ISTANBUL COMMERCE UNIVERSITY
GRADUATE SCHOOL OF FINANCE
MASTER OF INTERNATIONAL FINANCE

THE EFFECT OF BANKING SECTOR PROFITABILITY ON ECONOMIC GROWTH: EVIDENCE FROM ECOWAS AREA

Master Thesis

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ABSTRACT

The primary goal of this research is to analyze whether the financial profitability of the banking sector in the Economic Community of West African States has an impact on economic growth. This study uses quantitative methodology to attain the main objective and over a period of 2010 to 2019. In our model, the banking sector profitability measured by financial indicators as ROA, ROE, and NIM indicates the explanatory variables while annual growth rate of GDP for economic growth measures the predicted variable. The model uses Panel Generalized Method of Moment (GMM) to test the hypothesis. The result of our survey suggests that all financial rentability and profitability indicators have a statistically significant influence on the gross domestic product (GDP) growth rate. It implies that the banking sector financial performance has significant impact on the economic growth in West Africa. The profitability of banks is conditioned to some prerequisites: macroeconomic stability, a range of diversified financial products, and effective enforcement of legislation and regulation, and a properly functioning asset registration system.

Keywords: Banking Sector, Profitability, Economy, West Africa

ÖZET

Bu araştırmanın temel amacı, Batı Afrika Devletlerinin Ekonomik Topluluğundaki bankacılık sektörünün finansal karlılığının ekonomik büyüme üzerinde bir etkisi olup olmadığını analiz etmektir. Bu çalışma, temel hedefe ulaşmak için ve 2010-2019 dönemi boyunca nicel metodolojiyi kullanmaktadır. Modelimizde finansal göstergelerle ROA, ROE ve NIM olarak ölçülen bankacılık sektörü karlılığı açıklayıcı değişkenleri gösterirken, ekonomik büyüme için GSYİH'nın yıllık büyüme oranı öngörülen değişkeni ölçmektedir. Model, hipotezi test etmek için Panel Genelleştirilmiş Moment Yöntemini (GMM) kullanır. Araştırmamızın sonucu, tüm finansal karlılık göstergelerinin gayri safi yurtiçi hasıla (GSYİH) büyüme oranı üzerinde istatistiksel olarak anlamlı bir etkiye sahip olduğunu göstermektedir. Bankacılık sektörünün finansal performansının Batı Afrika'daki ekonomik büyüme üzerinde önemli bir etkisi olduğu anlamına geliyor. Bankaların karlılığı bazı önkoşullara bağlıdır: makroekonomik istikrar, bir dizi çeşitlendirilmiş finansal ürün ve mevzuatın ve düzenlemenin etkin bir şekilde uygulanması ve düzgün işleyen bir varlık kayıt sistemi.

Anahtar Kelimeler: Bankacılık Sektörü, Karlılık, Ekonomi, Batı Afrika

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ADB: African Development Bank

BIS: Bank for International Settlements

BRVM: West African Stock Exchange

CFA: African Financial Community

BECEAO: Central Bank of West African States

ECOWAS: Economic Community of West African States

EIB: European Investment Bank

GMM: Generalized Method Moments

GSMA: Global System for Mobile Communications

IMF: International Monetary Fund

WAEMU: West African Economic and Monetary Union

WDI: Word Development Indicator

1   INTRODUCTION

1.1   Background of the Study

The banking sector in West Africa has developed in recent years. Bank credit to the economy has risen sharply in most countries since the mid-2000s. The banking system in the region is heterogeneous with low diversity. Baking institutions dominate largely financial systems in West Africa by detaining 90% of financial sector assets (IMF, 2021). After the countries in the region accessed to independence, the banking sector was mainly constituted of state banks and some international banks from the former colonial powers.

Over the last decades, major changes have progressively changed the banking sector. An important transformation was the emergence of first private banks, followed by the implementation of their regional networks. The sector was also marked by the gradual decrease in number of big foreign groups and the important difficulties of state banks. Another major transformation was the creation of regional markets, which favored the creation of African banking groups with a regional and even continental dimension. Recently, the different stages and repetitive changes have shaped financial systems of West African countries.

The financial system is characterized by important changes during the last years in the region. For instance, the number of branches and bank accounts have significantly increased. The role of banks in maintaining strong and stable financial system is primordial for the economies. Consolidated by important wave of reforms, the banking sector started to expand activities, spread funding and develop scope through new products. The appearance of local banking groups and high competition are leading the banking industry to develop innovation strategies. Despite its importance, the banking sector must overcome new challenges to contribute in the region's economic development.

McKinsey (2018) reported that the banking sector in Africa is very dynamic, and this dynamism is pushing new business models to emerge aiming to overcome challenges such as the low proportion of banking market penetration, liquidity usage, and the small geographical mesh physical agencies and ATMs, especially in the retail banking. The

African Development Bank (2021) acknowledges that Africa's GDP is expected to grow by 3.4% in 2021, following a 2.1% contraction in 2020 caused by the COVID-19 pandemic. The recovery will be supported by the expected rebound in tourism, an increase commodity prices and an easing of pandemic-induced restrictions. The African banking sector is growing rapidly and almost showing profitability twice above the global average.

The market penetration level of retail banking in Africa is only 38% of the GDP according to a survey made by Mckinsey in 2018. This number represents half of the global average of other emerging countries of the world. In terms of size, the banking sector represented about 86 billion USD in revenue in 2018, with an expected growth of 8.5% yearly, banks of the continent will bring total revenue in to 129 billion dollars (Mckinsey, 2018). Another characteristic of the sector in West Africa is the tremendous growth in number of banked individuals. In 2018 approximately 300 million adults were banked, compared to 170 million in 2012 (Statista, 2019). This number is expected to be 450 million people by 2022 which is nearly half of the total African population.

African banks are facing many challenges such as low level of income in many countries, the strong use of liquidity in most countries, and the low coverage of credit. However, some banks are already seizing opportunities from these challenges. The extension of digital banking service solutions in Africa allows the sector to design low-cost offers and adopt innovative distribution. Thanks to these innovations, the growth of banks turnover could increase significantly over the next five years. Africa is making significant growth rate that pulls millions of people from extreme poverty, creates a class of emerging consumers and stimulates a rapid economic growth in many countries.

 The African banking sector contrasts with this global performance. In fact, African banking sector is growing rapidly and almost showing profitability twice above the global average. Beyond the strong competition and high regulation, this region of the world keeps a strong growth potential. The market penetration level of retail banking in Africa is only 38% of the GDP according to a survey made by Mckinsey in 2018. This number represents half of the global average of other emerging countries of the world.

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Africa is making significant growth rate that pulls millions of people from extreme poverty, creates a class of emerging consumers and stimulates a rapid economic growth in many countries. West African banks' net products increased at an annual growth rate of 11% from 2011 to 2020, in addition ROE of these banks amounted 14.1% in 2019 (Mckinsey, 2021). The ROE of African banks represents more than the double 6% achieved by the banks in developed countries.

1.2   Statement of the Study

The influence of banking institutions of the Economic Community of West African States (ECOWAS) is very significant because of less developed financial markets. Banks are principal actors that allow liquidity and credit services to agriculture, manufacturing, and other sectors to financing their activities. Banks in their role of financial intermediaries use the savings of certain customers to finance other customers who are in need. These clients may be companies that need financial support to carry out their major projects or simple families that consume on credit. Thus, banks have the possibility of creating currencies through the creation and management of debts.

By maintaining the profitability of investments in a country, banks encourage as many investors as possible by keeping borrowing rates low while keeping the minimum profitability of investments on track. Banks are not only financial intermediaries in West African countries, but they also finance the State by issuing currencies that allow the State

to pay, for example, State officials. The State, municipalities and public institutions also have financing needs. Their financing constitutes what is commonly referred to as public debt. This compensation enables the State to meet its obligations and prevents it from standing still in the face of possible budget deficits.

The economies of Sub-Saharan African countries are still developing and with a financial system mainly controlled by banks. With underdeveloped or weak financial markets, banks are the only options to access funding. They are essential to African economies and the performance of banking sector is relevant for the effective functioning of local economies. Banks allow a mobilization of savings as well as a better allocation of resources that generally promote the economy, and in particular promotion of investment. Extreme poverty, unemployment, and lack of investment are some factors characterizing the under-development in Africa.

1.3   Purpose of the Study

The primary objective of this research is to investigate the impact of banking sector profitability on the economic growth in West Africa. Specifically, the purpose of the study is:

- To explore macroeconomic variables and trends in ECOWAS area,
- To investigate the banking sector considering risk management, regulation, and innovation.
- To determine the relationship between bank profitability and economic growth.
- To make recommendations based on the findings and results.

1.4   Significance of the Research

The significance of this paper is simply allowing the public to understand the role of banks in the economy development, specifically in West Africa. In addition, it helps the audience to get better understanding of financial system in Africa. This study is also pointing out the main factors affecting the banking sector and the impact of financial development on the African population. Moreover, by analyzing the performance of local banks, the study provides necessary information on West African Banking financial health.

In addition, from a macroeconomic perspective, the paper will examine most of the economies of ECOWAS members by providing figures and table. This enables us to identify strengths and weaknesses of these economies. Furthermore, this study will also be of importance to potential investors in West Africa to get an understanding of the financial market and to seize opportunities. It is also significant to local governments who are seeking to establish an integrated financial system for economic development.

1.5   Nature of the Research

This study uses quantitative methodology in order to attain the main objective. The research proposes to develop a methodology, through theoretical study as well as making use of related literatures, which can be used in determining the impact of banking sector performance and growth in West African region.

The required data can be classified into two main categories: the factors that determine bank profitability and rentability, and the economic indicator that explains growth in the region. The goal is to analyze whether the financial profitability of banks lead to growth in the economies of countries. In our model, the banking sector profitability measured by financial indicators as ROA, ROE, and NIM indicates the explanatory variables while annual growth rate of GDP for economic growth represents the predicted variable. The choice profitability and rentability variables to measure bank performance is supported by the World Bank's indicators of financial institutions efficiency at country level (WDI, 2021). Moreover, our model uses Panel Generalized Method of Moment (GMM) to test the hypothesis from EVIEWS software.

1.6   Research Questions

- What are the determinants of banking sector performance in West Africa?
- What are the benefits of regulation and risk management for African Banks?
- How does banking sector performance impact the GDP growth of ECOWAS country members?

2   LITERATURE REVIEW

2.1   Determinants of the Banking Sector Performance

The performance of banking sector has been subjected to several empirical studies. The main goal of our research is to examine the relationship between bank performance and economic growth in west African countries. Therefore, this section analyses factors that influence the performance and development of banks based on related literature.

Durosinmi (2019) conducted a survey to determine the impact of capital structure on the performance of Nigerian banks. The author's goal was to investigate the impact of equity on financial efficiency, and thus the relationship between financial leverage and bank performance. In his model, the bank's financial soundness was measured using capital adequacy, asset quality, earnings, and liquidity, while the equity-to-debt ratio and total debt-to-total-capital ratio represented capital structure. The researcher examined secondary data collected from financial proxies of the sample between 2010 and 2017 using descriptive statistics methodology and a regression technique. He concluded that debt ratio has a negative impact on bank performance, while shareholders' funds have a positive impact on their soundness, whereas there is a statistically significant negative relationship between leverage and bank solvency in Nigeria at a level of 1%. According to his research, the country's banking institutions should prioritize shareholder equity over debt in their capital structure.

Oni (2019) analyzed the factors influencing non-performing loans of the banking institutions in Sub-Saharan Africa. According to the author, there's a relationship between NPLs risk minimization and growth in the banking system and growth within the continent. His model focused on bank-specific, macro-economic, global, and institutional factors as key determinants of NPLs of Deposit Money Banks in the geographical area. The researcher applied the system GMM technique with an elaborated econometric method, supported a panel set from 23 Sub-Sahara African countries. The results of his research suggested that banks in Africa should emphasize mainly the performance of the real economy when enlarging loans to their customers, especially during expansion; because according to the author, loan delinquencies are likely to be higher in periods of an economic downswing. In addition, he suggests that governments of African countries

should develop legal structuring to prevent adverse effects of bad loans and improve the regulatory body.

Otoo (2019) investigated the role of internal control in the financial performance of Ghanaian banks. A qualitative approach was used in his study to evaluate the real market life experiences of Ghanaian bank executives and employees with extensive knowledge of internal control strategies in the banking sector. According to the researcher, the findings confirmed that developing effective internal control strategies would be simple for Ghanaian banks to implement for financial efficiency. It also enables banks to secure potential customers' and shareholders' investments. However, the author revealed that implementing effective strategic internal control practices in banking can be extremely difficult from a practical standpoint in Ghana, because while Ghanaian banks continue to profit and increase shareholder wealth, some banks are closed down by the government due to insolvency or a lack of cash in reserves.

Tiamiyu (2019) investigated the impact of risk management on the financial effectiveness of Nigerian banks. His research goals are to assess the impact of various risks on bank performance, including credit risk, liquidity risk, operational risk, capital adequacy risk, and market risk management. Between 2008 and 2017, he used data from deposit banks' annual reports and accounts traded on the Nigerian Stock Exchange. To validate his assumptions, the author analyzed the data using various statistical techniques such as descriptive analysis, Pearson correlation, and regression analysis. The findings revealed that operational risk has a statistically significant negative effect on return on assets, whereas capital adequacy risk has a statistically significant positive effect on return on equity. Furthermore, credit and operational risk have a negative significant impact on returns on equity, whereas capital adequacy risk, foreign exchange risk, liquidity risk, and interest rate risk have no positive or negative significant impact on returns on assets (Tiamiyu, 2019).

Areola (2018) surveyed the impact of credit risk indicators on the financial efficiency of Nigerian banks. The author aimed to assess the impact of loan inefficiency, the contribution of liquidity, and the impact of GDP on bank financial performance. ROA was used to measure bank performance in his study, while non-performing loan ratio, capital adequacy ratio, and loan to total deposit ratio were used to estimate risk level. The

researcher examined data from ten commercial banks from 2010 to 2015, and his findings indicated that credit risk indicators have a positive impact on bank financial solvency. However, he revealed that the real gross domestic product is statistically insignificant in terms of bank performance.

Hu (2018) investigated the relationship between bank financial health and risk and regulation, governance, market power, and diversification. The researcher examines the performance of Asian commercial banks from 2000 to 2012, as well as the impact of diversification and deposit insurance on liquidity risk, using evidence from G7 and BRICS country members. The author discovered that market power has a positive effect on banking sector performance but increases banks' exposure to emerging markets. Indeed, he believes that revenue diversification improves the stability of individual banks. Furthermore, the author asserted that Credit Rating Agencies (CRAs) improve bank performance. Furthermore, the researcher proposed that greater diversification can reduce the risk of illiquidity during crisis periods by lowering funding costs, increasing funding inflows, maintaining total loan lending, and improving the liquid ratio. Finally, the author concluded that deposit insurance has a positive effect during a crisis because it reduces the impact of liquidity demand risk, but it cannot eliminate this risk completely.

Yinusa (2018) investigated the role of intellectual capital in the development of Nigeria's banking sector. A mixed-method design was used in his research, which included both primary and secondary data. The primary data were gathered through a questionnaire distributed to a random sample of deposit money bank employees, and the secondary data were gathered from the annual reports of nineteen (19) Nigerian deposit money banks. According to Yinusa, the primary data was examined using the partial least squares path modeling method, while secondary data was examined using multiple least square and general least square regression in Stata (2018). He reveals that the findings of his research using both methods show that structural capital has a significant and positive effect on banks. As a result, the researcher concludes that policymakers in the banking sector regard Intellectual Capital and its components (Human and Structural capital) as an important business resource.

Kalyvas (2014) investigated the effect of business regulations on bank performance in the European Union over a period of 10 years from 2000 to 2010. His study analyzed the

effect of several types of business regulations on bank performance. Specifically, the author analyzed the effect of business, credit, and labor regulation on the efficiency of the banking sector in the EU. Furthermore, the researcher analyses the relationship between bank efficiency and credit, labor, and business regulation in the banking industry of the new EU member states. The study employed some econometric techniques and found that, among the important variables that re government size, legal structure and property rights protection, access to sound money, trade freedom, and regulation, only labor, and business regulation affect the banking sector with a positive and statistically significant effect on bank efficiency. However, the author found that severe labor regulation reduces bank efficiency while decomposing the regulation indicators into three components which are business, credit, and labor regulations.

Luo (2014) investigated the relationship between financial liberalization and bank development. The author aimed to examine find the effect financial liberalization on banking sector effectiveness. He used statistical techniques such frontier estimation methods, regressions, and Granger causality to develop his model. His study indeed covered data from bank scope and economic data at country level for a sample of 1536 commercial banks covering 88 countries over the period 2000 to 2009. The result of the study showed that financial liberalization contributes positively to profit efficiency while the impact on cost efficiency is generally mixed. Moreover, the researcher said that for the influence of risk in banking, the result suggested that financial liberalization, lower cost efficiency and higher profit efficiency of banks increase the potential for default risk. Additionally, the author mentioned that greater competition in banking contributes to higher cost but lower profit efficiency of banks under financial liberalization.

Muhtar and Ahmad (2014) investigated the connection between banking sector development and company financial leverage from South African firms. They applied two -step system generalized method of moments (GMM) to seek out that when the banking sector expands, South African publicly listed companies use less debt in their capital structures. According to researchers, the explanation behind this assumption is that while the banking sector develops in emerging markets, the risk management process makes stronger pricing for risk and also the cost of bank credit higher. They suggested that policy makers and regulators should implement policies that may provide a much

better efficient risk management process which can decrease the price of bank credit for corporates.

Ekata (2011) studies the impact of investment in information technology (IT) and on the financial performance of the Nigerian bank. In his research, IT investment and financial performance data were collected on 21 of the 24 commercial banks in Nigeria for 2005 through 2009 period. The researcher claims that his result of quantitative correlation design study shows a positive significant association between IT expenditure and return on assets (ROA) while his research found no correlations between IT expenditure and net income or return on equity (ROE), between IT budget and net profit, and between IT training cost and net profit. He concluded that there's an existence of paradox in IT productivity in the banking sector of Nigeria.

Demetriades and Fielding (2011) studied the effect of data on banking sector development in West Africa. They identified the determinants of individual banks' loans and assets in some west African countries. Their study affirmed that higher loan default rates decrease both the loans to asset ratio and also the volume of assets. They revealed that the scale of those impacts is sensitive to bank age and ownership structure because younger, private, domestically owned banks are most plagued by the informational disadvantages compared to the mature government-owned banks.

Kamau (2011) examined the intermediation efficiency and productivity of the banking sector in Kenya. The author made a non-parametric Data Employment Analysis (DEA) live the intermediation efficiency and employed and Malmquist Productivity Index (MPI) to investigate the productivity of the banking sector in Kenya. The survey concludes that banks weren't fully efficient while they perform fairly and suggests that they will be more productive by improving their technology, skills and spreading their scale of operations. Additionally, the paper claimed that policies favoring competition, product diversification, risk minimization through increased capital regulation, and privatization of some banks are essential.

Brissimis et al. (2008) examined the connection between banking institution reforms and financial soundness with evidence from the latest European Union country members. They evaluated bank performance in terms of efficiency, total factor productivity growth,

and net interest margin. Their study revealed that banking sector reform and competition have a positive effect on bank performance. However, the impact of reform on total factor productivity growth is critical only by the top of the reform process. additionally, they argued that the effect of capital and credit risk on bank performance is negative in most cases, and better quick assets reduce the efficiency of banks.

2.2   Financial Development and Economic Growth

In this part, we examine past literature to look at whether there's any connection between banking sector development and economic expansion. Access to financing is one of the most challenges facing businesses and households in Africa because the financial market is principally controlled by banks. Therefore, the role of banks in the real economy is vital for all market participants. The aim is to look at if there's any relationship between banking sector development and economic growth from related literature.

Islam (2019) investigated the effect of banking sector financial performance on the economic process in Bangladesh. His research examines 16 commercial banks operating within the country from 2008 to 2017. The gross domestic product rate indicated economic development while bank size, return on equity, return on investment and operating profit rate represented the financial performance of the banking sector in his model. The author employed a panel data regression model and GDP rate represented variable whereas ROE, Bank Size, ROI, and Operating Profit rate represented the explanatory variables. The results of his research provide evidence that each of the explanatory variables has a statistically significant influence on the GDP rate of growth meaning that the banking sector's financial performance has a significant impact on the economic process in Bangladesh. The author concluded that the concerned authority should emphasize the event of the banking sector thereby accelerating the economic development.

Xue (2018) conducted a study about financial sector development, economic process, and stability through the analysis of Chinese and international evidence. The authors evaluated the impacts of the rise in bank credit growth on firm-level output, employment, and investment. Additionally, he analyzed the impacts of economic sector development on the expansion of fifty countries from 1997 to 2014. The study mentioned that financial sector development significantly reduces growth volatility. Moreover, it suggested that

financial sector development contains the shock of inflation volatility, therefore optimal financial sector development is vital to cut back aggregate fluctuations and inflation shocks. Additionally, the authors revealed that bank credit is pro-cyclical and amplifies the fluctuation, especially during economic peak.

Davis (2017) analyzed the effect of commercial bank development on economic expansion in Europe. The author examines whether industry development incorporates a significant impact on growth where economic development starts at a lower level. The researcher used principal component analysis (PCA) to remodel twenty-one banking variables that measure access, depth, stability, and efficiency into components to judge the strength of the link between banking development and economic process in Europe from 2004 to 2013. His study analyzed the banking development in Europe by using the planet bank's four dimensions that are access, depth, efficiency, and solvency. The author revealed that the banking system development features a strong correlation with the economic process in Europe. Additionally, he affirmed that a greater relationship is observed from components reflecting efficiency and solvency.

Al-Moulani (2016) investigated the connection between banking sector development and long-term economic process within the Gulf Cooperation Council States. The researcher used the Generalized Method of Moments (GMM) approach to spot the banking and growth relationships and to search out the banking system determinants within the Gulf States. The results of the research argued that there's a non-linear relationship between banking sector depth and economic development. Moreover, the author indicated that the banking system and economic process relationship exhibits a smaller total effect magnitude and shorter time between the industry development and its impact on economic expansion. Additionally, the researcher suggested that the industry may be a potential sector within the GCC, but it's underdeveloped in certain aspects in comparison to countries with similar levels of income. He concluded that the banking sector can contribute to the expansion of the opposite economic activities while the event of the arena requires investment in working capital, human resources, and designing suitable legal and regulatory frameworks to confirm the sustainability of the industry within the GCC States.

Hamza (2014) had research on the impact of banking sector performance in the economic process of Pakistan. The research employed a sample of 10 commercial banks from 2008

to 2012 for the multivariate analysis. In his model, GDP measuring the expansion represents the variable quantity, and the explanatory variables are deposits, investment, advances, profitability, and interest-earning. The results of his study suggested that deposit and investment statistically negatively predicted GDP while advances, profitability, and interest-earning significantly positively predicted GDP. He concluded that the banking sector is contributing to the economic expansion in Pakistan.

Abubakar and Gani (2013) analyzed the impact of banking sector development on Nigerian economic growth. They argued that the important sector in Nigeria has difficulty accessing financial resources from the commercial banks that hold 90% of the whole financial assets. Other problems they identified are the high nominal charge per unit causing many companies to avoid borrowing; banks provide major parts of their credits to grease sectors to the disadvantage of other real sectors like communication. Moreover, researchers said that fifty of banks' assets are affianced in government debt. They examined the future relationship between financial development and economic process and located that liquid liabilities of banks and trade openness have a positive effect on economic expansion.

Chaudhuri (2012) investigated the effect of monetary development on the economic process of some countries. Within the research, four dependent variables were considered which are output growth, capital stock growth in productivity, and therefore the gross private savings rate. Furthermore, the survey used banking sector and stock exchange variables as independent variables, additionally, the industry development indicator was measured by bank credit. The author then regressed the four dependent variables on bank credit, turnover, and institutions. He commented that bank credit is insignificant altogether specifications while turnover and institutional quality are all significant for growth in output, capital stock, and productivity. However, the researcher argued that none of the financial and institutional quality variables don't explain differences in private savings rates in countries.

Parvin (2011) analyzed the effect of banking sector development on the economic expansion in developing countries. His paper investigates the link between financial development and economic expansion within informal and formal sectors. The researcher found that growth in developing economies is especially driven by human capital and better allocations within the formal sector. Furthermore, he argued that higher revenue

through consumption taxation within the formal sector provides more redistribution that causes a multiplier effect on growth. Additionally, the author examines the impact of banking development in regional output, agriculture, and industry in India by using state-level data from 1999 to 2008. He found that there's a strong positive relationship between banking development and growth effects, however, he revealed that commercial banks' deposits affect positively growth in the industry but don't significantly impact growth in agriculture.

Oluitan (2010) investigated the impact of monetary development and economic process in Africa. Specifically, the study analyzed the link between finance and growth in Nigeria and the African continent. Moreover, the researcher examined the effect of bank credit in stimulating real output by considering the financial factors within the economy. For the case of Nigeria, he suggested that allowing credit causes real output. The findings of the research revealed that exports, especially oil exports are negatively associated with credit in Nigeria while there's a positive relationship between non-oil exports and bank credit. Additionally, the author mentioned that capital inflows and imports are positively associated with bank credit in Nigeria. per the author, this conclusion holds for Africa as a full. Bank credit is positively associated with exports to other regions of the planet, but the other holds in Africa. The author analyzed these differences and located that exports are largely dominated by multi-national companies that value more highly to get financing from credit markets instead of the industry in Africa. He revealed that the efficiency of the banking sector is 74%, 76%, and 92% measured respectively by loans, earnings, and other operating income.

Mao (2009) investigated the effect of banking sector openness on the economic process of various groups of states. The research aimed to research whether banking sector openness provokes economic process or economic volatility in several regions of the globe. The researcher suggested that the openness of the banking sector may impact the economic process directly or indirectly. He used GMM econometric techniques to research the direct or indirect link between banking sector openness and economic process. Furthermore, he employed stochastic frontiers to estimate the banking industry's cost efficiency, then to investigate the connection between banking efficiency and therefore the sector openness. The results of his study revealed that banking sector openness improves access to financial services, banking sector efficiency, and economic

development. Additionally, the evidence from thirty (30) countries supported that foreign bank entry improves the national banking sector and affects positively the domestic economy. However, the author claimed that an aggressive banking sector openness may expose the domestic economy to a global crisis that its economic system cannot manage.

Kessy (2007) analyzed the connection between bank efficiency and the economic process of the geographical region Community (EAC) countries. The study covered the banking sector in East African countries from 1994 to 2005 by employing quantitative and qualitative aspects. Firstly, the author evaluated bank efficiency by using the Data Envelopment Analysis model, then he used efficiency scores to look at the impact of a well-functioning financial setup on economic development. According to him, the empirical analysis of the connection between financial set-up efficiency and economic growth is predicated on an equation relating GDP growth to bank efficiency scores and credit to the private sector. The results of the study affirmed that commercial banks' credit to the non-public sector is statistically significant meaning that credit allowed to the non-public sector by banks has a positive effect on the economic expansion. Moreover, the researcher suggested that commercial banks' efficiency is positively related to both the common capital productivity and level of savings, also he affirmed that these intermediate variables are positively and statistically associated with GDP growth.

Claessens and Laeven (2005) studied the banking competition and its impact on the economic process of 16 countries. They compared countries with higher banking sector competition and countries with lower competition supported financially dependent industries. Their survey found that in countries with higher competition in the industry, financially dependent industries grow faster. They suggested that competition is important for financial sector functioning.

Jobome (2002) investigated the link between the development of the monetary system and the economic growth within the UK. The author employed a statistical econometric methodology to conduct his research. The findings of his study suggested that the link between financial development and growth is sector specific. Therefore, he revealed that banking sector development is very important for service sector development while the event of the securities market is positively associated with the event of producing sector. Additionally, the researcher explained that banking sector development encompasses a

positive and significant impact on the speed of growth of the service sector's output in the UK. He revealed that the effect of an increase of banking on the physical capital coefficient provides the sector's investment efficiency.

Koivu (2002) analyzed the efficiency of the banking sector's effect on the economic process in transition countries. The research covered 25 transition economies from 1993-2000, the methodology was to live the event in banking sectors by using the margin between lending and deposit interest rates and therefore the amount of bank credit provided to the personal sector as a share of GDP. The result showed on one hand that the charge per unit margin is significantly and negatively associated with economic expansion, and on the other hand that increases within the level of credit allocated to the personal sector tend to accelerate the economic process.

3 MACROECONOMIC ANALYSIS IN AFRICA AND ECOWAS AREA

3.1 Macroeconomic outlook in Africa

Africa is a continent of 30 million square kilometers and counted a population of 1.3 billion people according to the World bank (WDI,2021). Due to high natality, the population of Sub-Saharan Africa grows significantly at an average annual rate of 2.8%. Moreover, the population in Africa is the youngest in the world according to Statista and youth under the age of 25 account for 62 percent of the population, compared to 44 percent in developing countries overall and 27 percent in developed countries (2021). As a result, Africa may be a young continent with numerous growth opportunities. Its population increased nearly fivefold between 1960 and 2020, compared to 2.7 times for Asia and three times for geographic region, and it now accounts for 16% of the world's population, up from 7% in 1960.

In 2020, economic activity in Africa was constrained by an unprecedented global pandemic caused by COVID-19. After contracting 2.1% in 2020, Africa's real GDP is expected to grow 3.4% in 2021 (AFDB, 2021). In addition, the report revealed that the expected recovery from the recession since then will be supported by a recovery in tourism, a rebound in commodity prices, and the lifting of pandemic-induced restriction.

3.2 Macroeconomic Conditions in West Africa (ECOWAS area)

West Africa is a vast and diverse continent. It regroups countries of West African Monetary Union, which are using a common currency the Franc CFA. The union country members are Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. In addition, seven other countries are located in the region, which are Cabo Verde, Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone. These countries form the Economic Community of West African States (ECOWAS). It is a political and economic union that groups fifteen countries located in geographic region of West Africa (ECOWAS, 2016). Founded in 1975, the Union mission is to develop economic and politic0al cooperation between States. In line with UN projections, the region's population is predicted to succeed in 550 to 600 million in 2050. Moreover, with 5% of

the world's population and a neighborhood covering 40% of geographic region, it's the foremost densely populated continent.

In 2019, the population in the region was estimated at 393 million, with Nigeria accounting for more than half (201 million). The macroeconomic indicators show the disparity of income level. In fact, Nigeria is leading the economy with a GDP per capita of 6000 US dollars (at purchasing power parity, PPP), and the average rate was estimated at 5500 US dollars in the region (EIB, 2020). Moreover, the economy is less diverse compared to other regions of the world, for instance services dominate the economy accounting for 55% of GDP, industry accounts for 23%, while agriculture accounts for 22%. On the demand side, consumption accounts for 86% of GDP, investment for 18%, and net exports for 4%. According to the European Investment Bank, the high potential of natural resources is the engine of economic development in the region (EIB, 2020). However, natural resources dependency causes less diversification and can be the main factor of crises when there is fall in prices. For instance, the fall in oil prices impacts the Nigerian economy adversely and lead to recession in 2016. Most of the researchers see agriculture as the future for African economy due to its demographic and climate characteristics.

In recent years, economic development has reflected the region's diverse economic structures and, as a result, varying degrees of oil dependency. Nigeria was on the verge of emerging from an economic slump in 2017, owing primarily to rising oil prices, whereas Ghana was able to record a sharp increase in the rate of growth after a two-year slowdown. Furthermore, the economic process within the West African WAEMU, which includes former French colonies, has remained strong, with a nearly 6-percentage-point increase for the sixth year in a row (EIB, 2020). Growth in the region is expected to reach 2.8% in 2021 and 3.9% in 2022 due to pandemic restrictions ease and the rebound on commodity prices (AFDB, 2021). Furthermore, growth will be mainly driven by the agriculture sector, infrastructures, and oil products.

- **Gross Domestic Product (GDP) growth**

In general, the region's GDP continued to grow, despite a drop from 2013 to 2016. (figure 1). GDP fell from 6.3 percent in 2012 to 2.2 percent in 2016, owing primarily to the

collapse of oil and commodity prices (IMF, 2019). Following this shock, GDP increased by 4.9 percent in 2019. This result can be explained by the region's largest economy, Nigeria, which recovered from a recession in 2016 to achieve a growth rate of 2.2 percent in 2019. Furthermore, Ghana, the region's second-largest economy, has grown by more than 6 percent per year since 2016, reaching a value of 6.5 percent in 2019. When compared to non-WAEMU member countries, WAEMU members showed a stronger and faster growth rate. The reason for this disparity is that inflation is better controlled in the WAEMU area because the members use a common currency backed by the euro.
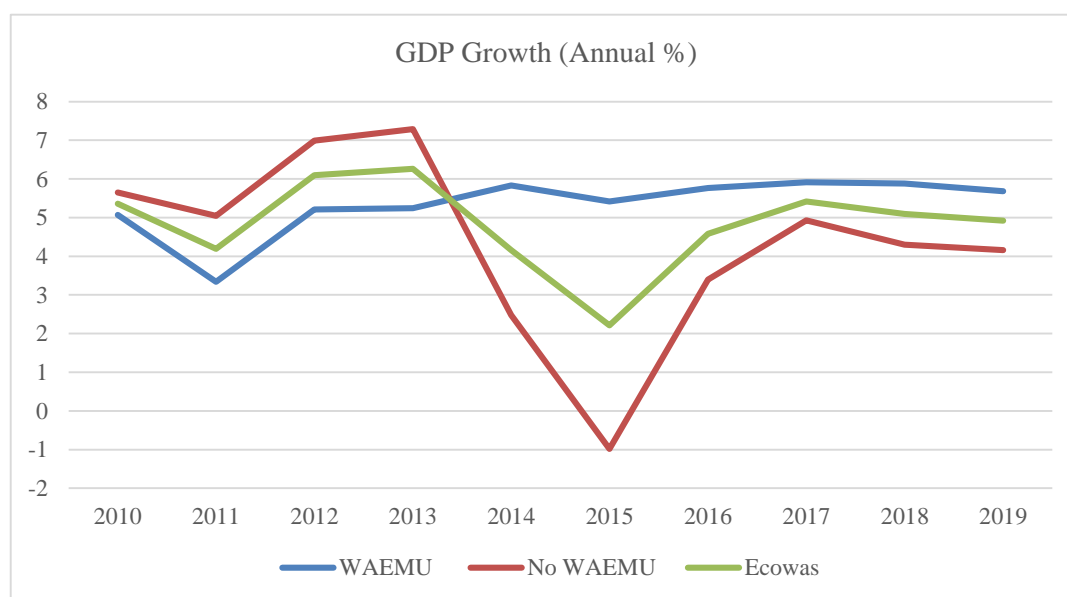
Figure 1. GDP Annual Growth (%)

Source: Author's compilation using data from World Development Indicators (2020)

- **Inflation**

In many developing economies, including West Africa, inflation is a major concern. Inflation is stifling economic growth because it is persistent and unchecked. In West Africa, there is a significant disparity in inflation rates. Figure 2 shows that the rate is much lower in the WAEMU. In reality, two exchange rate regimes predominate: flexible exchange rate regimes and fixed exchange rate regimes. English-speaking countries tend to have more flexible schemes, whereas French-speaking countries tend to have more rigid regimes. The volatility of the exchange rate has been higher in English-speaking countries. According to the African Development Bank, the currency in Ghana and

Nigeria fell dramatically between 2014 and 2016, owing primarily to global declines in commodity prices and crude oil (2018). However, the flexible currencies appreciated in 2018 and 2019 as global commodity and crude oil prices rose. This currency appreciation has reduced inflation in English-speaking countries from 11.04 percent in 2017 to 8.51 percent in 2019 (Figure 2).
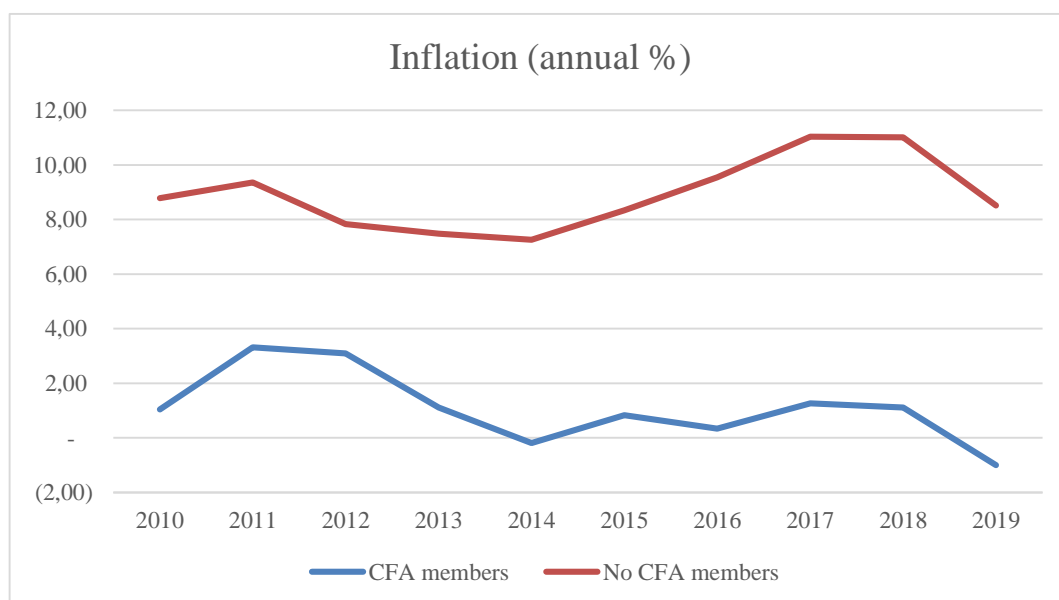
Figure 2. Inflation Annual Growth (%)

Source: Author's compilation using data from World Development Indicators (2020)

Figure 2 shows that inflation rates are much lower in francophone countries that use the CFA Franc (Common currency used in 8 countries of West Africa). The main reason for the low inflation rate is the relatively stable exchange rate. Thus, there is a fixed exchange rate between the CFA Franc and the euro, which explains the stability of inflation in this ECOWAS region. Furthermore, the CFA economies have benefited from the euro's appreciation.

West African countries must strike a delicate balance between, on the one hand, maintaining stable exchange rates to control inflation and, on the other, accumulating buffer reserves that can be deployed when commodity revenues are low. In smaller economies with fragile macroeconomic conditions, this balance is even more precarious. Interventions in foreign exchange markets to artificially maintain the national currency at an artificially high level, as well as high inflation rates in comparison to those of its

trading partners, are two negative factors affecting exchange rates' ability to compete effectively (African Development Bank, 2021)

4   BANKING SECTOR IN AFRICA

The African banking sector has grown over the last decade because of a series of reforms such as technological innovation, foreign bank involvement, bank implementation of the Integrated Cash Management System (ICMS), ease in retail and investment lending standards, and implementation of Basel one, two, and three to improve efficiency (Ahmad and Muhtar, 2014).

4.1   African Banking Condition

African banking markets differ in terms of size, infrastructure, banking rates, and digital adoption. The banking market is classified into four categories in this study, each of which is defined by income per capita, bank penetration, revenue growth, profitability, and financial infrastructure. Based on these characteristics, the goal is to identify each type of market.

The first category of African banking markets is a relatively mature market that includes countries with higher GDP per capita, such as Egypt and South Africa. Its distinguishing feature is a geographical network of 17 agencies per 100 000 adults, which is significantly higher than the African average of 5 agencies for the same number of people (Mckinsey and Company, 2018). Furthermore, credit bureau penetration is high (22 percent of adults), which is more than double the African average. Credit reporting agencies are businesses that collect financial information about consumers, such as their debt level and employment history, and sell it to financial institutions that lend money, such as banks (Cambridge English Business Dictionary). Credit reporting agencies are important in the banking industry because they evaluate each applicant by conducting a credit check, which provides critical information to banks. Furthermore, retail banking accounts for a larger share of net banking income in these markets, and other financial services, such as asset management and mortgage loan companies, are more widely distributed.

The second type of African banking market is one that is in transition and rapidly expanding. Countries in this market include Ivory Coast, Ghana, and Kenya. It has a higher banking penetration rate than the African average and fierce competition in retail banking. Furthermore, sophisticated banking services such as mobile banking, as well as a wide range of innovations, are common in this market. The growth rate is also high,

with an annual average of 14% between 2011 and 2016, and the profitability is high, with a ROE of 17% in 2017. (Mckinsey and Company, 2018).

The third type of banking market is large market in which banking penetration is lower than expected in relation to revenue. It includes Nigeria, Africa's largest country and first economy, with a population of 190.1 million people and a GDP of $375.8 billion (The World Bank, 2019). Angola is also included in the markets because both countries are oil exporters and have stronger economies than most African countries. In these markets, we also find a credit bureau coverage rate of only 3%, the lowest of the four market categories, as well as less innovation in banking services such as mobile banking. The main reason for this poor performance is that banks in this region are more focused on the oil sector than on other industries or consumer markets.

The last category is an emerging market, consisted of countries such as Congo, Tanzania, and Ethiopia. In this market, GDP per capita and banking penetration level is relatively low compared to other markets. The emerging market represents the biggest challenge for foreign investors looking for positive returns on investments. In fact, some of the countries such as Congo and Ethiopia with a respective population of 89 and 105 million people, represent a significant potential to penetrate the markets. Despite the restrictions or limitations for foreign banks to enter the market, it is still a big opportunity for local investors.

4.2   Banking Sector in West Africa

The banking system within the geographic area accounted for 142 establishments by the year 2018 against 138 establishments in 2017 consistent with the EIB (2020). The expansion in GDP has favored the growth of the banking network constantly. The number of agencies increased by 14.1% to achieve 3396 in 2018, plus the ATMs increased by 9.9% yearly to achieve 2,976 (EIB, 2020). Additionally, the banking sector total assets increased by 6.8% from 2017 to 2018 to achieve 57.6 billion euros according to the EIB (2020).

In 2018, the WAEMU banking sector was made up of 29 international and regional banking groups. These groups dominate banking activity in the region, accounting for 86.8 percent of total banking assets and 83.4 percent of customer bank accounts (EIB,

2020). As shown in table 1, the banking market is highly concentrated, the ECOBANK; and BMCE Bank of Africa groups are the largest, with market shares of percent and 10.1 percent of total assets, respectively (EIB, 2020). In addition, eight largest African banking groups detain 64% of total market share (table 1).

Table 1. Major West African Banking Groups

Group	Presence in countries	Market share (%)	Number of agencies	Number of accounts
Ecobank (ETI)	8	15.3	225	1,131,339
Société Général	4	11.2	129	524,584
Bank of Africa Group	6	10.1	145	573,827
Ajariwafa Bank	4	8.7	210	571,078
BNP Paribas	7	7	176	362,658
ABI (Ex-AFG)	4	6.2	81	442,144
United Bank for Africa	4	3.3	59	212,941
BSIC	7	2.4	73	68,649
Total		63.9	1098	3,887,720

Source: European Investment Bank (2020), available at:
https://www.eib.org/attachments/efs/economic_report_banking_africa_2018_en.pdf (accessed June 2020).

In 2018, banking sector resources within the WAMEU area increased more than expected, causing significant grow in credit of banks to the real economy. In fact, bank assets were 45.5 billion euros at the year of 2018, an annual increase of 10.4%. The main explanation behind this fact is due to the rise in customer demand deposits account for 53.6% and term deposits for 46.4% of total deposits, which increased by 10.4% yearly to achieve 38.2 billion by the tip of 2018 (EIB, 2020). The level of funds allowed by the banking sector to the economy continued its upward trend in 2018 and attained 50 billion euros. This evolution is principally because of the incredible acceleration of bank credit.

At the end of 2020, the Union's banking system had 152 authorized financial institutions compared 153 in December 2019 (BCEAO, 2021). The asset of UMOA's banking institutions totaled 47,718.5 billion FCFA by 31 December 2020, an increase of 14.8 percent from 2019 valued at 6,159.3 billion. This trend was observed in all UMOA banking centers: Côte d'Ivoire (+2,483 billion; +18.5%), Burkina (+949 billion; +16.4%), Senegal (+883 billion; +11.2%), Mali (+637 billion; +12.8%), Benin (+574 billion; +13.5%), Togo (+415 billion; +13.7%), Niger (+182 billion; +9.9%) and Guinea-Bissau (+36 billion; +11.9%). The number of locations (agencies, offices, and sales outlets)

increased by one hundred and thirteen (113) units in 2020, or +3.1%, to reach 3,762. The number of ATMs increased by 159 units, or 4.5% to 3,676. Number of bank accounts held in the books of credit institutions also registered growth of 13.2%to 15,414,253 at the end of 2020. The individuals grew by 12.7% and those held by legal persons of 20.9%.

The region's net banking income (NBI) amounted to 2,347.7 billion in 2020, up 8.0% on an annual basis. It consists mainly of net income from customer transactions and income from securities and diver transactions, which represent respectively 65.5% and 31.5% compared to 69.5% and 28.4% in 2019. Net income from customer transactions rose 1.7% to 1,538.3 billion in 2020, compared to 1,512.1 billion in 2019.8% to reach 740 billion in 2020 against 617.8 billion a year earlier. The result of treasury transactions and transactions with credit institutions and similar, showed a deficit of 197.4 billion in 2020 against a deficit of 212.7 billion a year earlier, improvement of 15.3 billion (+7.2%). Revenues from other operations (foreign exchange, off-balance sheet, financial and other services) increased by 9.3 billion, or 3.6%, from 257.6 billion in 2019 to 266.9 billion in 2020.

The net cost/income ratio, which measures the level of absorption of NBI by overhead cost, decreased by 2.4 percentage points annually from 66.7% in 2019 to 64.3% in 2020. Loans and receivables to customers of these entities increased by 7.2% over the year to reach 14,842.2 billion at the end of 2020. Debt to customers increased by 13.5% to reach 22,321.1 billion at 31 December 2020.Revenues totaled 1,905.0 billion compared to 1,759.9 billion a year earlier, an increase of 8.2%. The provisional net income of financial companies decreased by 31.7%, posting 212.7 billion against 311.6 billion in 2019.

The resources of the Union's banking institutions consolidated by 15.8% annual growth amounted to 38,691.7 billion CFA in 2020. They are divided into deposits and borrowings (85.3%), net equity (10.7%) and other resources (4.0%). Deposits and borrowings rose 17.0% per year to 33,007.3 billion at the end of 2020. They are composed of demand deposits (17,919.1 billion; 54.3%) and term deposits (15,088.2 billion; 45.7%), which increased by 18.1% and 15.8% respectively during the period under review.Net own funds of the banking system increased by 474.3 billion (+12.9%) from 3,672.6 billion in 2019 to 4,147.0 billion a year later. Other resources20 grew by 1.0 billion (+0.1%), year-on-year, to 1,537.4 billion by the end of 2020.

The Nigerian banking sector totalizes 25 commercial banks. Several international banks are operating in the country, which hold nearly 13% of the overall assets. Ghana has one of the most developed financial system in the region and comprises 34 commercial banks. The major three banks own nearly 41% of all operating assets and 42% of deposits (EIB, 2018). Nigeria and Ghana have a developed and complex banking system compared to other countries of the region. Financial crises were averted in the past years, illustrating the solidity of the financial system and the effectiveness of the proactive actions implemented by central banks. However, following the slump that occurred over the 2014-2016 period thanks to fall in oil prices, the financial sectors faced series of challenges. Overall, the financial soundness indicators associated with capital adequacy and asset quality have deteriorated in both countries since 2014 and number of other banks are subject to enhanced supervision or perhaps placed under supervision. In both countries, deposits are the most source of financing, representing about 60% of total liabilities (EIB, 2018).

4.3   Banking Sector Dynamism

The dynamism of banking sector is measured by the level of bank deposits to GDP. This ratio is consisted of all checking, savings and time deposits in banking institution to economic activity and represent an important measure of deposit resources available to the banking sector for its lending activities according to Beck et al. (2009). The ratio increased positively from 22.9% in 2010 to reach 30.2% in 2016 (figure 3). This indicator shows us that the region is improving but still well below some emerging economies such as Brazil and India with respective ratios of 62.3% and 64.9% in 2017 (Global Financial Development, 2019). Traditionally, there is lack of confidence between depositors and banks in west Africa that explains this low rate of deposits to GDP. In addition, lack of banking infrastructure impacts the expansion of the industry adversely.

Bank Deposits to GDP (%)
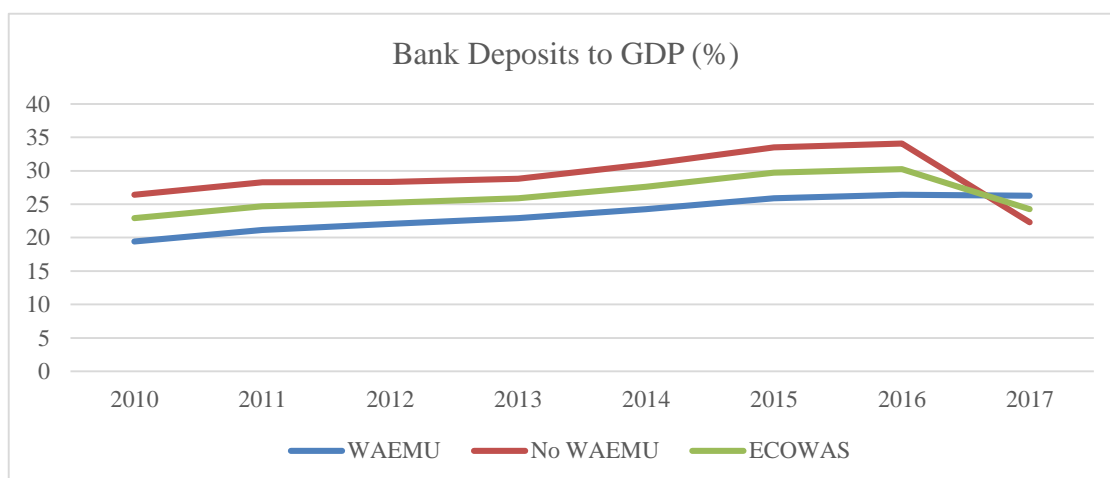
Figure 3. Deposits to GDP (Annual %)

Sources: Author's compilation using data from World Development Indicators (2020)

Broad Money to GDP Ratio

Broad money refers to the amount of money in a country or economic zone. It includes all securities which can be converted into cash, as well as the aggregate of fiduciary currency (banknotes & coins), bank deposits and negotiable debt securities, all of which can be immediately used as a means of payment. The ratio of broad money to GDP is considered as a measure of financial efficiency. It tells the relationship between the banking system and economy and gives the level of liquidity allowed by the banking industry. In addition, broad money is the main measure that central banks use to determine what interventions, if any, they could make to influence the economy. Figure 4 resumes the percentage of broad money to GDP from 2010 to 2019 in west Africa. Although the ratio is slightly growing to reach 38.5% in the ECOWAS zone, it is well below the world average of 127% in 2019. This indicator shows us that there is less money circulating in west Africa that causes difficult access to financing for businesses.
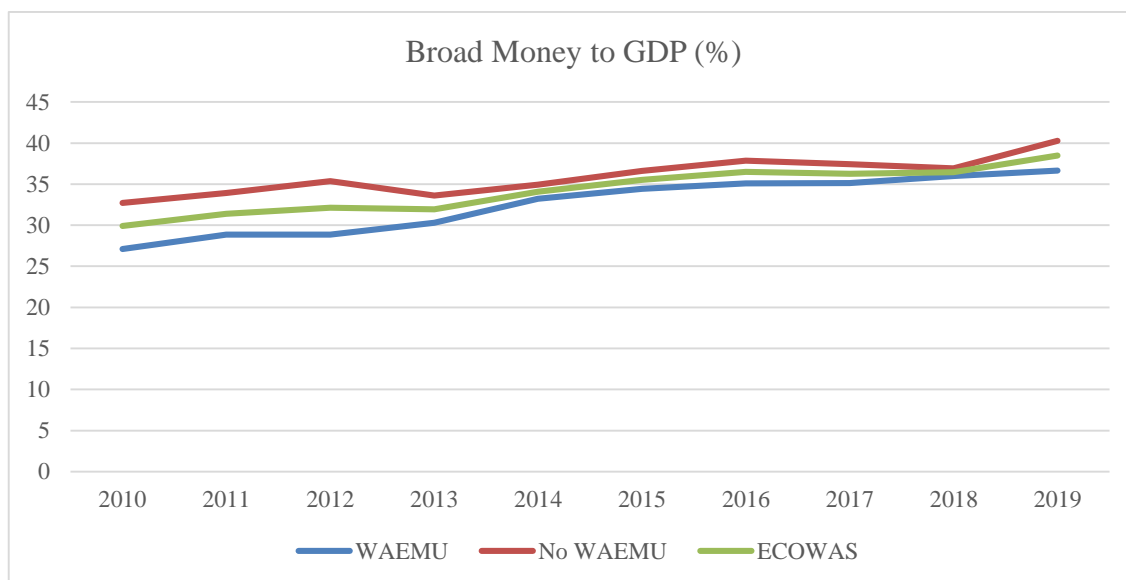
Figure 4. Broad Money to GDP (Annual %)

Sources: Author's compilation using data from World Development Indicators (2020)

Plus, if there is more money available, it tends to impact the economy positively because of the easy access to financing activities. However, based on the relationship between money supply, inflation, and interest rate, a high rate of broad money could increase prices, thus inflation. The low ratio of broad money to GDP in the ECOWAS region is one of the reasons of stable and controlled inflation.

Domestic Credit to Private Sector

Domestic credit to non-public sector indicates to the impact banking sector in allowing future financing private sector. This indicator shows financial resources allowed by banks non-public sector like loans, trade credits, non-equity securities, and other assets (WDI, 2020). Banks play the role of transferring savings into investments through the method of information analysis and therefore the identification of effective investment.
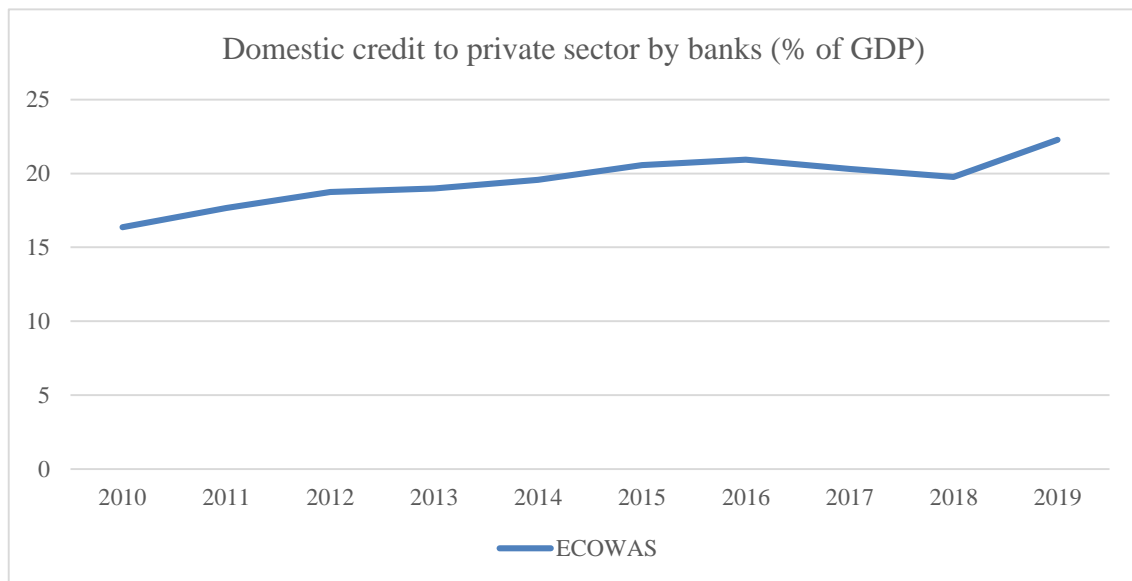
Figure 5. Credit to Private Sector

Source: Author's compilation using data from World Development Indicators (2020)

Figure 5 represents domestic credit to private sector by banks as percentage of GDP in west Africa. The level of ratio increased annually from 16.3% in 2010 and to reach number of 22.3 % in 2019. Beside the fact that the ratio in west Africa is varying positively, it is still well below the world average of 90.5% in 2019. According to Saic and Holden (2008), higher values of the ratio explains that transaction cost are low and an increased level of financial intermediation. It suggests that the transaction cost is still very high in west Africa, and that the financial intermediation needs a major improvement. Local industries and investors are both suffering from this anomaly because in one side the industries need financing for their activities and the investors need efficient information in order to invest in these companies.

4.4 Profitability and Rentability of Banking Sector

Return on Asset (ROA)

It is one of the indicators determining the performance of the banking sector. The financial indicator gives information on level of return on invested assets. This suggests that it indicates whether the financial resources of banks are getting used efficiently, to provide profitability. It is consisted of net profit that is the final earning of a

company, and turnover of assets which ratio is calculated by dividing the total turnover by the number of assets, and therefore to measure profitability of each asset. It is insensitive to the leverage effect, which makes it possible to generate a profit through debt.
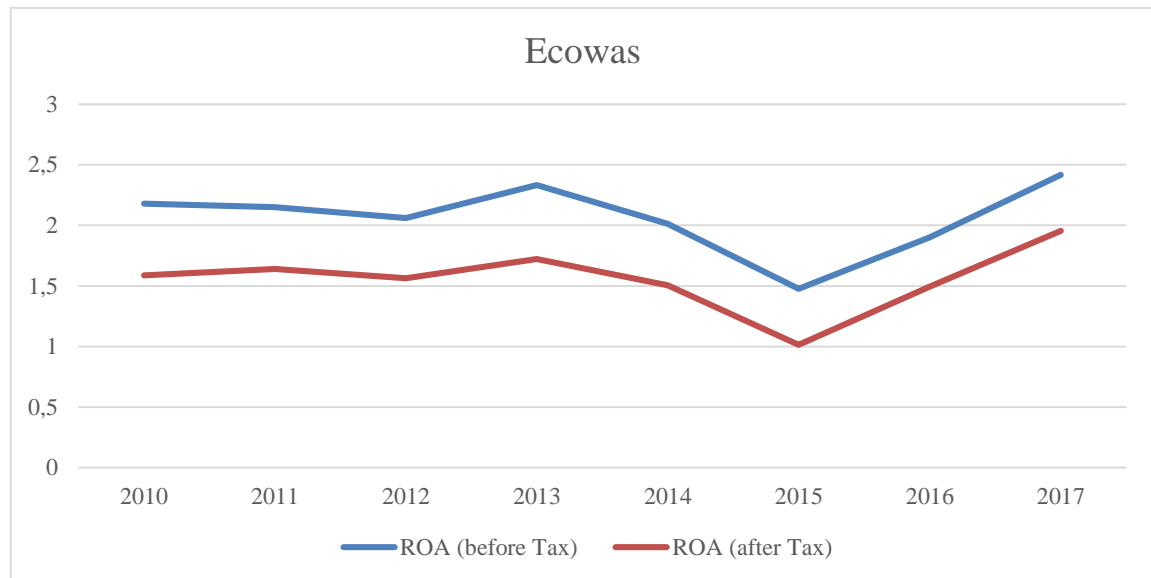
Figure 6. Return on Asset

Source: Author's compilation using data from World Development Indicators (2020)

Figure 6 reports the ROA of the banking sector in West Africa from 2010 to 2017. As we can remark from the figure, the ratio of ROA after tax vary between 1.5% and 1.9% from 2010 to 2017. According to Lukosiunas (2017), a ratio of 1% or greater has been considered as a good performance for banks. In addition, he affirms that this ratio will fluctuate with the prevailing economic times. The west African banks' average ROA was at 1.9% in 2017, compared to 1.6% for Turkey and 1.5%. In fact, the size of banks has an important impact on the return on asset because, larger banks in developed countries tend to have less ROA than smaller banks in developing countries. For instance, ROA was at 1.0 % in the United States in 2017.

Return on Equity (ROE)

Another important indicator explaining the efficiency of banking system is the Return on Equity (ROE). It is a major financial measure that is generally investigated by shareholders in order to estimate the rate of return on investment. Indeed, ROE represents the level of a company's income that's returned as shareholder equity. Most of the

companies emphasize on earning per share (EPS) while measuring the market value and growth, but banks focus on ROE. In fact, many investors argue that ROE is a better metric while evaluating the banking industry. The explanation of this assumption is that the capital base for banking sector is different than other corporations. They have more incentives to concentrate on managing capital to maximize shareholder value than growing earnings according to Maverick (2020).

Table 2. Profitability of Ratios (%) in WAEMU

Year	2013	2014	2015	2016	2017	2018
Gross margin (Return on loans - cost of capital)	7.9	6.7	6.5	6.8	5.4	5.2
Net operating ratio (General expenses + depreciation)/NBI	68.8	66.4	66.9	66.8	65.9	67.4
Net margin ratio (Net result/net banking income)	15.6	12.8	14.4	21.4	19.8	23.2
Non-performing loans ratio (Non-performing loans /total loans)	15.6	15.2	13.7	10.1	13	12.3
Non-performing loans provision ratio (Provisions/non-performing loans)	60.9	61	60.1	49.5	61.6	64.3

Source: European Investment Bank (2020)

The banking sector in West Africa is more attractive compared to other regions of the world. As we can observe from figure 7, the average ROA in the ECOWAS area increased was 15.4% in 2010 and reached 19.9% in 2017. These numbers are well above the average ROE of European banks at 6.1% in 2018 and 5.8% in 2017. WAEMU banks' profitability remains stable. The WAEMU banking sector's results reflect the region's economic resilience, with return on equity (ROE) remaining high at 13.9 percent at the end of 2018, up from 12.5 percent the previous year. The region's net banking income (NBI) was EUR 3 billion, a 6% increase annually. Against this backdrop, the overall net result increased by 24% year on year, reaching EUR 697 million at the end of 2018. This performance is due to an increase of 181.6 percent in foreign exchange-related operations.
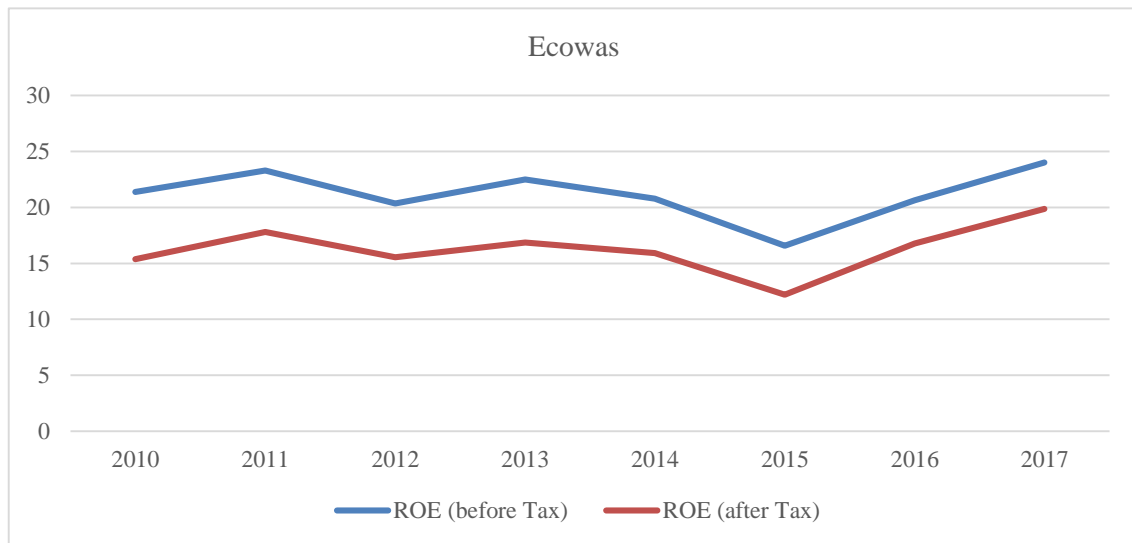
Figure 7. Return on Equity

Source: Author's compilation using data from World Development Indicators (2020)

Among the criticisms against return on equity, some analysts argue that it doesn't take into consideration the risks taken by the corporate. Indeed, the utilization of debt higher return by producing a leverage effect that increases profitability artificially. However, thanks to severe regulation of banks such as Basel III, the ROE is a relevant measure for profitability.

Net Interest Margin (NIM)

Net Interest Margin of banks is a financial indicator which represent the difference between interest generated by banks and the interest paid to their lenders, like deposits. The level of NIM is the difference between interest revenue and interest expense, with average earning assets. It is an important measure for bank efficiency. Andrew (2020) relates that the indicator shows the quantity of money that a banking institution gains in interest on loans compared to the amount it pays in interest on deposits. Several factors affect net interest margin of the institutions. For instance, the provision and demand of loans enable to line market interest rates. It has been asserted that monetary policy and banking regulations established by central banks may increase or decrease demand for deposit accounts and demand for loans (Andrew, 2020). In addition, he indicated that when the demand for savings increases compared to the demand for loans, the net interest

margin will probably decrease and in counter, if the demand for loans is higher, the net interest margin is likely to increase (Andrew, 2020). In addition, low interest rates set by central banks will push consumers to borrow money rather than save it. This will cause net interest margin to increase, thus there is a negative relationship between net interest margin and interest rate. When we look at the NIM simply, a positive value suggests that banks are profitable, while a negative value implies that there is inefficiency.

The banking sector in west Africa shows strong net interest margins since 2010 with a value of 6.7% in 2010 and 6.3% in 2017. They vary among banking sectors in the ECOWAS depending on the monetary policies of central banks and business models adopted banks. According to the Economist (2020), the difference between deposit and lending rates in Africa is higher than anywhere else in the world, based on that measure they are the most profitable. The reason explaining high values of NIM in west Africa is that banks are willing to charge high rates for lending because of their market power. Some people argue that banks are abusing their market power to swindle customers This paradox in this sector is such as banks are profitable but not efficient. Banks main borrowers in the ECOWAS area are governments that are able to pay high interest on loans. However, small businesses and companies are affected adversely by the high cost for borrowing.

For instance, an entrepreneur claimed that to purchase a new machine, he must borrow from a bank at an annual rate of 22% that is killing his business. Like him, many other businesses are not growing because of high rate for borrowing. Recently, some governments are taking measures to bring down rates.
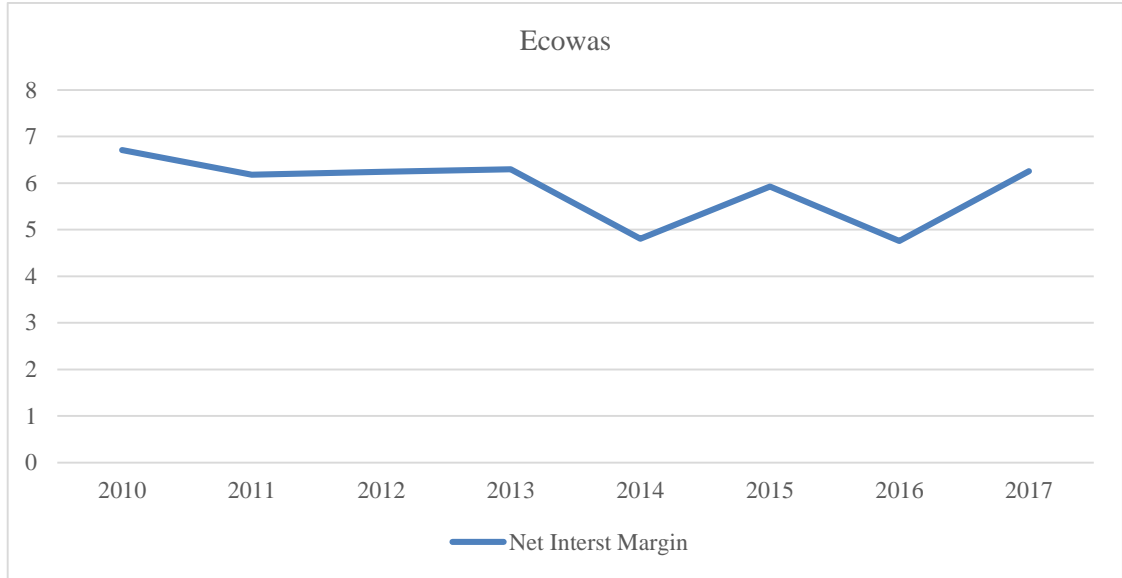
Figure 8. Net Interest Margin

Source: Author's compilation using data from World Development Indicators (2020)

4.5   Measurement of Banking Sector Stability

Z- Score Methodology of Altman

The Z-score is a measure of financial analysis that consists of coordinating a set of ratios to determine single indicator that classify healthy companies (banks) from failing companies (banks) Goyeau and Tarazi (1992). This tool, commonly used as a predictive measure of probability of bank failure, is initially proposed by Altman (1968). It uses the basis of accounting data to measure the probability that losses exceed a bank's equity. A high Z-score implies a low probability of failure and vice versa. The indicator can be presented by the following formula:

$$zcore = \frac{ROA+EQTA}{\sigma(ROA)} = \frac{R0A}{\sigma(ROA)} + \frac{EQTA}{\sigma(ROA)} \qquad\qquad Eq.1$$

Where:

ROA: is the return on asset

EQTA: is the ratio of total equity to total assets

σ(ROA): is the standard deviation of return on asset

The World Bank uses a similar formula for calculating the Z-score expressed as follows: Z-score = $(k+\mu)/\sigma$, where k is equity capital as percent of assets, μ is return as percent of assets, and σ is standard deviation of return on assets as a proxy for return volatility. This ratio can be used aggregated or as an average, at a country level, in order to assess the soundness of its banking system. The value of the Z-score and the risk of failure vary in opposite directions, a high Z-score corresponds to a low risk of failure. The z-score is considered as a major indicator for estimating the financial soundness of banking sector.

The attractiveness of this index is that of the result of its connection to the probability of insolvency of a bank, meaning the probability that the financial worth of its assets is insufficient to cover the repayment of the liabilities incurred. It is defined as a measure that explains the probability of default of a country's banking sector (GFD, 2020). The index is a measure that "compares the buffer of a country's banking system (capitalization and returns) with the volatility of those returns and it is calculated as the sum of ROA and (equity/assets)) divided by the standard deviation of ROA where ROA, equity, and assets are country-level aggregate figures" (Global Financial Development, 2020)

The z-score remains an approximation to the indicator reflecting the distance to default (DD) of a bank (Central Bank of Luxembourg, 2020). The "distance to default provides a measure of the distance in asset value standard deviations of the current market value of assets in a bank or company from a specified default point" (ECB, 2005). Plus, the European Central Bank affirms that "it is derived using information on the market value of assets, a pre-specified default point and the uncertainty of the market value of assets, and represents a yardstick of business risk" (2005).

The fundamental difference between z-score and DD is statistical. It is observed in the nature of data used to assess the financial soundness of banks. In this context, the z-score is a conservative measure that relies exclusively on historical balance sheet information, while DD requires a combination of market and balance sheet data from banks. The z-score is defined as the measure in number of standard deviations, of the decline in the bank rate of return leading to a complete absorption of capital. Thus, if the value of the z-score is high, the risk of default should be low.

The Banking Sector Stability
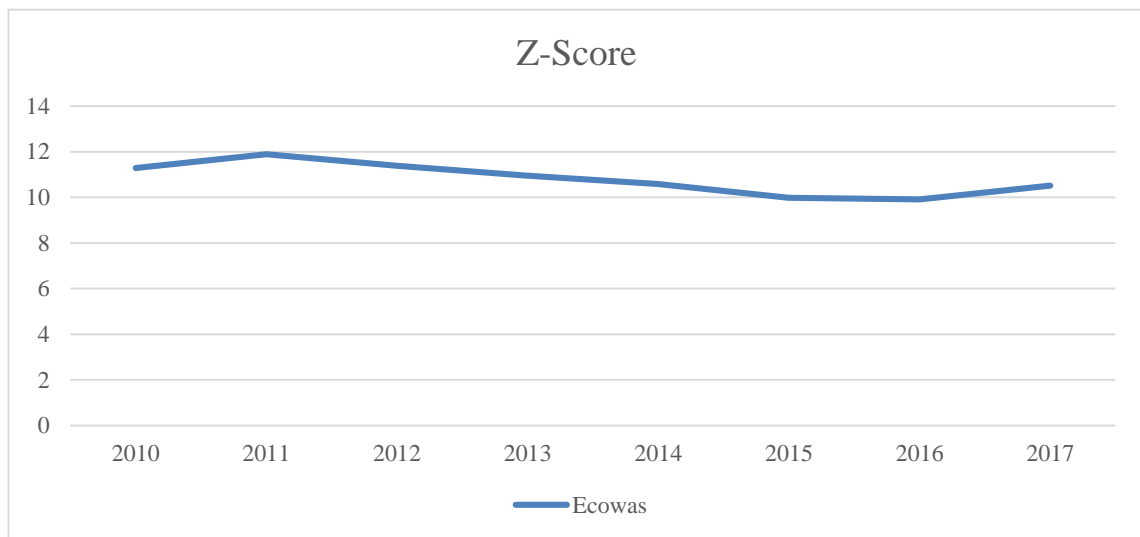
Figure 9. Z-Score of Banks

Source: Author's compilation using data from World Development Indicators (2020)

Figure 9 resumes the Z-Score level of ECOWAS country members from 2010 to 2017 with an annual measure. As we can observe from the figure, the measure of Z-score in West Africa is about 10.5 in 2017 compared 15.2 in brazil, 22.9 in China, and 29.8 in the United States for the same period. These measures tell us that the stability in the West African banking system is not as strong as in emerging and developing countries. Even though banking failure is not very common in the region, different actors should contribute to an efficient and more stable system in order to protect the banking sector in particular and the economy in general.

5   DETERMINANTS OF THE PROFITABILITY OF BANKS

The profitability of banking sector has been subject to several studies due to its capital importance on the financial system. In this section, we will analyze the determinants of banking sector rentability by investigating risk management tools and the effect of regulation.

5.1   Risk Management

In general, three main risks are faced by the bank during the conduction of its activity: counterparty risk, liquidity risk and market risk. In addition, two other types of risk that are also important and have major impacts on the banking sector are: operational risk, which has become crucial thanks to the Basel II reform and solvency risk.

The credit risk is very important to banking institutions because it is sufficient for a small number of customers to have difficulties in repaying, to put the bank in serious financial difficulties. Indeed, when the credit or counterparty risk materializes, the bank amortizes it by constituting provisions. Otherwise, it can cover losses by drawing on its own funds, reserves see the capital. Once the bank starts to draw on its equity in a significant way in order to cover its losses, it would become insolvent itself and even disappear (bankruptcy). Credit risk is a very difficult risk to assess and measure and then to manage, it is the subject of a very special attention of bankers, but also of international bodies, namely the Basel Committee.

Liquidity risk is also an important risk because it is connected to the traditional intermediation of banking sector. In fact, the risk of illiquidity is the risk, for a bank, of being unable to repay its short-term debts, particularly its current debts (demand deposits and overnight interbank loans), because the assets held by that institution would be not likely to be sold on a liquid market.

The market risk is the cause of negative deviations from the market value of the financial products during the minimum period required to liquidate those products. In general, this risk is manifested by an unfavorable change in the price of an asset, or by the realization of capital losses or losses on the resale of securities held on the market.

5.1.1 Credit or Counterparty Risk

The bank needs to know the nature of the risk it faces. The identification step is to define the counterparty risk, to present its forms and to identify the various factors that are behind it. This is to be able to evaluate it in the most relevant way to ensure its optimal management.

To analyze the credit risk of an economic agent is to seek to define the probability of loss on a claim of that agent or of overall default of that agent as a debt issuer. For banking institutions that core business is lending to a multitude of clients, it is assessing the overall risk of its credit portfolio. In other words, it is an assessment of the extent to which a borrower (or debtor) may no longer be able to meet its obligations to a lender (or creditor) on a temporary or final basis.

Bank credit is a form of loan made to a household or business by a bank. Credit risk is the likelihood that the borrower will no longer be able to meet its maturities. When a borrower is in default, it impacts its creditor (the bank) in several ways: reduction of its margin and profitability, weakening of the overall soundness of the institution (difficulties in granting new loans), possible liquidity crisis with "contamination" of other agents. When banks evaluate the credit risk of a company or household, they will be interested in:

- Nature (bond or traditional credit),
- Maturity (long-term or short-term financial debts),
- Method of payment (in fine, constant depreciation, constant annuity),
- Method of implementation (traditional financing with guarantees, specialized financing with asset guarantee, structured financing type infrastructure project financing).

Factors related to counterparty risk which variations could influence the value of the portfolio of the bank's receivable liabilities may be interest rate, exchange rate (for international transactions), the price of an asset, and the volatility of the underlying assets (concerning counterparty risk on derivative instruments) according to the Bank for International Settlements (2020).

5.1.2   Natures of Credit Risk for Banks

The credit risk taken by banks when granting credit to a borrower is at three levels, depending on the external aspect of the credit risk that are individual risk, the general risk, and the sector risk (BIS, 2020). The individual risk is directly related to the activity of the client borrower itself. It depends on its commercial or industrial situation, and the nature of the operation to be financed. Even if a company is well structured organizationally, this does not prevent it one day from being confronted with difficulties that may be transient or chronic. The effective management of those difficulties is very important to its main creditor that is the banking institution. This type of risk can be measured by the technical competence and morality of the managers. The capacity and credibility of the management are imperative conditions for the granting of a credit in banking.

The sectoral risk is particularly sensitive to the economic conditions of a given sector. Primarily, this risk is manifested in changes and developments that have constraints and consequences on the commercial or/and industrial operating conditions of an economic activity. These constraints are numerous, namely: shortage of raw materials, collapse of prices, collapse of demand, threat of substitute products, profound changes in production processes, technological innovation of products, etc. This risk is difficult to assess by the bank because it does not have enough expertise in areas of strong competitive dynamics. Therefore, the bank has a tendency to refuse credit applications for companies operating in troubled sectors.

The global or general risk affects an entire economy. This type of risk usually leads to the insolvency of the borrower. This insolvency situation is due to external factors, such as: political and economic crises or natural disasters. These factors are likely to cause significant adverse effects to businesses. In fact, political crises very common in Africa, and especially economic crises, increase credit risk. Economic crises are a frequent source of debtor insolvency, which does not leave banking institutions indifferent in the region. Faced with this situation, banks tend to ration their credits.

Credit risk causes the banking system radical changes and restructurings. Two essential elements are to be considered: the credit policy of the institution and the procedures for

processing credit files. In general, the bank's top management in collaboration with the commitments commitment decide on the credit policy. They fix mainly:

* The objectives to be pursued, which, in line with the strategic plan, are formulated in terms of target clienteles, types of credit, sectors to be financed, geographical areas, etc.
* The interest rates to be charged for each type of credit so that the margins are sufficient to cover the costs generated by the credits (resources, management, risk and type of credit) as well as the guarantees that must be taken.
* The delegations of authority to be granted for each hierarchical level according to the risk and type of credit.

The bank sets up formalized procedures for the study of the credit application, the monitoring of the credit file and the internal control of the credit function. Internal control also checks that the banking regulations relating to credit risk are respected: risk division, adequate pricing, provisioning rates for non-performing loans. The purpose of this role is to avoid distortions with supervisory authorities.

5.1.3   Assessment of Credit Risk

Financial institutions have adapted to rapidly changing environments. The introduction of financial techniques facilitates the identification of potential risk on each portfolio. The primary step for banks in credit risk management is the identification and measurement of the risks before it can process them. The premise of credit risk management is the identification of risk factors related to credit. This analysis allows the examination of achievement, and to design risk mitigation instruments. In the process, the bank will be interested on all data relating to the customer as well as the credit requested.

The bank for international settlement acknowledges that board of directors and the general management of each bank shall be responsible for ensuring that it applies appropriate credit risk practices, including an effective system of internal control, in order to systematically build up adequate provisions in accordance with the bank's policies and procedures, the applicable accounting framework and the prudential recommendations in force (BIS, 2015). In addition, the committee suggest that the aggregate amount of a

bank's provisions, whether determined collectively or individually, must be sufficient and meet the objectives of the applicable accounting framework.

Furthermore, it recommended that bank must apply policies and procedures to appropriately validate the models it uses to assess and calculate expected loan losses (BIS, 2015). In order to assess and calculate its expected credit losses, it is important that each bank exercises an informed credit judgment, taking into account in particular forward-looking, reasonable and justifiable information, including macroeconomic factors.

Credit risk management has three main objectives for banking institutions. It must allow the banks to anticipate the average losses to come and therefore the level of margin to ask the borrowers to cover these losses. it must also provide the banking institution with an estimation of the maximum possible losses, therefore the statistical ceiling of losses that the bank may potentially have to bear. These maximum losses, which are likely to be achievable, are then used to determine the amount of own funds the bank must have to insure the total risk on its outstanding loans. Finally, a risk measure should allow a bank to communicate with shareholders, depositors and other banks on the one hand and supervisory authorities on the other hand. The latter impose on banks strict rules on the level of risk to be taken.

To achieve these objectives, West African banks use traditional tools such as prudential rules and new tools such as securitization to better manage credit risk or counterparty risk. In this part, the tools enabling both individual counterparty risk management and global credit risk management tools are presented. In the case of individual counterparty risk management, it is a question of making acceptable the risk presented by a given counterparty (household or business) through certain measures adopted either during the implementation of the credit or subsequently and is not exclusive of each other. They should not be confused with the provisioning that occurs when the risk has materialized. These include taking guarantees (real or personal), risk sharing, contractual clauses, credit derivatives.

Credit risk management is at the main challenges of the banking institutions. In fact, it allows them to have a better knowledge of their customers and to optimize: the return/risk ratio of the loans granted. Therefore, the stages of bank risk management do not stop only at the identification and measurement of the risk. The management phase is also

important. It is a set of actions designed to reduce risks within the established limits. The main traditional tools of managing counterparty risk for banks are the prudential rules, risk diversification, insurance company guarantees, and provisioning.

The banking institution must put in place a risk management system to ensure its credit risk exposures, based on prudent criteria for granting, evaluating, administering and monitoring appropriations. The institution shall have appropriate credit risk management practices incorporating rigorous internal controls, adapted to the scale, nature and complexity of its exposures. It must also have a reliable system for classifying and accounting for such exposures.

The institution must carry out prior checks to fully understand the risk profile and the characteristics of each counterparty as soon as a credit operation is set up. The assessment of credit risk must be based on a deep analysis of the financial situation of the beneficiary, in particular its ability to repayment and, on guarantees received. The cases relating to outstanding debts must be updated and reviewed, at least quarterly, to assess the ability of customers to repay. Credit policies and procedures in West Africa must include:

- Arrangements for monitoring the documentation, amendments, contractual obligations, collateral and other risk mitigation measures and an appropriate credit rating or classification system
- appropriate mechanisms for at least an annual assessment of the value of the collateral and personal security received by the institution. The valuation of collateral should reflect net realizable value, taking into account prevailing market conditions
- Clear and rigorous tools to ensure that all legal requirements for the performance of a guarantee are complied with and duly documented.
- The institution must have evaluation and measurement processes to ensure reliable estimation and timely consideration of the provisions to be established, in accordance with the applicable accounting framework, its policies and procedures and the required prudential rules.

Rating and Scoring

The rating is of American origin which means «evaluation», it is a risk assessment process for a debt instrument, summarized in a note, allowing classification. It is determined by

financial analysis. Furthermore, rating is employed for large corporations that are listed on the stock market. The main purpose is to avoid the risk of insolvency. It is therefore a financial tool of informing the risk level of a borrower or issuer. It measures the latter's ability to repay all amounts due in the short or long term. It is a decision-making tool, since it summarizes the strength and solvency of the counterparty in a single note. The rating is assigned either by specialized rating companies, we are then talking about external rating, or established by the banks themselves and the rating is then called internal. Indeed, the use of rating as credit risk management is not common in West Africa as stock markets are not developed. In fact, only few African companies are listed on the regional stock exchange called "BRVM".

Recently, banks have popularized the use of scoring. This technique measures the probability of default on the credit offered to individuals and companies. Credit scoring can be based on either historical data or statistical variables. The borrower's information constitutes a basis for knowing its characteristics and predicting whether it will have a solvency. This model of evaluation has time advantages. The scoring methodology is very common in developing countries due to asymmetric information. Moreover, this technique significantly reduces the processing time for basic credits.

Risk Adjusted Return on Capital (RAROC)

Banks use certain indicators to assess the profitability of their operations. It is for this reason that new methodologies have been developed, such as the RAPM (Risk Adjusted Performance Measurement) method, whose principle is to relate the return of an asset to its consumption in economic capital, and possibly compare this performance to the cost of capital of the bank. Among the RAPM methods, we can identify the RAROC. It measures the adjusted return on risk in relation to economic capital. It is calculated as follows:

RAROC = Revenue – Expenses – Expected loss + Income from capital/ Capital   *Eq.2*

Where:

Income from capital = (capital charges) x (risk free rate);

and Expected loss = average loss expected over a specified period of time (James, 2020).

To be acceptable, any new credit transaction would have to generate a RAROC of at least 25%. In fact, this method is both a tool for comparing and selecting counterparties and a means of dynamic risk management, including credit risk, since its objective is the optimal allocation of economic capital between all the credit lines of the financial institution, in particular the bank. It should be noted that this method is used by banks in developed countries to assess the counterparty risk of companies. The banking institution in west Africa is still behind on adopting this method of risk management.

5.1.4 Market Risk

Market risks recover for a bank any losses they may incur on the bond, equity, foreign exchange, commodity, or derivative markets. There are two dimensions to risk: a quantitative dimension (the potential loss) and a probabilistic dimension (the probability of an adverse event). There are risk indicators to give a measure of either dimension according to Holton (2004). One of the financial instruments to assess market risk it the Value at Risk (VAR).

Holton (2004) defines the Value at Risk as a financial indicator of maximum potential loss a portfolio may incur over a given time horizon, with a given probability. It is a financial instrument that allows the interpretation of risk level. For instance, if the 10-day VAR at the 99% confidence level is 10 million USD, this means that there are 99 out of 100 chances of not losing more than 10 million USD over 10 consecutive days. The model is used to measure market risk and was mainly developed by the American bank JP Morgan. According to Holton (2004), three main techniques are used to estimate the Value at Risk.

The historical estimation: this technique retrieves price histories of the assets that form the portfolio, and to apply them to the current positions to reconstruct a distribution of the possible results of the portfolio. For the result to be reliable, the sampling period must be long enough (to have a significant number of possible values), but not too long for the probability distribution law to have not changed significantly over the period in convenience with Holton (2004). A limit in this method is that it is based on the assumption that the past is a means of predicting the future, which is not necessarily the case.

$$VAR = V_n \frac{V_i}{V_{i-1}} \,, \qquad Eq.3$$

where:

- V_i is level of variables on day i

- **n** is the number of days from which historical data is counted

Source: Corporate Finance Institute (2021)

The parametric estimation: this method consists of calculating the portfolio results distribution curve using a formula describing this curve according to Holton (2004) For this technique, the financial analyst must firstly identify the risk factors that influence the value of the portfolio: prices, prices, rates, etc. The distribution function of each of these risk factors is expressed by its variance, which is an indicator of the volatility of the relevant market parameter (for example, the price of a share). Variance is a statistical indicator that gives a measure of the dispersion of a variable. this is the hypothesis that risk factors can approach a theoretical law that estimates the Var of a portfolio.

$$Var_{A+B} = \sqrt{Var_A{}^2 + Var_B{}^2 + 2 * \rho * Var_A * Var_B} \qquad Eq.4$$

The Monte-Carlo estimation: is the most sophisticated technique for the VAR estimation. It consists of running several simulations using different assumptions for each of the market variables having an impact on the valuation of the portfolio according to Holton (2004). The reliability of the result will depend greatly on the reliability of the statistical distribution laws used. In the process, the analyst not only uses historical data but also employs a dose of prospective in the scenarios, especially with regard to extreme values.

We have just seen that Value at Risk could be considered the maximum potential loss. However, its evaluation is based on inaccuracies sometimes more or less important that can influence the final result. The first limitation is the assumption of normality of price changes of the different assets. Indeed, normal law often underestimates large market variations.

The second limitation concerns the reliability of the result obtained when, in order to anticipate the evolution of an asset in a more or less near future, its past evolution is used.

Finally, the last limit of the VAR comes from the fact that we use a lot of approximations and simulations. And despite the increasing power of the machines, the desire to implement quickly requires the use of approximations.

Internal Credit Risk Assessment

An internal credit risk model is a model whose objective is to assess the probability of losses generated by the holding of outstanding credit (DE COUSSERGUES, 2002). The first models built by the banks were used to assess market risks. From 1995 onwards, these models were transposed to counterparty risk according to the new solvency ratio to determine the level of own funds covering this risk, but also to allocate own funds to the different risks.

These models are based on credit portfolio and are not interested in individual counterparties. Some of them are used to assess the different values of a loan portfolio over a given time horizon, taking into account the probability of loss on that portfolio when the borrowers' risk class changes. These models include the "Credit metrics" model proposed in 1997 by the American bank J. P. Morgan. Moreover, according to the basic method of internal ratings, the decomposition of counterparty risk is the result of the following parameters:

- The probability of default (PD), which is the probability that a counterparty will default within a given time horizon, generally one year.
- Exposure at Default EAD, maximum loss in case of default, represents the number of risks on a counterparty at the time of the default.
- Loss Given Default LGD equals 1 minus the recovery rate 1-R, considers the recovery rate of the receivable and the guarantees attached to it, (Arnaud, 2003).

Hence an expected loss calculated as follows: **EL = PD x EAD x LGD.** *Eq. 5*

In the basic method, the bank assesses only the probability of default through its internal ratings, the others as well as the maturities and diversification effects being set by the supervisor. Overall, what can be retained from these new methods of counterparty risk assessment is that banks are strongly encouraged to develop core or advanced method-type internal ratings when they have a lower-rated clientele. As for the construction of an

internal credit assessment model, it has the advantage of an identical approach to allocate own funds to the various risks.

5.1.5 Limit of Financial Analysis in African banking System

In practice, the bank cannot have perfect information about the causes leading to the failure and their perceptions through indicators provided by the company. The analysis will focus on the opportunistic and unexpected behaviors of the debtor, which finds its justification in the incomplete and biased nature of the accounting information held by its creditor.

Insufficient and manipulated accounting information: these practices are very common in banking in west Africa, they aim to improve the image given by the various financial statements of the company. Among these practices we have the hard play the situation of the stocks, sharing of income and expenses in operations or exceptional operations, the operations of disposals of assets to inflate the results in case of gains.

Another problematic linked to financial analysis approach on assessing credit risk in Africa is linked to the opportunism of the debtor. That is the increase of the risk of enterprises by managers and shareholders without the creditor (bank). The result is a decrease in the value of the company's debt and an increase in its equity obviously helps the situation of the shareholders. Under-investment or sub-optimal investment is an additional limit to the financial analysis approach.

In addition to financial analysis, other methods have been developed to measure credit risk. They allow the bank to predict the default of the borrower in the future. These methods are rating, RAROC, VAR and internal credit risk assessment models.

5.2 Regulation

The African banking environment and particularly francophone Africa is marked by a strong growth in its activity over the last decade. At the end of 2013, Net banking income of the 127 banks of the WAEMU zone amounted 1,197 billion FCFA compared to 973 billion FCFA in 2011, an increase of 23% (Finafrique, 2015). In addition, the value of Net banking income reached 2,057 billion FCFA in 2019. Profits amounted 542.2 billion,

this is an increase of 42.9% compared to 2018. The net cost/income ratio was 65.3% compared to 68.0% in 2018.

The current regulation of the banks of the west African economic and monetary union (WAEMU) is based on a certain number of devices that tend to strengthen since the financial crisis of 2008. Its main objectives must be to encourage banks to return to their fundamentals, to restore the disciplining effect of governance and to limit systemic risk Lobez (2010). In fact, banks produce public services that need to be regulated, including supranational regulation. They manage currency, relay monetary policies and contribute to the production of global financial stability if they are efficient.

In the WAEMU area where the banking sector is highly oligopolistic, the preservation of financial stability has traditionally been achieved through the application of supervision of banks individually, through a micro-prudential approach to risk assessment and its evolution. Historically, the banking sector in the area was not affected that much by the global financial crisis of 2008. However, the sector faced a major crisis in the 1980s mainly caused by the poor management of credit institutions and the deterioration of the economic environment.

Among the WAEMU country members, six were mainly affected. In Benin, the only three existing banks, all publics, were liquidated. In Senegal, seven out of twelve banks stopped their activities. In Côte d'Ivoire, the five development banks were liquidated. In Togo, the restructuring of the banking system has involved both private and public banks. This crisis of the 1980s finally required several reforms conducting liberalization and restructuring of the banking sector. The prudential rules, adopted by the WAEMU Council of Finance Ministers in June 1999 and came into force on 1 January 2000, are mainly aimed at strengthening the solvency and stability of the banking system, in order to ensure greater protection of depositors (Central Bank of West African States, 2011).

The need for banks to adopt good governance standards because of their specificities led the banking commission of West Africa to adopt a number of provisions. One of the first conditions for the exercise of the banking profession in the WAEMU refers to minimum share capital. Adoption a minimum capitalization level common to all the countries of the area is based on a piece of legislation that the regulatory authorities must enforce. The ability of regulatory bodies to meet this requirement is dependent on their ability to assess

the degree exposure of banks to credit, liquidity, and systemic risks. Three main standards are used to assess the solvency of WAEMU banks: representation of the minimum capital, rules for hedging risks and those relating to the limitation of fixed assets and shareholdings, in conjunction with the level of each bank's regulatory capital. Within the WAEMU area supervisory authority (Banking Commission of West Africa have defined a supervisory system based on supervision.

The representation of the minimum capital requires WAEMU banking institutions to hold minimum capital of 5 billion FCFA for Banks with a projected capital increase to FCFA 10 billion. As of December 31, 2010, 76% of banks meet this requirement (Banking Commission of West Africa, 2012). This instruction is strongly inspired by the Basel agreements with a capital ratio of 8%. Since June 2014, banks operating in Nigeria are subjected to the Basel 2 agreements transposed to the rules set by the Central Bank of Nigeria in December 2013. A minimum capital ratio of 10% for local banks and 15% for foreign banks. An assessment of credit and market risks by the standard approach and operational risks by the basic approach.

 The Central Bank of Ghana had envisaged the adoption of Basel 2 by June 2012, but until now the text regulating the banking system (Banking Act, 2004) is aligned with the Basel 1 standards amended by the following improvements: the capital ratio is set at 10% and the required minimum capital is about 20 billion FCFA (Central Bank of Ghana, 2015).

Prudential rules include all legal and ethical measures to protect savers against excessive risks when they deposit in financial institutions like banks. In fact, the underdevelopment of the financial market of the region and its lack of liquidity are the result of a deep opacity. The lack of transparency is due to the lack of rating agency. This weak transparency in information causes doubts about the solvency and soundness of banks. One of the prudential ratios that is more specifically linked to good governance is that of the indebtedness of staff and officers (agents and directors) on own funds that must not exceed 20% (it is specific to Central and West Africa). The granting of internal loans must comply with the principles ensuring the security and soundness of the bank. Thus, internal loans may be granted only on market terms or on the same terms for all employees, in the normal framework of remuneration benefits, and may be restricted to

certain types of credits (Nouy, 2006). On average, over the last decade, about 73% of WAEMU banks comply with the standard that limits the accumulation of loans to major shareholders, managers and staff to 20% of their capital. In order to prevent the short-term risk of illiquidity in the banking system in West Africa, the liquidity coefficient requires banks to have sufficient funds available or to use up to a residual period of not more than three months to cover, up to at least 75 %, their due dates of the same maturity. On average, 63% of banks meet this standard in the WAEMU over the from 2010 to 2010 (Lobez, 2012).

The region regulators are mostly in favor of strengthening their existing system by gradually migrating to the international standards Basel 2 and Basel 3. In the WAEMU area and Ghana, the pace of transition to these reforms is much slower than in Nigeria. This slowness can be explained by several reasons. Firstly, the implementation of these reforms raises many constraints of budgets, time and resources that require banks and regulators of large investment. For instance, the cost of setting up Basel 3 (cost of transformation and compliance across the French sector) was estimated by a European firm to be 960 million euros, including 540 Million Euros for the eight largest banking players on the French market (BNP Paribas, Crédit Agricole, BPCE, Société Générale, Crédit Mutuel-CIC, Dexia, La Banque Postale, HSBC France). The second reason is the lack of expertise adapted to the African market, also the implementation of these regulations also requires qualified human resources. In fact some measures are necessary for the improvement of the system as follow:

- Statistical engineers with a good knowledge of local regulations and Basel 2 standards for the implementation of internal rating models.
- Computer engineers with a good knowledge of the Bank's databases and business lines for the design of information systems and the collection of internal data.
- Auditors with quantitative, IT and banking expertise for the validation and supervision of internal rating models, information system or procedures.
- Lawyers with a good knowledge of banking and financial markets for facilitating the understanding and interpretation of standards.

The third problematic is the low presence of structures such as rating agencies at the regional level for the rating (adapted to the local environment) of banks and sovereign

states. Until 2006, no regional rating agencies existed in the WAEMU area. The arrival of rating agencies Bloomfield Investment Corporation and West Africa Rating Agency (WARA) in these two areas will significantly improve the system for assessing interbank and sovereign counterparties for banks wishing to use the Basel 2 standard method.

Although West African banks are making overall efforts, compliance with prudential rules is still deficient and some standards do not comply with international provisions, including on risk concentration (IMF, 2012). Banks that have a higher capital ratio, that focus on loans, that devote a relatively higher share of the value of their assets to personnel costs, and large banks have a lower probability of default in West Africa. However, banks with subordinated debt and hybrid capital have a higher risk of failure. while GDP growth helps to reduce the risk of bank failure, a high relative weight of the financial sector in the GDP is a source of increased default risk (Lobez, 2012). Measures to reinforce the application of the international capital standard should be encouraged to avoid the replication of a major banking risk in ECOWAS countries. In addition, banks can exploit economies of scale by increasing their size through increased risk diversification without correspondingly increasing the risk of insolvency. The switch to Basel II and Basel III wished by regulators in West Africa is done gradually but at a much slower pace than that European banks.

5.2.1   Basel Directives

One of the main activities of banks is to grant credit and thus contribute to the financing of the economy. However, these activities generate various risks which are particularly acute in view of the changes affecting the financial economy. In order to identify, measure and control its various risks and to protect the stability of the banking system, the Basel Committee has gradually set up a system for controlling and supervising the risks of banking institutions, commonly referred to as Basel I, Basel II and Basel III.

Origin

The Basel Committee was born in 1974 under the leads of the G10 countries aiming for Central Banks of the Member States to improve the stability of the international banking system. The dissemination and promotion of best banking and supervisory practices and the promotion international cooperation in the field of prudential supervision. As such, it makes recommendations based on banking reference practices and offers minimum

standards. These recommendations are incorporated into EU regulations in the form of directives and transposed into the local regulations of each country.

Basel I and the Cook Ratio

In 1988, the Basel Committee introduced the Cook ratio through the Capital Directive by requiring credit risk to be hedged by own funds at a minimum of 8%. This translates into the fact that when a bank lends €100 to a client, it must have at least €8 of equity and use up to €92 of its other sources of financing such as deposits, loans, interbank financing, etc.

The numerator of the ratio consists of regulatory capital. In addition to capital and reserves (basic own funds), may be included in regulatory own funds additional own assets considered as "quasi-capital", subordinated debts, (debts whose repayment takes place only after that of all other debts). The denominator contains the Bank's credit commitments to which some of the weightings set between 0% and 100% are applied depending on the nature and type of credit or counterparty. Thus, some loans are weighted at 50% (loans guaranteed by a mortgage), or 20% (bank counterparty, international organization or non-OECD state) or even 0% (OECD government counterparty). Unfortunately, the weighting system quickly showed its limits because the weighting of commitments was insufficiently differentiated to take into account the different effective levels of the customer's credit risk. Moreover, the emergence of the derivatives market in the 1990s with the emergence of off-balance sheet risks led the Committee to a revision of the 1988 Directives. Thus, the 1996 Directives introduce market risk into the Cook ratio with the possibility for some banks to use internal rating systems to better assess the customer's credit risk.

Basel II

The second Basel Agreement is a prudential system designed to better understand banking risks and mainly credit or counterparty risk and requirements, in order to guarantee a minimum level of equity, to ensure financial stability. New capital directives called Capital Requirement Directives (CRD) were introduced by the Basel Committee in 2004 for a better risk assessment through the establishment of a supervisory and transparent system. Faced with the reforms of Basel II, Africa plays the card of specificity. Here is a

focus according to a report by the Finafrique agency conducted under the leadership of Mr. Idrissa Coulibaly, Director for West Africa.

With 1,280 billion dollars in banking assets and an average return on equity of more than 12%, sub-Saharan Africa is still migrating to Basel II in the WAEMU and CEMAC areas. The Central Bank of Ghana, which planned to migrate to Basel II in June 2012, is still in a sort of Basel I amended by a regulatory capital ratio of 10%. Unlike the WAEMU area, where the regulatory minimum capital is FCFA 5 billion, Ghana has adopted a minimum capital of FCFA 20 billion since 2013. As for the Nigerian giant, it has met Basel II standards since June 2014 with a minimum capital ratio of 10% for local banks and 15% for foreign banks.

The Basel II agreements were based on three main pillars. The first was to define minimum capital requirements for banks. The second introduced the principle of individualized prudential supervision. Finally, the third focused on the concepts of transparency and market discipline.

The first pillar of Basel II consists of minimum capital requirements. Minimum capital requirements of 8% defined by the Mc Donough ratio, which takes into account a new type of risk, operational risk in addition to credit and market risk, and imposes a risk management system using different assessment methods. The McDonough ratio is a bank solvency ratio. It sets a weighted exposure limit for loans granted by a financial institution based on the level of its equity and the risk of loans.

The 8% ratio is broken down into two parts: a so-called "Tier 1" ratio representing 4% of the capital where the capital is supposed to be "true" capital (i.e. risk-free) and another "Tier 2" ratio for which the constraints are less strong with a level of 4%. Tier 1 is also divided into two: the core Tier 1 of a level of 2% includes only shares and reinvested profits of the bank, and the other part of Tier 1 (2 %) including hybrid securities (such as convertible bonds).

The objective of the second pillar of Basel II is to ensure that banks apply sound internal procedures to determine the adequacy of their own funds to their risk profile based on an assessment risks. This includes considering certain risks not covered in Pillar 1 (concentration risk), and the integration of factors external to the bank in risk management

(stress scenario, macroeconomic environment). This pillar also formalizes the establishment of a true risk management requiring a strong involvement of the General Management.

The third pillar of Basel II is about market discipline in terms of transparency and communication of information between the various banking institutions and with the regulator. The qualitative and quantitative information provided must make it possible to establish the risk profile of the institution. Pillar 3 aims to establish financial transparency rules by improving the communication of information to the general public on assets, risks and their management. The underlying objective is to standardize banking practices in financial communication and thus facilitate the reading of bank accounting and financial information from one country to another.

Basel III

The financial crisis of 2008 revealed some weaknesses of the Basel II system mainly related to the Mc Donough ratio, to exclusion of liquidity risk in the assessment of own funds, the roles of rating agencies in risk assessment and a delay in new banking practices. Therefore, the Basel III agreements introduce several measures to thoroughly reform the international prudential system. They draw the consequences of the shortcomings of the Basel II regulation and impose a strengthening of the standards in terms of solvency and bank liquidity. The committee agrees on the implementation of series of reforms whose main points are the reinforcement of the measure of market risk and the introduction of a new ratio to limit bank leverage.

Enhanced solvency ratio: Core tier 1 ratio increases from 2% (Basel 2) to 4.5% (Basel 3) from 2015 to reach a level of 7% by 2019 (BIS, 2020). The introduction of a new ratio to limit the leverage effect of banks on loans granted to clients relative to the level of equity. It is composed of the numerator of Tier 1 capital and the denominator of the adjusted balance sheet total (including off-balance sheet, derivatives, goodwill, etc.).

In line with the Bank for International Settlements, two liquidity ratios are introduced in response to liquidity difficulties encountered by several banks during the 2008 financial crisis: a short-term (1-month) liquidity ratio (Liquidity Coverage Ratio (LCR)), and a long-term (1-year) liquidity ratio (Net Stable Funding Ratio (NSFR)). The Basel

Committee on Bank Supervision explains that Liquidity Coverage Ratio (LCR) requires banks to hold a stock of risk-free, easily marketable assets in relation to the net flows disbursed over one month, and Net Stable Funding Ratio (NSFR) requires banks to finance a share with stable resources significant assets in the context of a 1-year crisis according to BIS (2020). These two ratios are defined as follows: Stable funding available/stable funding required > 100% (BIS, 2020).

5.2.2 Basel Implementation in Africa

When Basel II was set up in Europe in 2004, the Bank for International Settlements (BIS) administered a questionnaire to 25 local African regulators to survey their interests on the implementation of the system within their respective banking environments (Finafrique, 2015). These regulators include the Banking Commissions of West Africa and the CEMAC zone, the Central Bank of Nigeria, and the Central Bank of Ghana. In addition, the European Investment Bank surveyed West African banking groups to measure the compliance with Basel standards in 2019 (figure 10).

As shown in figure 10, most African banks assume being in compliance with Basel I and II and most of them report being in compliance with Basel III. The survey's result shows that 85 percent are following Basel I and 79% in compliance with Basel II. With respect to Basel III standards, less than one in three banking groups (29%) reported complying, while the majority reported working towards compliance and less than one in six (15%) did not consider Basel III as a priority.
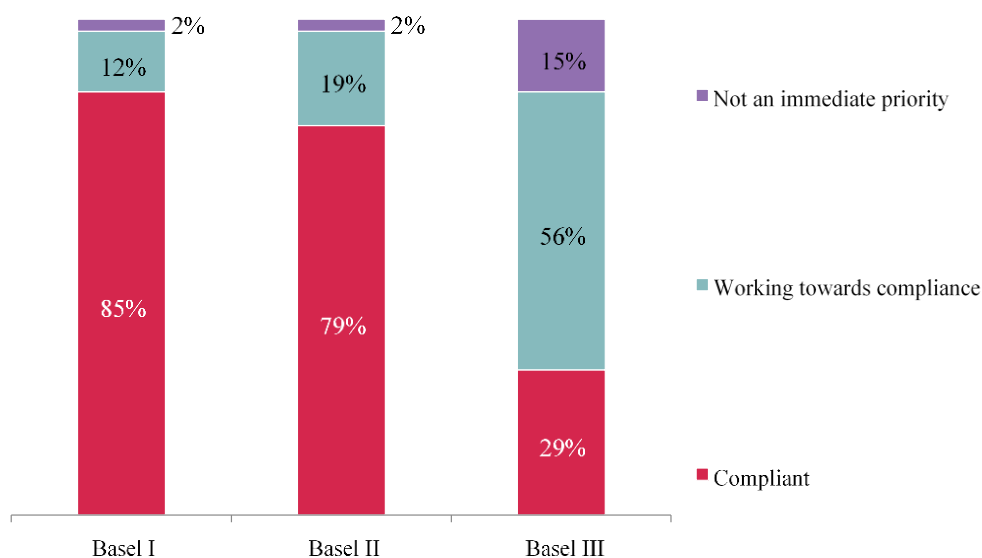
Figure 10. Implementation Level of Basel Standards
Source: Survey from EIB (2020)

The overall average solvency ratio is above the minimum standard (9.6%) at 11.6% (BECEAO, 2019). The survey's result of the European Investment Bank suggests that the reforms made by regulatory and supervisory authorities to apply best practices more rigorously induce the banking groups in Africa to align themselves progressively with the standards (2020). Moreover, the results shows that it would be interesting to examine why fifteen percent of the investigated banks are not intended to work immediately to bring them into compliance with the Basel III standards, including financial reporting requirements, market discipline and access to the capital markets.

6 FINANCIAL INNOVATION IN AFRICA

6.1 Digital Banking

Digital banking and online banking are both used to designate online alternatives to traditional physical establishments. But unlike a simple online bank, a digital bank, in addition to being present online, makes it possible to carry out virtually all types of daily banking operations (Huet and Chakroun, 2018). In digital banking, services are available via digital tools such as computers, smartphone, and tablet, at any time and everywhere. While traditional banks are still rarely adopted by the population, Africa is increasingly relying on digital and mobile offerings (Huet and Chakroun, 2018). In fact, there is a small number of branches 5 per 100,000 habitants in Africa, compared to 13 per 100,000 habitants in emerging Asian countries. With 70% of adults in Sub-Saharan Africa still don't have a bank account, mobile telecoms operators have been able to seize this opportunity by using their proximity to the customers and capitalize on mobile terminal.

The introduction of mobile banking by telecoms operators such as Orange in Mali via its Orange-Money system has rapidly distanced banks. Today in Africa there are about 346 million mobile money accounts registered against 120 million bank accounts (Huet and Chakroun, 2018). These numbers tell us that there is such a gap between mobile money by telecoms operators and traditional bank account that banks in Africa should develop in a very large scale their online banking services such as money transfer, E-payment, cash in and cash out, etc. Banks should take benefits from the tremendous growth of the digital on providing their financial services. According to Huet and Chakroun (2018), this new approach of banking will profoundly transform the banking business. In fact, the digital banking enables to transform all traditional banking services such as checking, transfers, or savings management. This revolution will allow banks to widen their customers, ease access to services, and reduce operational costs. In fact, banks are already facing competition from telecom operators and companies specializing in money transfer and payment. These competitors now hold an important market share through their innovative mobile money transfer and mobile payment offerings.

African markets are still moderately regulated with a large number of non-banked people, the banks have the opportunity to offer new categories of services. The customer

proximity problematic is very important to banks, because they can't rely to physical agencies that are only concentrated in big cities. There are only six automated teller machines per 100,000 adults compared to approximately 42 ATMs per 100,000 adults at the global level according to the world bank data (2020). In addition, we can observe shortages of commercial bank branches in Sub-Saharan Africa with 5 branches per 100,000 adults, well below the global average that is about 13 branches (The World Bank Data, 2020). Digitalization allows African banks to develop an important customer base and compete fairly with telecommunication operators which take a big step forward with their mobile money application. In Europe, major banks have already developed their digital banking or online banking.

For instance, Eyup Kahveci and Bert Wolfs (2018) wrote an article about "Digital banking impact on Turkish deposit banks performance" and concluded that Turkish banks invest in digital banking in order to be competitive in the industry since the banks are already efficient and performant, it is a strategic necessity for them. Investing in digitalization provides many advantages to both banks and customers such as accessibility, saving time and money, decreasing transaction cost, increasing and keeping customer base, decreasing the dependence on traditional banking services and branches, developing the market share, and meeting quickly and more accurately the customer's needs and expectations (Kahveci and Wolfs, 2018).

6.2   Financial Technology and Mobile Banking in West Africa

The improvement of technology networks and development of mobile internet are favoring the expansion of financial technologies (Fintech) and mobile banking of the ECOWAS region. Indeed, the main objective of technical assistance is based on credit risk management. According to a survey of the European Investment Bank, a significant proportion of African banks (44 percent) completed the implementation of mobile banking techniques (2020). This number illustrates the speed at which this technique is being implemented in West Africa. On the other hand, only 14% of African banking groups believe they have completed the deployment of financial technologies, namely those used to automate and improve financial services (EIB, 2020). However, a sizable proportion of the groups are either implementing or planning to implement financial techniques. Distance and mobile banking services reduce the cost of intermediation with

small customers and allow for lower-cost deposit collection, while freeing up branch networks.
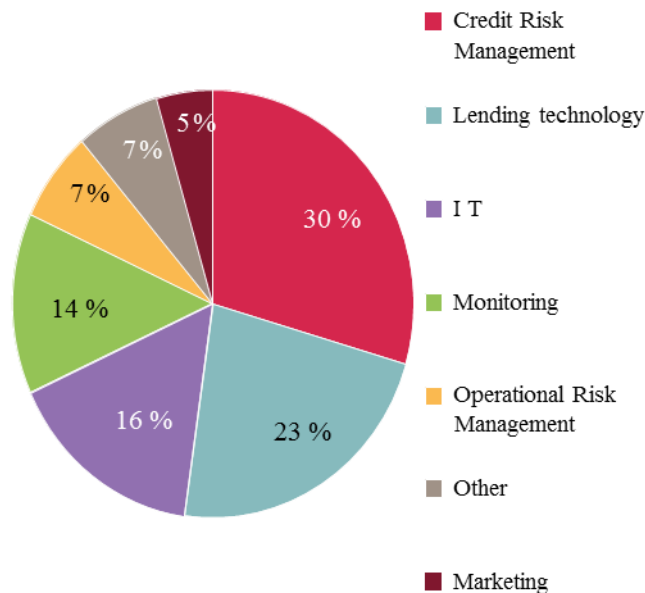
Figure 11. Uses of Technology by Banks

Source: European Investment Bank survey (2020)

Among the financial technologies (Fintech) in the region, mobile payments and E-Transfers (21%), software related to financial services (21%), and payments and settlements (18%) constitute the major areas of investment (EIB, 2020). However, techniques related to data analysis and lending are not getting the same attention from African banking groups. Financial technologies in West Africa are only in their early stages of development and banking groups are not yet investing heavily in lending-related financial techniques. The focus is always on facilitating transfers and back-office activities. However, it should be noted that more than one in four banking groups report focusing their FinTech investments on lending, data analysis and blockchain techniques (EIB, 2020). In other words, while financial technologies are not yet widely implemented for lending activity, a quarter of banking groups invest funds in this direction
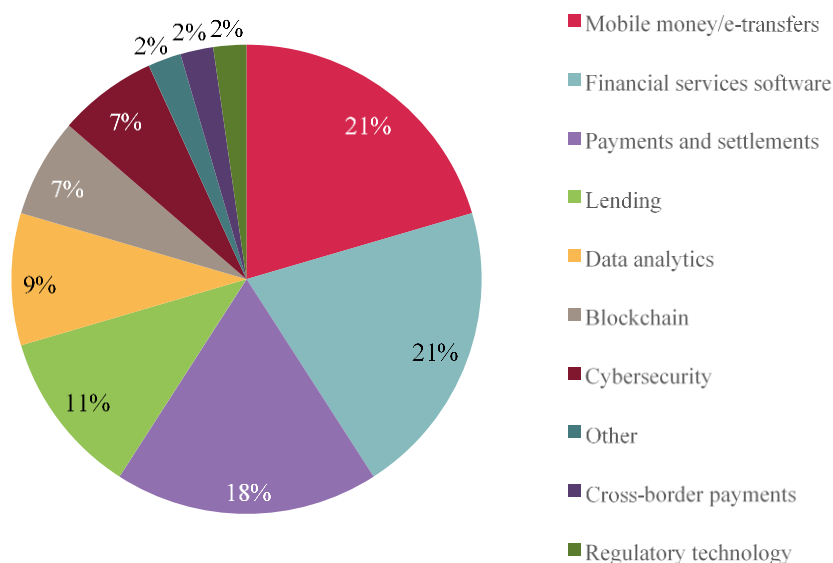
Figure 12. Fintech Investment of Banks

Source: European Investment Bank survey (2020)

6.3   Mobile Money

Promoting financial inclusion is increasingly a major focus of economic policies in Africa to reduce poverty. In practice, it is a matter of generalizing access to quality financial services at affordable cost. In a continent that for several years has been characterized by a very low rate of bancarization it is nevertheless happy to note that thanks to the high penetration of mobile phones and the offer of accounts of Mobile Money, more people are accessing a transaction account for the first time. Sub-Saharan Africa remains the region where Mobile Money is most dynamic. In 2019, the zone recorded 23.8 billion transactions out of the 37.1 billion recorded worldwide by the World Association of Telephone Operators (GSMA, 2021). The region recorded USD 456.3 billion in money sent, received, or spent. The sum, with an annual growth of 27.5%, represents 66.12% of the total financial value of Mobile Money transactions recorded by GSMA, which amounted to USD 690.1 billion (GSMA, 2021).

Over the past decade, the mobile money sector has continued to strengthen, with sub-Saharan Africa being the main driver of this growth. In fact, mobile money continued to grow at the regional level throughout the COVID-19 outbreak in 2020, as well as through the regional and national restrictive measures that accompanied the pandemic. At the end of 2020, sub-Saharan Africa accounted for 64% of the number of transactions sent by

mobile money worldwide, reaching USD 490 billion in 2020, an increase of 23% compared to the previous year (GSMA, 2021).

The total Mobile Money value increased tremendously over last 5 years to reach an annual value of 766 billion USD in 2020 and daily value of 2.1 billion USD. In addition, this level is expected to reach 3 billion USD daily value by the year 2022 (see Figure 12). According to GSMA (20221), the impressive growth in transaction values of mobile money is supported by the policy of increasing transaction and balance limits. Furthermore, the number of agents increased significantly from 2019 to 2020 and reach 2.5 million. Networks of agents are very important because, despite rapidly expanding urbanization, majority of the population still lives in rural areas. Moreover, the population density in sub-Saharan Africa remains very low. In this context, networks of physical agents, in one form or another, remain essential to provide financial services to rural and geographically isolated populations across the continent.

In 2020, the African continent had 562 million mobile money accounts, representing 45% of the number of mobile money accounts opened worldwide that represents 2.1 billion (GSMA, 2021). Most of these accounts are divided between East Africa (293 million) and West Africa (198 million), where platforms of mobile money are more developed. Transactions made via mobile money services amounted to $495 billion in value in 2020 which is quite significant given that the main holders are primarily individuals and micro-entrepreneurs.

2020
$2.1bn

$0.6 — 2015
$0.8 — 2016
$1.0 — 2017
$1.5 — 2018
$1.7 — 2019*
$2.1 — 2020
>$2.5 — 2021
>$3.0 — 2022

Forecast
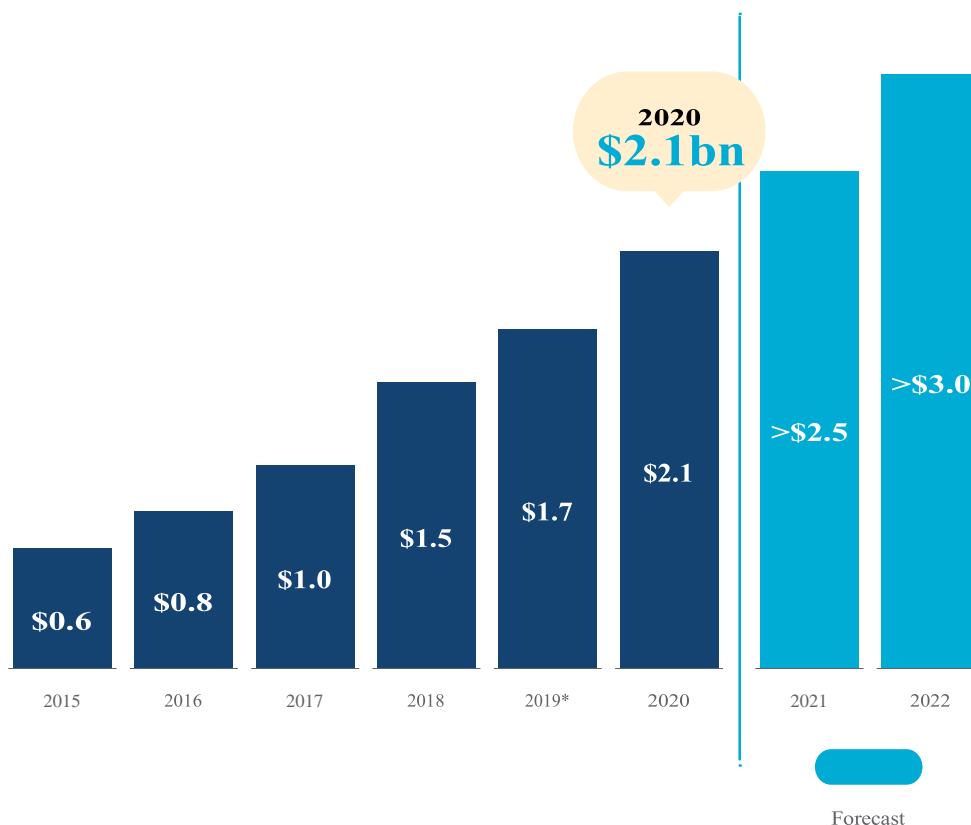
Figure 13. Daily Total Money Value

Source: State of the Industry Report 2021, GSMA

The interaction between banking sector and mobile money has increased significantly for the past five years. The value of transactions between banks and mobile money platforms has quadrupled to reach $68 billion in 2020, compared to only $15 billion in 2015 (see Figure 13). Over the same period, the amounts circulating in each direction remained in the same order. According to the industry report of GSMA (2021), the integration between the banking sector and mobile money platforms favors a better environment to access the formal economy for financially excluded population in Africa. Moreover, this connection eases the maintenance of unique strong financial system. The banking sector and the mobile money sector do not target the same market, but even in cases of overlap, customers do not tend to choose one sector over the other. Whether they use mobile money or banking, they want to be able to make transactions.

Billions, 2015-2020
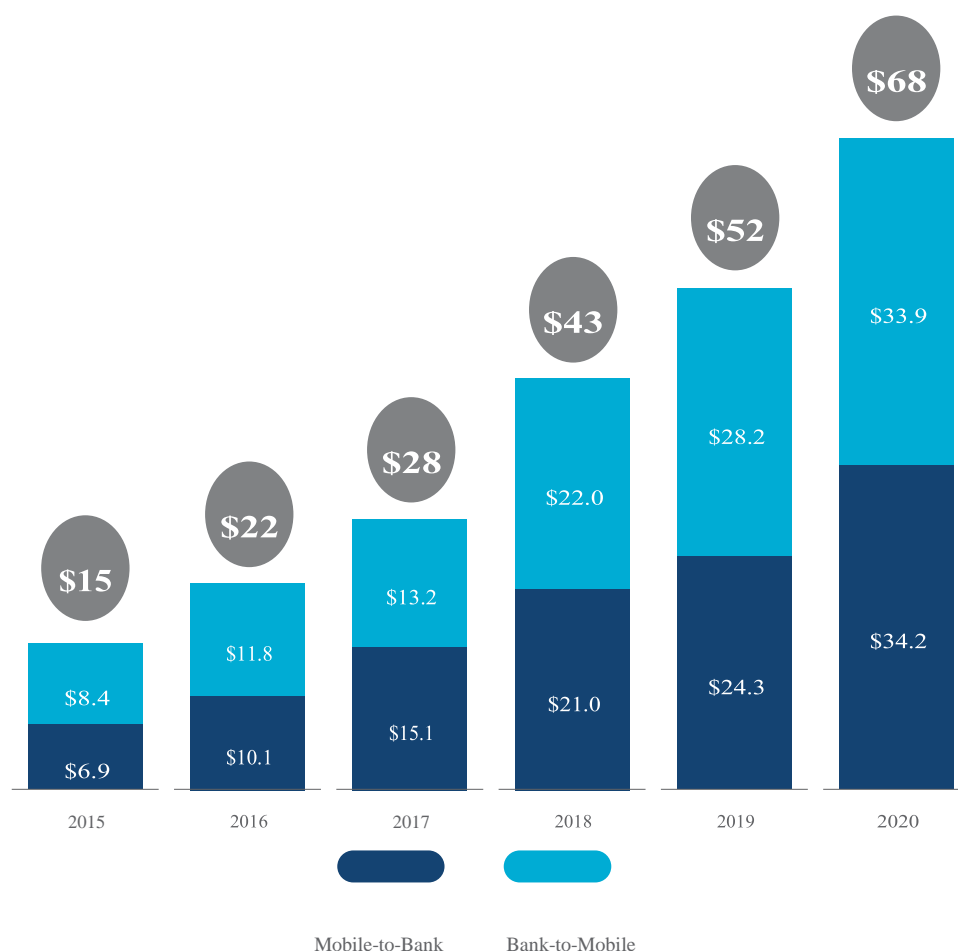
Figure 14. Banks and Mobile Money Platforms Transactions

Source: State of the Industry Report 2021, GSMA

6.4   Characteristics of Mobile Money in West Africa

Various characteristics make West Africa a favorable market for the establishment of Mobile Money: a low rate of bancarisation, a scarcity of small denomination banknotes, a high rate of telephone equipment, a significant network of telephone companies and a strong need for money transfers from cities to more remote areas. With nearly 80% of unbanked people, transactions in "cash" have for a long time had an important place in West Africa, whether for the payment of electricity bills, the payment of rents or the purchase of a vehicle. However, with banknotes with face values ranging from 500 to 10,000 FCFA (from €0.75 to €15) and a scarcity of small denominations and coins, making change is often a problem.

Moreover, the penetration rate of connections (SIM cards) amounted to 86% in 2018 with a projection of 96% by 2025 and telephone companies' network is more important than that of banks, which makes it possible to offer a service of proximity in the cities and the countryside. Concretely, with the basic services of mobile money, the user can credit his phone, pay bills, make payments/transfers between individuals or merchants/major brands. Enrolment is easy: an ID and a phone number are enough to subscribe to the solution.

Mobile Money is a solution that allows financial inclusion and thus social development of the region's unbanked populations, including rural, women and informal sector entrepreneurs/traders. At the end of 2018, 54% of the adult population in Senegal, Côte d'Ivoire, Benin, and Ghana were actively using electronic money services.

For banks, it is a driving force to meet the challenges of conquering the unbanked population: BNP Paribas, Ecobank, Bank of Africa, etc. have partnered with Orange to offer solutions to facilitate the transfer of money from the traditional bank account to the Mobile Money account. As for Societe Generale, it has launched its own Mobile Money YUP solution, which it will soon add to with financial services.

Furthermore, the development of mobile money is leading fintech implementation in Africa. For instance, there is Kudigo solution in Ghana that allows small enterprises in the informal sector to formalize themselves through a mobile application integrating accounting, sales analysis, and mobile payments. In Niger, Mobile Money is at the origin of new "business models" that contribute to social development: to meet the challenge of access to running water at the home of urban populations, CityTaps has developed a prepaid water meter that feeds, at any time, via mobile micro-payments. Mobile Money is part of daily life in West Africa and addresses some of the region's development needs, such as financial inclusion, a development factor.

7 EMPIRICAL RESEARCH

The methodology is consisted of two important elements in this survey, specifically the sample and data collection variables and their indicators. Empirical models for the analysis of key results are also provided in this section. The design of this research is aiming to analyze whether the financial profitability of banking sector in west Africa has an impact on the economic growth in the region. In the study, we employ quantitative research approach and use secondary data to satisfy the research objectives. Thus, banking institutions are key actors in African economy, and to verify whether their performances affect growth may be relevant for different economic agents.

7.1 Research Design and Approach

In the research, we will mainly investigate the effect of banking sector financial profitability on the economic growth in West Africa. The study covers 14 country members of the ECOWAS over the period 2010 to 2017 giving rise to 122 observations. To conduct our survey, we apply the Generalized Method of Moments (GMM). The advantages of using the GMM are multiples because it is compatible with dynamic panel models, control heteroscedasticity and potential endogeneity (independent variables that are not strictly exogenous), and autocorrelation within panel or group. Our model is a dynamic panel data of 14 countries extracted from the World Bank financial development indicators (2020). Several economists have studied the relationship between bank financing and economic growth. For instance, Meagon (2005) studied the impact of bank financing on economic growth in Senegal. Its analysis shows that growth in Senegal is mainly due to the level of bank credit to the economy and total deposits. Following this optic, Soumare (2009) analyzed the same problem on the Malian economy and concluded that bank credit acts negatively on growth and deposits act positively but weakly on it. Hague (2000) studied a sample of 12 countries, including six developed and six developing countries, and the author concludes that bank credit negatively influences the growth of developing countries, but positively and significantly on developed countries; moreover Dembele (2010) analyses the contribution of bank credit to economic growth in Cote d'Ivoire from a simultaneous equation model. Ngono (2009) shows from a step-by-step multiple regression method (stepwise) in the case of bank financing on the growth

of GDP in Cameroon that credit to the private sector does not influence real GDP in the short and long term.

Moreover, some surveys use GDP growth as measure of economic development. For instance, Bui (2020) surveyed the relationship between bank profitability and economic expansion from ASEAN countries. The author employed annual GDP growth rate to measure the economic development, and the banking sector efficiency was measured by ROA, ROE, NIM, and lending-deposits spread. In our model, the response variable or dependent variable is represented by the annual growth rate of gross domestic product denoted as (GDPG) as a measure of economic growth in the region. Whereas, the bank efficiency measured by Return on Asset (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) are used as predictor or independent variables.

7.2   Data and Sample

Depending on data availability, 14 countries in West Africa that are current members of the ECOWAS have been selected as a sample on purpose. The selected countries are Benin, Burkina-Faso, Cabo Verde, Cote D'Ivoire, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leonne, and Togo. The study employs annual data which covers the period of eight years (from 2010 to 2017) and forms the panel data of 112 observations. Data are collected from a secondary source which is the World Bank financial development indicators (2020).

7.3   Variables

 In our model, the response variable or dependent variable is represented by the annual Gross Domestic Product (GDP) as a measure of economic growth in the region. Whereas Return on Asset, Return on Equity, and Net Interest Margin of the banking sector of all country members of ECOWAS have been used as predictor or independent variables. The use of three financial indicators for representing the bank profitability and rentability in this survey enables us to assess the performance of the banking sector from different perspectives. However, some previous surveys measured the performance of the banking sector by the level of credit allowed to the economy. In addition, these indicators are relevant because they are used by the World Bank to assess the financial development of a country.

Table 3: Identification of Variables

Variables		Descriptions
Dependent Variable	GDP GROWTH (annual %)	Annual % changes in the Gross Domestic Product
Independent Variables	ROA (after Tax)	The ratio of net income after tax to total assets
	ROE (after Tax)	The ratio of net income after tax to total equity
	Net Interest Margin	The percentage measure of the difference between the interest generated by banks and the interest paid to their lenders

Source: Author's compilation

7.4 Hypothesis

Based on the main objective of this research, the following hypothesis has been tested:
H1: Banking sector financial profitability in the Economic Community of West African States expressed by Return on Asset (ROA), Return on equity (ROE), and Net Interest Margin (NIM) has significant effect on the economic growth of the region measured by the gross domestic product (GDP) growth rate.

7.5 Summary of Descriptive Statistics of Variables

Table 4: Descriptive Statistics

Variables	GDP	ROA	ROE	NIM
Mean	4.859967	2.116198	16.79176	5.989097
Median	5.382500	1.974160	16.08000	4.778535
Maximum	20.71577	9.663920	95.10100	21.43420
Minimum	-20.59877	-3.769060	-32.95120	1.162210
Std. Dev.	4.368862	1.767879	13.46648	3.551930
Skewness	-1.508308	0.305705	1.404750	1.456380

Kurtosis	13.81240	6.409249	14.11754	5.652688
Observations	112	112	112	112
Jarque-Bera	588.0372	55.98508	613.6338	72.43100
Probability	0.000000	0.000000	0.000000	0.000000

Table.5 denotes the summary of descriptive statistics of our variables. The GDP variable has a mean of 4.86 and a maximum value of 20.71. This implies that the average growth rate in the ECOWAS region is 4.86 percent. In addition, the means of ROA, ROE, and NIM are respectively 2.12 percent, 16.76 percent, and 5.99%. The highest value of ROE (95.10%) and GDP growth rate are both connected to Sierra Leonne. Indeed, the country have experienced an economic boost recently from severe recession in 2015. The table also shows that our variables are not normally distributed. The decision criteria for Jarque-Bera is: (p-value > 0.05 for null hypothesis (Normal Distribution) and p-value < 0.05 for non-null hypothesis (Non-Normal Distribution). In addition, the Skewness and Kurtosis results demonstrate that all the variables are not normally distributed.

7.6 Stationary Test

Table 5: The Augmented Dickey-Fuller (ADF) test result

Variables	p-value	Statistic	Critical Value at 5%
GDP	0.0086**	-1.60512	-2.862186
ROA	0.0009**	-1.98854	-2.862274
ROE	0.0098**	-1.60384	-2.864212
NIM	0.9715	1.88732	-2.863919

Since our model contains time series, we must examine their stationarity. If the initial series is not stationary, this condition should be verified for the first and possibly second difference. In this case we checked the condition unit root at level and first difference. A series is said to be stationary if it has no trend, no seasonality, and, moreover, no factor that changes over time. Only stationary series allow for reliable econometric forecasting. The acceptance of the null hypothesis states that the common unit root exists, according to the Augmented Dickey-Fuller (ADF) test method. The acceptance of the alternative

hypothesis, on the other hand, states that there is no unit root. To determine whether there is stationarity or non-stationarity, we verify if the probability is less than the chosen significance level (5 percent in our case). The ADF test shows that all variables are stationary at the significance level of 5% except the Net Interest Margin (NIM).

7.7   Results and Findings

The result of our survey suggests that all the explanatory variables have statistically significant influence on the gross domestic product (GDP) growth rate meaning that the banking sector financial performance measured by ROA, ROE, and NIM have significant impact on the economic growth in West Africa. The research shows that the main actors in banking sector and authorities should focus on the profitability of banking system in order to drive a sustainable economic growth. In addition, this research obviously provides some important information to researchers, governments, financial analysts, banking policy makers and supervisory authorities.

Table 6: Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.198265	0.024923	7.955183	0.0000
NIM	0.191316	0.095155	2.010577	0.0477**
ROA	2.471291	1.201398	2.057013	0.0000***
ROE	0.265639	0.163544	1.624264	0.0002***

***Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Table 2. shows the result of the Panel Generalized Method of Moments (GMM). We use the software EVIEWS 11 in order to estimate the relationship between the efficiency of banks and economic growth in the selected countries of West Africa. The result suggests that the probability value (p-value = 0.0002) corresponding to the variable (ROE) is less than 1%, so the variable (ROE) is significant at 1 percent level, and the sign of its coefficient is positive which corresponds to the expected sign. Therefore, there is a positive impact of the Return on Equity on economic growth. This positive relationship can be explained by the fact that the capital base for the banking sector is different than other corporations. They have more incentives to concentrate on managing capital, thus the high rate of returns of African banks demonstrates the efficient management of

capital. Therefore, the optimal capital management of the banking sector favors economic growth in the region.

In Addition, the probability value of the variable (NIM) shows that there is a statistically significant positive relationship between this independent variable and the Gross Domestic Product (GDP) growth at 5 percent significant level (p-value = 0.048 < 0.05). The financial indicator of (NIM) is the difference between interest revenue and interest expense, on average earning assets. The high interest rate margins reflect the disincentive cost of credit in Africa, which is due to a combination of factors, including the small size of the market. Thus, the NIM is a solid financial rentability and profitability indicator of the banking sector. In this survey, the result suggests that the high rate of the variable (NIM) stimulates the economy expansion. This can be explained by the level of credit allowance of banks to the economy. In fact, the West African region contains major projects such as development in infrastructures that are mainly financed by banks. Therefore, the positive relationship between the variables (NIM and GDP) is due to the important role of the banking sector in financing major economic activities.

Moreover, the return on asset (ROA) variable has a positive influence on GPD growth rate at a significant level of 1% (p-value < 0.01) with a coefficient 2.47. Among all the explanatory variables, bank return on asset has the most important effect on economic growth. The result demonstrates the optimal use of bank assets, the banking sector in West Africa is profitable and contributes to economic expansion.

7.8 Validation Test of Instruments

Table 7: Arellano-Bond Serial Correlation Test

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-5.073939	-763.734250	150.520963	0.0000
AR(2)	-0.969046	-707.723357	730.329727	0.3325

Since our model is estimated by Generalized Method of Moments (GMM), the Arellano-Bond test is necessary to test the serial correlation. The test is consisted of two statistics, one for first order correlation (AR(1)), and one for second order correlation (AR(2)). In

this case we expect the first order (AR(1)) statistic to be significant and the second order (AR(2)) statistic to be insignificant. The result of the serial correlation test shows that the first order statistic is significant (p-value = 0.000), while the second order is statistic is not significant (p-value = 0.332). This suggest that our expectation is met, and the model error terms are serial uncorrelated in levels.

8 CONCLUSION AND RECOMMENDATIONS

The spirit that prevailed throughout this work was to show the role of banking system financial profitability on the economic growth in the ECOWAS area. We reviewed the literature on banking performance and the role banking institution on economic growth all around the world. To verify our hypothesis, we have collected data which are of secondary source, from the annual publication of the World Bank, more precisely in the book of world development indicators and we did an econometric study that involved testing a model from the E-Views software trough Generalized Method of Moments (GMM) technique. The choice of profitability indicators to measure bank performance is inspired by the Word Bank measurement of financial institutions efficiency at country level.

The main goal was to analyze whether these independent variables have any impact on the economic growth in ECOWAS area. The outcome of our survey suggests that all the explanatory variables have statistically significant influence on the gross domestic product (GDP) growth rate meaning that the banking sector financial performance measured by ROA, ROE, and NIM have significant impact on the economic growth in West Africa.

The model estimated is a dynamic model that experienced a stationarity test to see the significance of the variables. It follows that all the variables are significant. This demonstrates that the explanatory variables used are all significant and that the model is generally good. Moreover, the results show that the financial indicators corresponding to bank profitability have a positive effect on growth. The existence of an effective financial system is conditioned to some prerequisites: macroeconomic stability, a range of diversified financial products, and effective enforcement of legislation and regulation and a properly functioning asset registration system. Access to information and its transparency are also essential to filtering costs and prevent an anti-selection phenomenon. The research shows that banking groups in Africa tend to prefer the assets of large companies and states to minimize risks. In addition, because of the lack of information on creditors and the fear of failures, the financial system is atomized, with a large part of the population unable to access financing.

The financial system is one of the foundations of economic development. To ensure that the available resources are mobilized and distributed effectively between the different actors, the well-functioning of the banking sector must be subject to appropriate regulation and open to a wider range of instruments and services. The study suggest that a more profitable banking system increases the level of economy activity. However, we did not consider the cost-to-asset ratio in this survey which is higher in Africa compared to the global average. In fact, the effect of this ratio on the profitability and rentability of banks is mitigated by high interest rates but the cut in rates due to the pandemic will affect adversely interest margins for African banks. Therefore, African banks should increase their operating efficiency in order to maintain their profitability and efficiency.

8.1   Recommendations

In general, the main objectives of our research have been achieved. The empirical evidence showed that there is statistically positive relationship between economic growth and bank profitability. However, some variables that can affect the bank profitability and economic growth have not been considered. A future study can take a new approach to each country with data considered individually. For instance, the political specificity of each country could affect the economic growth and bank profitability.

 In this research, we have identified several anomalies of the African banking system. For instance, the low banking penetration rate. Despite the advances observed with the successive transformations of the banking system, the access of population to banks remains very low compared to the other parts of the world. The authorities should set up a banking plan that will allow the population to have a bank account and to have easy access to banking services while orienting bank credits in productive sectors.

Additionally, the ratio of financial assets to Gross Domestic Product (GDP) remains very low, even less than 30% occasionally, and still very far from those observed in Asia and South America. Some important reforms are needed to improve this situation. One of the solutions is the expansion of financing sector directly supported by banks. Furthermore, diversification of the African financial system is primordial for sustainable economic development. Better risk management tools are also primordial to the future of African Banking system because of the number of operations and their diversification. Therefore,

the assessment of risks should get more focus to improve the quality of institutions, and their profitability.

Banks must put in place mechanisms to credits to economic agents and above all medium and long credits term by targeting the most profitable business areas and services because credits are then an important source of profits. They need to diversify banking products to expand areas and segments of the bank's operations, particularly in areas not covered by the bank in order to increase the market shares and even interest income. Identify services and products adapted to the characteristics of the African clientele, improve their quality, and adapt their prices to the standard of living and meet the expectations of investors.

We suggest banking marketing since the products offered by banks are not known to the public. Banks must follow the example of telecommunications companies, therefore the dissemination of bank information via the media to allow customers to know the state of the bank and to strengthen the bank's image to attract customer confidence; and analysts who want to conduct in-depth studies to determine the soundness or efficiency of the banking system and to react to any speculative movement that could harm the system.

External variables are not under the control of banks, the government must intensify economic growth and limit inflationary pressures in order to allow banks to take full advantage of the economic performance of the country. The government must put in place incentives to allow the public to restore confidence in the banking sector, such as deposit insurance.

The banking sector improves but do not meet the financial inclusion because major part of the population is excluded from the system. Banking institutions suffer from crisis of legitimacy and a lack of roots in the population. Most of the investment projects are mainly financed outside the banking sector, mainly through self-financing. The profitability of banks was also accompanied by a concentration towards less risky activities. Since high interest rates make it expensive to use credit and in exchange, deposits are poorly remunerated because the nature of deposits (mostly short-term) requires banks not to take the risk of engaging in medium- and long-term financing.

Thus, to the extent that the performance of the banking sector plays an autonomous role in the process of economic growth, further research is needed to verify how finance acts on the immediate determinants of growth, such as capital stock formation, labor productivity and technological change. It is also important to understand the extent to which the country's institutional framework affects banking and financial development and, indirectly, through it, the process of economic growth.

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9 Appendix

GDP growth (annual %)										
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Benin	2,114065	2,963753	4,811223	7,191434	6,357679	1,778151	3,339673	5,671555	6,697259	6,865687
Burkina Faso	8,446282	6,622563	6,452672	5,792606	4,326846	3,912557	5,958692	6,157105	6,819617	5,688599
Cote d'Ivoire	2,017639	-4,38725	10,7065	8,889421	8,794077	8,84286	7,179208	7,359637	6,793488	6,852335
Ghana	7,899712	14,04712	9,292789	7,312525	2,897439	2,178207	3,447793	8,143447	6,263481	6,478395
Guinea	4,813363	5,612107	5,915288	3,945685	3,696541	3,825922	10,81838	10,33812	6,181139	5,576969
Mali	5,313935	3,213134	-0,83663	2,303767	7,101422	6,167479	5,764065	5,418533	4,650587	5,04
Guinea-Bissau	4,610971	8,08478	-1,71268	3,255904	0,964561	6,134083	6,262806	5,919177	3,8	4,600094
Gambia, The	5,908336	-8,13044	5,241569	2,872769	-1,40738	4,058074	1,94336	4,822611	6,547027	5,975204
Liberia	6,099828	8,200766	7,993816	8,704028	0,701144	0	-1,59958	2,468626	1,222551	-2,27825
Niger	8,426193	2,364753	10,59991	5,56573	6,564426	4,367783	5,688553	4,997929	7,004562	5,82859
Nigeria	8,005656	5,307924	4,230061	6,671335	6,309719	2,652693	-1,61687	0,805887	1,922757	2,208429
Sierra Leone	5,346466	6,315045	15,18177	20,71577	4,556772	-20,5988	6,055474	4,211183	3,446163	5,51346
Senegal	3,562745	1,458389	5,117394	2,822106	6,6135	6,367044	6,356069	7,407486	6,379557	5,271192
Togo	6,099259	6,398199	6,543507	6,112343	5,920589	5,742868	5,559079	4,357414	4,910148	5,312535
Cabo Verde	1,46679	3,968886	1,081918	0,802798	0,611213	1,006864	4,705792	3,702039	4,531162	5,667752
WAEMU	5,073886	3,339789	5,210237	5,241664	5,830388	5,414103	5,763518	5,911105	5,881902	5,682379
NO WAEMU	5,648593	5,045915	6,99103	7,289273	2,480778	-0,98243	3,393478	4,927416	4,30204	4,163138
ECOWAS	5,36124	4,192852	6,100634	6,265468	4,155583	2,215837	4,578498	5,41926	5,091971	4,922758

Bank Deposits to GDP (%)								
Country	2010	2011	2012	2013	2014	2015	2016	2017
Benin	25,3377	25,7229	25,0771	25,1262	27,1996	30,0559	30,4467	28,9881
Burkina Faso	20,404	22,2698	23,3618	25,9178	27,7937	31,5589	33,1284	34,6802
Cote d'Ivoire	18,7248	22,9711	22,7847	22,4645	23,1809	24,9281	25,3879	25,3384
Cabo Verde	72,1784	71,933	74,1089	79,1493	86,2489	90,2332	93,3311	..
Gambia, The	22,9626	28,6872	27,4966	27,8997	29,082	..	..	29,655
Ghana	20,7338	21,2406	21,4475	21,2217	22,861	24,9293	25,5153	24,6732
Guinea	11,7428	15,9327	15,1227	13,9722	15,1033	16,7371	16,2333	..
Guinea-Bissau	11,0482	14,7072	17,6309	16,9803	17,8578	16,6996	16,0611	14,6166
Liberia	25,7272	28,7863	28,8749	28,491	..	..	..	..
Mali	17,2328	16,6656	18,1064	19,0702	19,9686	21,6993	21,8202	21,2067
Niger	10,8393	11,151	11,0385	12,361	13,185	14,1351	13,8601	13,466
Nigeria	17,5239	16,9103	17,4128	17,9533	17,9116	17,6923	17,2662	16,2891
Senegal	22,929	24,1231	24,047	25,444	26,6905	27,8123	28,045	27,7394
Sierra Leone	14,1271	14,4625	13,9626	12,9641	14,5573	17,7992	17,9365	18,6057
Togo	28,9406	31,4306	34,3387	35,9924	38,2718	40,3628	42,368	43,9633
WAEMU	19,43205	21,13016	22,04814	22,91955	24,26849	25,9065	26,38968	26,24984
No WAEMU	26,42797	28,27894	28,34657	28,80733	30,96068	33,47822	34,05648	22,30575
ECOWAS	22,93001	24,70455	25,19735	25,86344	27,61459	29,69236	30,22308	24,27779

Broad money (% of GDP)										
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Guinea	26,44142	27,15823	..	22,8716	24,14057	27,01532	25,37364	23,96353	22,58307	24,60928
Liberia	20,52246	22,25284	20,04316	21,80875	19,58262	21,0672	18,75917	20,70671	21,4749	..
Mali	23,85989	23,26872	25,90578	27,22282	26,55648	26,83919	27,71718	26,90957	28,77305	29,1612
Gambia, The	30,24879	35,01217	34,36471	36,14174	37,97905	..	..	38,28397	40,38744	..
Burkina Faso	25,62624	25,75645	26,4212	28,28734	30,28943	35,5971	36,59338	40,91855	41,32362	43,72946
Niger	14,32457	14,37667	16,24992	16,98959	19,94081	19,48214	19,84684	17,73688	15,81441	17,10719
Togo	39,82759	43,43045	44,1376	47,82098	46,82278	51,68221	53,99449	56,40663	58,01501	56,39965
Sierra Leone	20,80949	21,61688	20,43324	17,52056	20,39788	24,15339	26,37392	23,61901	23,03852	24,0275
Benin	25,52344	26,13823	24,88315	26,86197	29,96543	30,98476	29,83209	28,63099	27,95669	27,82163
Guinea-Bissau	26,6158	31,42526	30,50914	31,31488	46,21342	49,40396	47,91305	43,90217	45,04755	46,63047
Ghana	29,61919	30,54901	30,36174	22,09968	24,13712	26,11518	26,83279	26,09673	25,79539	26,92519
Senegal	28,17979	28,83629	28,38878	29,84069	31,80299	35,28983	37,37748	37,79342	40,75251	41,20247
Nigeria	21,35585	22,47905	24,92823	25,44805	22,68961	22,36683	27,37879	24,78142	25,36246	23,87846
Cabo Verde	80,10418	78,47817	82,07898	89,44061	95,64898	98,88484	102,57	104,6259	99,96311	102,0191
Cote d'Ivoire	32,81859	37,49245	34,42499	33,94043	34,27986	26,1103	27,628	28,62593	30,32672	31,26564
WAEMU	27,09699	28,84057	28,86507	30,28484	33,2339	34,42369	35,11281	35,11552	36,00119	36,66471
No WAEMU	32,72877	33,93519	35,36834	33,61871	34,9394	36,60046	37,88138	37,43962	36,94356	40,2919
ECOWAS	29,91288	31,38788	32,11671	31,95178	34,08665	35,51207	36,4971	36,27757	36,47238	38,47831

Bank return on assets (%, after tax)								
Country	2010	2011	2012	2013	2014	2015	2016	2017
Benin	1,06321	1,47545	1,28819	1,13561	0,970382	0,237936	0,332837	0,164703
Burkina Faso	0,857977	2,01536	2,23569	2,32989	1,85192	1,63577	1,5287	1,64882
Cote d'Ivoire	1,51609	0,098063	1,00844	2,3529	1,52301	1,79362	1,80624	1,80529
Cabo Verde	0,957279	0,853891	0,47273	0,530325	0,433234	0,481636	0,351278	0,381533
Gambia, The	2,74162	2,32813	1,54872	3,46382	2,9172	3,50348	2,71008	2,51832
Ghana	2,49749	2,30251	3,61909	4,50745	3,95543	2,93524	3,03782	3,40616
Guinea	2,12364	2,80679	2,36172	2,06613	1,20826	2,43303	2,20814	2,40264
Guinea-Bissau	0,392797	2,72647	-1,50364	1,12926	..	..	2,01638	1,31975
Liberia	0,019709	-0,86667	0,266785	0,909992	1,06242	-3,04514	0,423199	-0,51385
Mali	1,1378	1,84879	1,17832	1,70574	1,41821	1,15189	1,12696	1,06091
Niger	1,83304	2,18738	2,26652	2,34487	2,16966	2,26093	0,38746	1,40712
Nigeria	2,91697	0,217465	2,99869	2,04182	2,08639	1,4716	1,53139	2,43538
Senegal	1,7645	1,51782	1,2507	1,42548	-0,22263	0,566574	1,20916	1,74468
Sierra Leone	2,61451	2,6918	2,60208	-1,0172	1,55383	2,65652	0,59362	8,77612
Togo	1,38074	2,39011	1,8532	0,895034	0,159874	-3,87863	3,17962	0,757724
ROA (after Tax)	1,587825	1,639558	1,563149	1,721408	1,506228	1,014604	1,496192	1,954353

Bank return on equity (%, after tax)								
Country	2010	2011	2012	2013	2014	2015	2016	2017
Benin	12,4156	17,4304	15,8379	15,3084	13,6825	13,3661	6,26426	3,26592
Burkina Faso	10,4831	25,0702	27,1681	28,0063	22,3335	21,359	20,0753	20,7854
Cote d'Ivoire	15,8332	14,5536	12,7567	18,76	21,8017	25,1643	25,8158	24,6908
Cabo Verde	14,6323	12,7113	6,63299	7,23212	5,97259	6,72957	5,13712	5,65424
Gambia, The	24,367	23,6739	13,8005	31,1444	28,7302	31,7826	22,3821	19,8675
Ghana	18,9192	17,3063	26,5952	31,2229	27,7644	21,1634	21,9751	23,0237
Guinea	36,5228	43,1141	29,7568	21,7467	13,1615	25,4931	20,3569	21,5612
Guinea-Bissau	2,98391	17,7147	-10,5762	9,37635	..	..	17,4377	10,0952
Liberia	0,214863	-8,80211	2,03892	8,57691	10,4908	-32,9512	4,72094	-4,86449
Mali	12,056	18,9753	11,1166	15,9394	16,8527	14,4344	13,4415	12,3461
Niger	18,5388	21,3405	20,7873	21,4704	20,5864	22,5746	4,07665	14,5235
Nigeria	13,7737	1,63385	21,618	14,5541	14,8842	10,1367	10,698	16,5922
Senegal	16,0761	14,1905	12,2143	14,0071	-2,38003	6,65468	14,3153	19,4291
Sierra Leone	18,8725	21,1311	19,9033	-8,67449	14,621	20,3255	4,23089	95,101
Togo	14,8595	27,2001	23,7265	24,3705	14,2178	-15,3391	60,803	16,0839
ROE (after Tax)	15,3699	17,81625	15,55846	16,86941	15,90852	12,20669	16,78204	19,87702

Bank net interest margin (%)								
Country	2010	2011	2012	2013	2014	2015	2016	2017
Benin	3,77586	4,1757	2,84727	2,33038	1,16221	2,60203	1,65282	2,70879
Burkina Faso	3,89692	4,23385	3,38532	3,7347	3,35	3,29653	2,2259	2,14824
Cote d'Ivoire	4,14282	4,1693	3,69212	3,54654	2,60961	3,13293	2,87811	3,59801
Cabo Verde	4,88508	4,83775	3,93933	3,57502	2,83598	3,51274	3,10893	4,38304
Gambia, The	8,61486	7,69401	5,5448	11,1634	9,37605	10,3548	9,56759	8,83256
Ghana	12,0208	9,24107	9,63511	11,7573	10,1626	11,1126	11,8922	11,1754
Guinea	3,96224	4,90531	5,09225	8,78077	3,58386	9,48935	9,82974	10,2162
Guinea-Bissau	5,04961	7,62932	4,98394	5,29482	..	..	2,30784	0,840931
Liberia	17,8862	5,79212	13,3778	6,40298	6,60716	8,95152	7,48443	8,05649
Mali	4,16949	4,26234	4,83599	4,72108	3,36717	3,87161	2,72135	3,27941
Niger	5,06072	5,36293	5,58749	5,33548	4,37182	5,1459	4,24836	3,50485
Nigeria	6,6485	8,9723	8,87508	7,70212	7,1244	6,84022	5,60158	7,93377
Senegal	5,50253	4,6259	4,8814	5,04528	4,15422	3,47835	3,39632	3,66736
Sierra Leone	11,165	13,1142	13,1649	11,2112	6,10684	7,81366	2,46501	21,4342
Togo	3,86314	3,72141	3,78806	3,82279	2,49012	3,32446	2,023	2,03816
Net Interst Margin	6,709585	6,182501	6,242057	6,294924	4,807289	5,923336	4,760212	6,254494

	Bank Z-score							
Country	2010	2011	2012	2013	2014	2015	2016	2017
Benin	16,7749	16,545	16,0206	13,4492	15,1202	11,581	9,62539	8,57789
Burkina Faso	6,88563	8,23974	8,3428	8,61957	7,99969	7,21711	7,4858	7,7444
Cote d'Ivoire	18,6072	17,6364	16,0123	15,9509	14,746	14,3443	13,9282	15,1248
Cabo Verde	24,447	24,9239	25,5007	25,2987	24,8271	24,4836	22,5352	23,4375
Gambia, The	8,27684	8,08924	9,75897	9,06981	8,58511	10,0664	10,072	10,1653
Ghana	7,38422	7,2121	8,18473	8,97083	8,17522	7,91828	7,72156	8,98246
Guinea	4,25847	5,25679	6,15711	6,41662	4,78792	6,79646	7,3368	7,11416
Guinea-Bissau	6,96159	8,24939	5,13494	5,60974	..	5,79003	6,05725	7,07835
Liberia	4,3843	18,1929	7,18486	6,42164	7,13894	3,13381	6,27047	6,58353
Mali	9,41368	8,77664	10,9604	9,22086	7,01608	7,77581	7,68344	8,00769
Niger	15,3397	17,416	17,6822	17,7011	16,5506	16,2431	12,7382	15,4256
Nigeria	20,0693	12,7842	15,8347	14,8382	14,9592	15,2876	15,5273	16,2357
Senegal	17,0602	15,8697	15,1704	15,5526	10,9804	12,1839	12,7454	14,9788
Sierra Leone	4,5758	4,33189	4,72889	2,54755	3,9164	4,82841	4,15642	4,95378
Togo	4,84753	4,91543	4,21252	4,55729	3,46962	2,20389	4,73666	3,33342
Ecowas	11,28576	11,89595	11,39241	10,94831	10,59089	9,990247	9,908006	10,51623

Panel Data of Selected Countries

Country	Year	GDP Growth (%)	ROE	ROA	NIM
Benin	2010	2,114064726	12,4156	1,29296	3,77586
Benin	2011	2,963752919	17,4304	1,77785	4,1757
Benin	2012	4,811223316	15,8379	1,43355	2,84727
Benin	2013	7,191433721	15,3084	1,37746	2,33038
Benin	2014	6,357679098	13,6825	1,05564	1,16221
Benin	2015	1,77815106	13,3661	0,343819	2,60203
Benin	2016	3,339673426	6,26426	0,39462	1,65282
Benin	2017	5,671555469	3,26592	0,241535	2,70879
Burkina Faso	2010	8,446281577	10,4831	1,22757	3,89692
Burkina Faso	2011	6,622562612	25,0702	2,4145	4,23385
Burkina Faso	2012	6,452672381	27,1681	2,58226	3,38532
Burkina Faso	2013	5,792605592	28,0063	2,70268	3,7347
Burkina Faso	2014	4,326845613	22,3335	2,32748	3,35
Burkina Faso	2015	3,9125572	21,359	1,94063	3,29653
Burkina Faso	2016	5,958691719	20,0753	1,74608	2,2259
Burkina Faso	2017	6,15710463	20,7854	1,80416	2,14824
Cabo Verde	2010	1,466790097	15,8332	1,92274	4,14282
Cabo Verde	2011	3,968886345	14,5536	0,385929	4,1693
Cabo Verde	2012	1,081918279	12,7567	1,35665	3,69212
Cabo Verde	2013	0,802797601	18,76	2,5893	3,54654
Cabo Verde	2014	0,611212666	21,8017	1,77218	2,60961
Cabo Verde	2015	1,006863707	25,1643	2,06006	3,13293
Cabo Verde	2016	4,705791509	25,8158	2,07071	2,87811

Cabo Verde	2017	3,702039188	24,6908	2,11568	3,59801
Cote d'Ivoire	2010	2,017638592	14,6323	1,17191	4,88508
Cote d'Ivoire	2011	-4,387254789	12,7113	1,00713	4,83775
Cote d'Ivoire	2012	10,7065041	6,63299	0,531181	3,93933
Cote d'Ivoire	2013	8,889421302	7,23212	0,635622	3,57502
Cote d'Ivoire	2014	8,79407739	5,97259	0,453693	2,83598
Cote d'Ivoire	2015	8,84285995	6,72957	0,545269	3,51274
Cote d'Ivoire	2016	7,179207824	5,13712	0,404807	3,10893
Cote d'Ivoire	2017	7,359637184	5,65424	0,482746	4,38304
Gambia, The	2010	5,90833581	24,367	4,54483	8,61486
Gambia, The	2011	-8,130444223	23,6739	3,57878	7,69401
Gambia, The	2012	5,241569246	13,8005	2,45583	5,5448
Gambia, The	2013	2,87276879	31,1444	5,41272	11,1634
Gambia, The	2014	-1,407382495	28,7302	4,22843	9,37605
Gambia, The	2015	4,058073804	31,7826	4,75494	10,3548
Gambia, The	2016	1,943359655	22,3821	3,65098	9,56759
Gambia, The	2017	4,822611249	19,8675	3,66006	8,83256
Ghana	2010	7,899711889	18,9192	3,73819	12,0208
Ghana	2011	14,04712363	17,3063	3,33974	9,24107
Ghana	2012	9,292789405	26,5952	4,83076	9,63511
Ghana	2013	7,312525007	31,2229	6,37665	11,7573
Ghana	2014	2,897438837	27,7644	5,58625	10,1626
Ghana	2015	2,178206744	21,1634	4,19083	11,1126
Ghana	2016	3,447792991	21,9751	4,46254	11,8922
Ghana	2017	8,143446549	23,0237	4,98971	11,1754
Guinea	2010	4,813362961	36,5228	3,34784	3,96224
Guinea	2011	5,61210719	43,1141	4,17208	4,90531
Guinea	2012	5,915288138	29,7568	3,52524	5,09225
Guinea	2013	3,945685431	21,7467	3,22257	8,78077
Guinea	2014	3,696541182	13,1615	2,00769	3,58386
Guinea	2015	3,825922386	25,4931	3,73483	9,48935
Guinea	2016	10,81838382	20,3569	3,29515	9,82974
Guinea	2017	10,3381214	21,5612	3,47525	10,2162
Liberia	2010	6,099827602	0,214863	0,144532	17,8862
Liberia	2011	8,20076584	-8,80211	-0,866666	5,79212
Liberia	2012	7,993815693	2,03892	0,525486	13,3778
Liberia	2013	8,704028066	8,57691	0,889859	6,40298
Liberia	2014	0,701143912	10,4908	1,41656	6,60716
Liberia	2015	0	-32,9512	-3,66747	8,95152
Liberia	2016	-1,599584075	4,72094	0,675859	7,48443

Liberia	2017	2,468626095	-4,86449	-0,894947	8,05649
Mali	2010	5,313935279	12,056	1,58436	4,16949
Mali	2011	3,21313378	18,9753	2,40537	4,26234
Mali	2012	-0,836627497	11,1166	1,53169	4,83599
Mali	2013	2,303766958	15,9394	2,12658	4,72108
Mali	2014	7,101422348	16,8527	1,69303	3,36717
Mali	2015	6,167479219	14,4344	1,40273	3,87161
Mali	2016	5,764064945	13,4415	1,28459	2,72135
Mali	2017	5,418533372	12,3461	1,2118	3,27941
Niger	2010	8,426193268	18,5388	2,47371	5,06072
Niger	2011	2,364753132	21,3405	2,89903	5,36293
Niger	2012	10,5999074	20,7873	3,06345	5,58749
Niger	2013	5,565729596	21,4704	3,1355	5,33548
Niger	2014	6,564426227	20,5864	2,87268	4,37182
Niger	2015	4,367782715	22,5746	2,88502	5,1459
Niger	2016	5,688552607	4,07665	0,636472	4,24836
Niger	2017	4,997928857	14,5235	1,74198	3,50485
Nigeria	2010	8,005655915	13,7737	3,38103	6,6485
Nigeria	2011	5,307924204	1,63385	0,085202	8,9723
Nigeria	2012	4,230061175	21,618	3,24568	8,87508
Nigeria	2013	6,671335393	14,5541	2,30423	7,70212
Nigeria	2014	6,309718656	14,8842	2,33279	7,1244
Nigeria	2015	2,652693295	10,1367	1,6989	6,84022
Nigeria	2016	-1,61686895	10,698	1,82448	5,60158
Nigeria	2017	0,80588662	16,5922	2,88244	7,93377
Senegal	2010	3,56274539	16,0761	2,13684	5,50253
Senegal	2011	1,458388671	14,1905	1,84485	4,6259
Senegal	2012	5,117394237	12,2143	1,49329	4,8814
Senegal	2013	2,82210565	14,0071	1,76144	5,04528
Senegal	2014	6,613500103	-2,38003	-0,05195	4,15422
Senegal	2015	6,367043651	6,65468	0,756405	3,47835
Senegal	2016	6,356068572	14,3153	1,40221	3,39632
Senegal	2017	7,407486186	19,4291	2,0623	3,66736
Sierra Leonne	2010	5,346466052	18,8725	3,43629	11,165
Sierra Leonne	2011	6,315045036	21,1311	3,6557	13,1142
Sierra Leonne	2012	15,18176908	19,9033	3,53079	13,1649
Sierra Leonne	2013	20,71576829	-8,67449	0,082152	11,2112
Sierra Leonne	2014	4,556772366	14,621	2,26049	6,10684
Sierra Leonne	2015	-20,59877072	20,3255	3,81154	7,81366
Sierra Leonne	2016	6,055474029	4,23089	0,596193	2,46501

Sierra Leonne	2017	4,211182649	95,101	9,66392	21,4342
Togo	2010	6,099259161	14,8595	1,79129	3,86314
Togo	2011	6,398199052	27,2001	2,75402	3,72141
Togo	2012	6,543507031	23,7265	2,25094	3,78806
Togo	2013	6,112343078	24,3705	1,17815	3,82279
Togo	2014	5,920588571	14,2178	0,242159	2,49012
Togo	2015	5,742868453	-15,3391	-3,76906	3,32446
Togo	2016	5,559079306	60,803	3,38294	2,023
Togo	2017	4,357413915	16,0839	1,06503	2,03816

Descriptive Statistics

Variables	GDPG	ROA	ROE	NIM
Mean	4.859967	2.116198	16.79176	5.989097
Median	5.382500	1.974160	16.08000	4.778535
Maximum	20.71577	9.663920	95.10100	21.43420
Minimum	-20.59877	-3.769060	-32.95120	1.162210
Std. Dev.	4.368862	1.767879	13.46648	3.551930
Skewness	-1.508308	0.305705	1.404750	1.456380
Kurtosis	13.81240	6.409249	14.11754	5.652688
Observations	112	112	112	112
Jarque-Bera	588.0372	55.98508	613.6338	72.43100
Probability	0.000000	0.000000	0.000000	0.000000

Panel Data GMM

Dependent Variable: GDP

Method: Panel Generalized Method of Moments

Instrument specification: @DYN(GDP,-2) NIM(-1) ROA(-1) ROE(-1)

Transformation: First Differences

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.198265	0.024923	7.955183	0.0000
NIM	0.191316	0.095155	2.010577	0.0477**
ROA	2.471291	1.201398	2.057013	0.0000***
ROE	0.265639	0.163544	1.624264	0.0002***

Stationary Test

Null Hypothesis: Unit root (individual unit root process)

Series: GDP

Date: 05/04/21   Time: 13:59

Sample: 2010 2017

Exogenous variables: Individual effects, individual linear trends

User-specified lags: 1

Total (balanced) observations: 84

Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	48.8986	0.0086
ADF - Choi Z-stat	-0.90098	0.1838

Null Hypothesis: Unit root (individual unit root process)

Series: GDP

Date: 05/04/21   Time: 14:08

Sample: 2010 2017

Exogenous variables: Individual effects

User-specified lags: 1

Total (balanced) observations: 84

Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	47.3910	0.0125
ADF - Choi Z-stat	-1.60512	0.0542

Null Hypothesis: Unit root (individual unit root process)

Series: ROA
Date: 05/04/21   Time: 14:10
Sample: 2010 2017
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 84
Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	57.1980	0.0009
ADF - Choi Z-stat	-1.98854	0.0234

** Probabilities for Fisher tests are computed using an asymptotic Chi
      -square distribution. All other tests assume asymptotic normality.

Null Hypothesis: Unit root (individual unit root process)
Series: ROA
Date: 05/04/21   Time: 14:11
Sample: 2010 2017
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 84
Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	33.8615	0.2055
ADF - Choi Z-stat	1.06248	0.8560

** Probabilities for Fisher tests are computed using an asymptotic Chi
      -square distribution. All other tests assume asymptotic normality.

Null Hypothesis: Unit root (individual unit root process)
Series: ROE
Date: 05/04/21   Time: 14:14
Sample: 2010 2017
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 84
Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	48.3662	0.0098
ADF - Choi Z-stat	-1.60384	0.0544

Null Hypothesis: Unit root (individual unit root process)
Series: ROE
Date: 05/04/21   Time: 14:16
Sample: 2010 2017
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 84
Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	29.8920	0.3684
ADF - Choi Z-stat	1.01131	0.8441

** Probabilities for Fisher tests are computed using an asymptotic Chi
      -square distribution. All other tests assume asymptotic normality.

Null Hypothesis: Unit root (individual unit root process)
Series: NIM
Date: 05/04/21   Time: 14:18
Sample: 2010 2017
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 84
Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	15.5881	0.9715
ADF - Choi Z-stat	1.88732	0.9704

Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 84
Cross-sections included: 14

Method	Statistic	Prob.**
ADF - Fisher Chi-square	36.6346	0.1271

ADF - Choi Z-stat	1.06233	0.8560

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Arellano-Bond Serial Correlation Test

Equation: EQ01
Date: 05/04/21   Time: 17:37
Sample: 2010 2017
Included observations: 84

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-5.073939	-763.734250	150.520963	0.0000
AR(2)	-0.969046	-707.723357	730.329727	0.3325