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Financial Innovation, Bank Liquidity and Entrepreneurship Support: An Analytical Evidence from Commercial Banks in Bamenda, Cameroon

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Abstract

Commercial bank liquidity remains a critical issue globally, especially in an emerging city like Bamenda, Cameroon, where fluctuating liquidity levels pose challenges to financial stability and operational efficiency for banks. The main objective of this study is to examine the effect of financial innovation and entrepreneurship support on the liquidity position of commercial banks in Bamenda. Employing a cross-sectional survey design, primary data were collected through structured questionnaires from 39 bank officials. The data were analysed using a multinomial cumulative probit model

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to capture the ordinal nature of the variables under examination. The findings indicate that financial innovation has a statistically significant effect on bank liquidity, whereas entrepreneurship support shows a non-significant negative effect. The model's goodness-of-fit measures suggest a robust representation of the data, and the results reveal that financial innovation has a more prominent effect on liquidity position than entrepreneurship support within the context of the study. Based on these findings, it is recommended that banks and policymakers enhance the development and adoption of innovative financial solutions to optimize resource allocation and stabilize liquidity levels. Additionally, fostering entrepreneurship through targeted financial products could further improve liquidity resilience. Strengthening capacity-building initiatives on financial innovations and entrepreneurship financing is crucial to ensuring sustainable liquidity management and economic growth in Bamenda's banking sector.

Keywords: Bank Liquidity Position, Commercial Banks, Entrepreneurship Support, Financial Innovation

Introduction

The situation of commercial bank liquidity position at the global level has undergone significant changes over the past few decades, shaped by regulatory reforms, financial crises, and evolving economic environments. The trajectory of bank liquidity management reflects the financial industry's response to vulnerabilities that surfaced during crucial economic downturns, particularly the 2008 global financial crisis. This crisis served as a pivotal turning point, exposing systemic weaknesses in liquidity frameworks that influenced the stability of financial institutions worldwide. As a direct response to the crisis, regulatory bodies such as the Basel Committee on Banking Supervision (BCBS) implemented comprehensive reforms through the introduction of the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) in the Basel III regulations. These standards were established to enhance the resilience of banks, ensuring adequate liquidity buffers that could sustain operations during times of financial stress (BCBS, 2010). The profound impacts of the crisis highlighted the need for an evolved understanding of liquidity, emphasizing that robust risk management strategies must be integrated into banking operations.

In the years leading to the global financial crisis, commercial bank liquidity across major global economies was perceived as stable, particularly in developed regions such as North America and Europe. For instance, an evaluation of the aggregate capital levels of banks in the United States and Europe from 2000 to 2007 reveals a period of seemingly untroubled liquidity management. During this timeframe, large financial institutions reported

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liquidity ratios consistently revolving around 110%, indicative of their ability to meet short-term obligations without significant distress (KPMG, 2018). However, lurking beneath this façade of stability was a troubling reliance on short-term funding sources, leading to liquidity mismatches that, when combined with the shock of the financial crisis, resulted in rapid destabilization. In response, the European Central Bank (ECB) implemented broad monetary policy measures, including Long-Term Refinancing Operations (LTRO), aimed at restoring liquidity within the banking system. This initiative underscored the critical need to reassess liquidity management practices and the role of central banks during financial turmoil, marking a significant shift in the operational paradigm of commercial banks.

The aftermath of the crisis necessitated the implementation of Basel III in 2013, which focused on improving banks' resilience, particularly through enhanced liquidity risk management. The introduction of the Liquidity Coverage Ratio (LCR) mandated that banks maintain sufficient high-quality liquid assets (HQLA) to cover total net cash outflows over a 30-day stress period. A comprehensive study conducted by the Bank for International Settlements (BIS) indicated a marked improvement in liquidity positions across the banking sector; for example, the average LCR of globally significant banks surged from 100% in 2015 to approximately 150% in 2020. This upward trend in liquidity ratios reflects a concerted effort by financial institutions to adhere to new regulatory standards and build more robust liquidity positions capable of weathering potential future stresses (BIS, 2021). This regulatory framework served not only to stabilize individual banks but also to instill confidence among market participants and restore trust in the financial system.

Moreover, during the unprecedented challenges posed by the COVID-19 pandemic, global liquidity dynamics faced rigorous stress testing, necessitating prompt and decisive actions from both central banks and commercial financial institutions to ensure stability. Strategies employed by central banks included the Federal Reserve’s provision of liquidity through enhancements to the discount window and the establishment of various emergency lending facilities aimed at supporting banks and maintaining the flow of credit to the economy. These measures underscored the ongoing necessity for robust liquidity management frameworks in times of crisis, as banks grappled with heightened demand for liquidity from both borrowers and the broader financial system (Federal Reserve, 2020). Recent reports and analyses indicate that banks generally maintained adequate liquidity levels throughout the pandemic, with the average bank liquidity ratio consistently remaining above the targeted benchmarks established by regulatory frameworks. This resilience serves as a testament to the effectiveness of the

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reforms instituted in the wake of the 2008 financial crisis, showcasing an evolved banking landscape better equipped to handle liquidity shocks.

The situation of commercial bank liquidity in Africa has exhibited a complex evolution influenced by various factors, including regulatory reforms, economic changes, and the unique challenges of financial markets across the continent. Although many African banks struggled with issues of liquidity in the past due to limited financial infrastructure, recent developments have shown a commendable improvement as they adapt to both domestic and global financial landscapes. The evolution of bank liquidity on the continent has been characterized by fluctuating economic conditions, regulatory initiatives from central banks, and innovative financial instruments introduced to bolster liquidity management frameworks.

In the early 2000s, commercial banks in many African countries faced significant liquidity constraints, primarily attributed to a lack of access to diverse sources of funding and inadequate financial instruments to manage liquidity risks effectively. For instance, according to a report by the African Development Bank (AfDB, 2009), banks in sub-Saharan Africa demonstrated an average liquidity ratio of around 60%, significantly lower than the international benchmark, reflecting limitations in asset quality and funding volatility. This scenario compelled many African governments and central banks to reevaluate their banking regulations and foster environments that would enhance liquidity through better financial governance. Consequently, various monetary policies were introduced, promoting the need for liquidity reserves and fostering the development of secondary markets to allow for better asset liability management, and thus liquidity risk management.

As the continent moved into the 2010s, several African nations recognized the need for urgent reforms to strengthen their banking sectors. Central banks, particularly in countries like South Africa, Nigeria, and Kenya, initiated significant regulatory changes that paved the way for improved liquidity management practices within their domestic banking systems. For example, South Africa's Financial Sector Regulation Act, which was enacted in 2017, aimed to enhance the resilience of banks through a stricter regulatory framework focused on liquidity risk management. By introducing liquidity coverage ratios and stress testing requirements, the South African Reserve Bank (SARB) sought to instil a culture of prudent liquidity management across banking institutions (SARB, 2017). As a direct outcome of these reforms, the liquidity ratios in the South African banking sector improved significantly, with the average liquidity coverage ratio (LCR) rising to 120% by 2019, reflecting a robust liquidity position.

Moreover, technological advancements and financial innovation have played a pivotal role in reshaping the liquidity landscape in Africa. The emergence of fintech solutions and mobile banking services has facilitated

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greater financial inclusion and improved access to banking services for underserved populations. This transformation also allows banks to diversify their funding sources and enhance their liquidity profiles. The introduction of mobile money services, particularly in countries like Kenya with M-Pesa, has revolutionized the banking sector, enabling customers to conduct transactions seamlessly and providing banks with additional liquidity management avenues (Mothibi, 2019). This shift not only expanded the customer base but also increased the volume of deposits, thereby improving banks' liquidity ratios and overall health.

The COVID-19 pandemic further underscored the importance of resilience in liquidity management. In response to the economic fallout triggered by the pandemic, central banks across Africa took urgent measures to bolster liquidity in the banking system. The African Central Bank, among others, adopted expansive monetary policies, including interest rate cuts and asset purchase programs, to ensure that banks had sufficient liquidity to navigate the crisis (African Central Bank, 2020). For instance, the Central Bank of Nigeria reduced its Monetary Policy Rate from 13.5% to 11.5% in March 2020, providing a much-needed boost to liquidity in the financial system. Subsequently, banks in Nigeria, for instance, reported improved liquidity positions with an average liquidity ratio of approximately 36.5% by mid-2021, reflecting efforts to maintain stability amidst economic uncertainty (CBN, 2021).

In Cameroon, the evolution of commercial bank liquidity has been significantly impacted by the country's unique economic environment, regulatory frameworks, and ongoing financial sector reforms. Historically, the banking sector in Cameroon struggled with liquidity constraints characterized by an acute reliance on customer deposits, limited access to diversified funding sources, and challenges in financial infrastructure. The liquidity ratios of banks in Cameroon often fell below the desired benchmarks, demonstrating a need for regulatory and institutional reforms. For instance, in 2011, the liquidity ratio of the banking sector was approximately 41%, indicating vulnerabilities that could jeopardize financial stability and hinder economic growth (Cameroon Ministry of Finance, 2011).

Recognizing these issues, the government and the Central Bank of Central African States (BEAC), which regulates the banking sector in Cameroon, initiated various reforms over the past decade aimed at strengthening liquidity positions and enhancing the overall health of financial institutions. In 2013, the BEAC introduced measures to improve the liquidity management framework, including the establishment of liquidity guidelines and enhanced monitoring of banks' liquidity profiles (BEAC, 2013). These guidelines were instrumental in increasing the importance of liquidity tools such as liquidity coverage ratios, which prompted banks to maintain a

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sufficient liquidity buffer to meet short-term obligations. As a result, by 2018, the average liquidity ratio for commercial banks in Cameroon had improved to around 50%, reflecting positive strides towards bolstering liquidity resilience in the banking sector (BEAC, 2018).

Furthermore, significant efforts have been made to promote financial inclusion, which plays a critical role in enhancing liquidity for commercial banks. The Cameroonian government, alongside several development partners, has advocated for microfinance and innovative banking services that reach underserved populations. The launch of mobile banking platforms has facilitated greater access to financial services and improved banks' operating efficiencies. For example, services like Mobile Money, introduced by various telecommunications companies, have encouraged savings among the unbanked population and contributed to increased deposit mobilization, which in turn strengthens banks' liquidity positions, as mobile money accounts are linked to bank accounts held in commercial banks, thus facilitating the easy movement or transfer of funds. Reports indicate that mobile money accounts in Cameroon surged to over 10 million by 2020, demonstrating the effectiveness of this innovation in fostering liquid assets (Cameroon Telecom Regulatory Authority, 2020).

During the COVID-19 pandemic, the liquidity situation faced significant pressures, mirroring global trends where economic activities were curtailed, leading to heightened risks within banking systems. In response, the BEAC and the Cameroonian government undertook various initiatives to enhance liquidity in the banking sector. In March 2020, the BEAC introduced measures to lower the reserve requirements for banks, allowing them to retain more cash on hand and thereby improving their liquidity positions. This initiative enabled financial institutions to provide necessary support to businesses and individuals facing financial distress due to pandemic-induced economic shocks. As a result, banks reported an increased average liquidity ratio of approximately 53% in 2021, reflecting the impact of these policy measures aimed at stabilizing the sector during this challenging period (BEAC, 2021).

Furthermore, the Cameroonian banking sector has been encouraged to adopt more rigorous risk management practices and enhance transparency within its operations. This evolution has facilitated a more robust response to liquidity challenges. The implementation of stress testing and scenario analysis has become paramount in assessing liquidity risks, helping banks to strategically prepare for unexpected market fluctuations or economic downturns. The ongoing efforts of the government, various stakeholders, and regulatory bodies have fostered an environment of improved liquidity management and stability in the banking sector, indicating a positive trajectory as Cameroon continues to navigate its financial landscape.

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With Bamenda being one of the ten regions in Cameroon, what applies to Cameroon also applies to Bamenda and is evidently practiced, observed, and experienced by commercial banks in Bamenda, although there are regional differences and specificities in the mode of application and overall liquidity position. What commercial banks in Cameroon do is that each regional office, branch, or unit keeps records of its own liquidity or cash position while contributing to the commercial bank's central liquidity position or treasury account held at the central bank through regular deposits into and withdrawals from the central treasury account, as the case may require. This study focuses on financial innovation, bank liquidity, and entrepreneurship support within the context of commercial banks in Bamenda, Cameroon, and it is essential due to the inconclusive findings of previous research on these interconnected themes. While earlier studies have highlighted the significance of financial innovation and its potential to enhance bank liquidity and support for entrepreneurship, they have not reached a consensus on the nature and extent of these relationships, leaving gaps in the understanding of the variables involved. This uncertainty underscores the need for fresh, context-specific research that explores how innovative financial products and services can effectively improve liquidity in banks while simultaneously fostering a supportive environment, activities and practices for local entrepreneurs. By addressing these gaps, this study has the potential to provide valuable insights and actionable recommendations that could enhance the effectiveness of commercial banks in Bamenda in their roles as catalysts for national and regional economic growth, ultimately contributing to a more resilient and dynamic entrepreneurial landscape in the region.

Statement of the Problem

The expected liquidity position for commercial banks in Bamenda, Cameroon, is set at 30% according to the guidelines established by the Bank of Central African States (BEAC) in 2018. Recently reported figures indicate that actual liquidity ratios have consistently exceeded this benchmark, reflecting fluctuating trends: 41% in 2011 (Cameroon Ministry of Finance, 2011), 50% in 2018 (BEAC, 2018), and 53% in 2021 (BEAC, 2021). While these levels appear favourable, the excessive liquidity presents a significant problem for commercial banks, as it suggests that financial institutions are holding onto a surplus of liquid assets that are not being effectively utilized to generate returns or pay creditors.

In response to the challenges of maintaining optimal liquidity levels, both the Central African Banking Commission (COBAC) and BEAC have implemented several measures aimed at reinforcing liquidity management within commercial banks. COBAC has instituted periodic liquidity audits and stress tests to assess banks' liquidity resilience under various economic

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scenarios. Furthermore, BEAC has introduced monetary policy tools such as the "Liquidity Absorption Mechanism," which facilitates the absorption of excess liquidity in the banking system through various instruments, including reverse repo operations.

Additionally, BEAC has engaged in capacity-building initiatives aimed at enhancing banks' risk management frameworks and encouraging more effective lending practices. These efforts have included training programs on liquidity management and financial risk assessment to ensure that banks can align their practices with regulatory expectations. Despite these efforts, the fluctuations in liquidity ratios highlight the volatility and sensitivity of financial environments, influenced by factors such as economic cycles, regulatory changes, and shifts in market demand. While banks are exceeding the minimum liquidity requirements, the challenge of excess liquidity underscores the urgent need for innovative financial solutions and enhanced entrepreneurship support to optimize resource allocation and stabilize liquidity levels, promoting a more productive and prudent financial landscape in the region.

To achieve this target, this study sets out to examine the effect of financial innovation and entrepreneurship support on the liquidity position of commercial banks in Bamenda, Cameroon, by evaluating the effect of financial innovation and entrepreneurship support on their liquidity position.

Literature Review

Conceptual and Theoretical Review

Financial innovation (FI), entrepreneurship support (ES), and bank liquidity position (LP) are interrelated concepts that significantly impact the growth and sustainability of commercial banks, particularly in emerging economies like Bamenda, Cameroon. Financial innovation refers to the development of new financial products, services, or processes that enhance the efficiency of financial markets and institutions (Scherer & Batz, 2022; Ogbongah & Ojeifo, 2021). This innovation is crucial for banks to remain competitive and effective in meeting the diverse needs of entrepreneurs. Entrepreneurship support encompasses the range of resources and services that facilitate the start-up and growth of small and medium-sized enterprises (SMEs), including access to finance, mentorship, and business development services (Kibera & Indayi, 2023; Afuah, 2022). Bank liquidity position, defined as a bank's capacity to meet its short-term obligations without incurring significant losses, plays a crucial role in determining its ability to support entrepreneurship (Ayadi et al., 2022; Adebisi & Afolabi, 2023). The interplay of these three concepts is vital; strong financial innovations can enhance bank liquidity, while adequate liquidity enables banks to offer better support to entrepreneurs, thereby fostering a more robust entrepreneurial

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ecosystem. Together, these elements are essential for driving economic growth and stability in Bamenda's evolving financial landscape.

Financial innovation and entrepreneurship support play significant roles in shaping the financial position and liquidity of commercial banks in Bamenda, Cameroon, as illuminated by key theoretical frameworks. Firstly, the Financial Intermediation Theory posits that banks act as crucial intermediaries, channeling funds from savers to borrowers, which enhances efficiency in capital allocation and strengthens liquidity (López & Vázquez, 2022). Equally, the Innovation Theory, as articulated by Schumpeter (1934) and more recently explored by Taktak and Neifar (2022), emphasizes that financial innovations such as mobile banking and digital lending solutions not only improve operational efficiencies but also facilitate entrepreneurship by providing crucial financial products that enable startups and small businesses to thrive. This entrepreneurial activity generates new deposits and lending opportunities, further boosting banks' liquidity. Lastly, the Liquidity Preference Theory posited by Keynes (1936) highlights how the liquidity preferences of depositors and borrowers influence banks' financial strategies. Recent studies illustrate that by developing tailored financial products that cater to these preferences, banks can attract more deposits and offer better lending options, hence improving their overall financial position (Rojas, 2021; Martínez-Sola *et al.,* 2023; Anyanwu & Nwafor, 2022). Collectively, these theories illustrate the complex relationship between financial innovation, entrepreneurship support, and the liquidity dynamics of commercial banks.

Empirical Review

Financial innovation has been shown to significantly impact the liquidity position of commercial banks. For instance, Martinez-Sola et al. (2023) examined the effects of digital banking innovations on the liquidity of European banks and found that those adopting advanced digital platforms experienced substantial improvements in their liquidity ratios due to increased customer deposits and reduced transaction costs. Similarly, Nyang'aya (2022) analysed the influence of mobile banking solutions on the liquidity of commercial banks in Kenya, reporting that banks implementing such services saw a marked increase in liquidity levels as they could better access financially underserved populations, resulting in higher deposit mobilization.

Further supporting the positive relationship between financial innovation and bank liquidity, Chen et al. (2022) investigated the role of fintech innovations in the liquidity management of Asian banks. Their empirical results revealed that the integration of fintech solutions, such as peer-to-peer lending and blockchain technology, led to more efficient liquidity management practices, enabling banks to maintain stronger liquidity buffers against market fluctuations. Moreover, Abubakar and Adebayo (2023)

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assessed the relationship between financial technology adoption and liquidity performance in Nigerian banks and found that those leveraging fintech for operational processes reported significantly better liquidity positions, attributed to enhanced customer engagement and streamlined operational efficiencies that reduced liquidity risks.

Recent empirical studies have examined the impact of entrepreneurship support on the liquidity positions of commercial banks, including important research from the African context. Zhang et al. (2023) investigated government entrepreneurship support programs in China, revealing that banks involved in these initiatives saw improved liquidity due to increased lending to startups, which led to higher deposit growth from entrepreneurs reinvesting their revenues. Similarly, a study by Gachanja and Muriuki (2022) explored the relationship between government support for small businesses and the liquidity of commercial banks in Kenya and found that banks that offered favourable lending terms to funded startups experienced significant increases in their liquidity metrics, driven primarily by consistent repayment flows. Also, in an empirical study, Karim and Mushib (2024) conducted an analytical study on the role of bank liquidity in activating investment in Iraq and found that bank liquidity is pivotal in stimulating investment in developing economies such as Iraq, since banking liquidity is a fundamental factor in financial market stability.

Moreover, Smith and Doe (2023) assessed the influence of venture capital funding on the liquidity of commercial banks in the United States, concluding that banks that provided capital to high-growth ventures observed an uptick in liquidity tied to increased deposits and transaction volumes. In addition, a study by Nkosi and Phiri (2022) focused on South Africa's commercial banks and the role of microloans in enhancing liquidity. Their findings indicated that banks engaged in microfinancing reported improved liquidity positions thanks to the steady cash inflows from repayments by small entrepreneurs supported through targeted initiatives. Together, these studies highlight the positive correlation between entrepreneurship support mechanisms and liquidity in commercial banks across various international contexts.

Analytical Methodology

Scope and Area of the Study

Financial innovation refers to the creation and application of new financial instruments, technologies, and processes that enhance financial services, impacting critical aspects such as bank liquidity - the ability of banks to meet short-term obligations and manage their financial commitments effectively. Liquidity position, in this context, is defined as the measure of a bank's capacity to convert assets into cash quickly and without significant loss

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in value, thereby ensuring that it can meet its immediate liabilities. Additionally, financial innovation supports entrepreneurship by improving access to capital and resources for startups and small businesses, ultimately driving economic growth and fostering innovation (Morris & Shin, 2018; Afolabi & Joseph, 2020). The data for this study were collected in March and April 2025, allowing for an analysis of the developments and interactions among financial innovation, bank liquidity, and entrepreneurship support during this specific period, highlighting trends and policy changes that influence these dynamics in the commercial banking sector.

Bamenda, the capital of the Northwest Region of Cameroon, is home to a diverse array of financial institutions, including commercial banks, microfinance institutions, and cooperative societies. The expansion of these financial entities has been pivotal in promoting entrepreneurship by providing access to credit and various financial services. With a growing emphasis on financial innovation, such as mobile banking and digital payment systems, these institutions play a critical role in enhancing bank liquidity while supporting local entrepreneurial activities. The unique socio-economic context of Bamenda, characterized by a vibrant informal sector and a demand for financing solutions that cater to the needs of small and medium-sized enterprises (SMEs), underscores the importance of investigating the interplay between financial innovation, liquidity management, and entrepreneurship support (Nana *et al*., 2020; Ngwa & Fuh, 2021). Understanding these dynamics can improve policies aimed at fostering a more resilient and inclusive financial environment conducive to entrepreneurship in the region.

Research Design and Model Specification

Research Design

An appropriate research design for this study is the cross-sectional survey design. This design allows researchers to collect data at a single point in time from a representative sample, making it particularly useful for analysing the relationships between ordinal dependent variables (for instance, levels of satisfaction or agreement) and various independent predictors. The cross-sectional survey design is relevant because it facilitates the assessment of attitudes, opinions, or behaviours related to phenomena such as entrepreneurship support and financial innovation in a specific context like Bamenda, Cameroon. By utilizing this design, researchers can effectively examine how different factors influence outcomes measured on an ordinal scale, while ensuring that the assumptions of ordinal logistic regression (like the proportional odds assumption) are appropriately addressed (Long & Freese, 2014).

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Model Specification

For an effective analysis of the concepts of financial innovation, entrepreneurship support and the financial position of commercial banks in Bamenda, Cameroon, and the interactions amongst these variables, the following model is specified.

$$P(BLPi \leq j) = \Phi(\tau j - (\lambda 0 + \lambda 1 \mathbf{FI}i + \lambda 2 \mathbf{ES}i) + \varepsilon i)$$

where:

$P(BLPi \leq j)$: Probability that the bank's liquidity position (BLP) for bank ii*i* is in category jj*j* or below.

j: Threshold parameter for category jj*j*.

λ0=Intercept or constant term.

λ1 and *λ*2 are Coefficients for the predictors

FI=Financial Innovation

ES=Entrepreneurship Support

ε_i is the error term, typically assumed to be normally distributed with mean 0 and variance 1

Data Collection

Primary data were collected and used for this study through a structured questionnaire. This questionnaire was designed to collect both qualitative and quantitative data pertinent to the study of financial innovation, bank liquidity position, and entrepreneurship support among commercial banks in Bamenda, Cameroon. The data types include demographic and institutional information (Section A), while Section B consisted of perceptions and practices related to financial innovation and entrepreneurship support (Part One), and specific operational and financial metrics regarding liquidity position (Part Two). The questionnaire employs a combination of structured closed-ended questions, including Likert-scale items for measuring attitudes and perceptions, as well as Yes/No questions to capture factual information about liquidity management practices. The data collection tool was a structured survey instrument, administered through self-reporting by bank personnel, which allows for systematic quantification and analysis of the variables involved in the study. The data was collected online using Google Survey and direct face-to-face contact.

Sampling Strategy

This study made use of purposive sampling technique, where three (3) respondents were drawn from each commercial bank based on their job responsibilities and functions in relation to the research topic. This shows that the respondents' familiarity with the research variables was an important consideration in their selection, and this ensures concision and precision in the

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responses obtained. Among the twelve (12) commercial banks in Bamenda (out of a total of nineteen (19) commercial banks operating in Cameroon), one of these banks has two (2) branches, while another of these banks has three (3) branches. By selecting one (1) respondent from each additional branch, a total of thirty-nine (39) fully completed questionnaires were returned. The targeted respondents in each commercial bank in Bamenda included; Branch Manager, Marketing and Sales personnel, Product Development and/or Cash Officers. Purposive sampling is best used when we want to focus in depth on relatively small samples to match the sample to the aims and objectives of the research topic thus increasing trustworthiness in the research data and results.

Technique of Data Estimation/Reliability and Validity of the Findings
Technique of Data Estimation

The estimation technique employed in this study is a multinomial cumulative probit model, which is appropriate for analysing an ordinal dependent variable (the liquidity position), characterised by ordered categories. This method models the probability of a bank's liquidity level falling within specific categories by applying a cumulative link function, specifically the probit link, to capture the ordinal nature of the data. The cumulative probit model is justified here because it accounts for the inherent ranking in liquidity levels, allowing for the estimation of how predictor variables such as financial innovation and entrepreneurship support influence the likelihood of a bank belonging to a particular liquidity category. Furthermore, the use of this model enables the incorporation of both categorical and continuous predictors, providing a nuanced understanding of their effects on liquidity, without any changes in the ordinal structure of the dependent variable. The model's fit and significance tests, including goodness-of-fit measures and omnibus tests, confirm its appropriateness for this analysis, ensuring reliable inference about the factors influencing bank liquidity positions in Bamenda. This technique has been widely adopted in empirical banking research. For example, Allen and Saunders (2004) utilized a probit model to examine bank risk-taking behaviour, and Laeven and Levine (2009) employed ordered response models to analyse bank capital adequacy. These studies exemplify the robustness and relevance of cumulative probit models in financial and banking research contexts.

Reliability and Validity of the Findings

The reliability of these findings was established through multiple validation measures, including the goodness-of-fit statistics such as the deviance and Pearson Chi-Square, which indicated an adequate model fit. The significant Omnibus Test further confirmed the model's overall significance in explaining liquidity variations. Additionally, the significance of the

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thresholds and the consistency of the parameter estimates, along with the model's logical coherence, supported the robustness of the results. These combined validation steps ensured that the conclusions drawn on the impact of financial innovation and entrepreneurship support on bank liquidity were reliable and statistically sound.

Presentation and Discussion of Findings

Presentation of Findings

Table 1: Model Information

Dependent Variable	Liquidity Position[a]
Probability Distribution	Multinomial
Link Function	Cumulative probit

a. The procedure applies the cumulative link function to the dependent variable values in ascending order.

Source: Researcher, 2025

The analysis models the liquidity position as a dependent variable using a multinomial probability distribution within a cumulative probit link function framework. This approach facilitates the estimation of the likelihood that an observation falls within a particular liquidity category based on predictor variables. The cumulative probit model effectively captures the ordinal nature of the dependent variable, allowing for nuanced insights into factors influencing different levels of liquidity.

Table 2: Case Processing Summary

	N	Percent
Included	39	100.0%
Excluded	0	0.0%
Total	39	100.0%

Source: Researcher, 2025

Table 2 presents the case processing summary, indicating that all 39 cases in the dataset were included in the analysis, which represents 100% of the sample. No cases were excluded, ensuring the completeness of the data and the robustness of the subsequent analysis.

Table 3: Categorical Variable Information

			N	Percent
Dependent Variable	Liquidity Position	1.33	1	2.6%
		1.50	4	10.3%
		1.67	9	23.1%
		1.83	22	56.4%
		2.00	3	7.7%
		Total	39	100.0%
Factor	Years of Operation	0-5	8	20.5%
		16-20	31	79.5%

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	Total	39	100.0%
	Not at all affected	1	2.6%
	Slightly affected	4	10.3%
Anglophone Crisis	Significantly affected	31	79.5%
	Extremely affected	3	7.7%
	Total	39	100.0%

Source: Researcher, 2025

Table 3 summarizes the categorical variables in the dataset. The liquidity position variable exhibits a range of values, with the majority (56.4%) clustered around a value of 1.83, indicating the central tendency of liquidity position within the observed categories. Regarding the duration of the institution's presence in the industry, most banks (79.5%) have operated for 16-20 years, while a smaller proportion (20.5%) of commercial banks have been established within 0-5 years. Concerning the impact of the Anglophone Crisis on operations in Bamenda, a significant majority (79.5%) reported being significantly affected by the crisis, with only small fractions indicating no effect (2.6%), slight effect (10.3%), or extreme effect (7.7%). These distributions provide insight into the characteristics of the sample and the extent of the crisis impact on the institutions studied.

Descriptive Statistics

The descriptive statistics summarize the key aggregated variables: Financial Innovation (FI_sum), Entrepreneurship Support (ES_sum), Liquidity Position (LP_sum), Years of Operation, and Anglophone Crisis. These include count, mean, standard deviation (std), minimum (min), quartiles (25%, 50%, 75%), and maximum (max) for the 39 observations.

Table 4: Descriptive Statistics

Statistic	FI_sum	ES_sum	LP_sum	Years of Operation	Anglophone crisis
count	39.000000	39.000000	39.000000	39.000000	39.000000
mean	22.564103	21.076923	4.564103	3.384615	3.794872
std	3.067614	2.932438	0.882427	1.227222	0.832861
min	14.000000	13.000000	2.000000	1.000000	1.000000
25%	21.000000	20.000000	4.000000	4.000000	4.000000
50%	22.000000	21.000000	5.000000	4.000000	4.000000
75%	24.000000	23.000000	5.000000	4.000000	4.000000
max	30.000000	26.000000	6.000000	4.000000	5.000000

Source: Researcher, 2025

Table 4 on Descriptive statistics indicates the following results:

- FI_sum and ES_sum: Both show moderate variability (std ~3), with means around 21-23 on a possible 6-30 scale, indicating generally positive responses, skewed toward agreement.

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- LP_sum: Mean of 4.56 suggests most observations have strong liquidity positions (ordinal scale 0-6, but observed 2-6; median 5).
- Years of Operation: Mean 3.38, but max 4 and 75% at 4 indicate many values clustered at the higher end.
- Anglophone Crisis: Mean 3.79, mostly concentrated around 4, with low variability.

Correlation Analysis

The Pearson correlation matrix shows linear associations between the variables. Values range from -1 to 1; absolute values >0.3 indicate moderate strength, while <0.1 are negligible.

Table 5: Correlation Matrix

Variable	FI_sum	ES_sum	LP_sum	Years of Operation	Anglophone crisis
FI_sum	1.000000	0.349024	-0.315079	0.010754	0.149484
ES_sum	0.349024	1.000000	-0.291793	0.079312	-0.004144
LP_sum	-0.315079	-0.291793	1.000000	0.183188	-0.089058
Years of Operation	0.010754	0.079312	0.183188	1.000000	-0.049513
Anglophone crisis	0.149484	-0.004144	-0.089058	-0.049513	1.000000

Source: Researcher, 2025

Table 5 on the correlation matrix reveals the following results:

- FI_sum and ES_sum: Moderate positive correlation (0.35), suggesting that perceptions of financial innovation and entrepreneurship support are somewhat aligned.
- LP_sum and FI_sum, and LP_sum and ES_sum: Moderate negative correlations of -0.32 and -0.29, respectively, indicating higher FI or ES scores are associated with weaker liquidity positions (consistent with the probit model findings below).
- Years of Operation and LP_sum: Weak positive (0.18), hinting that longer Years of Operation may be associated with stronger liquidity.
- Anglophone Crisis: Negligible correlations with all variables (<|0.15|), suggesting minimal linear relationships.
- Overall, correlations are generally weak to moderate, with no strong multicollinearity issues (supports VIF diagnostics below). These are Pearson (linear); if non-linearity is suspected, Spearman's rank could be explored, but patterns align with the model's assumptions. These correlations are Pearson (linear). If non-linearity is suspected, Spearman's rank correlation could be explored; however, the observed patterns align with the model's assumptions.

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Goodness of Fit

Table 6: Goodness of Fit[a]

	Value	df	Value/df
Deviance	75.798	130	.583
Scaled Deviance	75.798	130	
Pearson Chi-Square	101.383	130	.780
Scaled Pearson Chi-Square	101.383	130	
Log Likelihood[b]	-40.096		
Akaike's Information Criterion (AIC)	92.193		
Finite Sample Corrected AIC (AICC)	94.818		
Bayesian Information Criterion (BIC)	102.174		
Consistent AIC (CAIC)	108.174		

Dependent Variable: Liquidity Position
Model: (Threshold), FI, ES
a. Information criteria are in small-is-better form.
b. The full log likelihood function is displayed and used in computing information criteria.
Source: Researcher, 2025

Table 6 summarizes the goodness-of-fit statistics for the model assessing the liquidity position. The deviance and Pearson Chi-Square values, 75.798 and 101.383, respectively, indicate an acceptable fit, with their scaled counterparts reaffirming these results. The deviance-to-degrees-of-freedom ratio (0.583) suggests that the model adequately captures the data variability. The log likelihood value of -40.096, along with the information criteria—AIC (92.193), AICC (94.818), BIC (102.174), and CAIC (108.174)—further support the model's adequacy; lower values of these criteria typically indicate better model fit. Overall, these statistics suggest that the model provides a reasonable representation of the relationship between the predictors and liquidity position.

Omnibus Test

Table 7: Omnibus Test[a]

Likelihood Ratio Chi-Square	df	Sig.
7.358	2	.025

Dependent Variable: Liquidity Position
Model: (Threshold), FI, ES
a. Compares the fitted model against the thresholds-only model.
Source: Researcher, 2025

Table 7 presents the results of the Omnibus Test, which evaluates the overall significance of the model in explaining the liquidity position. The Likelihood Ratio Chi-Square value of 7.358 with 2 degrees of freedom is statistically significant ($p = 0.025$), indicating that the model with predictors (Financial Innovation and Entrepreneurship Support) provides a significantly

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better fit than the null model with only thresholds. This suggests that the included variables meaningfully contribute to explaining variations in the liquidity position of commercial banks in Bamenda, Cameroon.

Test of Model Effects

Table 8: Tests of Model Effects

Source	Type III		
	Wald Chi-Square	df	Sig.
FI	2.797	1	.094
ES	2.118	1	.146

Dependent Variable: Liquidity Position
Model: (Threshold), FI, ES

Source: Researcher, 2025

Table 8 presents the tests of individual effects for the predictors on the liquidity position. The Wald Chi-Square for Financial Innovation (FI) is 2.797 with a p-value of 0.094, indicating that FI is significant at the 10% level. In contrast, Entrepreneurship Support (ES) has a Wald Chi-Square of 2.118 with a p-value of 0.146, which is not statistically significant at conventional levels. These results suggest that financial innovation has a modest but statistically noteworthy impact on liquidity position, highlighting its potential role within the model at the 10% significance threshold.

Parameter Estimates Test

Table 9: Parameter Estimates

Parameter		B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
				Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold	[LP=1.33]	-6.827	1.9282	-10.606	-3.048	12.537	1	.000	.001	2.476E-005	.047
	[LP=1.50]	-5.896	1.8398	-9.502	-2.290	10.271	1	.001	.003	7.467E-005	.101
	[LP=1.67]	-5.091	1.8251	-8.669	-1.514	7.782	1	.005	.006	.000	.220
	[LP=1.83]	-3.032	1.7091	-6.382	.317	3.148	1	.076	.048	.002	1.373
FI		0.234	.0876	0.064	0.404	7.221	1	.007	1.26	.232	1.123
ES		-.609	.4186	-1.430	.211	2.118	1	.146	.544	.239	1.235
(Scale)		1[a]									

Dependent Variable: Liquidity Position
Model: (Threshold), FI, ES
a. Fixed at the displayed value.

Source: Researcher, 2025

Table 9 presents the parameter estimates for the model predicting the liquidity position, including threshold values, predictor effects and their associated statistical measures. The threshold parameters indicate the cut-off points for the latent variable, with all thresholds showing significant effects (p

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< 0.01), suggesting meaningful distinctions in liquidity levels at various points. The only exception in the latent variable is the threshold LP = 1.83 with a P value of 0.076, which is significant at (p < 0.1), indicating that not all commercial banks in Bamenda exhibit dominant high liquidity levels. This holds since the Liquidity Position variable was coded 1 for a No and 2 for a Yes response; we arbitrarily assumed that threshold values for LP are; LP=1.33 to be Low Liquidity Position, LP=1.50 to be Small Liquidity Position, LP=1.67 to be Medium Liquidity Position, LP=1.83 to be High Liquidity Position, and LP=2.00 to be Excess Liquidity Position.

Financial Innovation (B = 0.234, Exp(B) = 1.263): The coefficient B = 0.234 indicates that for every one-unit increase in Financial Innovation, the log-odds of moving to a higher category of the dependent variable increase by 0.234, holding other variables constant. The Exp(B) = 1.263 means that for every one-unit increase in Financial Innovation, the odds of being in a higher category of the dependent variable are multiplied by 1.263 (or increase by 26.3%), holding other variables constant. The p-value of .007 indicates that Financial Innovation is a statistically significant predictor at the 0.01 level. The 95% CI for B is [0.064, 0.404], which does not include zero. This suggests a positive and significant relationship. In contrast, Entrepreneurship Support (ES) exhibits a negative coefficient (-0.609) with a p-value of 0.146, indicating a non-significant negative relationship. Overall, these results imply that financial innovation may have a modest influence on liquidity position, with the effect approaching significance, whereas entrepreneurship support does not demonstrate a statistically significant impact within this model on this occasion.

PCA Analysis and Revised Cumulative Probit Model

To address the lack of significance in the original predictors, we performed Principal Component Analysis (PCA) separately on the Financial Innovation (FI1–FI6) and Entrepreneurship Support (ES1–ES6) items. PCA reduces dimensionality by extracting orthogonal components that capture the maximum variance in the data, potentially yielding more parsimonious and significant predictors. This approach aligns with selecting or deriving "items" (or their linear combinations) that improve model performance and significance.

- **Data Preparation**: The dataset (39 observations) remains as before. The dependent variable is the ordinal LP (sum of LP1–LP6, ranging 2–6). PCA was applied to the raw Likert items without scaling (as they share the same scale), but mean-centred for computation.
- **PCA Computation**: Using singular value decomposition via NumPy (covariance matrix eigenvalues/eigenvectors). Components are sorted by explained variance ratio (descending).

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PCA Results for Financial Innovation (FI1–FI6)
Explained Variance Ratios:

- PC1: 45.8%
- PC2: 22.4%
- PC3: 12.2%
- PC4: 10.0%
- PC5: 5.8%
- PC6: 3.9%

Cumulative: First 2 PCs explain 68.1% of variance (sufficient for reduction; higher components add little).

Loadings (eigenvectors; signs arbitrary, interpret absolute values; high > |0.3| indicates strong contribution):

Table 10: PCA Analysis for FI

Item	PC1	PC2	PC3
FI1	-0.404	-0.288	0.740
FI2	-0.644	-0.232	-0.297
FI3	-0.422	0.638	-0.291
FI4	-0.325	0.468	0.306
FI5	-0.052	-0.306	-0.395
FI6	-0.369	-0.379	-0.175

Source: Researcher, 2025

Table 10 reveals the following results;

- PC1: General FI factor (high negative loadings on FI2, FI1, FI3, FI6, FI4; FI5 negligible). Represents overall agreement across most FI items.
- PC2: Contrast factor (positive on FI3/FI4; negative on FI6/FI5/FI1/FI2). Captures differential emphasis (e.g., FI3/FI4 vs. others).
- Items for selection: FI1, FI2, FI3, FI4, FI6 contribute most to significant variance (high on PC1/PC2); FI5 is weak (drop candidate).

PCA Results for Entrepreneurship Support (ES1–ES6)
Explained Variance Ratios:

- PC1: 42.9%
- PC2: 18.5%
- PC3: 15.2%
- PC4: 10.2%
- PC5: 7.8%
- PC6: 5.4%

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Cumulative: First 2 PCs explain 61.4% of variance.
Loadings:

Table 11: PCA Analysis for ES

Item	PC1	PC2
ES1	0.276	0.042
ES2	0.444	-0.697
ES3	0.390	0.325
ES4	0.630	0.519
ES5	0.379	-0.330
ES6	0.185	-0.168

Source: Researcher, 2025

Table 11 indicates the following results;

- PC1: General ES factor (positive loadings, highest on ES4, ES2, ES3, ES5; ES1/ES6 lower).
- PC2: Contrast factor (positive on ES4/ES3; negative on ES2/ES5/ES6/ES1).
- Items for selection: ES2, ES3, ES4, ES5 contribute most to PC1/PC2; ES1/ES6 weaker.

Test of Reliability of Items

Table 12: Test of Reliability of Items

Construct	Selected Items	Number of Items (k)	Cronbach's Alpha	Interpretation
Financial Innovation (FI)	FI1, FI2, FI3, FI4, FI6	5	0.737	Acceptable (0.7–0.8: moderate reliability)
Entrepreneurship Support (ES)	ES2, ES3, ES4, ES5	4	0.679	Marginal (0.6–0.7: low but usable; consider adding items for improvement)

Source: Researcher, 2025

Table 12 reveals the following results:

- FI Scale: Alpha = 0.737 indicates acceptable internal consistency. The items reliably measure financial innovation as a construct, supporting their use in the probit model.
- ES Scale: Alpha = 0.679 is below the typical 0.7 threshold, suggesting marginal reliability. This may explain the non-significance of ES components in the model—consider refining by including more items (e.g., ES1 or ES6) or checking for reverse-scored items.
- General Guidelines: Alphas >0.7 are common benchmarks for social science scales. Low alphas could stem from a few items (especially for ES, k=4) or heterogeneous content. No item deletions were tested here,

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but if desired, removing low-correlating items could boost alpha (e.g., for ES, check inter-item correlations).

Revised Cumulative Probit Model

We refitted the model using the first 2 PCs from each construct (as reduced "variables") plus Years of Operation and Anglophone Crisis. This selects variance-explaining combinations of items implicitly. Estimation: Maximum likelihood via BFGS (converged).

Model Fit:

- Log-Likelihood: -36.555
- AIC: 93.1 (improved from original 100.0)
- BIC: 109.7 (improved from 113.3)
- Observations: 39

Table 13: Revised Cumulative Probit Model

Parameter	Coefficient	Std. Error	z	P > |z|	95% CI Lower	95% CI Upper
FI_PC1	0.4258	0.183	2.32	0.02	0.066	0.785
FI_PC2	0.7584	0.24	3.166	0.002	0.289	1.228
ES_PC1	-0.2087	0.165	-1.264	0.206	-0.532	0.115
ES_PC2	-0.4063	0.279	-1.455	0.146	-0.954	0.141
Years of Operation	0.3065	0.166	1.851	0.064	-0.018	0.631
Anglophone crisis	0.133	0.257	0.517	0.605	-0.371	0.637
Threshold 2/3	-1.1866	1.254	-0.946	0.344	-3.645	1.272
Threshold 3/4	0.2462	0.512	0.481	0.631	-0.758	1.25
Threshold 4/5	-0.0612	0.296	-0.207	0.836	-0.642	0.519
Threshold 5/6	0.9183	0.201	4.568	0	0.524	1.312

Source: Researcher, 2025

Table 13 shows the following results;

- FI_PC1 and FI_PC2: Both significant ($p < 0.05$). Positive coefficients indicate that higher scores on these components (driven by FI1, FI2, FI3, FI4, FI6) increase the latent liquidity propensity, shifting probabilities toward higher LP categories.
- ES_PC1 and ES_PC2: Not significant ($p > 0.10$), suggesting ES items do not meaningfully predict LP even after PCA reduction.
- Years of Operation: Marginally significant ($p = 0.064$), positive effect (longer longevity weakly associated with stronger liquidity).
- Anglophone Crisis: Not significant.
- Overall: The model improves fit, with FI components now significant. This implies selecting/weighting FI items via PCA (emphasizing FI1–FI4, FI6) yields predictive power, while ES items do not (consider dropping ES entirely for parsimony).

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Robustness and Diagnostic Tests for the Revised Cumulative Probit Model

To evaluate the robustness and diagnostics of the model (using PCA-derived components FI_PC1, FI_PC2, ES_PC1, ES_PC2, plus Years of Operation and the Anglophone Crisis as predictors of ordinal LP), we conducted the following tests using Python (statsmodels for modelling, sklearn for PCA, and scipy for statistics). The dataset (n=39) was reloaded, and PCA was recomputed (note: PC signs are arbitrary and may flip across runs, affecting coefficient signs but not magnitudes or significance; interpret directions relative to the loadings). Tests focused on robustness to heteroskedasticity, model fit, multicollinearity, and the parallel regression (proportional odds) assumption.

Robust Standard Errors (Heteroskedasticity-Consistent, HC3)

HC3 covariance was used to adjust standard errors for potential heteroskedasticity, which is common in small samples. The model was refitted with cov_type='HC3'. This approach provides more reliable inference than asymptotic SEs.

Model Fit Metrics (unchanged from robust estimation):

- Log-Likelihood: -36.555
- AIC: 93.11
- BIC: 109.7
- Pseudo R-squared: 0.210 (McFadden's; indicates ~21% explained variation, reasonable for ordinal data)

Table 14: Coefficient Table with Robust SEs:

Parameter	Coefficient	Robust Std. Error	z	P > |z|	95% CI Lower	95% CI Upper
FI_PC1	-0.4258	0.156	-2.738	0.006	-0.731	-0.121
FI_PC2	0.7584	0.223	3.404	0.001	0.322	1.195
ES_PC1	-0.2087	0.186	-1.121	0.262	-0.574	0.156
ES_PC2	0.4063	0.266	1.53	0.126	-0.114	0.927
Years of Operation	0.3065	0.142	2.158	0.031	0.028	0.585
Anglophone crisis	0.133	0.194	0.685	0.493	-0.247	0.513
Threshold 2/3	-1.1866	0.983	-1.207	0.228	-3.114	0.741
Threshold 3/4	0.2462	0.325	0.756	0.449	-0.392	0.884
Threshold 4/5	-0.0612	0.298	-0.205	0.837	-0.645	0.523
Threshold 5/6	0.9183	0.161	5.722	0	0.604	1.233

Source: Researcher, 2025

Table 14 shows that: FI_PC1 and FI_PC2 remain significant ($p < 0.01$), confirming robustness. Years of Operation becomes significant ($p = 0.031 < 0.05$) with robust SEs, suggesting a positive effect on liquidity position. ES components and the Anglophone Crisis remain insignificant. The

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signs for FI_PC1 and ES_PC2 flipped due to PCA eigenvector orientation (which is arbitrary); therefore, the focus should be on magnitudes and p-values. Higher values on these components shift the latent variable, influencing category probabilities (e.g., a negative FI_PC1 implies that higher FI agreement reduces latent LP propensity).

Goodness-of-Fit Tests

Likelihood Ratio (LR) Test vs. Null Model: Compares the full model to an intercept-only (null) model.

- LR Statistic: 19.41
- Degrees of Freedom: 6
- p-value: 0.0035

The Goodness of Fit test indicates Significant ($p < 0.01$), implying that the model fits better than a null model without predictors. It also rejects the hypothesis that all coefficients are zero.

Pseudo R-squared: 0.210 (as above). For ordinal models, values >0.2 suggest adequate fit given the small sample.

Multicollinearity Diagnostic (Variance Inflation Factors, VIF)

VIF measures predictor redundancy (VIF > 5-10 indicates potential issues).

Table 15: Multicollinearity Diagnostic (Variance Inflation Factors, VIF)

Feature	VIF
FI_PC1	1.24
FI_PC2	1.09
ES_PC1	1.15
ES_PC2	1.18
Years of Operation	6.57
Anglophone Crisis	6.58

Source: Researcher, 2025

Table 15 shows All VIF < 10, indicating low to moderate multicollinearity. The higher VIF for Years of Operation and the Anglophone Crisis suggests some correlation (possibly due to data patterns), but not severe enough to bias estimates. PCA ensures orthogonality within FI and ES groups.

Parallel Regression Assumption (Proportional Odds) Test

These tests of coefficients are constant across category thresholds (analogous to Brant test for probit: fit binary probit models for each cumulative split P (Y >= k), then Wald tests for coefficient equality).

Binary Probit Coefficients by Cut (for P (Y >= k); unstable at extremes due to sparse data, e.g., only 1 observation at LP=2, 3 at LP=6):

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Table 16: Parallel Regression Assumption (Proportional Odds) Test

Cut	FI_PC1	FI_PC2	ES_PC1	ES_PC2	Years of Operation	Anglophone crisis
>=3	-4.278	5.824	-3.114	3.957	2.977	1.929
>=4	-0.356	0.598	-0.207	0.318	0.297	0.099
>=5	-0.101	0.701	-0.480	0.369	0.287	-0.126
>=6	-1706.019	2301.771	-1779.674	1858.115	504.474	-1691.874

Source: Researcher, 2025

Pairwise Wald Tests for Equality (between consecutive cuts; high p-values fail to reject equality):

- **Between >=3 and >=4**: All $|z| \approx 0$, $p \approx 1$ (no differences).
- **Between >=4 and >=5**: $|z| < 1$, $p > 0.35$ (no significant differences, e.g., FI_PC1 $z = -0.715$, $p = 0.475$).
- **Between >=5 and >=6**: $|z| \approx 0.01$, $p \approx 0.99$ (no differences, though unstable due to sparsity).

Table 16 shows no evidence against the parallel assumption (all $p > 0.35$). The model is appropriate; the coefficients do not vary significantly across thresholds. Extremes (>=3, >=6) show large coefficients due to imbalanced categories, but Wald tests account for this via large SEs.

Overall Model Fit and Specification Appreciation

- Robustness: Findings are robust to heteroskedasticity (HC3 SEs). FI components remain key significant predictors, and Years of Operation gains significance. ES and the Anglophone Crisis do not contribute meaningfully (consider dropping for parsimony).
- Diagnostics: Good overall fit (significant LR, decent pseudo-R^2); no major multicollinearity; parallel assumption holds. Small sample (n=39) and imbalanced LP categories may limit power, but tests support model validity. If sparsity is a concern, consider collapsing categories (e.g., LP 2-3 low, 4 medium, 5-6 high) for future analysis.

Discussion of Findings

The findings of this study indicate that Financial Innovation (FI) has a positive and statistically significant effect on the Liquidity Position (LP) of commercial banks in Bamenda, Cameroon, aligning with the theoretical framework of Financial Intermediation Theory, which emphasizes the role of banks as intermediaries that facilitate efficient capital allocation through innovative financial products. The empirical evidence from Martinez-Sola et al. (2023) and Chen et al. (2022) supports this conclusion, demonstrating that digital banking and fintech solutions enhance liquidity by increasing deposit mobilization and streamlining liquidity management practices. Conversely, Entrepreneurship Support (ES) shows a negative but non-significant effect,

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which may be attributed to the complex nature of entrepreneurial ecosystems and the time lag in realizing liquidity benefits from support programs, as suggested by Zhang et al. (2023) and Gachanja and Muriuki (2022). Theoretically, this aligns with the notion that while entrepreneurship support can foster economic activity, its impact on liquidity is mediated by external factors such as the institutional framework and crisis effects, including the Anglophone Crisis' significant impact on banking operations and business firms in Bamenda. Furthermore, the negative effect captured in the model by the entrepreneurship support variable on bank liquidity position reflects a short-run effect on liquidity position when a commercial bank initially starts supporting entrepreneurial activities. This situation could be different in the long run. Overall, these results underscore the prominence of financial innovation over entrepreneurship support in influencing bank liquidity within this specific context, corroborating the importance of technological advancements posited by Innovation Theory and the role of financial development in fostering liquidity as outlined by Liquidity Preference Theory.

Conclusion and Recommendations

In conclusion, the study highlights the critical role of financial innovation in enhancing the liquidity position of commercial banks in Bamenda, with empirical support from both local and international research. The limited, negative, and non-significant influence of entrepreneurship support suggests that while entrepreneurial development is vital for economic growth, its immediate effects on bank liquidity may be less direct or delayed, especially in crisis-affected regions. Based on these findings, it is recommended that banks and policymakers prioritize the development and adoption of innovative financial technologies, such as mobile banking and digital platforms, to improve liquidity management and operational efficiency. Additionally, efforts should be made to strengthen entrepreneurship support mechanisms through targeted financial products, capacity-building, and institutional reforms that mitigate risk and crisis impacts. Enhancing the synergy between financial innovation and entrepreneurship support can create a more resilient financial ecosystem, promoting sustainable growth and stability in Bamenda's banking sector. The best scenario requires that commercial banks aiming to support entrepreneurial activities should have a stable, high, if not excess, liquid funds to navigate challenging short-term periods associated with entrepreneurial financing before long-term payoffs begin to accrue, thereby building excess liquidity through higher deposit mobilisation and loan repayments.

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Limitations of the Study

While this work is useful in explaining the relationship among key variables associated with the concept of entrepreneurial finance and the role of commercial banks, it is limited by a small sample size of 39. The sample size can be increased by enlarging the study to focus on Cameroon as a whole, rather than just the Bamenda region. Further, the study could make use of secondary data rather than the primary data used here. In this case, the actual evidence on the number or volume of entrepreneurship support extended to businesses over a specific time period could be obtained from all the commercial banks operating in Cameroon. These factors may considerably alter the results of the study and reveal a significant effect of entrepreneurship support on bank liquidity position.

Ethical and Human Participation Statements

We are not aware of any potential conflicts of interest at the time of writing and publishing this study. We also did not receive any funding to aid the realisation of this work. The study is self-funded by the authors. All the responses from the respondents to the questionnaire were handled confidentially. All tables in this study are products of the data analysis conducted by the authors using the completed and returned questionnaires. This study is the original work of the authors; it is free from plagiarism, and all borrowed ideas have been duly acknowledged through proper citation and referencing.

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Appendix

Questionnaire

We are researchers from the Department of Money and Banking, Higher Institute of Commcerce and Management (HICM) of the University of Bamenda conducting a study on **Financial Innovation, Bank Liquidity Position and Entrepreneurship Support: The Case of Commercial Banks in Bamenda-Cameroon**. Your responses will be handled confidentially and purposely for this research. Thank you for accepting to participate in the exercise.

Section A: General Information

1) What is your position in the bank? a=Branch Manager, b=Marketing and Sales, c=Product Development, d= Cash Officer, e)=Others (Specify)
2) For how many years has this institution existed in this industry? **Tick** where appropriate. a)=0-5, b)=6-10, c)=11-15, d)=16-20, e)=20 and Above.
3) To what extent has the Anglophone Crisis affected your bank's operations in Bamenda Cameroon? **Tick** where appropriate. a)=Not at all affected, b)=Slightly affected, c)=Moderately affected, d)=Significantly affected, e)=Extremely Affected.
4) What can you say about the networking capacity of your bank's employees o potential clients in your community of operation? **Tick** where appropriate. a)=Very loa, b)=Low, c)= Moderate, d)= High, e)=Very High.

Section B: Financial Innovation, Entrepreneurship Support and Bank Liquidity Position Issues

Part One: Financial Innovation and Entrepreneurship Support Issues

Instructions: Kindly indicate your level of agreement with the following statements regarding Financial Innovation and Entrepreneurship Support in commercial banks within Bamenda. (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Financial Innovation						
SN	**Question Items**	1	2	3	4	5
	Digital Banking Adoption					
5	Our bank has successfully implemented a mobile and ATM banking platforms					
6	We provide our customers with upto date online banking services					
	Financial Technology (Fintech) Collaboration)					
7	Our bank collaborates effectively with fintech companies to improve service delivery					

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8	Our bank keeps updating its Fintech services through appropriate budget allocations					
	Product Diversification					
9	Our bank actively develops diversified innovative financial products/services to meet changing client needs					
10	The diversification of our innovative products/services is determined by cleint needs and specifications					
Entrepreneurship Support						
	Easy Access to Funding					
11	Our bank makes available sufficient venture funding to support startups and entrepreneurs					
12	Our Bank analyses and makes available funding to expand exisitng businesses					
	Mentorship Programs					
13	Our bank offers mentorship programs for entrepreneurs in the community through mentor-mentee matching (Pair entrepreneurs businneses with experienced ones)					
14	There are regular mentorship meetings aimed at training and development, meeting unique needs and challenges of entrepreneurs, networking opportunities using diverse mentor pool with SMART goals and objectives					
	Business Incubators					
15	Our bank provides business incubation services to entrepreneurs such as access to technology and equipment, businness support services like financial management, etc.					
16	Our business incubation services has helped entrepreneurs to gain industry partnerships, performance monitoring and evaluation, establishment of new businesses based on acquired skills, funding facilities, etc.					

Part Two: Liquidity Position of Commercial Banks in Bamenda-Cameroon				
Instructions*: Kindly Answer Yes or No on the Issues Raised about the Liquidity Position of your Bank*				
	Response Options		**No**	**Yes**
17	Has your bank maintained a liquidity ratio above the regulatory requirement over the last fiscal years?		1	2
18	Does your bank have sufficient liquid assets to cover short-term obligations?			
19	Has there been an increase in the volume of customer deposits in your bank over the past year?			
20	Are there any instances in the past year where your bank had to borrow funds to meet liquidity needs?			
21	Does your bank actively monitor to ensure that the liquidity requirement does not fall above or below required ratio?			
22	Does your bank regularly conduct stress tests to evaluate its liquidity under adverse conditions?			

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For how many years has this institution existed in this industry?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	8	20.5	20.5	20.5
	16-20	31	79.5	79.5	100.0
	Total	39	100.0	100.0	

To what extent has the Anglophone Crisis affected your bank's operations in Bamenda, Cameroon?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all affected	1	2.6	2.6	2.6
	Slightly affected	4	10.3	10.3	12.8
	Significantly affected	31	79.5	79.5	92.3
	Extremely affected	3	7.7	7.7	100.0
	Total	39	100.0	100.0	

What can you say about the networking capacity of your bank's employees on potential clients in your community of operation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	3	7.7	7.7	7.7
	moderate	11	28.2	28.2	35.9
	High	23	59.0	59.0	94.9
	Very high	2	5.1	5.1	100.0
	Total	39	100.0	100.0	

Our bank has successfully implemented a mobile and ATM banking platforms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2.6	2.6	2.6
	Neutral	11	28.2	28.2	30.8
	Agree	20	51.3	51.3	82.1
	Strongly agree	7	17.9	17.9	100.0
	Total	39	100.0	100.0	

We provide our customers with up-to-date online banking services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	5.1	5.1	5.1
	Neutral	14	35.9	35.9	41.0
	Agree	15	38.5	38.5	79.5
	Strongly agree	8	20.5	20.5	100.0
	Total	39	100.0	100.0	

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Our bank collaborates effectively with fintech companies to improve service delivery

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2.6	2.6	2.6
	Disagree	1	2.6	2.6	5.1
	Neutral	13	33.3	33.3	38.5
	Agree	17	43.6	43.6	82.1
	Strongly agree	7	17.9	17.9	100.0
	Total	39	100.0	100.0	

Our bank keeps updating its fintech services through appropriate budget allocations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.1	5.1	5.1
	Neutral	11	28.2	28.2	33.3
	Agree	20	51.3	51.3	84.6
	Strongly agree	6	15.4	15.4	100.0
	Total	39	100.0	100.0	

Our bank actively develops diversified innovative financial products/services to meet changing client needs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.6	2.6	2.6
	Neutral	10	25.6	25.6	28.2
	Agree	24	61.5	61.5	89.7
	Strongly agree	4	10.3	10.3	100.0
	Total	39	100.0	100.0	

The diversification of our innovative products/services is determined by client needs and specifications

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2.6	2.6	2.6
	Neutral	10	25.6	25.6	28.2
	Agree	24	61.5	61.5	89.7
	Strongly agree	4	10.3	10.3	100.0
	Total	39	100.0	100.0	

Our Bank analyses and makes available funding to expand existing businesses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.6	2.6	2.6
	Neutral	20	51.3	51.3	53.8
	Agree	16	41.0	41.0	94.9
	Strongly agree	2	5.1	5.1	100.0
	Total	39	100.0	100.0	

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Our bank offers mentorship programs for entrepreneurs in the community through mentor-mentee matching (Pair entrepreneurs' businesses with experienced ones)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2.6	2.6	2.6
	Disagree	1	2.6	2.6	5.1
	Neutral	16	41.0	41.0	46.2
	Agree	15	38.5	38.5	84.6
	Strongly agree	6	15.4	15.4	100.0
	Total	39	100.0	100.0	

There are regular mentorship meetings aimed at training and development, meeting unique needs and challenges of entrepreneurs, networking opportunities using diverse mentor pool with SMART goals and objectives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	5.1	5.1	5.1
	Disagree	3	7.7	7.7	12.8
	Neutral	11	28.2	28.2	41.0
	Agree	20	51.3	51.3	92.3
	Strongly agree	3	7.7	7.7	100.0
	Total	39	100.0	100.0	

Our bank provides business incubation services to entrepreneurs such as access to technology and equipment, business support services like financial management, etc.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	2.6	2.6	2.6
	Disagree	3	7.7	7.7	10.3
	Neutral	12	30.8	30.8	41.0
	Agree	23	59.0	59.0	100.0
	Total	39	100.0	100.0	

Our business incubation services have helped entrepreneurs to gain industry partnerships, performance monitoring and evaluation, establishment of new businesses based on acquired skills, funding facilities, etc.

		Frequency	Percent	Valid Percent	CumulativePercent
Valid	Disagree	3	7.7	7.7	7.7
	Neutral	15	38.5	38.5	46.2
	Agree	19	48.7	48.7	94.9
	Strongly agree	2	5.1	5.1	100.0
	Total	39	100.0	100.0	

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Has your bank maintained a liquidity ratio above the regulatory requirement over the last fiscal years?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	20.5	20.5	20.5
	No	31	79.5	79.5	100.0
	Total	39	100.0	100.0	

Does your bank have sufficient liquid assets to cover short-term obligations?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	12.8	12.8	12.8
	No	34	87.2	87.2	100.0
	Total	39	100.0	100.0	

Has there been an increase in the volume of customer deposits in your bank over the past year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	10.3	10.3	10.3
	No	35	89.7	89.7	100.0
	Total	39	100.0	100.0	

Are there any instances in the past year where your bank had to borrow funds to meet liquidity needs?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	61.5	61.5	61.5
	No	15	38.5	38.5	100.0
	Total	39	100.0	100.0	

Does your bank actively monitor to ensure that the liquidity requirement does not fall above or below required ratio?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	25.6	25.6	25.6
	No	29	74.4	74.4	100.0
	Total	39	100.0	100.0	

Does your bank regularly conduct stress tests to evaluate its liquidity under adverse conditions?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	12.8	12.8	12.8
	No	34	87.2	87.2	100.0
	Total	39	100.0	100.0	