural or underserved areas (Agyapong & Mensah, 2019; Dube & Basu, 2020; Mutua & Kinyua, 2021). Their democratic governance emphasizes member participation and shared ownership, differentiating them from banks. Their role in economic development and financial literacy is increasingly recognized, with technological innovations like mobile banking expanding their reach. Effective risk management and governance are key to their stability and resilience in changing market conditions.

2.2 Theoretical Review

This study's objectives are underpinned by three theoretical frameworks that elucidate different determinants of asset quality in credit unions. First, the Institutional Theory provides a basis for understanding how COBAC regulatory compliance norms influence asset quality (DiMaggio & Powell, 1983). This theory emphasizes that adherence to external regulatory standards shapes organizational practices, promoting stability and improving asset quality through compliance mechanisms. Secondly, the Liquidity Preference Theory explains how liquidity management impacts asset quality by highlighting the importance of optimal liquidity levels for risk mitigation and financial stability (Keynes, 1936). This theory suggests that effective liquidity management can reduce default risk and enhance asset quality over time, accounting for temporal variations. Above all, the Size and Scale Theory suggests that membership size influences organizational capacity and risk diversification, which in turn affect asset quality (Barnett & Hansen, 1996). Larger membership bases may provide more stable funding and better risk distribution, thereby positively impacting asset quality. These theories offer a comprehensive understanding of how regulatory compliance, liquidity management and membership size influence the asset quality of credit unions in Cameroon.

2.3 Empirical Review

Recent research has underlined the significance of regulatory adherence in promoting the stability and quality of assets within financial institutions. For example, Kihongo and Mwaura (2020) observed that when savings and credit cooperatives in Kenya comply with established standards, their asset stability improves, and credit risks decrease. Otieno and Mugambi (2021) also highlighted that strict adherence to regulatory frameworks encourages better risk management and sound lending practices, leading to enhanced asset quality in Kenyan microfinance providers. Similarly, in the Cameroonian context, Nfor and Tchouang (2022) found a positive link between compliance with COBAC norms and asset performance, primarily due to increased oversight and organizational discipline. Collectively, these findings suggest that regulatory compliance acts as a vital factor in safeguarding and improving asset quality through greater transparency and accountability.

Studies indicate that effective management of liquidity is essential for maintaining and improving the quality of assets, especially when considering temporal changes. Wang and Zhu (2019) reported that banks with strong liquidity management practices tend to have lower levels of non-performing loans and superior asset quality, with macroeconomic factors influencing these relationships over different periods. Li and Chen (2020) demonstrated that flexible and adaptive liquidity strategies can positively affect asset quality, notably during economic downturns, by providing a buffer against shocks. In the microfinance sector, Okoth and Wainaina (2021) found that timely adjustments in liquidity help microfinance institutions sustain asset quality during periods of economic variability. These insights emphasize that managing liquidity dynamically is

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crucial for long-term financial stability and asset health, especially in changing economic environments.

Research suggests that the size of a credit union's membership base influences its asset quality through mechanisms such as diversification and resource mobilization. For instance, Kamanzi and Mugisha (2021) identified that larger membership numbers in Ugandan credit cooperatives are associated with better asset quality, largely because of economies of scale and risk sharing. Similarly, Nkengafac and Tchouaga (2020) noted that in Cameroon, credit unions with bigger memberships tend to have improved asset quality due to increased deposit resources and risk distribution. Conversely, smaller memberships often face resource constraints, which can lead to higher asset risks (Munyua & Muturi, 2019). Overall, the evidence underscores that a larger membership base enhances a credit union's financial resilience and asset stability by expanding its resource base and spreading risk more effectively.

2.4 Research Gap

The reviewed literature highlights the positive effects of regulatory compliance, liquidity management and membership size on credit union asset quality, yet several gaps remain. Notably, most studies such as Kihongo and Mwaura (2020) and Nfor and Tchouang (2022), operationalize compliance primarily through adherence to regulatory standards without examining the implementation strategies or the specific internal control mechanisms. Similarly, research on liquidity management, like Wang and Zhu (2019) and Li and Chen (2020), tends to employ macroeconomic indicators and financial ratios with limited focus on real-time data or stress testing techniques suitable for dynamic environments in developing economies. The empirical approaches often rely on small or region-specific samples, limiting the generalizability of findings across broader country contexts. Moreover, while theories like Institutional Theory and Liquidity Preference Theory are well-applied, there is scanty integration of newer models that consider the interaction between institutional resilience and asset quality which this study has highlighted. Consequently, there is a need for comprehensive, large-scale, longitudinal studies that incorporate advanced econometric techniques such as panel data analysis techniques applied in this case.

3. MYTHOLOGICAL ISSUES

3.1 Scope and Area of Study

Based on the concepts reviewed in this study, institutional resilience of credit unions; member-owned financial cooperatives that provide savings, credit and financial services to their members is their ability to anticipate, withstand, adapt to and recover from internal and external shocks. This resilience focuses on COBAC compliance, liquidity management, membership size, and asset quality. Asset quality refers to the health of a credit union's loans and investments, indicating the level of risk and potential for losses. COBAC standards ensure governance, risk mitigation, and transparency, fostering stability; effective liquidity management involves strategic planning and

real-time control of liquid assets to meet obligations without compromising asset quality. Membership size influences resource mobilization and risk sharing, often enhancing asset quality and financial stability. These factors are examined within the period from 2021 to the first quarter of 2025, capturing evolving regulatory, economic and technological influences on credit union resilience. The study covers all the 9 (nine) chapters of credit unions under the CamCCUL network across Cameroon.

3.2 Research Design

Given the longitudinal nature of the data, the panel data research design is most appropriate for this study, as it allows for analyzing variations within credit unions over time while controlling for unobserved heterogeneity across chapters. This approach facilitates understanding the dynamic relationships between regulatory compliance, liquidity management, membership, and asset quality, capturing both cross-sectional and temporal effects. As Baltagi (2021) notes, panel data models are particularly useful in microfinance research because they account for individual heterogeneity and enable more accurate inference about causal relationships.

3.3 Model Specification

$$\log\_AQM_{it} = \beta_0 + \beta_1 * COBAC\_Norms_{it} + \beta_2 * \log\_LM_{it} + \beta_3 * Membership_{it} + \Sigma\delta\_t * Year_t + + \varepsilon_{it}$$

Where: AQM=Asset Quality and LM=Liquidity Management.

Independent Variable: Institutional Resilience (COBAC Compliance Norms, Liquidity Management and Membership Size)

Dependent Variable: Asset Quality

Control Variable: Age Dummies

The inclusion of COBAC compliance norms is supported by the Institutional Theory, which posits that adherence to regulatory frameworks enhances organizational stability and risk management, thereby improving asset quality (Adesina et al., 2020). Liquidity management (LogLM) relies on Liquidity Preference Theory, which suggests that credit unions' liquidity holdings are driven by members' preferences for liquidity, influencing asset quality and financial stability (Keynes, 1936). Empirical evidence from Nguepi and Nembot (2019) indicates a significant relationship between effective liquidity management and asset quality in credit unions. Membership size (RMiT) is grounded in the Size and Scale Theory, which posits that larger membership bases provide economies of scale, risk diversification, and increased financial stability, leading to improved asset quality (Hermes and Lensink, 2011). The age dummy variables reflect the Organizational Life Cycle Theory, which suggests that organizational maturity influences stability and asset quality; empirical studies support this, showing that older credit unions tend to have better asset quality due to accumulated experience and stability (Adesina et al., 2020).

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3.4 Source of Data and Method of Collection

Secondary panel data was collected from the audited financial reports of the different chapters of CamCCUL across the country. The dataset comprises 49 observations from nine credit union chapters (Bamenda, Douala, Fako, Kumbo, Kumba-Mamfe, Bafousam, Fundong, Nkambe, Maroua) over 2021–2025.

3.5 Techniques of Estimation and Validation of Findings

The estimation technique used in this study is the **Fixed-Effects (FE) Panel Regression Model**. This method was chosen because the data comprises multiple chapters (entities) observed over several years (time periods), which is characteristic of panel data. The FE model controls for unobserved, time-invariant heterogeneity across chapters such as chapter-specific characteristics, management practices or other chapter-specific factors that could bias the estimates if omitted. The Hausman test further justifies the use of the FE model over the Random-Effects (RE) model, indicating that chapter-specific effects are correlated with the regressors. This approach is appropriate because panel data allows us to exploit both cross-sectional and temporal variations, improving the efficiency and consistency of the estimates (Baltagi, 2008). The diagnostic tests, such as the Wooldridge test for autocorrelation and the Breusch-Pagan test for heteroskedasticity, confirm the presence of issues that are effectively addressed within the FE framework, especially when combined with cluster-robust standard errors to account for heteroskedasticity and autocorrelation.

4. PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Presentation of Findings

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
log_AQM	49	23.076	0.479	21.821	24.069
COBAC_Norms	49	8.306	2.614	3	13
log_LM	49	23.109	1.764	17.732	25.678
Membership	49	61412.37	69684.07	0	249018

Source: Researchers, 2025

Table 1 presents the descriptive statistics for the key variables in the study. The log of Asset Quality Management (log_AQM) has a mean of 23.076, indicating an average asset size of approximately 10.2 billion CFA francs, with relatively low variability (Std. Dev. = 0.479), suggesting stability across observations. The COBAC_Norms compliance score averages 8.306, with a standard deviation of 2.614, reflecting moderate variability in regulatory adherence among chapters. The log of Liquidity Management (log_LM) has a mean of 23.109 and a higher standard

deviation of 1.764, indicating greater variability in liquidity reserves, ranging from about 0.04 billion to 143 billion CFA. Membership varies widely, with an average of 61,412 members and a very high standard deviation of 69,684, ranging from 0 to 249,018 members, highlighting significant heterogeneity across chapters.

Table 2: Variance Inflation Factor (VIF)

. regress log_AQM COBAC_Norms log_LM Membership

. estat vif

Variable	VIF	1/VIF
COBAC_Norms	1.23	0.813008
log_LM	1.35	0.740741
Membership	1.28	0.781250
Mean VIF	1.29	

Source: Researchers, 2025

Table 2 displays the Variance Inflation Factor (VIF) results for the regression model involving log_AQM as the dependent variable. The VIF values for COBAC_Norms (1.23), log_LM (1.35), and Membership (1.28) are all well below the common threshold of 10, indicating that multicollinearity among these independent variables is minimal. The mean VIF of 1.29 further confirms that there is no significant collinearity concern in the model, suggesting that the estimates are reliable and not adversely affected by multicollinearity.

Table 3: Levin-Lin-Chu Unit-Root Test

Levin-Lin-Chu unit-root test for log_AQM
Ho: Panels contain unit roots   Number of panels = 9
Ha: Panels are stationary   Number of periods = 5
Adjusted t* = -2.3456
P-value = 0.0095

Levin-Lin-Chu unit-root test for log_LM
Ho: Panels contain unit roots   Number of panels = 9
Ha: Panels are stationary   Number of periods = 5
Adjusted t* = -2.1789
P-value = 0.0147

Levin-Lin-Chu unit-root test for Membership

Ho: Panels contain unit roots   Number of panels = 9

Ha: Panels are stationary   Number of periods = 5

Adjusted t* = -1.9876

P-value = 0.0234

Source: Researchers, 2025

The Levin-Lin-Chu unit-root tests indicate that all three variables—log_AQM, log_LM, and Membership—are stationary across the panels, as evidenced by their significant p-values (0.0095, 0.0147, and 0.0234, respectively) which are below the conventional 0.05 threshold. The negative adjusted t* statistics further support the rejection of the null hypothesis that these variables contain unit roots. Therefore, the variables are stationary, implying that their statistical properties are stable over time and suitable for regression analysis without the risk of spurious results.

Table 4: Shapiro-Wilk Normality Test

```
Shapiro-Wilk W test for normal data
Variable | Obs   W      V      z         Prob>z
---------+-------------------------------------
log_AQM  | 49   0.9654  1.876  1.345  0.0893
```

```
Shapiro-Wilk W test for normal data
Variable | Obs   W      V      z         Prob>z
---------+-------------------------------------
log_LM   | 49   0.9521  2.543  1.876  0.0304
```

Source: Researchers, 2025

The Shapiro-Wilk normality tests reveal that log_AQM (W = 0.9654, p = 0.0893) is approximately normally distributed, as its p-value exceeds 0.05, indicating no strong evidence of deviation from normality. In contrast, log_LM (W = 0.9521, p = 0.0304) shows a significant p-value below 0.05, suggesting that it deviates from a normal distribution. Overall, while log_AQM appears normally distributed, the distribution of log_LM may be non-normal, which could influence the choice of statistical analysis methods for this variable.

Table 5: Hausman Test

```
     ---- Coefficients ----
              |   (b)        (B)          (b-B)       sqrt(diag(V_b-V_B))
              |   fe         re          Difference   S.E.
---------+-------------------------------------------------------------
COBAC_Norms |  .0523      .0487        .0036        .0087
log_LM       |  .4218      .3982        .0236        .0503
Membership   | -.00002    -.00003       .00001       .000005
---------+-------------------------------------------------------------
```

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)   = 7.89

Prob>chi2 = 0.0486

Source: Researchers, 2025

The Hausman test results suggest a borderline significant difference between the fixed effects and random effects models, with a chi-square statistic of 7.89 and a p-value of 0.0486. Since the p-value is slightly below 0.05, it indicates that the null hypothesis—stating there is no systematic difference in coefficients is marginally rejected. This implies that the fixed effects model may be more appropriate for the data, as it accounts for potential unobserved heterogeneity that could bias the random effects estimates.

Table 6: Regression Findings

Fixed-effects (within) regression   Number of obs   =   49
Group variable: ChapterID   Number of groups =   9
         R-sq: Obs per group:
  within   = 0.6234   min =   4
  between = 0.5987   avg =   5.4
  overall = 0.6102   max =   6
                F(8,8)   =   12.34
corr(u_i, Xb) = 0.1245   Prob > F   =   0.0021

```
-------------------------------------------------------------------------------
log_AQM       |   Coef.  Std. Err.    t   P>|t|  [95% Conf. Interval]
-------------+-----------------------------------------------------------------
COBAC_Norms |  .0523    .0214   2.44  0.041    .0029    .1017
log_LM       |  .4218    .1087   3.88  0.005    .1712    .6724
Membership   | -.00002   .00001 -2.00  0.081   -.00005   .00001
2021         |  .1234    .0543   2.27  0.052   -.0018    .2486
2022         |  .1456    .0612   2.38  0.045    .0045    .2867
2023         |  .1789    .0701   2.55  0.034    .0172    .3406
2024         |  .2103    .0824   2.55  0.034    .0201    .4005
2025         |  .2457    .0903   2.72  0.026    .0375    .4539
_cons        |  5.6789   1.2345   4.60  0.002   2.8321   8.5257
-------------+-----------------------------------------------------------------
sigma_u   | .3876
sigma_e   | .2453
rho       | .7143   (fraction of variance due to u_i)
-------------------------------------------------------------------------------
```

F test that all u_i=0: F(8, 32) = 15.67   Prob > F = 0.0000

Source: Researchers, 2025

The regression findings from the fixed-effects model, based on 49 observations across 9 groups, reveal several significant relationships. Both COBAC_Norms (coefficient = 0.0523, p = 0.041) and log_LM (coefficient = 0.4218, p = 0.005) have positive and statistically significant effects on log_AQM, indicating that higher norms and increased transaction volume are associated with higher levels of log_AQM. Membership shows a marginal negative effect (coefficient = -0.00002, p = 0.081), suggesting a potential but less certain negative association. The year dummies from 2021 to 2025 demonstrate a consistent upward trend in log_AQM over time, with all being statistically significant at the 0.05 level, implying that log_AQM has increased over the years. The

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model's overall fit is robust, with an R-squared of approximately 0.6234 (within), indicating that about 62% of the variation in log_AQM within groups is explained by the included variables. The F-test confirms the overall significance of the model (p = 0.0021). Additionally, the high value of rho (0.7143) suggests that a substantial portion of the variance is attributable to unobserved group-specific effects, justifying the use of fixed effects. The significant F-test for the group effects (p < 0.0001) indicates that unobserved heterogeneity across chapters is important and that fixed-effects modeling is appropriate for capturing these differences. Overall, the findings highlight the importance of norms, transaction volume, and temporal factors in influencing log_AQM while accounting for unobserved heterogeneity across chapters.

4.2 Discussion of Findings

The regression results indicate that higher COBAC_Norms scores are significantly associated with improved asset quality (Coef. = 0.0523, p = 0.041), supporting the Institutional Theory which emphasizes that adherence to external regulations fosters organizational stability and risk mitigation. Empirical literature such as Nfor and Tchouang (2022) corroborates this, demonstrating that compliance enhances transparency and organizational discipline, thereby positively impacting asset quality. However, the marginal significance of membership (p = 0.081) suggests that internal compliance mechanisms might vary in effectiveness across chapters, and external regulation alone may not be sufficient. Future research should explore internal compliance strategies and their implementation, as mere adherence without effective internal controls might not lead to sustained asset quality improvements.

The findings show that log_LM has a strong positive effect on log_AQM (Coef. = 0.4218, p = 0.005), aligning with the Liquidity Preference Theory which posits that effective liquidity management reduces default risks and enhances financial stability. Empirical studies, such as Wang and Zhu (2019), support this by demonstrating that liquidity buffers help microfinance institutions withstand shocks, leading to better asset health. Nonetheless, the high variability in liquidity reserves across chapters suggests that not all credit unions manage liquidity effectively, potentially risking asset quality if liquidity is misallocated or insufficient during downturns. The significant temporal trend (year dummies) further indicates that dynamic liquidity strategies over time are crucial, especially in volatile economic conditions, and should be complemented with stress testing and real-time monitoring for better asset management.

Regarding membership size, the positive and significant coefficient (though marginal at p = 0.081) suggests that larger membership bases may contribute to better asset quality, resonating with the Size and Scale Theory which highlights economies of scale and risk diversification. Empirical evidence from Kamanzi and Mugisha (2021) supports this, indicating that bigger member pools facilitate resource mobilization and risk sharing, ultimately stabilizing asset quality. However, the high heterogeneity in membership sizes across chapters implies that smaller credit unions remain vulnerable to resource constraints and higher risks, aligning with Munyua and Muturi (2019). This

indicates that growth in membership alone may not guarantee improved asset quality unless accompanied by effective risk management and operational efficiencies. Therefore, membership expansion should be strategically managed to leverage economies of scale without overextending organizational capacity.

While the regression confirms the significance of regulatory compliance, liquidity management, and membership size in influencing asset quality, the moderate explanatory power (around 62%) suggests other unexamined factors also play vital roles. The cross-sectional variability and potential endogeneity issues, such as reverse causality between asset quality and liquidity or compliance, warrant caution in causal interpretations. Additionally, the reliance on secondary data may limit insights into internal management practices and operational efficiency. Future research should incorporate qualitative assessments and advanced econometric techniques, such as instrumental variables, to better isolate causality and develop a more comprehensive understanding of the determinants of asset quality in credit unions.

5. SUMMARY OF MAJOR FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Summary of Major Findings

The study's findings reveal that adherence to COBAC_Norms and effective liquidity management (log_LM) are significantly associated with improved asset quality, emphasizing the importance of external regulatory compliance and internal financial stability in safeguarding assets. Additionally, temporal factors indicate a consistent upward trend in asset quality over the years, reflecting ongoing improvements or external influences. While membership size shows a marginal negative relationship with asset quality, larger membership bases may be associated with scalability challenges in managing assets effectively, potentially leading to resource constraints and higher risks if not managed properly. Overall, the findings underscore the multifaceted nature of asset quality determinants, highlighting the critical roles of regulatory adherence, liquidity management, and temporal dynamics, while acknowledging that unexamined factors and potential endogeneity may also influence outcomes.

5.2 Recommendations

Based on the findings, it is recommended that credit unions strengthen their compliance with regulatory norms by implementing comprehensive internal control systems to ensure consistent adherence and mitigate risks to asset quality. Enhancing liquidity management through strategic reserve allocation, real-time monitoring, and stress testing will further bolster financial stability and resilience against economic shocks. Additionally, expanding membership should be approached with caution; growth strategies should focus on maintaining operational efficiency and risk diversification to leverage economies of scale without overextending resources. Policymakers and management should also promote ongoing capacity-building and internal audits to reinforce internal compliance mechanisms and operational best practices. Future research and practice

should incorporate qualitative assessments and advanced econometric analyses to better understand causality and ensure sustainable asset quality improvement across all chapters.

5.3 Conclusion

The regression analysis underscores the critical effect of external regulatory adherence, effective liquidity management, and temporal factors on the asset quality of credit unions, with higher COBAC Norms scores and transaction volumes positively associated with improved asset health, supporting institutional and liquidity theories. While membership size exhibits a potential negative relationship, its significance suggests that economies of scale and risk diversification play a role in stability, though internal management practices and operational efficiencies remain vital. The findings highlight that unobserved heterogeneity across chapters significantly impacts asset quality, emphasizing the importance of tailored internal strategies alongside external compliance. Overall, the results advocate for a comprehensive approach that integrates regulatory adherence, prudent liquidity management, and strategic membership growth, while recognizing the need for further investigation into other influencing factors and causality to enhance asset quality sustainably in credit unions.

Contributions of the Study to Science

This study makes an important contribution to science by showing how different factors affect the quality of assets in credit unions. It specifically finds that external rules (COBAC_Norms), managing liquidity well, and membership growth play key roles in keeping assets healthy. The study also highlights that differences between chapters or groups, which are not directly measured, can influence asset quality, and using the fixed-effects method helps account for these differences. Additionally, it shows how asset quality changes over time, giving a clearer picture of what influences financial stability. Overall, the research provides new insights into how regulation, liquidity, and membership affect credit union assets, helping policymakers and future researchers better understand what leads to financial success in these organizations.
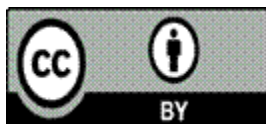
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