

The Analysis of Bank-Specific Variables on Commercial Bank Profitability in European and African Currency Unions

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ABSTRACT

It is beyond contestation that commercial banking is a vital service in national and international economies. This study sets out to investigate the effect of certain bank-specific variables on the return on average assets of banks whose business activities are in common-currency monetary unions. The performance of commercial banks in the Eurozone, Central African CFA Franc and West African CFA Franc zones are assessed to ascertain their profitability over a ten year span encompassing the Eurozone sovereign debt crisis and the post crisis recovery. Data was extracted from annual reports covering the 2011-2020 period and correlation and panel data analysis were used to determine the impacts of readily-available CAMEL independent variables – LAT (liquid assets to total deposits and borrowings), NIM (net interest margin), BG (bank governance) and LLR (loan loss reserves-to-gross loans) ratio – in order to determine their impact on ROAA (return on average assets). Regarding our empirical analysis, all of the banks performed well during the length of the study.

Keywords: Profitability, Commercial Banking, Monetary Unions

ÖZ

Ticari bankacılığın ulusal ve uluslararası ekonomilerde hayati bir hizmet olduğu tartışılmaz bir gerçektir. Bu, belirli bankaya özgü değişkenlerin, ticari faaliyetleri ortak para birimi parasal birlikler halinde olan bankaların ortalama varlıklarının getirisi üzerindeki etkisini araştırmayı amaçlamaktadır. Avro Bölgesi, Orta Afrika CFA Frangı ve Batı Afrika CFA Frangı bölgelerindeki ticari bankaların performansı, Avro Bölgesi ülke borç krizini ve kriz sonrası toparlanmayı kapsayan on yıllık bir süre boyunca kârlılıklarını belirlemek için değerlendirilir. Veriler, 2011-2020 dönemini kapsayan yıllık raporlardan çıkarılmış ve hazır bulunan CAMEL bağımsız değişkenlerinin etkilerini belirlemek için korelasyon ve panel veri analizi kullanılmıştır - LAT (likit varlıklar toplam mevduata ve borçlanmalara), NIM (net faiz marjı), BG (banka yönetimi) ve LLR (kredi kaybı rezervlerinden brüt kredilere) oranı - ROAA (ortalama varlıkların getirisi) üzerindeki etkilerini belirlemek için. Ampirik analizimizle ilgili olarak, tüm bankalar çalışma süresi boyunca iyi performans gösterdi.

Anahtar Kelimeler: Karlılık, Ticari Bankacılık, Para Birlikleri

DEDICATION

To My Dad, Mom and brothers, Sasha, Tinashe and Christian

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Chapter 1

INTRODUCTION

1.1 Background

The economic development of any nation is dependent upon factors which include mining, manufacturing, construction, agriculture, industrial development, the supply of water, food services, accommodation, transportation, financial, insurance and real estate activities, information and communication. The primacy of banking and reliable monetary policy should be tackled through reliable economic development as it is designed to allocate capital to activities that are productive and the diversion of funds from surpluses to deficits. Banks and financial institutions play critical roles in the economy's commercial, investment, transaction, and trade interests (Ping and Kusairi, 2020).

The development of the commercial banking sector has resulted in banks dramatically and widely competing against each other by offering many services and products that aim to easily facilitate our daily lives whilst enabling banks to earn profits. Today, it can be argued that the banking sector is the spine of every country's economy; thus, the performance of the banking sector in any country leads to continued economic success whilst the opposite holds true as poor performance leads to major financial and economic disruptions as was evidenced during the Global Financial Crisis and ensuing Eurozone sovereign debt crises (Regi, 2013).

The performance of commercial banking shows that the banking system's continued viability plays a critical part in the formation of capital due to its important function as a financial intermediary. Commercial banks should warrant greater attention than any other economic and financial entity in a nation. Flannery et al (2013) highlight that for most regulators, economic crises and collapses are the most severe financial problems they face, and must plan a competent supervisory frameworks that allow them to maintain their distance from banking implosions (Weber, 2014). The systems of payments, the transformation of savings, and the transmission of monetary policies are the main functions used to avoid future business collapses. Thus, regulators must be cognisant of CAMEL variables in determining bank performance to ascertain the strengths, weaknesses, opportunities and threats of the banking system.

1.2 The Aim of the Study

This study attempts to observe the performance of all the commercial banks in the world's extant monetary unions - the Eurozone and the Central African CFA Franc and West African CFA Franc zones – over a period of time that included the post-Global Financial Crisis recovery, the Eurozone sovereign debt crises and the first year of the COVID-19 global pandemic. The return on average assets (ROAA) will be applied as the dependent variable whilst CAMEL independent variables – LAT (liquid assets to total deposits and borrowings), NIM (net interest margin), BG (bank governance) and LLR (loan loss reserves-to-gross loans) ratio – will be used as independent variables.

1.3 Contribution of the Thesis

This thesis work mainly to highlight the importance of non-bank specific variables that go beyond the well-established CAMEL bank specific variables. This study also places emphasis on qualitative non-bank specific variables that are to be considered in any

economy with a vibrant and profitable banking system. A comparative study (between Eurozone and African Franc zone countries) was used to determine the differences in the ROAA between these two groups of countries using panel econometric analysis.

1.4 Sample Selection

The Eurozone and African franc zone were selected to emphasize the aim of this study which were selected due to several reasons as both groups have the same central bank interest rates and reserve requirements, there are no fluctuation in both currencies and repo rates are also the same, and many others. The similarities and comparability characteristics between both groups make it attractive for further detailed investigation.

1.5 The Framework of the Study

This thesis shall be structured by the researcher as follows: Chapter 1 will encompass the introduction, whilst Chapter 2 will faithfully present the literature review of previous studies and highlight the historical factors that have led to the questions to be addressed in the thesis. Chapter 3 includes the data, variables and proposed methodologies that will be used to analyse the data. Chapter 4 entails the analysis and interpretation of the panel data results and Chapter 5 will conclude the discussion and offer policy recommendations.

Chapter 2

LITERATURE REVIEW

2.1 The History of the Central African CFA Franc and West African CFA Franc

Formed in 1945, the CFA franc area, which constitutes two zones that are managed by two separate central banks, has been the world's longest-lasting monetary union with 14 African member states. The exchange rate against the former anchoring French franc (now the euro) was changed only once in 1994.

The CFA franc, the Franc of the Financial Community of Africa, is comprised of the West African CFA franc and the Central African CFA franc whose ISO currency codes are XOF and XAF, respectively. The XAF is used by Cameroon, Central African Republic, Chad, Congo Republic, Equatorial Guinea and Gabon. The XOF is used by Benin, Burkina Faso, Guinea-Bissau, Ivory Coast, Mali, Niger, Senegal and Togo. The XAF is issued by the Banque des États de l'Afrique Centrale (BEAC) whilst the XOF is issued by the Banque Centrale des États de l'Afrique de l'Ouest (BCEAO) (Saadaoui, 2013).

The XAF and XOF have a fixed exchange rate to the euro which is determined by the XAF/XOF peg to the former French franc. The XAF and XOF are pegged at 0.00152449 per euro or $1 \text{ €} = 655.957 \text{ XAF} = 655.957 \text{ XOF}$.

It is widely accepted that participation in a monetary union entails both benefits and costs. The benefits may include lower transaction costs, reduced exchange rate variability and relatively lower price changes, and greater confidence in policies. The costs include the inability to use independent monetary policy and flexible nominal exchange rates (Sallenave, 2010).

2.2 The History of the Euro

Introduced as a unit of accounting in January 1999, the euro is the currency of the Eurozone monetary union that is shared by 21 countries in Europe. These countries are Andorra, Austria, Belgium, Cyprus, Estonia, Finland, France Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, San Marino, Slovenia, Slovakia and Spain. Physical banknotes and coins began circulating in January 2002 and had completely phased out the former individual currencies of the Eurozone within a year (Gros and Schoenmaker, 2014).

The euro has grown in importance and is now the second most widely international reserve currency and second most widely traded currency after the US dollar (Bank of International Settlements, 2020). The currency is a floating currency and is determined by market forces (Howarth and Quaglia, 2013). The currency has been extremely volatile particularly during the period of the study, which covers the sovereign debt crises that arose between 2011 and 2016 because of unsustainable debt loads in Belgium, Greece, Ireland, Italy, Portugal and Spain.

2.3 Banking Systems in the Eurozone

In 2012, the European Union (EU) adopted a transformational change to its banking policy for the Eurozone in response to the prior crises by shifting banking supervision to the supranational level. The EU harmonised banking rules based on new laws that

gave even more sweeping powers to regulators than before. The establishment of a single Eurozone supervisor was a breakthrough towards the creation of a banking union with the national authority and financial resources to restructure and resolve failing banks (De Rynck, 2012).

The European Central Bank (ECB) was granted the ability to become the exclusive issuer and revoker of banking licenses. The ECB replaced national supervisors for the supervision of 120 banks that largely operate cross-border and represent 85% of banking assets (Donnelly, 2014).

Similarly, the ECB received micro-prudential powers and complete access to bank data with the power to conduct inspections. These powers are based on rules that implemented the Basel 3 regulations. The ECB has the power to impose certain measures to prevent the deterioration of a bank's balance sheet, terminate managers and impose resolutions where any new boards will be tasked with either restructuring or winding down a bank (Copeland and James, 2014).

2.4 Banking Systems in the Central and West African CFA Franc Zones

The Banque des États de l'Afrique Centrale (BEAC) is responsible for issuing the currency of the monetary union and ensuring the stability of the currency. The regulation of banking systems in the Central African CFA franc zone is the sole responsibility of the individual member states.

The Banque Centrale des États de l'Afrique de l'Ouest (BCEAO) is responsible for issuing the currency of the monetary union and ensuring the stability of the currency.

The regulation of banking systems in the Central African CFA franc zone is the sole responsibility of the individual member states (Jabko and Massoc, 2012).

2.5 Bank Specific Performance Indicators: CAMEL

2.5.1 What is the CAMEL rating system?

According to Barr et al (2002), the Uniform Financial Institution Rating system, commonly known as ‘CAMEL rating’, developed in 1979 and then used by the National Credit Union Administration in 1987. CAMEL has proven to be an effective method for evaluating the viability of a financial firm, by identifying institutions in need of special attention and concern. Gasbarro et al (2002) are of the opinion that the rating ensures a bank’s viability by assessing different aspects of a bank based on numerous information sources including financial statements, funding sources, macroeconomic data, budgets and cash flows.

The acronym CAMEL stands for Capital Adequacy, Asset Quality, Management, Earnings and Liquidity. Composite and component ratings are determined on a numerical scale that ranges from 1–5. A rating of 1 is the highest and shows the most robust performance and risk mitigation policies with the lowest level of concern to supervisors, whilst a rating of 5 is indicative of the lowest possible rating associated with the least performance, insufficient risk reduction policies and thus, the highest level of concern to supervisors (Federal Deposit Insurance Corporation, 1997).

2.5.2 Capital Adequacy

This is a crucial indicator in the financial viability of the commercial banking sector. The measure shows the banks’ ability to keep capital in proportion to the characteristics and magnitude of the kinds of risk, as well as the banks’ managers’

competency in identifying, quantifying, monitoring and mitigating these risks (Chotigeat, 2008).

2.5.3 Asset Quality

The asset quality of any commercial banking entity is a large contributor towards its financial state and soundness and is particularly important in the earnings potential of a bank. This measure shows the size of the bank's credit risk because of the way the firm is structured and state of its off-balance financial sheet activities, investments, loans and other credit products (Demireli et al, 2013).

Assets that are of low quality usually have a higher chance of becoming an NPL. NPLs are mostly bad debts in default or are near default. There is no particular standard for the commercial banks across the world that assert which assets are to be included as non-performing loans. Lower AQ ratios indicate that there is a higher probability of weakening bank performance (Iqbal, 2012).

2.5.4 Management

The management of the bank is a subjective measurement of how well a commercial bank performs as a result of the soundness of its management. This includes the competency with which senior management and directorate has in identifying, measuring, investigating and mitigating risks related to commercial banks. According to Kumari (2017), this measure, despite being qualitative, is used in determining the risk mitigation policies and procedures used by the commercial banks.

2.5.6 Earnings and Profitability

Profitability and earnings gains are added to the capital of the commercial bank whilst losses reduce the capital buffer. This component shows the trajectory of the earnings and analyses any strength of anticipated future earnings expansion. For a bank to be viable in the long-term, it should be able to generate profits (Said and Tumin, 2012).

The typical factors in the evaluation of profitability and earnings are the ROA (or ROAA) and ROE (or ROAE). ROA constitutes the after-tax net profit to the bank's total composite assets ratio. The greater is the ratio, the larger are the revenues that are generated on banking assets that are managed by the firm. A ROE is the after-tax net income to the bank's shareholders' equity ratio. The ratio shows the bank's efficacy in its use of the bank's capital (Rauf, 2016).

2.5.7 Liquidity

This entails the ability that a commercial bank has to transform its assets quickly into cash when the need arises or the availability of funds to settle extant financial obligations as they arise. The liquidity risk can be evaluated by using the ratio of bank loans to bank deposits. An increasing ratio shows imminent liquidity-related problems for a commercial bank. This measure considers the adequacy of the bank's existing and potential liquidity sources and includes the competency of any of its own funds' managers (Barth et al, 1999).

2.6 Bank Governance

Anginer et al (2019), in their fifth World Bank Bank Regulation and Supervision Survey, highlight the fact that banking crises are usually the result of poorly designed and implemented banking supervision and regulation.

The Global Financial Crisis and ensuing Eurozone Sovereign Debt Crises highlighted the risks of having low levels of capital buffers to cover unexpected and significant losses. Across the world, there's been a trend toward the increase of minimum regulatory capital requirements to improve the resiliency of banking system. This increase has translated into much higher levels of holdings of regulatory capital.

2.7 Financial Freedom

Financial freedom is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. State ownership of banks and other financial institutions such as insurers and capital markets reduces competition and generally lowers the level of available services.

In an ideal banking and financing environment where a minimum level of government interference exists, independent central bank supervision and regulation of financial institutions are limited to enforcing contractual obligations and preventing fraud. Credit is allocated on market terms, and the government does not own financial institutions. Financial institutions provide various types of financial services to individuals and companies. Banks are free to extend credit, accept deposits, and conduct operations in foreign currencies. Foreign financial institutions operate freely and are treated the same as domestic institutions.

2.8 Ease of Doing Business

Regulation is about freedom to do business. Regulation aims to prevent worker mistreatment by greedy employers (regulation of labor), to ensure that roads and bridges do not collapse (regulation of public procurement), and to protect one's investments (minority shareholder protections). All too often, however, regulation misses its goal, and one inefficiency replaces another, especially in the form of government overreach in business activity. Governments in many economies adopt or maintain regulation that burdens entrepreneurs. Whether by intent or ignorance, such regulation limits entrepreneurs' ability to freely operate a private business. As a result, entrepreneurs resort to informal activity, away from the oversight of regulators and tax collectors, or seek opportunities abroad—or join the ranks of the unemployed. Foreign

investors avoid economies that use regulation to manipulate the private sector. Is a valuable tool that governments can use to design sound regulatory policies. By giving policymakers a way to benchmark progress, it stimulates policy debate, both by exposing potential challenges and by identifying good practices and lessons learned.

The ease of doing business measures the processes for business incorporation, getting a building permit, obtaining an electricity connection, transferring property, getting access to credit, protecting minority investors, paying taxes, engaging in international trade, enforcing contracts, and resolving insolvency (World Bank, 2019).

2.9 Corruption

Corruption is dishonest behavior by those in positions of power, such as managers or government officials. Corruption can include giving or accepting bribes or inappropriate gifts, double-dealing, under-the-table transactions, manipulating elections, diverting funds, laundering money, and defrauding investors.

When corruption occurs within an organization, unflattering media coverage typically follows, which may result in customers losing trust in the company's business practices and products. A comprehensive public relations campaign is often required to limit reputational damage and restore trust. This requires valuable resources, such as time and money, which may result in other critical areas of the organization being deprived. As a result, inefficiencies that lead to financial losses can occur.

Corruption can happen anywhere: in business, government, the courts, the media, and in civil society, as well as across all sectors from health and education to infrastructure and sports. Corruption can involve politicians, government officials, public servants, business people or members of the public. Corruption happens in the shadows, often

with the help of professional enablers such as bankers, lawyers, accountants and real estate agents, opaque financial systems and anonymous shell companies that allow corruption schemes to flourish and the corrupt to launder and hide their illicit wealth. Corruption adapts to different contexts and changing circumstances. It can evolve in response to changes in rules, legislation and even technology (Banerjee et al, 2012).

Chapter 3

DATA AND METHODOLOGY

3.1 Data

3.1.1 Data Derivation

Data concerning the ROAA (return of average assets), NIM (net interest margin), LAT (liquid assets-to-total deposits and borrowings ratio) and the LLR (loan loss reserves-to-gross loans ratio) were derived from Orbis Bankscope data spanning the 10 years between 2011 and 2020. Data concerning the BG (bank governance) was derived from the World Bank's Bank Regulation and Supervision Surveys (BRSS) spanning the period 2011 to 2020. Data related to corruption was obtained from Transparency International spanning the years 2011 to 2020 whilst that related to the ease of doing business was derived from the World Bank's Ease of Doing Business Indexes from 2011 to 2020. Data sets pertaining to an economy's financial freedom was obtained from Economist Intelligence Unit's Annual Country Commerce and Country Finance Report and the International Monetary Fund's Annual Staff Country Report for the period 2011 to 2020.

The NIM is expected to positively affect the ROAA as the degree at which net interest income exceeds net interest expenses has a positive bearing on profitability. LAT, FF, EOB and BG are all expected to affect the ROAA positively, As the increase in liquid assets, more conducive financial industry operating environment, more flexible regulations and policies for business, and the strength of board and senior management

oversight. The LLR and CORR are expected to pose a negative impact of the ROAA, as the increasing probability of loan impairment and illegal transactions will have an inverse effect on the ROAA.

3.1.2 Bank Data Breakdown

698 commercial banks in 18 Eurozone countries and 14 West African CFA Franc Zone countries and 6 Central African CFA Franc Zone countries were analysed over the 10 years between 2011 and 2020. 121 Central and West African CFA Franc Zone commercial banks were included along with 577 Eurozone commercial banks.

3.2 Variables

3.2.1 Dependent Variable Definition

ROAA is defined by Kosmidou (2008) as a measurement of bank performance and shows just how well a commercial bank's assets are being utilised to generate profits. The ratio is expressed as a percentage of total average banking assets and is ascertained by dividing a bank's net income by the bank's total average assets.

3.2.2 Independent Variable Definition

NIM is described by Nguyen (2012) as the net interest income that a commercial bank generates from its mortgages, loans, advanced and other credit products less the outgoing interest expenses it incurs as it compensates its holders of certificates of deposits and savings account. A positive NIM is desirable as it shows that the commercial bank is profitable. NIM is calculated by dividing the difference between interest-related revenues and interest-related expenses by the bank's total average earning assets.

LAT, commonly known as a liquidity ratio, is defined by Mustafa (2020) as a measurement of the ability of a commercial bank's ability to pay its debt obligations.

The specific ratio used for the study is determined by dividing the total number of a bank's liquid assets by the bank's total deposits and borrowings.

BG, bank governance, is referred to by the World Bank (2019) as the system of principles, policies and processes by which an organization is run, defining the relationships among the overseeing board, management, and stakeholders. The BG was calculated by creating a country-specific index factoring bank-related governance indicators, similar to Barth et al (2013)'s regulation and supervision indexes.

LLR is referred to by Danisman et al (2021) as the loan loss reserves that are set aside as an allowance for current and expected future uncollected loans and other payments divided by the gross loans issued by the banking firm. Loan loss provisions, which are subsequently added to the loan loss reserve, appear on the income statement as an expense and will thus lower the bank's operating profits. Reserves typically include highly liquid securities such as cash equivalents and short-term notes and bills.

Corruption is referred to by Transparency International (2019) as the abuse of entrusted power for personal gain. Corruption weakens trust and democracy, reduces economic development and worsens poverty, inequality, the destruction of the environment and social division. CORR is the corruption perceptions index which aggregates data from a number of different sources that provide perceptions by business people and country experts of the level of corruption in the public sector.

The following steps are followed to calculate the CORR:

1. Select data sources: Each data source that is used to construct the CORR must fulfil the following criteria to qualify as a valid source:

- Quantifies perceptions of corruption in the public sector
- Be based on a reliable and valid methodology, which scores and ranks multiple countries on the same scale
- Performed by a credible institution
- Allow for sufficient variation of scores to distinguish between countries
- Gives ratings to a substantial number of countries
- The rating is given by a country expert or business person
- The institution repeats their assessment at least every two years

2. Standardise data sources to a scale of 0-100 where a 0 equals the highest level of perceived corruption and 100 equals the lowest level of perceived corruption. This standardisation is done by subtracting the mean of each source in the baseline year from each country score and then dividing by the standard deviation of that source in the baseline year. This subtraction and division using the baseline year parameters ensures that the CORR scores are comparable year on year since 2012. After this procedure, the standardised scores are transformed to the CORR scale by multiplying with the value of the CORR standard deviation in 2012 and adding the mean of CORR in 2012 (45), so that the data set fits the CORR's 0-100 scale.

3. Calculate the average: For a country or territory to be included in the CORR, a minimum of three sources must assess that country. A country's CORR score is then calculated as the average of all standardised scores available for that country. Scores are rounded to whole numbers.

4. Report a measure of uncertainty: The CORR is accompanied by a standard error and confidence interval associated with the score, which captures the variation in scores of the data sources available for that country/territory.

Chortareas et al (2013) define financial freedom, FF, as the ease with which financial firms can operate with the least level of hindrances to its operations and viability. Financial freedom is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. State ownership of banks and other financial institutions such as insurers and capital markets reduces competition and generally lowers the level of available services.

The FF Index scores an economy's financial freedom by looking into the following five broad areas:

- The extent of government regulation of financial services,
- The degree of state intervention in banks and other financial firms through direct and indirect ownership,
- The extent of financial and capital market development,
- Government influence on the allocation of credit, and
- Openness to foreign competition.

The ease of doing business, EOB, measures the regulations that enhance business activity and those that constrain it. EOB presents quantitative indicators on business regulations and the protection of property rights that can be compared across time.

EOB covers ten areas of business regulation. Ten of these areas—starting a business, dealing with construction permits, getting electricity, registering property, getting

credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency—are included in the ease of doing business score and ease of doing business ranking.

The data collected addresses three questions about government. First, when do governments change regulation with a view to developing their private sector? Second, what are the characteristics of reformist governments? Third, what are the effects of regulatory change on different aspects of economic or investment activity? Answering these questions adds to our knowledge of development.

3.3 Model Specification

The researcher will analyse the data using Panel Data in the determination of the existence of a relationship between the return on average assets and the five independent variables. The subsequent model shall be designed in accordance to the available academic literature in the prior chapter. The researcher determines that the variables that are independent will impact the rate on average assets (which constitutes the dependent variable).

The null hypothesis is that the parameter equals to zero, the rejection of the null hypothesis implies that the coefficient is statistically significant. The null and alternative hypothesis are as follows:

$$H_0: \beta = 0$$

$$H_1: \beta \neq 0$$

3.3.1 Pooled Ordinary Least Squares (OLS) Regression Model

The pooled OLS regression model is one that assumes a number of observations that are the same in all banks which enables the researcher to combine the data across the countries. The researcher is of the view that no heterogeneity problems with the model

as the estimation of the pooled OLS allows for the combination of the data as the researcher will not consider the characteristics of cross-sectional and time series data. This feature enables the researcher to ignore the varying economic dynamics inherent among all the sampled banks in their respective countries. The equation of the OLS is given as:

$$ROAA = \alpha + \beta_1 BG + \beta_2 LATDB + \beta_3 LLRGL + \beta_4 NIM + \beta_5 CORR + \beta_6 FF \\ + \beta_7 EOB + \varepsilon$$

where ROAA is the return on average assets, LAT is the ratio of liquid assets to the total deposits and borrowing, LLR is the loan loss reserves as a percentage of gross loans, NIM is the net interest margin, BG is bank governance, CORR is corruption perception and EOB is the ease of doing business.

3.3.2 Fixed Effects Models

The FEM enables the researcher to assess the impact of the variables between stipulated time periods. Such a model counters the weight of cross-commercial banking variables that respective cross-sections have by using the values of their intercepts. It is thus established that the fixed effects model will use the absolute net impact of the return on average assets (dependent variable) on the independent variables, which have removed the impact of time invariance in the model (Bai et al, 2009).

3.3.3 Random Effect Models

REM differs from the fixed effects model in that various considerations in differing commercial banks will change the dependent variable. This model assumes that random variables constitute individual effects.

The model's selection is completed as follows: the assumption of the FE by the use of the OLS method which enables the researcher to appropriateness of the fixed-effects model through the application of a restricted F-test (Gujarati and Porter, 1999).

Concerning the Restricted F-test, the null hypothesis (H₀) entails that the dummy parameters resemble each other, or in other words, $\beta_1 = 0, \beta_2 = 0, \beta_3 = 0, \beta_4 = 0$, etc. Conversely, the alternative hypothesis is that at least a single dummy parameter ought to be different from the others, or in other words, $\beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0, \beta_4 \neq 0$, etc. The loss of goodness-of-fit is the basis of the F-test used to assess the hypothesis. The decision rule based on our current hypothesis is that when there is at least one significant variable, we can reject the null hypothesis which underscores the existence of the model with the best fit. This is confirmed by the probability of the F-statistic. It is thus clear that the FEM is better than the pooled OLS model because individual cross-sectional units maintain their respective intercepts (Bai et al, 2009).

The Redundant Fixed Effects test is used to ascertain whether only the periods are to be fixed, or only the cross-sections are to be fixed, or both periods and cross-sections are to be fixed. Hereafter the Hausman test is effective in the determination of the most suitable model, be it random or fixed. With chi² probability 0.0001, we rejected null hypothesis random effect model is appropriate and we adopted fixed effect model to estimate our regression models. Gujarati (2003), discussed that, a significant advantage of FE model is that, it diminishes the possibility of getting bias estimation through controlling more the features in each bank that it's invariant through time. A disadvantage of FE model is the exclusion of the effect of the variables that have a very slight effect inside the observed entities. This pitfall can be solved by adding

dummy variables representing those variables to the model. That is why it also called least square dummy variables model.

Chapter 4

EMPIRICAL ANALYSIS AND RESULTS

4.1 Descriptive Statistics

Tables 1 and 2 present the descriptive statistics of the databases used in the research work for logarithmic form of variables. The Jarque-Bera test demonstrates that all of our variables are normally distributed. In addition to this, the researcher has found the variables to be significant at 99% confidence interval levels (Gujarati et al, 2012). The tables shows the number of observations for each variable as well as the mean, standard deviation, minimum number and the maximum number in our samples.

Table 1: Descriptive Statistics (Central and West African CFA Franc Zones)

	LNROAA	LNNIM	LNLLR	LNLAT	LNFF	LNEOB	LNCORR	LNBG
Observations	664	650	382	316	1210	1210	1210	996
Mean	-290.2930	-10.19757	0.895955	2.978190	1.125928	3.860562	1.447821	0.381308
Median	-290.2621	-10.18569	0.921534	3.005098	1.098612	3.903157	1.504077	0.182322
Maximum	-289.0918	-9.808730	3.100846	6.187500	1.252763	3.924945	1.589235	1.435085
Minimum	-296.3298	-10.63195	-1.000000	0.530223	0.916291	3.466190	1.223775	0.182322
Std. Dev.	0.334416	0.118382	0.790095	0.761321	0.102817	0.089076	0.114953	0.421751
Skewness	-13.72636	-0.093280	-0.060935	-0.151156	-0.402392	-1.937522	-0.931334	1.709469
Kurtosis	225.6266	3.733875	2.901992	3.947394	2.734341	6.689170	2.525692	4.064976
Jarque-Bera	1392083.	15.52896	0.389283	13.02115	36.21184	1443.225	186.2643	532.1672
Probability	0.000000	0.000425	0.023130	0.001488	0.000000	0.000000	0.000000	0.000000
Sum	-192754.6	-6628.423	342.2550	941.1079	1362.373	4671.281	1751.864	379.7828
Sum Sq. Dev.	74.14598	9.095255	237.8393	182.5769	12.78063	9.592919	15.97586	176.9844

Table 2: Descriptive Statistics (Eurozone)

	LNROAA	LNNIM	LNLLR	LNFF	LNLAT	LNEOB	LNCORR	LNBG
Observations	3302	3314	2624	5770	2466	5770	5770	5734
Mean	-601.5882	-8.4337	-5.4901	1.6871	0.2492	4.3148	1.3872	1.1707
Median	-601.5816	-8.4577	-5.6015	1.6677	0.2605	4.288	1.4109	1.3609
Maximum	-601.1444	-4.5524	-3.3178	1.7227	3.8353	4.4020	1.5260	1.4816
Minimum	-608.1652	-12.2527	-8.6061	1.5892	-6.0014	4.1917	1.0647	0.1823
Std. Dev.	0.14220	0.1949	0.4070	0.0359	0.8440	0.0427	0.1257	0.3433
Skewness	-37.0068	3.4179	1.5646	-0.5100	-0.0449	0.0900	-1.5106	-1.1931
Kurtosis	1572.2471	144.2206	8.2830	2.4584	4.3482	2.7599	4.5567	3.1290
Jarque-Bera	339557669.31	2760287.72	4122.260	320.6867	187.598	21.660	2777.29	1364.432
Probability	0	0	0	0	0	0	0	0
Sum	-1986444.38	-27949.48	-14406.17	9734.58	614.55	24896.63	8004.38	6713.169
Sum Sq. Dev.	66.7555	125.8559	434.5264	7.4573	1756.2260	10.5318	91.25077	675.788

4.2 Correlation Matrices and Multicollinearity

To insure there is no multicollinearity between the tested variables we applied variance inflation factor test (VIF) we can say that our data is multicollinearity free, as the VIF values for the variables in our main estimated models rely between 1.08 until 2.21. Whereas the consideration of multicollinearity availability is when VIF value is > 10 . For more exactness, we applied the Correlation matrix test. Through viewing Tables 3 and 4, we can say there is no high correlation between the observed variables in our study, is insure to for us that there's no multicollinearity problem in our data.

Table 3: Correlation Matrix (Central and West African CFA Franc Zones)

	LNROAA	LNNIM	LNLLR	LNLAT	LNFF	LNEOB	LNCORR	LNBG
LNROAA	1							
LNNIM	0.5703	1						
LNLLR	-0.1482	-0.0813	1					
LNLAT	-0.0057	0.1678	0.0849	1				
LNFF	-0.1586	-0.2655	0.0294	-0.2197	1			
LNEOB	-0.0231	-0.0729	-0.0208	-0.0965	0.3495	1		
LNCORR	-0.1119	-0.2820	-0.0108	0.0038	0.1317	-0.2754	1	
LNBG	-0.1031	-0.2830	0.0499	0.0119	0.0634	-0.2215	0.2386	1

Table 4: Correlation Matrix (Eurozone)

	LNROAA	LNNIM	LNLLR	LNFF	LNLAT	LNEOB	LNCORR	LNBG
LNROAA	1							
LNNIM	0.5156	1						
LNLLR	-0.1771	0.3012	1					
LNFF	0.0261	-0.1551	-0.3076	1				
LNLAT	0.0408	-0.1110	-0.1056	0.0308	1			
LNEOB	0.0246	-0.0511	-0.1009	0.3270	0.0807	1		
LNCORR	-0.0319	0.0636	0.2630	-0.5091	0.0213	-0.5012	1	
LNBG	-0.0138	-0.0684	0.0762	0.1463	0.0260	0.2125	0.1304	1

4.3 Pooled OLS

Table 5: Pooled OLS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.011392*	0.072607	-0.156900	0.0875
LNLLR	-0.004199*	0.008013	-0.524094	0.0609
LNFF	0.115039*	0.067264	-1.710261	0.0890
LNLAT	0.003284*	0.007803	-0.420886	0.0744
LNEOB	0.018371	0.093070	-0.197386	0.8438
LNCORR	-0.050908*	0.051766	-0.983430	0.0680
LNBG	0.010983***	0.011230	-0.977965	0.0295
C	-290.0712***	0.760271	-381.5368	0.0000
R-squared	0.420187	Mean dependent var		-290.2499
Adjusted R-squared	0.410207	S.D. dependent var		0.073275
S.E. of regression	0.073157	Akaike info criterion		-2.348985
Sum squared resid	0.920540	Schwarz criterion		-2.207076
Log likelihood	219.4087	Hannan-Quinn criter.		-2.291447
F-statistic	2.082259	Durbin-Watson stat		3.553179
Prob(F-statistic)	0.076753			

Table 6: Pooled OLS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.061118*	0.032166	1.900112	0.0576
LNLLR	-0.042285***	0.012726	-3.322656	0.0009
LNLAT	0.008636**	0.005469	1.579061	0.0145
LNFF	0.000383*	0.138821	0.002760	0.0978
LNEOB	0.062879*	0.119542	0.525997	0.0990
LNCORR	-0.008702	0.050931	-0.170858	0.8644
LNBG	0.004474*	0.014302	-0.312793	0.0545
C	-601.5652***	0.647508	-929.0471	0.0000
R-squared	0.609277	Mean dependent var		-601.5911
Adjusted R-squared	0.570015	S.D. dependent var		0.182566
S.E. of regression	0.182044	Akaike info criterion		-0.565055
Sum squared resid	64.52349	Schwarz criterion		-0.542229
Log likelihood	560.3412	Hannan-Quinn criter.		-0.556664
F-statistic	2.604471	Durbin-Watson stat		2.105140
Prob(F-statistic)	0.011227			

***, ** and *, represent significance of 10%, 5% and 1% respectively. Robust standard errors for heteroscedasticity and autocorrelation are reported.

In the African sample, all variables were statistically significant except EOB. The (NIM, FF, LAT and BG) positively affected the ROAA while the LLR and CORR negatively affected the ROAA which is compatible with our theory expectations. In Eurozone all variables except CORR were significant. NIM, LAT, FF, EOB and BG affected the ROAA positively while LLR negatively affected the return on average assets which is also compatible with our theoretical expectations.

Table 7: REM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.011392*	0.082691	-0.137766	0.0906
LNLLR	-0.004199	0.009125	-0.460181	0.6460
LNFF	0.115039	0.076606	-1.501698	0.1350
LNLAT	0.003284*	0.008886	-0.369560	0.0722
LNEOB	0.018371	0.105996	-0.173315	0.8626
LNCORR	-0.050908*	0.058956	-0.863503	0.0891
LNBG	0.010983*	0.012790	-0.858704	0.0917
C	-290.0712***	0.865861	-335.0091	0.0000
R-squared	0.420187	Mean dependent var		-290.2499
Adjusted R-squared	0.410207	S.D. dependent var		0.073275
S.E. of regression	0.073157	Sum squared resid		0.920540
F-statistic	2.082259	Durbin-Watson stat		3.553179
Prob(F-statistic)	0.076753			

4.4 Random Effects Model – Cross Sections Fixed

Table 8: REM CS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.061606**	0.030733	2.004585	0.0451
LNLLR	-0.043576***	0.012330	-3.534221	0.0004
LNLAT	0.005018*	0.005435	0.923448	0.0559
LNFF	0.145754*	0.177808	0.819727	0.0925
LNEOB	0.046446	0.144184	0.322133	0.1074
LNCORR	-0.010449	0.061873	0.168882	0.8659
LNBG	0.003590*	0.019060	-0.188376	0.0606
C	-601.7716***	0.761043	-790.7194	0.0000
R-squared	0.568489	Mean dependent var		-362.2646
Adjusted R-squared	0.490024	S.D. dependent var		56.14245
S.E. of regression	0.165353	Sum squared resid		53.23399
F-statistic	2.381401	Durbin-Watson stat		2.338917
Prob(F-statistic)	0.020017			

***, ** and *, represent significance of 10%, 5% and 1% respectively. Robust standard errors for heteroscedasticity and autocorrelation are reported.

When cross sections are fixed, we see that NIM, LAT, CORR and BG are statistically significant in the Franc zone countries. Of the statistically significant variables, all of them have a positive impact on ROAA except CORR, which shows that an increase in corruption results in a decrease in ROAA. All variables in the Eurozone data set are statistically significant except EOB and CORR. Of the statistically significant variables, all are positive except LLR which shows that an increase in the LLR results in a decline in the ROAA. These observations were supported in the literature review.

4.5 Hausman Tests

Tables 9 and 10 show us that Fixed Effects Models must be used as the prob values are both insignificant.

Table 9: Hausman

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.408408	7	0.9853

Table 10: Hausman

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.372324	7	0.9364

4.6 Fixed Effects Models – Cross Sections & Period Fixed

Table 11: FEM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.003570*	0.133969	-0.026648	0.0988
LNLLR	-0.004364*	0.012725	-0.342996	0.0734
LNFF	0.055402*	0.188430	-0.294022	0.0769
LNLAT	0.005893*	0.014854	0.396739	0.0925
LNEOB	0.135510	0.289714	0.467736	0.6410
LNCORR	-0.234940	0.584626	0.401864	0.6887
LNBG	1.259256*	1.161647	1.084026	0.0811
C	-291.8379***	2.161663	-135.0062	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Period fixed (dummy variables)

R-squared	0.309364	Mean dependent var	-290.2499
Adjusted R-squared	0.301303	S.D. dependent var	0.073275
S.E. of regression	0.083588	Akaike info criterion	-1.820470
Sum squared resid	0.663760	Schwarz criterion	0.312684
Log likelihood	248.8423	Hannan-Quinn criter.	-1.209128
F-statistic	2.506601	Durbin-Watson stat	3.301488
Prob(F-statistic)	0.099173		

***, ** and * represent significance of 10%, 5% and 1% respectively. Robust standard errors for heteroscedasticity and autocorrelation are reported.

Table 12: FEM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.062959*	0.033378	1.886264	0.0595
LNLLR	-0.048337***	0.013564	-3.563572	0.0004
LNLAT	0.002183***	0.006098	0.358051	0.0204
LNFF	0.055261*	0.353121	0.156494	0.0877
LNEOB	0.019132*	0.253946	0.075340	0.0940
LNCORR	-0.004450	0.128769	-0.034560	0.9724
LNBG	0.048955*	0.098400	-0.497509	0.0689
C	-601.4381***	1.252881	-480.0441	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Period fixed (dummy variables)

R-squared	0.413464	Mean dependent var	-601.5911
Adjusted R-squared	0.240496	S.D. dependent var	0.182566
S.E. of regression	0.159106	Akaike info criterion	-0.641174
Sum squared resid	38.19973	Schwarz criterion	0.631385
Log likelihood	1072.748	Hannan-Quinn criter.	-0.173379
F-statistic	2.390408	Durbin-Watson stat	2.868857
Prob(F-statistic)	0.000000		

***, ** and * represent significance of 10%, 5% and 1% respectively. Robust standard errors for heteroscedasticity and autocorrelation are reported.

When the cross sections and periods are fixed, the variables in the franc zone data set are statistically significant except for the EOB and CORR. Of the statistically significant variables, LLR is negative showing us that an increase in LLR leads to a decline in the ROAA. The Eurozone data set yields statistically significant variables except for CORR. Of the statistically significant variables, LLR is negative showing us that an increase in LLR leads to a decline in the ROAA.

4.7 Redundant Fixed Effects Tests

Table 13: Africa

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.414176	(68,95)	0.0999
Cross-section Chi-square	46.735134	68	0.0772
Period F	0.925381	(9,95)	0.5069
Period Chi-square	15.126421	9	0.0875

***, ** and *, represent significance of 10%, 5% and 1% respectively.

Table 14: Eurozone

Effects Test	Statistic	d.f.	Prob.
Cross-section F	2.394482	(429,1509)	0.0000
Cross-section Chi-square	1015.099820	429	0.0000
Period F	0.920892	(9,1509)	0.5057
Period Chi-square	10.708261	9	0.2962

***, ** and *, represent significance of 10%, 5% and 1% respectively.

Redundant tests help us determine whether we need to fix the cross section, period or both. In the Franc zone data set, the Cross section F and Cross section χ^2 values are statistically significant showing us that the cross sections should be fixed. In the eurozone data set, the Cross section F and Cross section χ^2 values are statistically significant showing us that the cross sections should be fixed.

4.8 Fixed Effects Model – Crss Sections Fixed

Table 15: Africa

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.018258*	0.129937	-0.140512	0.0885
LNLLR	-0.006683*	0.012163	-0.549506	0.0838
LNFF	0.082044*	0.179095	-0.458106	0.0678
LNLAT	0.001781*	0.014144	0.125909	0.0900
LNEOB	0.076538	0.277190	0.276123	0.7830
LNCORR	-0.192379*	0.545492	0.352670	0.0725
LNBG	0.791964**	1.100614	0.719566	0.0474
C	-291.3794***	2.083554	-139.8473	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.448818	Mean dependent var	-290.2499
Adjusted R-squared	0.392900	S.D. dependent var	0.073275
S.E. of regression	0.083318	Akaike info criterion	-1.836434
Sum squared resid	0.721951	Schwarz criterion	-0.488297
Log likelihood	241.2791	Hannan-Quinn criter.	-1.289822
F-statistic	2.059313	Durbin-Watson stat	3.548016
Prob(F-statistic)	0.099764		

***, ** and * represent significance of 10%, 5% and 1% respectively. Robust standard errors for heteroscedasticity and autocorrelation are reported.

Table 16: Eurozone

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNNIM	0.064027*	0.033243	1.926053	0.0543
LNLLR	-0.047801***	0.013523	-3.534927	0.0004
LNLAT	0.001675*	0.006084	0.275237	0.0832
LNFF	0.052726*	0.348772	0.151175	0.0899
LNEOB	0.033765*	0.253327	0.133287	0.0940
LNCORR	-0.004087	0.128625	-0.031774	0.7047
LNBG	0.042189*	0.098219	-0.429539	0.0676
C	-601.4935***	1.249482	-481.3945	0.0000

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.410242	Mean dependent var	-601.5911
Adjusted R-squared	0.240852	S.D. dependent var	0.182566
S.E. of regression	0.159068	Akaike info criterion	-0.644904
Sum squared resid	38.40954	Schwarz criterion	0.601976
Log likelihood	1067.393	Hannan-Quinn criter.	-0.186548
F-statistic	2.421878	Durbin-Watson stat	2.855342

The African data sets yields BG as being statistically significant at the 95% confidence level. NIM, LLR, CORR and FF are statistically significant at the 90% confidence level. LLR and CORR have negative coefficients which show that increases in LLR and CORR are associated with declines in the ROAA. The R2 and adj. R2 are 44.88 and 39.29 respectively, indicating that the independent variables explain 44.88% and 39.29% of the independent variable, respectively. The Prob (F-stat) is statistically significant at the 90% confidence level and indicates that this is a robust and competent model.

The Eurozone data set shows LLR as being statistically significant at the 95% confidence level. NIM, LLR, LAT and FF are statistically significant at the 90% confidence level. LLR has a negative coefficient which shows that increases in LLR are associated with declines in the ROAA. The R2 and adj. R2 are 41.02 and 24.08 respectively, indicating that the independent variables explain 41.02% and 24.08% of the independent variable, respectively

Chapter 5

CONCLUSION AND POLICY RECOMMENDATIONS

Vibrant economies depend on healthy financial sectors, with commercial banks being of prime importance. Regulators and supervisors must strike a balance between reigning in commercial banks' exuberance – such as engaging in highly leveraged speculative investments that are not core banking businesses – and burdensome regulations that stifle the banks' ability to be profitable.

This study showed that the commercial banks in the Eurozone, Central and Western African CFA franc zones have been shown to be resilient despite operating in markets where the central banks of independent countries cannot individually affect monetary policy. The stability provided by a common currency has reduced some of the risks that banks faced in ages past, such as interest rate and currency fluctuations across different countries.

The analysis results for the African and Eurozone shown that the ROAA was significantly affected by most our variables, as (NIM, FF,LAT and BG) positively affect the ROAA the banks need to increase the interest rates at which the lend and to decrease the interest rates at which they fund their assets, governments also can contribute by enhancing the conduciveness of financial institutions in their respective countries, with regards to liquidity ; the banks in each zone need to study the market conditions to decide the optimal liquidity management strategy, the corporate

governance and the way in which the bank senior management and directors monitor the banks operation which in turn contribute positively to the bank profitability as a result of reducing the conflict of interest between the owners and shareholders.

With regards to African zone, the (LLR and CORR) have negatively affected the bank profitability, so in order to minimize their effect, the banks needs to impose a more restrictions on landings which will reduce the probability of defaults. The governments also need to crease policies and regulations that control and at the same time incentivise the market participants to not engage in corrupt activities. In the Eurozone, the ease of doing business was positively affecting the ROAA, due to that effect; the governments need to facilitate and encourage the local and foreign investors to invest in their zone by many ways including reducing the regulatory burden and red tape that make the business environment hostile.

During periods of black swan events, such as the COVID-19 pandemic, regulators may be tempted to strip away regulations in order to stimulate economies that are in freefall. Regulators must be keenly aware that previous attempts to remove regulation have only served to harbour even more speculation and reckless investment habits.

Whilst the researcher did not look at the impact of central bank interest rates in this study, a future investigation on the impact of falling interest rates on bank profitability would be an interesting area of research.

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