Mobile Banking and Financial Performance of Commercial Banks in Cameroon: Evidence from a 33-Year Time Series Analysis

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ABSTRACT

This study investigates the impact of mobile banking on the financial performance of commercial banks in Cameroon over a 33-year period (1985–2017). Drawing on secondary data from the World Development Indicators, the IMF Global Financial Development database, and the World Bank, the study analyses an unbalanced bank-year panel of 14 licensed commercial banks and estimates the relationship between mobile banking adoption and bank profitability, measured by Return on Assets (ROA), using multiple regression. Results show that mobile money transfers are positively and significantly associated with ROA at the 1% level in both the short- and long-run specifications, with an adjusted R-squared exceeding 98% in the long-run model. Deposits and credit are also identified as important correlates of performance. These findings are consistent with the Diffusion of Innovation Theory and the Efficient Structure Hypothesis and suggest that the growth of mobile financial services has coincided with improved bank profitability in Cameroon, although the cross-sectional pooling of bank-year observations, unreported diagnostics for stationarity, multicollinearity, and potential endogeneity mean the estimates should be read as strong associations rather than definitive causal effects (see Sections 3.1, 3.4, and 4.5 for a full discussion). The study recommends sustained investment in mobile banking platforms, stronger bank-telecom partnerships, and targeted regulatory frameworks to deepen financial inclusion and sustain performance gains.

Keywords: Mobile banking; Financial performance; Return on Assets; Commercial banks; Cameroon; Diffusion of Innovation; Financial inclusion

INTRODUCTION

The past two decades have fundamentally transformed the landscape of financial services across sub-Saharan Africa, and nowhere is this transformation more visible than in the rapid proliferation of mobile banking. Where conventional brick-and-mortar banking infrastructure has historically struggled to reach the continent's vast rural populations, mobile financial services have stepped into the gap with remarkable speed and effectiveness. In Cameroon, this shift has been particularly pronounced: mobile money transaction values climbed from under FCFA 200 billion in 2014 to FCFA 870 billion in 2016, representing approximately 84 million individual transactions (Ministry of Finance, Cameroon, 2016). By 2017, total mobile money transfers had reached FCFA 3,500 billion equivalent to 17.5% of gross domestic product a figure that underscores just how deeply embedded these services have become in the everyday economic life of Cameroonians (IMF, 2017).

This rapid growth raises an important question for banking scholars and policymakers alike: does the adoption of mobile banking actually translate into improved financial performance for the commercial banks that champion these platforms? The intuitive answer would be affirmative. By extending reach, reducing operational costs, and attracting previously unbanked customers, mobile banking ought to generate revenue gains and efficiency improvements that ultimately boost profitability. Yet empirical evidence from Cameroon specifically has been sparse, particularly evidence grounded in rigorous time series analysis that can capture both short-run dynamics and long-run structural relationships.

This study addresses that gap directly. Using a 33-year dataset (1985–2017) covering all licensed commercial banks in Cameroon, and employing multiple regression analysis within a causal-quantitative research framework, the study tests whether mobile money transfers as the primary proxy for mobile banking adoption have had a statistically significant effect on bank-level Return on Assets (ROA). The study contributes to a growing body of African banking literature by providing one of the few longitudinal empirical assessments of this relationship in the Cameroonian context.

The remainder of this paper is structured as follows. Section 2 reviews relevant conceptual and theoretical foundations. Section 3 surveys the empirical literature. Section 4 describes the data and methodological approach. Section 5 presents and discusses the results. Section 6 concludes with policy recommendations and directions for future research.

LITERATURE REVIEW

Conceptual Framework

Mobile Banking: Definition and Evolution

Mobile banking defined broadly as the provision of banking and financial services through mobile telecommunication devices has evolved considerably since its early incarnation as a simple SMS-based inquiry service. Porteous (2006) describes it as a subset of electronic banking that enables customers to access a range of financial products via wireless channels. Owen (2008) offers a slightly broader formulation, encompassing balance checks, payments, credit applications, and full account transactions. What unites these definitions is the centrality of the mobile device as an interface between the bank and its customer, enabling real-time financial activity from virtually any location.

In Cameroon, mobile banking has developed along three principal technological channels. Text banking, which requires no internet connectivity, allows users to check balances, review transaction histories, and transfer funds through basic handset menus. Smartphone-based applications extend these capabilities to include bill payments, credit access, and cheque deposits. Mobile web banking bridges the gap between these two modes, offering core functionality to internet-enabled devices that cannot support dedicated applications. Together, these channels have dramatically lowered the transactional barrier that once restricted financial participation to those living within physical reach of a bank branch.

The business models underlying mobile banking in Cameroon follow three broad configurations (Aguirre et al., 2008). The bank-focused model extends conventional services through lower-cost digital channels while maintaining the primacy of the bank-customer relationship. The bank-led model substitutes mobile interfaces for physical branches, relying on retail agents to manage cash logistics. The non-bank-led model most familiar to Cameroonians through the mobile money products of MTN and Orange places telecommunications companies at the centre of financial service delivery, with banks playing a secondary custodial role. It is the growing interpenetration of these models, through strategic partnerships between banks and telecom operators, that has driven the explosive growth of mobile financial services in Cameroon since approximately 2012.

Financial Performance of Commercial Banks

Financial performance in banking is conventionally assessed through profitability ratios, of which Return on Assets (ROA) is perhaps the most widely used. ROA, computed as net profit divided by total assets, captures how efficiently bank management converts the institution's asset base into earnings (Ahmed, 2009). A high ROA indicates that management is deploying assets productively; a low or negative ROA signals inefficiency or distress. Alongside ROA, Return on Equity (ROE) and Net Interest Margin (NIM) are frequently employed as complementary measures, with each illuminating a different facet of profitability.

The CAMEL rating system offers a more holistic framework, assessing Capital adequacy, Asset quality, Management quality, Earnings ability, and Liquidity simultaneously (Karlyn, 1984; Grier, 2007). Within this framework, earnings ability the dimension most directly relevant to this study is evaluated not merely as a

snapshot of current profitability but as an indication of whether the bank generates income sufficient to absorb losses, build reserves, and sustain shareholder confidence over time. This multi-dimensional perspective is important context for understanding why mobile banking, by affecting both revenue and cost structures, can have meaningful implications for overall financial health.

Theoretical Framework

The Efficient Structure Hypothesis

The Efficient Structure Hypothesis, first articulated by Demsetz (1973) and subsequently applied to banking by Smirlock (1985) and Berger (1995), holds that superior financial performance flows from operational efficiency rather than from market power per se. Under this framework, banks that manage costs more effectively than their competitors whether through superior management, better technology, or economies of scale earn higher returns and, as a consequence, accumulate larger market shares. Mobile banking fits naturally into this theoretical tradition: by automating routine transactions, reducing the need for physical branch infrastructure, and enabling round-the-clock service delivery at marginal cost, it represents precisely the kind of technological advantage that the Efficient Structure Hypothesis predicts will translate into improved profitability.

The Diffusion of Innovation Theory

Rogers' (1983) Diffusion of Innovation Theory (DIT) provides the second major theoretical anchor for this study. DIT explains the adoption of new technologies as a function of five perceived characteristics: relative advantage over existing solutions; compatibility with users' values and existing practices; complexity of adoption; trialability, or the ability to experiment on a limited basis before full commitment; and observability, meaning the visibility of adoption outcomes to potential adopters. Applied to mobile banking in Cameroon, DIT illuminates why adoption has accelerated unevenly: mobile money's clear relative advantage in terms of convenience and cost has driven uptake among lower-income users, while complexity and trust concerns have slowed adoption among segments of the population more accustomed to traditional banking relationships.

The theory also helps to explain the temporal dynamics visible in this study's data. Innovation diffusion is rarely instantaneous; it proceeds through a series of stages as awareness spreads, early adopters establish social proof, and institutional infrastructure matures. The gradual but ultimately steep upward trajectory of mobile money usage in Cameroon from 2012 onward reflects precisely this diffusion process, suggesting that the full productivity benefits of mobile banking adoption may take several years to appear in bank financial statements.

Financial Intermediation Theory

Financial Intermediation Theory, developed by Diamond and Dybvig (1983) and elaborated by Leland and Pyle (1977), provides a third theoretical lens. This literature emphasises that financial intermediaries banks, principally exist because they can reduce the information and transaction costs that would otherwise prevent borrowers and lenders from transacting efficiently. By connecting savers to productive investments and managing risk on behalf of both parties, banks generate economic value that cannot be captured through direct market exchange. Mobile banking amplifies this intermediation function by dramatically lowering transaction costs at the customer interface, enabling banks to serve populations that were previously too costly to reach. The result is a broader deposit base, a larger pool of potential borrowers, and a stronger foundation for sustainable profitability.

Empirical Evidence

The empirical literature on mobile banking and bank performance is predominantly positive, though the magnitude and mechanisms of the effect vary by context.

Wambari (2009) conducted one of the earliest systematic studies of mobile banking in a developing-country context, focusing on Kenya. Using a descriptive survey of MBA students at the United States International

University in Nairobi, Wambari found that mobile banking reduced transaction costs in terms of both time and distance, increased financial accessibility for users not located near bank branches, and supported a broader range of payment activities than conventional banking channels. Fraud and privacy concerns emerged as significant barriers to fuller adoption.

Okiro and Ndungu (2013) extended this analysis to include both mobile and internet banking across a sample of Kenyan financial institutions, finding that mobile banking had achieved faster uptake than internet banking, with commercial banks recording the highest usage rates. System delays, transaction limits, and fraud were identified as ongoing operational challenges.

Islam (2013) contributed evidence from Bangladesh, where mobile banking was found to function as a form of branchless banking available 365 days per year, reducing human error and enabling efficient transfers, deposits, and withdrawals. Ndii's (2014) Kenyan study, which more directly parallels the approach adopted here, regressed mobile money transaction volumes against commercial bank ROA and found a weak positive relationship, attributing much of the residual variation in performance to macroeconomic factors such as post-election instability and exchange rate fluctuations.

The most directly comparable study to the present one is Felix Mabwai's (2017) analysis of eight Kenyan commercial banks. Using secondary data from bank financial statements and regression analysis, Mabwai found that the number of mobile banking transactions, capital adequacy, market share, and asset size all exerted positive influences on financial performance. This study confirmed that mobile banking adoption had contributed meaningfully to improved performance over the observation period and recommended continued investment in mobile platforms.

Taken together, these studies suggest that mobile banking's effect on financial performance is real but context-dependent, shaped by the maturity of mobile infrastructure, the regulatory environment, the competitive landscape, and macroeconomic conditions. The evidence from Cameroon presented in this study adds a new geographic dimension to this literature and tests whether the positive effects documented elsewhere can be confirmed in a CEMAC-zone economy with a distinctive banking history.

RESEARCH METHODOLOGY

Research Design

The study adopts a quantitative, correlational research design intended to characterise the association between mobile banking activity and bank profitability rather than to establish causation outright; the identification limitations that bear on any causal interpretation are discussed explicitly in Section 4.5. As detailed in Section 3.2, the data are organised as an unbalanced bank-year panel annual observations on up to 14 licensed commercial banks spanning 1985 to 2017 rather than a single aggregate time series. This distinction matters for estimator choice: pooling bank-year observations with ordinary least squares (OLS), as in the baseline specification reported here, assumes away any bank-specific, time-invariant heterogeneity in profitability (e.g. differences in ownership structure, risk appetite, or legacy balance-sheet composition across the 14 banks). Because that assumption is unlikely to hold, a bank-level fixed-effects estimator is generally preferable for panel data of this kind, with a Hausman test used to confirm fixed effects over random effects; both are natural extensions for a revised analysis and are flagged as a priority in Section 4.5. The 1985–2017 window was retained because it captures the full arc of Cameroon's banking evolution, from the pre-crisis era of the mid-1980s through the structural reforms of the 1990s to the digital transformation of the 2010s.

Data

All data are sourced from secondary sources of established reliability and international comparability: the World Bank's World Development Indicators (WDI), the IMF's Global Financial Development database, the World Bank Development Report series, and the International Financial Statistics database. The study covers 14 licensed commercial banks operating in Cameroon over the sample period. A purposive sampling approach was adopted, with banks selected based on data availability and operational continuity. The resulting dataset is

an unbalanced panel, with 285 observations for ROA and mobile money transfers, and somewhat fewer observations for some control variables due to data gaps in earlier years.

Variables

The dependent variable is Return on Assets (ROA), computed as net profit divided by total assets and expressed as a percentage. ROA is widely regarded as the most informative single measure of bank profitability in the academic literature because it captures management's efficiency in generating income from the full asset base, independent of the bank's leverage structure (Ahmed, 2009; Rose and Hudgins, 2006).

The primary independent variable of interest is mobile money transfers (MMT), operationalised as the aggregate value of mobile-money-mediated transactions recorded by commercial banks annually. This variable serves as the most direct and measurable proxy for mobile banking activity available in secondary data sources.

Six control variables are included to account for other determinants of bank performance: deposits (DEP), capturing the bank's liability-side funding base; credit (CRED), representing total lending activity; ATM penetration (ATM), as an indicator of broader electronic banking infrastructure; number of bank branches (BRANCH), reflecting physical distribution network scale; gross fixed capital formation (GFCF), a macroeconomic indicator of investment activity; and infrastructure quality (INFRA), capturing the transport and communications environment in which banks operate.

Model Specification

The baseline econometric model is specified as follows:

$$ROA = \alpha 0 + \beta 1(MMT) + \beta 2(DEP) + \beta 3(CRED) + \beta 4(ATM) + \beta 5(BRANCH) + \beta 6(GFCF) + \beta 7(INFRA) + \varepsilon$$

Where $\alpha 0$ is the regression constant, $\beta 1$ through $\beta 7$ are slope coefficients, and ε is the error term. The model is estimated separately for a short-run sample (110 bank-year observations) and a longer-run sample (67 bank-year observations) using pooled OLS with panel-robust standard errors; as noted in Section 3.1, a bank-fixed-effects specification with a Hausman test against random effects is recommended as a robustness check and is discussed further in Section 4.5. Prior to estimation, panel unit-root tests (e.g. Levin-Lin-Chu or Im-Pesaran-Shin, as appropriate given the unbalanced panel) should be applied to each series, and since ROA, deposits, credit, and mobile money transfers plausibly share a common trend over 1985–2017 panel cointegration tests (e.g. Pedroni or Westerlund) should be used to establish whether the "long-run" specification represents a genuine equilibrium relationship rather than a spurious regression driven by mutual trending. These test statistics are not yet reported in this draft and are flagged in Section 4.5 as required before the results can be considered publication-ready. Variance inflation factors (VIF) were not computed for the baseline model; Section 4.2 discusses the resulting multicollinearity risk, particularly between ATM penetration and branch count, and Section 4.5 recommends dropping one of the two collinear variables (or combining them into a single physical-infrastructure index) as a remedy. STATA Version 13 was used for all data processing and statistical analysis.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 presents the descriptive statistics for all model variables.

Table 1: Descriptive Statistics (1985–2017)

Dimension	DPDP Act, 2023 (India)	GDPR (European Union)	Professional standards (IFLA, ALA)
Reading	No special category;	No specific category,	Circulation, search, reference and

records as a category	treated as ordinary personal data	but special categories exist and may be engaged by inference	interlibrary loan records treated as confidential by class
Basis of protection	Consent and defined legitimate uses	Six lawful bases; legitimate interests assessment	Professional duty independent of user consent
Children	Under 18; verifiable parental consent; tracking and behavioural monitoring prohibited	13 to 16 depending on Member State	Minors' privacy affirmed; balanced against guardian rights
Disclosure to authorities	No requirement of legal process specific to library records	Subject to lawful basis and safeguards	Disclosure only under properly executed legal process; resistance to improper demands recommended
Vendor conditions	Fiduciary responsible for processors; no library-specific terms	Processor contracts mandatory with specified content	Institutional ownership of user data; audit rights; bar on secondary use
Transparency of the institution	RTI public interest override removed by section 44(3)	Not applicable	Openness about the library's own data practices

Several patterns in the descriptive statistics are noteworthy. The mean ROA of 7.54% across all banks and years is, on the surface, reasonably healthy, though the high standard deviation (24.73) indicates that performance varied substantially across banks and time periods. The wide range from zero to 287.14 reflects the dramatic performance divergence between crisis years of the late 1980s and early 1990s and the more stable post-reform period.

The mean value of mobile money transfers (16.38) with a similarly high standard deviation (51.48) is consistent with the non-linear adoption trajectory visible in trend analysis: transfers were negligible for much of the 1980s and 1990s, then grew rapidly from approximately 2012 onward. Deposits recorded a high mean (24.10) with pronounced dispersion, while credit (20.45) shows a narrower distribution, reflecting the historically conservative lending practices of Cameroonian commercial banks. ATM penetration and branch numbers are relatively modest in absolute terms, consistent with the limited physical infrastructure of the banking sector.

Correlation Analysis

Table 2 presents the pairwise correlation matrix for all model variables.

Table 2: Pairwise Correlation Matrix

Variable	ROA	MMT	Branches	ATM	Deposit	Credit	GFCF	Infra
ROA	1	—	—	—	—	—	—	—
Mobile Money Transfers	0.268***	1	—	—	—	—	—	—
No. of Branches	0.173**	-0.022	1	—	—	—	—	—
ATM	0.291***	0.048	0.985***	1	—	—	—	—
Deposit	0.927***	0.258***	0.102	0.175**	1	—	—	—
Credit	0.282***	0.345***	0.765***	0.790***	0.17	1	—	—
GFCF	-0.02	0.027	0.476***	0.460**	0.08	0.285***	1	—
Infrastructure	0.195***	0.416	0.741***	0.723**	0.134	0.871***	0.292	1

*Note: *** $p<0.01$, ** $p<0.05$, * $p<0.10$*

The correlation results provide initial support for the study's central hypothesis. Mobile money transfers are positively and significantly correlated with ROA ($r = 0.268$, $p < 0.01$), confirming a meaningful bivariate relationship between mobile banking activity and profitability. Deposit ($r = 0.927$) and credit ($r = 0.282$) exhibit the strongest positive correlations with ROA, underscoring these variables' foundational role in bank performance. ATM usage ($r = 0.291$) also displays a significant positive association.

The strong correlation between ATM usage and number of branches ($r = 0.985$) indicates near-perfect collinearity between these two variables in the Cameroonian banking context physical expansion and ATM deployment have historically moved together. The negative relationship between GFCF and ROA (−0.020, non-significant) is consistent with the view that heavy fixed capital investment does not automatically translate into superior profitability for banks, particularly in periods of economic instability.

This pairwise correlation has a direct implication for the regression estimates in Sections 4.3 and 4.4. For two collinear regressors, the variance inflation factor can be approximated from the pairwise correlation as $VIF \approx 1/(1 - r^2)$; with $r = 0.985$, this yields $VIF \approx 34$, well above the conventional concern threshold of 10. Full VIF diagnostics across all seven regressors were not computed for the baseline model reported here, but the ATM–branch pairing alone is sufficient to indicate that their individual coefficients and standard errors in Tables 3 and 4 are unstable and should not be interpreted separately. Credit is also fairly strongly correlated with both branches ($r = 0.765$) and ATM ($r = 0.790$), and with infrastructure ($r = 0.871$), further widening the set of regressors whose individual coefficients may be unreliable. A revised specification should either drop one of ATM or branches (or combine them into a single physical/electronic-infrastructure index), report full VIF statistics for the retained regressors, and treat any remaining coefficients on infrastructure-related variables with appropriate caution.

Regression Results: Short-Run Analysis

Table 3 reports the OLS regression results for the short-run model.

Table 3: Short-Run OLS Regression Results (Dependent Variable: ROA)

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
Mobile Money Transfers	0.1114	0.0106	10.49	0	***
No. of Branches	0.2919	0.1938	1.51	0.135	
ATM	-0.0257	0.1257	-0.2	0.838	
Deposit	0.4334	0.0084	51.55	0	***
Credit	0.1678	0.0334	4.4	0	***
GFCF	0.1019	0.0798	1.28	0.204	
Infrastructure	-0.4877	0.2696	-1.81	0.073	*
Constant	-9.7627	9.236	-1.06	0.293	
R^2	0.9778	—	—	—	
Adjusted R^2	0.9758	—	—	—	
F-statistic	488.99	—	—	0	
Observations	110	—	—	—	

*Note: *** p<0.01, ** p<0.05, * p<0.10*

The short-run results are consistent with the study's main hypothesis, though the pooled-OLS specification discussed in Section 3.1 means they should be read as associations rather than causal effects. Mobile money transfers carry a positive and highly significant coefficient (0.1114, $p < 0.001$), indicating that mobile money transfer activity is associated with an approximate 0.11 percentage point increase in ROA, holding all other variables constant. This finding is consistent with the theoretical expectation derived from both the Efficient Structure Hypothesis and the Diffusion of Innovation Theory, though it is equally consistent with reverse

causality or common-driver explanations (see Section 4.5) for example, more profitable banks may have greater capacity to invest in mobile platforms, or both variables may respond to a common trend in economic development.

Deposit is the strongest predictor in the model (coefficient: 0.433, $p < 0.001$), which is consistent with its foundational role in bank revenue generation a larger, cheaper deposit base enables more profitable lending at lower funding cost. Credit also exerts a significant positive effect (0.168, $p < 0.001$), reflecting the direct contribution of lending income to profitability.

Number of branches, ATM usage, and GFCF do not achieve statistical significance in the short-run model. Given the near-perfect collinearity between branches and ATM documented in Section 4.2 (VIF ≈ 34), the non-significance and comparatively large standard errors on these two variables (0.1938 and 0.1257 respectively) are at least partly a multicollinearity artefact rather than clean evidence that either channel is unimportant; a specification that drops or combines the two variables is needed before drawing substantive conclusions about their individual effects. Infrastructure carries a marginally significant negative coefficient (−0.488, $p = 0.073$), which may reflect the tendency for periods of heavy infrastructural investment to precede rather than coincide with profitability gains, the well-documented underperformance of infrastructure spending in the Central African context, or its own moderate correlation with credit and branches (Section 4.2).

The model fits the data exceptionally well: the adjusted R-squared of 0.9758 indicates that the included variables account for approximately 97.6% of the observed variation in ROA across the sample, and the F-statistic of 488.99 ($p < 0.001$) confirms joint statistical significance.

Regression Results: Long-Run Analysis

Table 4 presents the long-run regression estimates.

Table 4: Long-Run OLS Regression Results (Dependent Variable: ROA)

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
Mobile Money Transfers	0.1118	0.0108	10.31	0	***
No. of Branches	-0.3446	0.5723	-0.6	0.55	
ATM	0.5508	0.393	1.4	0.167	
Deposit	0.4267	0.0073	58.43	0	***
Credit	0.0766	0.0373	2.06	0.044	**
GFCF	-0.0537	0.0759	-0.71	0.482	
Infrastructure	-0.1752	0.2267	-0.77	0.443	
Constant	13.1137	8.5055	1.54	0.129	
R^2	0.9909	—	—	—	
Adjusted R^2	0.9894	—	—	—	
F-statistic	687.4	—	—	0	
Observations	67	—	—	—	

*Note: *** p<0.01, ** p<0.05, * p<0.10*

The long-run results reinforce the short-run findings in direction and magnitude. Mobile money transfers remain positive and statistically significant at the 1% level (coefficient: 0.1118, $p < 0.001$), suggesting that the association between mobile banking and bank profitability persists across the longer sample rather than being confined to a narrow sub-period. This result is consistent with Financial Intermediation Theory, though — absent the unit-root and cointegration testing outlined in Section 3.4 — it cannot yet be established whether "short-run" and "long-run" here reflect a genuine equilibrium relationship or simply two overlapping samples

of the same trending series; that distinction is essential before the persistence of the association can be interpreted as structural rather than mechanical.

Deposits again emerge as the most powerful predictor (coefficient: 0.427, $p < 0.001$), while credit retains statistical significance at the 5% level (0.077, $p = 0.044$). The slightly smaller long-run credit coefficient compared to the short-run estimate may reflect credit risk realisation over longer time horizons: loans extended in periods of mobile banking expansion can generate non-performing loan exposures that partially offset gross revenue gains, consistent with the portfolio quality concerns raised in the literature.

The long-run adjusted R-squared of 0.989 even higher than the short-run figure and the F-statistic of 687.40 ($p < 0.001$) indicate a very strong in-sample fit, though given the collinearity and specification concerns raised above an unusually high R-squared in a pooled panel of this kind is at least as likely to reflect shared trends among the regressors as it is to reflect precise structural explanation. Taken together, the short- and long-run results provide consistent evidence of a positive association between mobile banking activity and the financial performance of commercial banks in Cameroon; Section 4.5 sets out the additional diagnostics needed before this association can be described as a causal effect.

Robustness, Endogeneity, and Required Diagnostics

Several methodological gaps limit how far the results above can be pushed toward a causal interpretation, and each should be addressed before this analysis is considered publication-ready.

First, the analysis is described in Section 3.2 as an unbalanced bank-year panel, yet estimated in Section 3.4 with pooled OLS as though it were a single time series. This discrepancy should be resolved by re-estimating the model with bank-level fixed effects (or random effects if a Hausman test does not reject it), clustering standard errors by bank to account for within-bank serial correlation, and reporting the pooled and panel-corrected estimates side by side so readers can judge how much of the apparent explanatory power reflects between-bank differences rather than the variables of theoretical interest.

Second, stationarity and cointegration testing referenced in Section 3.4 should be reported explicitly rather than described only as having been "conducted." Panel unit-root tests (Levin-Lin-Chu, Im-Pesaran-Shin, or Fisher-type tests, as appropriate for the unbalanced structure) should be run on ROA, mobile money transfers, and each control variable, with results tabulated by variable and, if series are found to be non-stationary in levels, a panel cointegration test (Pedroni or Westerlund) should be used to confirm that the long-run specification represents a genuine equilibrium relationship rather than a spurious regression among mutually trending series.

Third, as discussed in Sections 3.4 and 4.2, full variance inflation factor diagnostics should be computed for all seven regressors, not only the ATM-branch pair. Given the approximate VIF of 34 for ATM and branches, and the moderate-to-strong correlations linking credit, infrastructure, branches, and ATM, a revised specification should drop or combine the most collinear variables and re-estimate before their individual coefficients are interpreted.

Fourth, robustness would be strengthened by re-estimating the model with alternative profitability measures Return on Equity (ROE) and Net Interest Margin (NIM), both introduced in Section 2.1.2 but not used in the empirical model — as dependent variables. If the mobile-money coefficient remains positive and significant across ROA, ROE, and NIM, that convergence would meaningfully increase confidence that the association is not an artefact of how profitability happens to be measured.

Finally, the relationship between mobile banking adoption and bank profitability is plausibly endogenous rather than one-directional. More profitable banks may have greater retained earnings to invest in mobile platforms in the first place (reverse causality); unobserved factors such as management quality or a bank's risk culture could plausibly drive both mobile-banking investment and profitability (omitted-variable bias); and macroeconomic conditions that raise profitability sector-wide could also accelerate digital adoption (a common shock). None of these possibilities can be ruled out by the OLS estimates reported in Sections 4.3 and 4.4. A

credible causal claim would require either a valid instrument for mobile money adoption (for example, exogenous variation in telecom infrastructure rollout, if available), a natural experiment such as a staggered regulatory change, or, at minimum, a dynamic panel estimator (e.g. system GMM) designed to address the endogeneity of a lagged dependent variable and correlated regressors. Until one of these strategies is implemented, the results in this paper should be described as a robust positive association between mobile banking activity and bank profitability, not as evidence that mobile banking causes improved performance.

CONCLUSION AND POLICY RECOMMENDATIONS

Conclusion

This study set out to examine whether the adoption of mobile banking is associated with improved financial performance among commercial banks in Cameroon. Using a 33-year unbalanced bank-year panel and multiple regression analysis, it finds a robust and statistically significant positive association between mobile money transfers and Return on Assets at the 1% level in both the short- and long-run specifications, with the model explaining a large share of observed variation in bank profitability. These findings are consistent with theoretical predictions from the Efficient Structure Hypothesis, the Diffusion of Innovation Theory, and Financial Intermediation Theory, and they align with the positive results documented in comparable studies from Kenya and other African contexts. As detailed in Section 4.5, however, the pooled-OLS estimator, unreported stationarity and cointegration tests, uncorrected multicollinearity between ATM and branch variables, and unaddressed endogeneity concerns mean this association should not yet be read as a causal effect; the diagnostics and robustness checks outlined there are a prerequisite for that stronger claim.

Beyond confirming the headline relationship, the analysis reveals that the gains from mobile banking operate in concert with more fundamental drivers of bank performance: deposit mobilisation and credit extension. Mobile banking's most important contribution may therefore be not simply as a revenue channel in its own right, but as an enabler of deeper and broader financial intermediation drawing in deposits from previously unbanked customers and facilitating credit access for borrowers who would otherwise have been outside the banking system's reach.

Policy Recommendations

On the basis of these findings, several recommendations can be advanced. First, commercial banks in Cameroon should continue and accelerate their investment in mobile banking infrastructure, treating it not as a discretionary innovation but as a core component of their competitive strategy. Banks that have not yet fully embraced mobile platforms risk being structurally disadvantaged relative to early movers.

Second, bank-telecom partnerships should be deepened and formalised. The success of mobile money in Cameroon has been built substantially on the distribution networks and customer relationships of telecommunications operators. Commercial banks that leverage these partnerships effectively will be better positioned to extend their reach into underserved communities and capture the profitability gains documented in this study.

Third, the regulatory environment must evolve to support responsible mobile banking growth. The Banking Commission for Central African States (COBAC) and the Cameroonian Ministry of Finance should develop comprehensive frameworks governing mobile banking security, interoperability between platforms, and consumer protection. Addressing the trust and security concerns that continue to limit adoption particularly among older and rural populations will be essential to realising the full potential of mobile banking as a driver of financial inclusion and bank profitability.

Fourth, capacity building for both bank staff and customers should be treated as a strategic priority. The benefits of mobile banking are only realised when customers and frontline employees understand how to use available tools safely and effectively. Banks should invest in financial literacy programmes tailored to the needs of first-time digital banking users.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study carries several limitations that future research should seek to address, beginning with the econometric priorities set out in Section 4.5: re-estimation with bank-fixed effects, explicit reporting of stationarity and cointegration tests, full multicollinearity diagnostics, robustness checks using ROE and NIM as alternative dependent variables, and a credible strategy (instrumental variables, a natural experiment, or a dynamic panel estimator) for addressing the likely endogeneity of mobile banking adoption. Beyond these, the exclusive reliance on secondary data, while appropriate for a macro-level panel analysis, precludes the kind of firm-level or customer-level insights that primary data collection would yield. Future studies combining quantitative time series analysis with qualitative interviews of bank managers and mobile banking users would generate a richer understanding of the mechanisms through which mobile banking affects performance.

The study also focuses solely on commercial banks, excluding microfinance institutions and savings cooperatives that play an important role in Cameroon's financial landscape. Extending the analysis to these institutions would provide a more complete picture of mobile banking's systemic effects. Future research might also explore the impact of specific mobile banking product categories person-to-person transfers, bill payments, merchant payments, and mobile credit on bank performance, as the aggregate measure of mobile money transfers used in this study may mask important heterogeneity.

Finally, as Cameroon's mobile banking sector continues to mature, panel data models incorporating bank-level fixed effects would enable researchers to control more precisely for unobserved institutional heterogeneity and to track the evolution of the mobile banking-performance relationship as technology, regulation, and competitive dynamics continue to shift.

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