

Implications of Diversification on Financial Performance of Financial Institutions in the Central African Economic and Monetary Community (CEMAC)

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doi:10.63593/LE.2788-7049.2025.06.001

Abstract

This paper sought to investigate the effect of diversification on the financial performance of financial institutions in the CEMAC region. Data for the study was collected from COBAC National Bureau of Statistics website, BEAC and the World Bank Statistics reports regarding the activities of financial institutions in the region for the period 2000 to 2021. The collated data was run with the aid of STATA software version 13.0. The researcher used regression analysis (PCSE, PanelGLS) to investigate the effect of diversification (liquid asset to cash, non-interest income to total income, inflation, non-bank financial institution and LGDP) on the financial performance of financial institutions in the region. Finally, Driscoll-Kraay regression technique was used to investigate the influence of diversification on competition among these financial institutions. The findings from the PCSE regression showed that diversification explained 56.4% ($R^2 = 0.564$) of the variation in financial performance. In conclusion, it was revealed by the regression analysis that diversification had a significant effect on the financial performance of financial institutions in the region. The findings suggest that policymakers should carefully consider the implications of incentivizing banks to increase their lending to government and state owned enterprises. While such policies might aim to support national development goals, they can inadvertently lead to detrimental effects on the financial sector's health. The study recommends that the emphasis on liquidity aligns with regulatory frameworks that mandate certain liquidity ratios, such as those outlined in Basel III. Maintaining higher liquidity positions helps banks meet regulatory requirements and avoid penalties, which can be financially detrimental.

Keywords: CEMAC, diversification, financial performance

1. Introduction

Financial institutions, like many other profit-making institutions, are expected to create profits through efficient and effective portfolio utilization of available capital resources. This is to ensure advancement and deliver on shareholders' expectations of maximum returns on their investments. Financial intermediation, which is to a large degree the primary job of financial institutions, can be defined as the reception of funds from units with surpluses in the form of changing deposit accounts in order to extend to units with deficits through loans and advances at different prices. Turkmen and Yigit (2012) stated that diversification versus concentration is very pertinent to financial institutions as it significantly contributes to financial stability. Banks should be connected to the circle of

economic and social growth of a nation in order to perform their primary tasks of intermediation. Banks are at a critical period of crisis in this era of economic challenges and reforms. There is a need to develop solutions to aid in the recovery of the banking industry. It is therefore critical to strengthen the portfolio composition of the banks (Olawejaju *et al.*, 2017).

For development and rapid growth of a country's economy, the banking system contribution is fundamental. Deposited surpluses in banks is the avenue through which resources are extended in a style deemed efficient and effective to units of the economy experiencing a deficit and hence foster liquidity, and propel proper functioning of a countries' financial systems (Kamau & Oluoch, 2016). The financial sector participates in the composition of existing assets types that the public can accept to hold, from the liabilities types debtors will be willing to incur. It will, therefore, embark on size transformation, maturity and riskiness of various classes of assets, and henceforth enhances the ambitions of savers with perspective to buy long term assets. Retail banks mainly raise short term deposits but can still make these deposits behave as if they are of long-term structure through a continuous flow of deposits from depositors. Intermediation of resources is the basic and pertinent business of the banks, more so in nations that are developing like Kenya where resources available seem not to be adequate or sufficiently able to fulfill the economic capital and developmental needs (Ndungu & Muturi, 2019). It is important to examine the input-output mix portfolio of these banks and how they have interacted with one another to determine the individual aggregate performance levels of banking institutions in the CEMAC region.

Theories related to diversification in banking advocate for existence of multiple diversification categories and have long dated empirical review with Liang and Rhoades (1991); Palich, Cardinal and Miller (2010), suggesting that banking establishments can diversify portfolios of credit covering varied classes of loans in rather than being geographically heterogeneous. In addition to issuing loans, banking institutions diversify their portfolios by investing in financial instruments and engaging in other activities. Diversification additionally encompasses amongst others, services or activities (Christiansen & Pace, 1994), geographical and international (Obinne *et al.*, 2012; Lin, 2010), revenue (Gambacorta *et al.*, 2014), asset, deposit and sectoral loans (Goetz *et al.*, 2013; Berger *et al.*, 2010), even though it was known as diversification of products, and it closely resembles income diversification (Ebrahim & Hasan, 2008). Related to this preposition, banks can diversify also their investments, not only their lending facilities portfolio (Saksonova & Solovjova, 2011). The most consequential and regular diversification strategies in banking are sectoral credit, income streams, assets, deposit types, geographical and international diversifications.

Derek (2015) defines diversification as a methodology of management of portfolio by which an investor minimizes unpredictability and risks in sets of portfolios by holding a variety of disparate investments that are minimally correlated with each other. Cernas (2011) defines diversification as a strategy of managing a portfolio through ushering together varied assets to bring down the universal risk linked with an investment portfolio. The common benefit of diversifying any portfolio is that it brings together various investments along with a variety of categories of financial tools, by which each bear proportionate risk-return. This diversification grouping is spearheaded with the essential objective of bringing down the anticipated risk that may come to light after all resources are set up in a single investment category.

Deposit diversification's major goal is to protect financial institutions from liquidity risk, especially when their relative borrowing capacity is limited, costly, or both. This form of risk can be related to unanticipated customer withdrawals or an increase in acceptable loan requests (Rose & Hudgins, 2010). Deposit diversification can be easily achieved, according to Moudud-UI-Huq, *et al.* (2023) by reducing the ratio of deposits acquired from a single source, such as individuals, the public sector, and businesses, whether at a global or local level. It can also be accomplished by redirecting deposits made by clients to certain accounts, such as demand, call, saving, and fixed deposits, or by issuing deposit-backed certificates. These portfolio diversification avenues will play the purpose of improving the efficiency of bank borrowing and, as a result, lowering the WACOC.

Credit diversification aims to reduce the levels of risk emanating from loan default on the side of borrowers, which is known as default risk, through deposit allocation and non-deposit funds borrowing among different customer groups belonging to more sectoral units or geographical regions or by the introduction of new products regarding credit facilities (Rajindra *et al.*, 2021). Lending specialization can also help achieve the reduction of credit. Lending specialization can be attained by reducing diversification ratio either in the diversity of customers who qualify for credit or in credit types, which in return lead to enhancement of bank's ability in screening out doubtful loans category.

Despite the growing trend of diversification among financial institutions in the CEMAC region, there is limited empirical evidence on how these diversification strategies impact the financial performance of these banks. While diversification is often pursued with the expectation of enhancing financial stability and performance, its effectiveness in a competitive context remains uncertain. Specifically, the interplay between diversification, and financial performance in the unique economic and regulatory environment of the CEMAC region has not been

thoroughly investigated. Against this background, the study sought to assess the effect of diversification on financial performance of financial institutions in the CEMAC region.

2. Literature Review

2.1 Theoretical Literature

2.1.1 Portfolio Theory Associated with Markowitz (1952)

Harry Markowitz developed Portfolio Theory in his seminal 1952 paper entitled “Portfolio Selection,” laying a cornerstone for modern financial theory and investment management. His framework changed the way investors built portfolios, emphasizing diversification for the efficient optimization of risk and return. This essay addresses the concepts, underlying mathematics, and empirical results of Portfolio Theory, and further points at its deficiencies and the developments beyond financial theory.

Markowitz defined risk as the volatility of returns, which can be measured using standard deviation. Return refers to the expected gain or loss in investment. No investment can be judged in isolation without considering these two factors—risk and return. Markowitz assumed that investors are risk-averse; that is, they either want to maximize returns with a given amount of risk or minimize risk with a desired return. A key part of his theory is the principle of diversification: by mixing different assets together in a portfolio, investors can diminish overall portfolio risk with no sacrifice in expected return. Many assets tend to respond variably to market changes; that is, if one falls, another may rise, thereby smoothing the portfolio’s performance. He also developed the concept of the Efficient Frontier, which defines the portfolio set that gives the maximum expected return at a particular point of risk. The portfolios lying on this frontier are efficient, whereas the ones falling below it are inefficient. This becomes an important tool for the investor in trying to achieve an optimum risk-return tradeoff. Portfolio Theory, on the other hand, has a mathematical underpinning in MVO—a technique for deriving the portions of various assets in a portfolio such that expected returns are maximized with minimum risk. The investors have to estimate returns expected from their portfolio assets, variances thereof, and covariance between these. Although not developed by Markowitz, CAPM is an extension of his Portfolio Theory. It relates the expected return on an asset to its systematic risk, or beta, with respect to the market. The CAPM gives the expected return of an asset as related to its risk relative to the general market return.

Mathematical Framework

Expected Return of a Portfolio

The expected return of a portfolio ($E(R_p)$) is the weighted sum of the expected returns of the individual assets:

$$E(R_p) = w_1E(R_1) + w_2E(R_2) + \dots + w_nE(R_n)$$

where (w_i) is the weight of asset i in the portfolio, and $E(R_i)$ is the expected return of asset i .

Variance of a Portfolio

The variance of a portfolio (σ_p^2), which measures the portfolio’s risk, is calculated as follows:

$$\sigma_p^2 = \sum_{i=1}^n w_i^2 \sigma_i^2 + \sum_{i=1}^n \sum_{j \neq i}^n w_i w_j \sigma_{ij}$$

where σ_i^2 is the variance of asset i and σ_{ij} is the covariance between the returns of assets i and j . The covariance measures how the returns of two assets move together.

Efficient Frontier Calculation

The mean-variance optimization framework can be employed to construct the Efficient Frontier, as investors compute the expected return and risk for alternative portfolios and select those offering the highest return for a given level of risk.

Sharpe Ratio

The Sharpe Ratio is a measure of risk-adjusted return, calculated as follows:

$$S = \frac{E(R_p) - R_f}{\sigma_p}$$

where R_f is the risk-free rate. A higher Sharpe Ratio indicates a more attractive risk-return profile.

The theory further guides on the issue of strategic asset allocation, which aids investors to determine the portion of the investment they can apportion to various classes of assets, such as stocks, bonds, and real estate, in relation to their risk tolerance and investment goals. Portfolio Theory allows the investor to work on his risk management

analysis by applying its principles. Clearly explaining the relations between the assets through covariance and correlation allows for better diversification strategies in one's portfolio. Portfolio Theory finds its application by institutional investors and fund managers in developing an investment strategy, thereby helping them create a portfolio that suits each client's risk-return profile. Markowitz's model assumes market efficiency. That is to say in the price of an asset, all available information about it is reflected in the price. Markets can actually be irrational, and unfounded speculation may result in asset mispricing. Again, the investment decision variables in the theory are static, whereas in reality, market conditions and investment preferences of investors change over time; in such cases, dynamic models can be more relevant. The Capital Asset Pricing Model, which was developed during the 1960s, built on Markowitz's work by introducing a concept of systematic risk, or beta, which is a measure of the risk that cannot be diversified away. The CAPM describes a way to calculate expected returns based on an asset's risk relative to the overall market. Multifactor models subsequently extended this initial model by considering various sources of risk beyond just market risk.

Models such as the Fama-French three-factor model became quite popular for describing asset returns more suitably. The rise of behavioural finance finally questioned the traditional notions of rationality in investment decisions and pointed at various cognitive biases that may affect investor behaviour and emphasized the impact of emotional factors in financial markets. Dynamic portfolio theory overcomes some of the deficiencies found in Markowitz's static model and introduces time-varying risks and returns. This approach allows for the possibility to modify the composition of the portfolio according to changes in the state of the market and according to variations in investor preference. Markowitz's Portfolio Theory has deeply influenced finance and investment management. It underlines, firstly, the importance of diversification and, secondly, the relationship between risk and return as the ground for optimal portfolio selection. Despite these limitations, which encompass assumptions of rationality and static markets, the theory is regarded as one of the cornerstones in financial studies and practice. These further developments include CAPM, multi-factor models, and behavioural finance, among other additions that Markowitz built on, thereby improving our knowledge in investment strategies and market dynamics.

As financial markets keep evolving, the insights from Portfolio Theory will eternally be key to investors in their quest to optimize their portfolios and understand intricacies in risk and return. On the side of support, such a fact that Markowitz's work is still relevant today underlines the importance of lifelong learning and the dynamism of investment practices which investors need in pursuing their financial goals.

2.1.2 Winton's Theory of a Non-Linear Diversification Effect: An In-Depth Exploration

In finance, the diversification concept has been the darling of risk management for quite some time. Traditional portfolio theory, which is essentially based on the work of Harry Markowitz, relies on linear associations between assets with regard to their returns and risk. More recent theories-most notably Winton's theory of nonlinear diversification effects-challenge that conventional wisdom. It follows that the gains to diversification are highly variable between different conditions of markets, having nonlinear implications for portfolio risk and return. The paper will discuss the main concepts, mathematical underpinning, and practical implications of Winton's theory with some mention of its limitations and relevance to modern investment strategy. Winton's theory is based on the very notion that asset returns are not symmetrically distributed and their correlations may change depending on market conditions. In fact, a number of traditional theories essentially assume that returns follow a normal distribution, which leads to linear relationships between risk and return assessments. What makes Winton's theory different is that under conditions of market duress-in other words, extreme conditions-the forms of asset returns can take may not be described by linear models.

What Winton suggests is that this relationship between portfolio risk and the number of assets in the portfolio is not always linear. Once a portfolio has a certain number of assets, further additions may actually result in smaller and smaller reductions in risk, particularly during stressed market conditions. The correlations between the assets are not fixed; they dynamically change with the changing market conditions. Whereas it is during normal market conditions that assets can have low or negative correlations, thereby offering some diversification benefits, during crisis times, correlations may spike upwards and the benefits of diversification would shrink. Winton also hypothesizes that given different market conditions, different assets might offer different risk premiums. The non-linearity presented here suggests that expected returns on assets can, in fact change due to correlations with other assets especially in periods of turmoil. Winton focuses on a proper understanding of market dynamics and the effects macroeconomic factors could have on asset return. This technique integrates insight from behavioural finance wherein investor sentiment and other psychological factors can control the prices of assets.

Mathematical Framework

The theory of Winton presents a mathematical framework that was more difficult to capture nonlinear diversification effects. While the classical Markowitz framework relies on mean-variance optimization, Winton develops nonlinear programming techniques to model portfolio risk and return. We can frame Winton's model within a utility function that captures nonlinear preferences. For example, given wealth, the investor might have

diminishing marginal utility and thus might require higher expected returns for bearing more risks. This is the mathematical formulation of the problem, where the nonlinear function to be optimized will represent a portfolio's expected utility while giving due regard to shifting correlations and risk premiums. This can often be conceptualized as:

$$U(w) = E[R(w)] - \frac{1}{2}\lambda Var[R(w)]$$

where $U(w)$ is the utility function, $E[R(w)]$ is the expected return of the portfolio, $Var[R(w)]$ is the variance of returns, and λ is the risk aversion coefficient.

It is also possible that Winton's framework, using dynamic programming, incorporates time-varying correlations and, therefore will allow the portfolio adjustments to make use of new information and changes in market conditions.

The implications of Winton's theory for portfolio management are immense. Above all, investors and managers alike would be better equipped in making asset allocation and risk management decisions fully recognizing the non-linear nature of diversification. Because diversification benefits tend to fade away in times of tumultuous markets, the investor will, in turn, be able to understand when to proactively adjust the portfolio. This may be through the reduction of certain exposures or increasing allotments toward those with traditionally lower levels of correlation. Winton's approach thus points to a dynamic asset allocation strategy wherein portfolios are changed based on prevailing market conditions so as to cut down associated risk linked to high correlations during crises. Meanwhile, the elements of behavioural finance integrated into investment analysis would explain market sentiment and its repercussions on asset prices better, hence allowing for better timing in the purchase and sale of assets. Portfolio managers can also conduct stress testing scenarios on how portfolios would perform under extreme conditions in the markets, thereby helping to uncover some weakness in diversification strategies. Nevertheless, Winton's theory brought the focus on tail risks-the risks of extreme market movements that traditional models may poorly estimate-further making for more robust risk management.

While Winton's theory gave much valuable insight, there were some important limitations. Non-linear in its mathematical framework, it is fairly complex to implement because one needs advanced quantitative skills and computational resources. Not all investors or firms are in a position to benefit from such models. In fact, Winton's theory has its effectiveness based on the entity having appropriate and comprehensive data on asset return and correlations. Partial or incomplete data may lead to flawed models and suboptimal investment decisions. The theory, in fact, operates on the premise that an investor is able to perceive with accuracy the changing correlations and market dynamics. However, sudden events or changes in investor psychology may turn out the actual outcome quite the opposite of what the model projects. While incorporating behavioural finance strengthens Winton's theory, this also introduces uncertainties in human behaviour. It is not always easy to predict the way investors will behave under stressed conditions.

Winton's theory has more relevance to the investing world at present times, with increased market volatility, uncertainty over economies, and the growth of behavioural finance. Insights arising from Winton's theory enhance strategic decision-making processes as investors face complex challenges. At a time when market volatility is becoming increasingly high, the ability to understand the non-linear implications of diversification provides an investor with certain competitive advantages. Investors are able to prepare in advance for bad markets and take necessary portfolio adjustments. Greater utilization of alternative investments, including cryptocurrencies and hedge funds, further complicates strategies of diversification. It will, therefore, allow investors to assess risks and rewards of adding these kinds of assets in their portfolios using Winton's framework. With advances in technology and data analytics, investors can apply Winton's theory with machine learning techniques that analyze vast amounts of data to find changing correlations and optimize dynamically a portfolio. The result can be a long-term perspective whereby the investor's portfolios remain resilient across various market cycles by acknowledging the nonlinear relationship in risk and return.

Winton's theory of nonlinear diversification effects is a milestone in portfolio management. This theory has changed the conventional linear assumptions to more complex market dynamics assumptions; hence, it is more appropriate for a deeper understanding of risk and return. While this concept does have a bound beyond which it cannot be applied, the practical implications for risk management, asset allocation, and behavioural insights make it highly relevant in today's investment landscape. With their continued evolution, financial markets are bound to lead to the incorporation of Winton's insights that will empower investors to optimize their portfolios and rise to the increasingly complex economic environment.

2.2 Empirical Literature Review

Šeho *et al.* (2024) examines the effects of bank financing diversification and market concentration on bank stability

in Malaysia. Our study is unique as it investigates these effects within a banking industry that has undergone major restructuring due to the introduction and rapid penetration of a new banking type, Islamic banking. Despite its recent history, Islamic banking, having benefited from strong government support, has grown to command more than a third of the market share. The extensive realignment caused by such industry disruption makes the study of such effects on banking stability highly relevant and interesting. The study investigates 24 conventional and 18 Islamic banks in Malaysia from 2003 to 2019. Our results reveal differences in the above dynamics between the two bank types. Increasing diversification up to a moderate level enhances the stability of conventional banks, but only in less-concentrated markets. Very high diversification levels, however, impair their stability. For Islamic banks, stability seems unresponsive to financing diversification. Furthermore, while market concentration negatively affects the stability of conventional banks, Islamic banks appear to benefit from market concentration. These findings withstand our robustness tests using alternative measures of the key variables. Further examination suggests that these dynamics may have a temporal dimension. Our findings imply that a policy based on a single regulatory framework emphasizing increased diversification and competition across the industry may not be appropriate for all banks. Conventional and Islamic banks may require different regulatory treatment.

Tang *et al.* (2024) investigated the influence of Fintech development on bank diversification and liquidity in China. Analysing 101 banks between 2011 and 2021, we apply robust text mining processes and implement factor analyses to construct a Fintech development index, which is used to test for specific liquidity and diversification influence across the Chinese banking industry. Our results provide robust empirical evidence that the development of Fintech reduces bank liquidity creation and helps to increase bank diversification. We find further evidence that this relationship is heterogeneous. Both state-owned and smaller banks, as measured by market capitalisation, are found to have presented a weaker response to Fintech development. Moreover, the outbreak of the COVID-19 pandemic is found to have enhanced the inhibitory effect of Fintech on bank liquidity creation, and thereby weakening its contribution to bank diversification.

Gelman *et al.* (2023) shows how bank asset diversification benefits the economy. Diversification reduces the bank's idiosyncratic risk and stabilizes its stream of earnings. Banks lend more in normal times and maintain credit supply during negative shocks, when credit availability is paramount. Diversification-induced lending, as well as its resiliency, leads to positive spill over to the economy. We use changes in bank regulation as exogenous shocks to identify the causal effect of asset diversification. Our results speak to the debate about whether bank expansion into new activities benefits or threatens the economy and provide some counterbalance to concerns about systemic risk.

Moudud-Ul-Huq *et al.* (2023) empirically investigated the quadratic effects of bank diversification, size and global financial crisis on risk-taking behaviour and performance. To unfold those effects, it uses the generalized method of moments (GMM) estimator and also uses an unbalanced panel data set on a large sample consisting of 542 bank-year observations between 2004 and 2015. The key results for emerging economies are as follows: (a) increasingly higher non-performing loan ratio makes the bank underperforming and unstable; (b) benefits derived from bank diversification are heterogeneous and confirms portfolio diversification theory; (c) small-sized banks of Bangladesh ensure higher advantage from portfolio mix over large banks; (d) large banks of South Africa achieve higher benefit from income diversification over small-sized banks; and finally, this study evidences that during the financial crisis, emerging economies can use portfolio diversification as a mechanism for controlling risk and improve bank performance. Mainly, emerging countries can rely on income diversification and should involve this mechanism with systematic risk a great care of.

Lin *et al.* (2022) study was to investigate whether bank diversification influences borrowing firms' financial constraints on investment decisions. It also analyzes whether the different dimensions of bank diversification could alleviate financial constraints to firm investment. Further, the role of bank diversification in achieving firm financial sustainability is explored. By applying the Two-step System GMM, this study examines the effect of changes in bank diversification on financial constraints to borrowing firm investment in a reduced-form investment model with a sample of 810 listed firms in Taiwan over the period 1997–2019. The empirical findings indicate that firms are financially constrained as well as there being a positive relationship between cash flow and investment among Taiwanese listed firms. Additionally, bank diversification significantly reduces the investment-cash flow sensitivity of firms, suggesting that bank diversification mitigates the financial constraints to borrowing firms. Moreover, the multi-diversification of a bank compared to single-diversification will have greater impact on mitigating the firms' financial constraints on investment.

Velasco (2022) investigated the interrelationship between bank regulatory capital and bank diversification. We argue that regulatory capital might act as a substitutive mechanism of diversification to alleviate a bank's default risk. As a result, regulatory capital is likely to discourage firms from excessive diversification, which might in turn indirectly improve bank value. Using a sample of listed banks in developed countries from 2011 to 2017, we find that total regulatory capital is inversely associated with bank diversification. Narrower regulatory capital ratios

only have a significant association with income-based but not with asset-based diversification. Our results also reveal an indirect effect of regulatory capital on bank value mediated by bank diversification (i.e. indirect-only mediation). Overall, our study provides novel insights into the complementarity of the institutional and strategic domains so as to understand the far-reaching implications of regulation reforms for the strategic behaviour of banking companies.

Shun-Ho *et al.* (2021) investigated whether financial institutions can adopt the strategy of bank diversification to improve the operating performance under the condition of financial stability. By using 19 financial institutions in Macau SAR, the study employing ROA to measure bank performance and income diversification and asset diversification to measure bank diversification. Furthermore, the study employs capital adequacy ratio, non-performing loan ratio, liquidity ratio and financial stability index to measure financial stability to measure financial stability as moderators in the estimation regression. The results of empirical study indicate that income diversification has a significant and positive effect on bank performance, while asset diversification has no significant and positive effect on bank performance. Furthermore, among the moderators of financial stability, liquidity ratio and financial stability index have facilitating effect on the relationship between income diversification and bank performance.

Akbar (2021) examined the effect of a chief executive officer (CEO)'s expertise power on bank diversification. Using US bank data from 1990 to 2020, we find that a CEO's expertise power is positively associated with bank diversification. Market competition and board composition (size and independence) positively affect this relationship. We also find that CEO delta and Vega are the underlying mechanisms through which expertise power leads to greater diversification. We address endogeneity concerns using the two-stage least squares, Heckman estimation and the difference-in-differences approaches and check result robustness in several ways. We provide a new explanation for bank diversification that is useful for policymakers in developing a bank strategy concerning CEO behaviour in diversification.

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Dang and Dang (2021) examined the impact of bank diversification on monetary policy transmission through the bank lending channel. Based on monetary and bank-level data from 2008 to 2018 in Vietnam, a diverse environment of monetary policy tools, results show that bank diversification significantly drives the bank lending channel in different ways. Using the changes in lending rates and policy rates as monetary policy indicators, the study posits strong evidence to indicate that the transmission of the bank lending channel becomes weaker as banks get more involved in non-traditional activities. In contrast, we observe that bank diversification promotes the effectiveness of monetary policy transmission by the intervention of foreign exchange reserves, with no clear-cut link in the case of open market operations. Further analysis indicates the weakening effect is almost confirmed in all bank groups, while the strengthening effect works only for banks with large capital buffers. In brief, the results suggest that monetary authorities should be vigilant when they are strongly encouraging bank diversification. Besides, they also need to choose the appropriate monetary tools to apply and establish specific policies for different groups of banks.

Duho *et al.* (2020) in their paper investigated the impact of diversification on profitability, profit efficiency and financial stability of Ghanaian banks. They employed a panel regression technique on a data set of 32 banks from 2000 to 2015. The data envelopment analysis is used to compute profit efficiency scores with credit risk accounted for. The results suggest that income diversification decreases profit, profit efficiency and financial stability. The impact on profit and stability is U-shaped. The impact of asset diversification was found to be insignificant. High competition reduces both profitability and profit efficiency which is inconsistent with the quiet-life hypothesis of Hicks (1935), but financial stability increases with competition. High investment in tangible assets is associated with poor performance. Non-banking financial institutions that later became universal banks are not financially stable. Competition, size, age, government ownership and leverage which are controlled for and a sensitivity analysis conducted also provided relevant insights. The results are relevant in understanding the events in the Ghanaian banking industry in 2017–2018. Income diversification strategy is essential in determining the performance of banks. Management has to figure out the extent and scope of their diversification to benefit from the strategy.

Kim *et al.* (2020) investigated the effect of bank diversification on financial stability and find a significantly nonlinear (i.e., inverted U-shaped) relationship. These findings suggest that a moderate degree of bank diversification increases bank stability, but excessive diversification has an adverse effect. Furthermore, we find that this relationship has a temporal dimension. For example, bank diversification decreased the variance of bank stability prior to the financial crisis but increased its variance during the crisis. Thus, during crisis periods, it is better for banks to concentrate on traditional intermediation functions (i.e., deposits and loans) rather than diversifying their activities and investments. Further, the results suggest that although most regulators worldwide encourage diversification to reduce bank risk, bank diversification may exacerbate bank financial instability or increase the risk of financial market collapse when idiosyncratic events, such as financial crises occur.

Toh *et al.* (2020) examined the effect of bank competition on bank liquidity creation and explores whether the effect varies by the diversification level of banks, using a sample of Malaysian banks from 2001 to 2017. Our preliminary analysis shows that the aggregate, on- and off-balance sheet liquidity creation of banks decreases when their market power drops, suggesting an adverse effect of bank competition on bank liquidity creation. However, the adverse effect diminishes or disappears for highly diversified banks, and this result holds for both asset and income diversification. The results identify diversification as a “buffer” through which banks could insure their liquidity creation business against competition by generating new income sources for the banks and enhancing their tolerance to intermediation margin compression.

Duho and Onumah (2019) examined the impact of intellectual capital and its components on bank diversification choice. Both asset and income diversification are computed and an unbalanced panel data set of 32 banks covering the period 2000–2015 have been used. The panel corrected standard error regression has been used to account for serial correlation and heteroscedasticity. The study found that intellectual capital determines the choice of diversifying. Precisely, intellectual capital motivates asset diversity but it dissuades income diversification. Human capital and structural capital are major components that determine asset diversity decisions. Income diversification decision, in this case to choose a focus strategy, is determined by human capital. This gives credence for the human capital theory in Ghana. Competition encourages a focus strategy. Bank size and leverage enhances income diversification while stock exchange listing and government ownership fosters the focus strategy. Diversification strategy, knowledge base of staff, corporate governance and internal control have been considered as factors leading to the collapse of some Ghanaian banks in 2017–2018.

Ndungu and Muturi (2019) determine the effect of diversification on financial performance of financial institutions in Kenya. Secondary data used by the study was collected for five years period (2013–2017 on annual basis). All the financial institutions were studied. Data was analysed using descriptive and inferential statistics and presented in tables and figures. The study found that Income Source Diversification and Geographical Diversification had a positive effect on the financial performance of the financial institutions while the Product Diversification had a negative impact the financial performance the financial institutions. The findings from the OLS regression analysis revealed that the diversification components studied namely product diversification, geographical diversification and income diversification explain up to 13.3% of the variations in return on assets ($R^2 = 0.133$) and 18.7% of the variations in return on equity ($R^2 = 0.187$). The study concluded that financial performance of the financial institutions in Kenya can be accounted for by the diversification strategies that have been implemented. It was further concluded that increased formulation and implementation of additional diversification strategies resulted in significant improvement in the financial performance of the financial institutions. The study recommended that managers at the financial institutions to make formulation and implementation of diversifications as a key organizational priority. Before the adoption of any particular diversification, the management of the financial institutions are encouraged to first determine the suitability of those particular diversification strategies based on the organization structure, culture and policies and the overall intended outcomes.

Sharma and Anand (2018) examine the impact of income diversification on bank performance in BRICS countries as a structural response to concentration risk. The authors argue that effectiveness of this approach is conditional upon its extent and quality. To understand the role of firm-specific characteristics on effectiveness of diversification, the authors examine this relationship across asset sizes. An unbalanced panel data set of 169 BRICS banks is sampled over the period 2001–2015. Fixed effect models and system generalized method of moments techniques are used to test the relationship between diversification and bank performance using alternate measures. Results indicate a positive relationship between diversification and performance measured in terms of bank risk and returns for medium and large size banks. However, for small banks this relationship is negative suggesting a “diversification discount.” The study indicates that diversification as a risk mitigating tool can be effective but the managers and regulators should not emphasize on the “one-size-fits-all” approach for all banks. Policy frameworks for controlling concentration risk should be developed keeping in mind factors like bank size, customer base and financial leverage which brings variations to the risk profile of banks.

Moudud-Ul-Huq *et al.* (2018) contributed to the ongoing debate on the costs and benefits of bank diversification.

Diversification may benefit banks if diversified activities are inherently less risky or yield a high return, while it may hurt banks if diversified activities are more dangerous or possess low return. Using bank-level data from Indonesia, Malaysia, the Philippines, Thailand, and Vietnam over the period 2011-2015, we find that overall banks benefit from diversification; that is, the diversified banks have higher performance and lower risk. However, we further observe that diversified activities heterogeneously benefit banks. While the revenue diversification has a robust positive impact on bank performance and stability, the effect of assets diversification varies from country-to-country. Our results imply that banks can prioritize activities for diversification to maximize the benefits.

Hamdi *et al.* (2017) investigated the relationship between non-interest income and the level of risk taking. To achieve their goal, they used annual data of 20 Tunisian banks during the period 2005-2012. In the empirical section we performed a Dynamic Panel Data model. Empirical results indicate that the main determinants of non-interest income are: relative performance (RROA and RROE), bank size, loan specialization and new e-payments channels, automatic teller machine (ATM) and credit cards. We also find that diversification increases bank performance for both ROA and ROE measures. Eventually, non-interest income appears to be negatively and significantly correlated with the effect on the level of risk. Tunisian banks are invited to more diversify their activities and do not focus only on the traditional activity. The noninterest income seems to be associated with a higher level of profitability and a lower risk.

3. Methodology of the Study

The Economic and Monetary Community of Central Africa (Communauté Économique et Monétaire de l'Afrique Centrale, CEMAC) was created in 1994 and became operational after the treaty's ratification in 1999 in N'Djamena, Chad. It comprises six countries, Cameroon, Central African Republic (CAR), Chad, Republic of Congo, Gabon and Equatorial Guinea. The community constitutes a single market to promote sub-regional integration through a monetary union and an economic union. The targeted population in the study constituted all financial institutions in CEMAC as obtained from World Bank reports, BEAC and COBAC. As maintained by BEAC (2019) annual report, the aggregated total of registered financial institutions firms was nineteen by end of the financial year 2022. The study scoped financial institutions in CEMAC, year period between January 2000 to December 2021. The study used a mixed research design, which entails gathering and analyzing data from study units at a specific point in time in order to determine the strength of relationships between variables. (Saunders *et al.*, 2014; Mulwa, 2013)

$$ROE_{i,t} = f(LACR, NITT, NBFI, INF, BRCR, LGDP) \quad (3.1)$$

$$ROA_{i,t} = f(LACR, NITT, NBFI, INF, BRCR, LGDP) \quad (3.2)$$

Upon linearization and parameterization which involved transforming the variables into natural logarithms the long run model was specified as:

$$ROE_{i,t} = \beta_0 + \beta_1 LACR_{i,t} + \beta_2 NITT_{i,t} + \beta_3 INF_{i,t} + \beta_4 BRCR_{i,t} + \beta_5 LGDP_{i,t} + \alpha_i + \epsilon_{it} \quad (3.3)$$

$$ROA_{i,t} = \beta_0 + \beta_1 LACR_{i,t} + \beta_2 NITT_{i,t} + \beta_3 INF_{i,t} + \beta_4 BRCR_{i,t} + \beta_5 LGDP_{i,t} + \alpha_i + \epsilon_{it} \quad (3.4)$$

And the short run model was specified as:

$$ROE_{i,t} = \beta_0 + \lambda ROE_{i,t-1} + \beta_1 LACR_{i,t} + \beta_2 NITT_{i,t} + \beta_3 INF_{i,t} + \beta_4 BRCR_{i,t} + \beta_5 LGDP_{i,t} + \alpha_i + \epsilon_{it} \quad (3.5)$$

$$ROA_{i,t} = \beta_0 + \lambda ROA_{i,t-1} + \beta_1 LACR_{i,t} + \beta_2 NITT_{i,t} + \beta_3 INF_{i,t} + \beta_4 BRCR_{i,t} + \beta_5 LGDP_{i,t} + \alpha_i + \epsilon_{it} \quad (3.6)$$

Where: LACR is liquid asset to cash ratio, NITT is non-interest income to total income, NBFI is non-bank financial institutions, INF is inflation rate, BRCR is bank regulatory capital to risk ratio and LGDP loan to gross domestic product for Bank i at time t , α_i is bank specific effect which held an assumption of normal distribution and with a variance that is constant and ϵ_{it} is the idiosyncratic error term which held an assumption of normal distribution and denotes other variables that were not included in this study. β represents coefficients of explanatory variables, $\lambda ROE_{i,t-1}$ is lagged bank performance. β_0 is the value of the financial performance when all independent variables effect is equal to zero.

4. Presentation and Discussion of Results

This approach enhances empirical analysis by reducing dimensionality while preserving the core financial performance dynamics within the dataset.

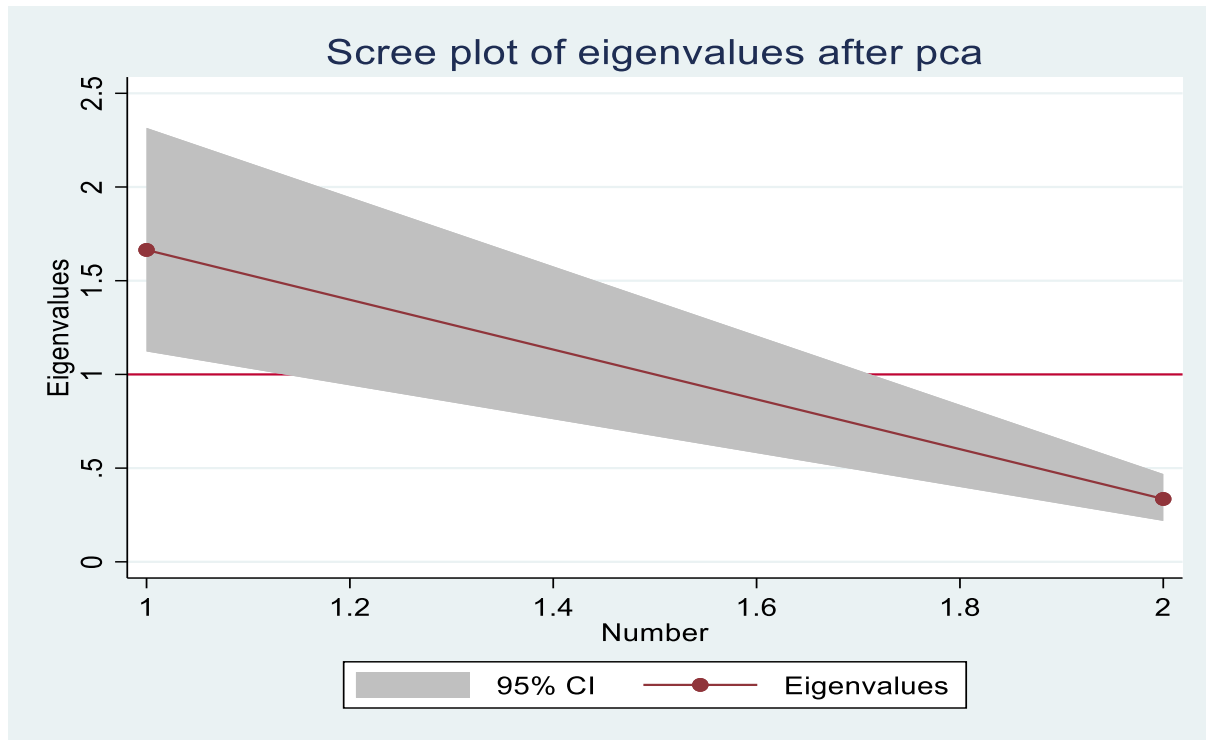


Figure 1. Scree plot eigenvalues after PCA for financial Performance index

Source: Author, Using Stata 14.

4.1 Estimate of Diversification and Financial Performance

The results from the panel-corrected standard errors (PCSE) regression in Table 1 reveal key insights into the relationship between diversification and financial performance. The diversification index (DIVSFTNINDX) exhibits a significant negative impact on return on equity (ROE) and the overall financial performance index (FINPERFINDX). Specifically, a 1% increase in diversification is associated with a 2.47 percentage point decrease in ROE ($p < 0.01$), indicating that higher diversification reduces shareholder returns. Similarly, a 1% increase in diversification leads to a 0.48 percentage point decrease in overall financial performance ($p < 0.05$), suggesting that diversification may have adverse effects on the broader financial health of banks. However, the effect of diversification on return on assets (ROA) is negative but not statistically significant, implying that diversification does not meaningfully influence this measure of profitability.

Table 1. PCSE estimation results for Diversification and Financial Performance

VARIABLES	(1) ROA	(2) ROE	(3) FINPERFINDX
DIVSFTNINDX	-0.140 (0.114)	-2.471*** (0.860)	-0.479** (0.227)
Liquid assets to deposits and short-term funding	-0.00325 (0.0124)	0.0495 (0.0847)	0.00506 (0.0238)
Bank regulatory capital to risk-weighted assets	-0.0374* (0.0194)	-0.370** (0.172)	-0.0878** (0.0405)
Inflation Rate	0.0468*** (0.0132)	0.383*** (0.138)	0.105*** (0.0301)
LGDP	0.392*** (0.118)	1.184 (1.020)	0.562** (0.240)
Constant	-1.110	9.251	-3.977**

	(0.888)	(7.282)	(1.740)
Observations	62	62	62
R-squared	0.663	0.488	0.241
Number of ID	3	3	3
chi2	23.17	18.11	17.25
	(0.0003)	(0.0028)	(0.0040)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author, using Stata 14.

Bank regulatory capital to risk-weighted assets is another significant determinant of financial performance. A 1% increase in regulatory capital leads to a 0.37 percentage point decrease in ROE ($p < 0.05$) and a 0.09 percentage point decline in FINPERFINDX ($p < 0.05$). This suggests that higher capital requirements, while intended to enhance financial stability, may constrain profitability and overall financial performance. The effect on ROA is also negative, with a 1% increase in regulatory capital reducing ROA by 0.04 percentage points, though this result is only weakly significant ($p < 0.1$).

The first objective of this study was to examine the impact of diversification on financial performance, measured through return on assets (ROA), return on equity (ROE), and a composite financial performance index (FINPERFINDX). The findings from the Panel-Corrected Standard Errors (PCSE) regression reveal important insights into the relationship between bank diversification and financial performance.

The results indicate that the diversification index (DIVSFTNINDEX) has a negative and significant effect on ROE and the financial performance index but is insignificant for ROA. Specifically, a 1% increase in diversification leads to a 2.47 percentage point decrease in ROE ($p < 0.01$) and a 0.48 percentage point decrease in the financial performance index ($p < 0.05$). These findings suggest that diversification, rather than improving profitability, may dilute financial performance, particularly in terms of shareholder returns.

These findings align with prior empirical evidence suggesting that diversification in the banking sector does not always lead to enhanced financial performance. Laeven and Levine (2007) argue that diversification can lead to inefficiencies as banks expand into non-core activities that they may not manage effectively. Similarly, Stiroh (2004) finds that while diversification can reduce reliance on interest income, it may also expose banks to operational risks that outweigh potential benefits. The negative effect of diversification on ROE and overall financial performance in this study supports these perspectives, indicating that banks that diversify extensively may struggle with managing complex operations, increased costs, and potential risk mismanagement.

However, the insignificant effect of diversification on ROA suggests that while diversification reduces shareholder returns (ROE), it does not necessarily impact the overall asset profitability of banks. This could indicate that although diversification may lead to operational inefficiencies, it does not significantly erode the profitability of a bank's total assets. The mixed findings highlight the need for a more nuanced approach to diversification, as its impact may vary depending on the specific financial performance metric used.

Contrary to the findings of this study, some empirical research has reported a positive relationship between diversification and financial performance. Elsas, Hackethal, and Holzhauser (2010) find that diversification enhances profitability and stability by creating multiple revenue streams. Similarly, Goddard *et al.* (2008) argue that well-managed diversification strategies can improve financial performance by reducing reliance on volatile interest income. The discrepancies between these studies and the present findings may be due to differences in regulatory environments, bank size, risk management frameworks, and the degree of diversification pursued by different banks. These contrasting results suggest that while diversification has potential benefits, its effectiveness depends on the strategic execution and risk management practices employed by banks.

Estimate of Diversification and Financial Performance using disaggregate variables for diversification.

The results from the disaggregated diversification variables reported in Table 2 provide further insights into the relationship between different forms of diversification and financial performance. Among the diversification measures, the share of nonbank financial institutions' (NBFIs) assets to GDP exhibits a significant negative effect on financial performance. Specifically, a 1% increase in NBFIs assets to GDP leads to a 0.08 percentage point decline in return on assets (ROA) ($p < 0.05$) and a 0.16 percentage point reduction in the financial performance index (FINPERFINDX) ($p < 0.05$). This suggests that a larger presence of nonbank financial institutions in the economy may intensify competition for banks, thereby reducing their profitability and overall financial

performance. However, the impact of NBFIs' assets to GDP on return on equity (ROE) is negative but statistically insignificant, implying that this form of diversification does not significantly influence shareholder returns.

Table 2. PCSE estimation results for Diversification and Financial Performance using disaggregate variables for diversification

VARIABLES	(1) ROA	(2) ROE	(3) FINPERFINDX
Credit to government and state-owned enterprises to GDP	0.0459 (0.0679)	-0.836 (0.617)	-0.0407 (0.142)
Bank noninterest income to total income	0.000874 (0.0110)	0.102 (0.0868)	0.0121 (0.0211)
Nonbank financial institutions' assets to GDP	-0.0828** (0.0383)	-0.456 (0.338)	-0.157** (0.0787)
Liquid assets to deposits and short-term funding	0.00476 (0.0115)	0.0705 (0.0911)	0.0172 (0.0230)
Bank regulatory capital to risk-weighted assets	-0.0416** (0.0184)	-0.374** (0.171)	-0.0915** (0.0391)
Inflation rate	0.0484*** (0.0120)	0.400*** (0.135)	0.108*** (0.0285)
LGDP	0.452*** (0.122)	1.414 (1.130)	0.669*** (0.253)
Constant	-0.513 (1.022)	13.12 (9.000)	-2.826 (2.050)
Observations	62	62	62
R-squared	0.612	0.499	0.260
Number of ID	3	3	3
chi2	28.67 (0.0001)	18.69 (0.009)	21.43 (0.0031)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Author, using Stata 14.

The results indicate that credit to government and state-owned enterprises does not have a significant effect on any of the financial performance measures. This suggests that bank lending to the public sector does not necessarily enhance or diminish bank profitability. This finding is consistent with Demirgüç-Kunt and Huizinga (1999), who argue that while government lending is often perceived as low risk, it also comes with lower returns, which limits its ability to enhance bank profitability. Moreover, public-sector loans may be subject to political influences and regulatory constraints, making them less attractive for generating higher financial returns.

The results show that noninterest income diversification does not significantly affect financial performance. This is particularly interesting because noninterest income, such as fees, commissions, and trading revenue, is often considered an important source of earnings diversification for banks. Prior studies such as DeYoung and Roland (2001) have suggested that noninterest income can enhance profitability by reducing reliance on interest income from loans. However, the insignificant findings in this study align with Lepetit *et al.* (2008), who argue that excessive reliance on noninterest income can introduce greater volatility and risk, particularly if banks engage in speculative activities such as trading and derivatives. This result suggests that while noninterest income may provide an alternative revenue stream, it does not necessarily translate into improved overall financial performance for banks.

The results show that the expansion of nonbank financial institutions negatively affects financial performance,

particularly in terms of ROA and the financial performance index. Specifically, a 1% increase in the share of NBFIs assets to GDP leads to a 0.08 percentage point decrease in ROA ($p < 0.05$) and a 0.16 percentage point decrease in the financial performance index ($p < 0.05$). These findings suggest that the increasing presence of nonbank financial institutions intensifies competition in the financial sector, thereby reducing the profitability of traditional banks. Boyd and Gertler (1994) provide a similar argument, noting that the growth of nonbank financial institutions puts pressure on banks by reducing their market share and forcing them to compete under tighter margins.

The negative effect of NBFIs on bank financial performance also aligns with the banking competition hypothesis, which suggests that as new financial institutions enter the market, traditional banks experience increased competition, leading to lower profitability. This trend has been observed in various banking systems worldwide, particularly in markets where fintech companies and shadow banking institutions have grown rapidly. These findings suggest that traditional banks must adapt their business models to remain competitive in an evolving financial landscape where nonbank institutions play an increasingly important role.

5. Conclusion and Policy Implications

The results highlight the complex and often counterintuitive effects of diversification on financial performance. While diversification is often promoted as a risk-mitigating strategy, the findings suggest that beyond a certain threshold, diversification can have detrimental effects on bank profitability and overall financial stability. The negative relationship between diversification and return on equity (ROE) and the financial performance index (FINPERFINDX) suggests that banks engaging in excessive diversification may face challenges related to increased operational complexity, managerial inefficiencies, and diluted profitability. Moreover, the disaggregated components of diversification reveal that non-bank financial institutions' assets to GDP have a significant negative effect on financial performance, indicating that expanding beyond core banking activities may introduce additional risks that outweigh potential benefits. These findings align with the broader literature, where studies have found that while diversification can enhance stability in the short term, it can also erode profit margins and increase exposure to non-core risks in the long run.

The findings of this study highlight the complex relationship between diversification and financial performance in the CEMAC region. While diversification can enhance stability and efficiency, excessive or poorly managed diversification may erode profitability and increase financial risks. Given the unique characteristics of the CEMAC financial sector, where institutions operate in a relatively underdeveloped but rapidly evolving market, policymakers, regulators, and financial institutions must adopt strategic measures to ensure that diversification enhances, rather than undermines, financial performance.

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Winton, A., (n.d.). Nonlinear diversification effects in portfolio management.

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