UNIVERSITY OF CAPE COAST

POLICY RATE AND NON-PERFORMING LOANS IN GHANA

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2020

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BY

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Dissertation submitted to the Department of Finance of the School of Business,

University of Cape Coast, in Partial Fulfillment of the Requirements for the

Award of Master of Business Administration Degree in Finance

September 2021

DECLAR**ATION**

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature …………………………… Date ……………………..

Name: Osman Mahama Bampuori

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature ………………………… Date ……………………….

Name: Dr. Anthony Adu-Asare Idun

ABSTRACT

The study examined policy rate and non-Performing loans in Ghana. The study employed ordinary least square, Johansen cointegration method, Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) to achieve the objectives of the study. The findings revealed that total debt service, annual broad money supply, and total trade as a percentage of GDP affect policy rate in the country. Further, the study revealed that policy rate has positive and significant effect on NPLs. Again, the lag levels of non-performing loan negatively affect the present level of banks non-performing loan. Furthermore, the study found that the deviations from the equilibrium of the NPLs quickly adjust with an approximately 1-year period. Again, in the short-run, the lags of the dependent variable-non-performing loan positively affect the NPLs in present levels. However, in the long-run, the relationship is negative although the results are not statistically significant. Besides the study recommends that Bank of Ghana must strengthen monetary policy regulation, particularly the policy rate to ensure that commercial banks lend with lower interest rate. Again, the government of Ghana must implement export-based policies to increase the percentage of trade earnings.

KEY WORDS

Nonperforming loans

Policy rate

Inflation

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisor, Dr. Anthony Adu-Asare Idun of the Department of Finance, School of Business, University of Cape Coast for his professional guidance, advice, encouragement and the goodwill with which he guided this work. I am really grateful. Recognition is given to all the academic facilitators who taught me during the three years master's program.

DEDICATION

To my Wife, Parents, Siblings, and Friends

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LIST OF ACRONYMS

ADJ   Adjustment

AR   Autoregressive

ARDL   Autoregressive Distributed Lag

BMS   Broad money supply

BNPL   Bank NPLs

DF   Dicky Fuller

DS   Debt service

EC   Error Correction

GDP   Gross Domestic Product

KPSS   Kwiatkowski Phillips Schmidt and Shin

LIR   Lending Interest Rate

LR   Long-Run

MA   Moving Average

OLS   Ordinary Least Square

PP   Phillips-Perron

SR   Short-Run

CHAPTER ONE

INTRODUCTION

The growing occurrence of Non-Performing Loans (NPLs) in financial reports of many financial institutions has become one of the key concerns of many industry stakeholders, as they have a significant impact on financial institutions' existence in Ghana. A non-performing loan, according to the International Monetary Fund (IMF), is one on which the interest and principal payments have been refinanced for more than 90 days. Any business venture's primary goal is to make money, so any asset acquired during operations should generate revenue (Rawlin et al, 2012; Porter, & Kramer, 2019).

As a result, banks provide loans and advances to individuals, businesses, and governments in order to strengthen their ability to conduct investment projects and developmental activities in order to improve the country's overall economic development and, in particular, to raise their own growth (Rawlin et al, 2012). However, bank loans in many cases perform poorly than expected which case policy rate has a major role in the rate at which central bank lends to the commercial banks. However, bank loans frequently perform below expectations, in which case the policy rate plays a significant impact in the rate at which the central bank lends to commercial banks.

Background to the study

According to Rawlin et al. (2012), banks' deposits are frequently countered by greater interest margins from credit creation as loans. When such credit facilities fail to create the projected returns, the bank is unable to repay the deposit amount

when it is due. This demonstrates that banks' positions will be undermined if they do not receive the promised return on their loan facilities, and clients will lose faith in the bank (Rawklin et al., 2012). Uncollected credit facilities (loans) are eventually written off as NPLs. Aside from the IMF, the Bank of Ghana (BoG) has defined a non-performing loan as one that has been late for 90 days or more.

The financial sector's function as the backbone of any economy, for both banking and non-banking populations, is therefore critical to Ghana's economic existence. It has been demonstrated that credit given to well-grounded financial institutions improves the degree of economic growth in any economy, whereas credit given to poorly managed financial institutions hinders the economy's growth, increasing the poverty rate (Berth, 2004). Commercial banks have an important role in lending with interest and advances, which account for a large portion of their operating funds. In 2012, the total amount of NPLs (NPLs) in commercial banks was 6%, however this quickly grew to 9% the following year (Bank of Ghana Annual Report, 2014). According to the Bank of Ghana, loans and advances accounted for more than half of commercial banks' total operating assets (BoG, 2018). In Ghana's financial industry, this resulted in the failure of a number of indigenous commercial banks. Commercial banks such as Beige Bank, Unibank, UT Bank, and Capital Bank were among the few commercial banks in Ghana that were found to have a high number of NPLs. Commercial banks presently provide and service the financial demands of around 15% of Ghana's population, according to Obuobi and Polio (2010).

Despite the fact that credit risk has long been a major worry for bank executives, the recent economic downturn and financial sector issues have brought the issue of NPLs to the forefront in developing countries (Berge, 2007). The recent financial sector challenges, when combined with those that have occurred in the past, demonstrate that the problem of poor loan portfolios is a stumbling block for banks and can have a negative impact on the economy as a whole (Bruneau et al., 2012). Bruneau et al., (2012) assert that rising non-performing loan rates have a detrimental impact on banks' assets and net value, perhaps putting them out of business. As a result, when the problem of NPLs affects a major section of the banking industry, much attention should be paid to it.

According to Berge (2007), the most significant impact of loans is a reduction in profit margins due to disposal expenses such as credit loss provisions and direct write-offs for bad debts, as well as a reduction in loanable funds. Many research on interest rates and loans found that a weak loan portfolio was a major factor in bank insolvency, with banks that failed having high percentages of nonperforming loans prior to failure (Isanzu, 2017). NPLs accounted for nearly 75% of total loan assets in Indonesia, according to Rosengard and Prasetyantoko (2011), resulting in the failure of 60 banks in 1997. Commercial banks in Ghana are not immune to this challenge. In light of the aforementioned events, the researcher investigates the Ghanaian financial industry in order to determine the impact of interest rates on Collapsed Banks' NPLs.

Statement of the Problem

The desire of commercial banks to extend additional credit facilities corresponds to the accumulation of high risk, making commercial banks vulnerable to failure to honor loan facilities. This stems from the belief that credit risk is the most ubiquitous since bad loans lower bank profitability (Wondimagegnehu, 2012). The largest component of a bank's operating assets that serves as a source of revenue, according to Proctor (2003), is the loan portfolio.

The issue of loan facilities, on the other hand, is fraught with risk, which has a negative impact on the profitability of a bank, solvency, and, ultimately, the Commercial Bank's financial position. Recently, many commercial banks in Ghana have been confronted with increasing numbers of NPLs. Domestic commercial banks have given out loans to customers who invested in risky ventures which have resulted in banks' inability to pay their depositors funds. From the years 2016 to 2018, about five domestic commercial banks (UT Bank, Beige Bank, Unibank, Construction Bank and Capital Bank) collapsed which the Central Bank's report in 2018 attributed to high incidence of NPLs in the financial sector.

Several studies have attempted to look into the phenomenon of NPLs in Ghana's financial industry. According to Haneef and Karim (2012), macroeconomic downturns, deterioration of terms of trade, high interest rates, over-reliance on highly priced interbank borrowing, moral hazards, and insider training are all factors that contribute to the buildup of NPLs (NPLs). Kigen (2014) found that after interest rates were liberalized, there were significant increases in implicit

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costs, as well as a contractionary monetary policy, which was aided by banks boosting their reserve and cash ratios.

Adano (2013) also found that loan performance, as measured by loan default, had an indirect impact on both the policy rate and the overall amount of loans issued. As a result, the policy rate was crucial in determining the behavior of NPLs. This paper examines the impact of the policy rate on NPLs in Ghana against this backdrop.

Purpose of the Study

The general objective of this study is to examine the effect of policy rate on NPLs in Ghana.

Research Objectives

Specifically, the study seeks to achieve the following:

1. To estimate the determinants of policy rate.

2. To estimate the effect of policy rate on NPLs in Ghana.

Research Hypotheses

1. H_0: Policy rate has no effect on NPLs in Ghana.

   H_1: Policy rate has effect on NPLs in Ghana.

Significance of the Study

This thesis makes a significant contribution to several stakeholders: small business investors and managers, policymakers, financial institutions and prospective researchers.

This study provides evidence for Bank of Ghana (BoG) to strengthen monetary policy regulation to ensure that policy rate is kept to at the lowest

minimum as higher levels increasing NPLs. Again, this study is relevant to the government of Ghana as it provides information necessarily to observe the relationship between export-based policies (trade) and GDP growth.

Also, the study is relevant as it provides evidence on the interrelationship among macroeconomic variables. Thus, it set the premises for the Bank of Ghana and government to work closely with the finance ministry to stimulate the right kind of growth which will bring about economic growth.

Delimitation of the Study

This study focuses on the effect of policy rateon NPLs in Ghana. The study is delimited to the time period 1971 to 2018. The study is further delimited to the relationship between policy rate and NPLs in Ghana.

Limitations of the Study

This study focuses on the effect of policy rate on NPLs in Ghana. The study is limited in the following ways: first, it was difficult to obtain data entries for all the years considered for the study for the variable NPLs. Thus, the study used the average value of the NPLs for the period unavailable to cater for the missing years.

Organisation of the Study

This study is divided into five chapters. Chapter one presents the background of the study, problem statement, objectives of the study, research questions, hypotheses and significance of the study, delimitation of the study and organisation of the study. Chapter two deals with an overview of financial operations and loan disbursement among the financial institutions, review related literature that is both theoretical and empirical evidence on the effect of policy rate

on NPLs in Ghana. Chapter three deals with the methods that formulates empirical model and econometric estimation technique. Chapter four presents the econometric results and discussions on the results. Finally, chapter five gives summary of findings, policy implications, conclusions and recommendations of the study.

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CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews the existing literatures related to the research problem and it is sub-divided into headings: theoretical framework of the study, policy rate spread among the financial institutions, an overview of Ghana's banking system, performing loans defined, NPLs and other determinants that contribute to NPLs among commercial banks. It also clarifies loan acquisition processes, ways of minimising NPLs among commercial banks and terminologies in the literature in order to achieve a thorough grasp of the topic under study. It again reviews major empirical works on the effect of policy rate on NPLs. The chapter concludes by highlighting the gap in the literature and indicates how the current study departs from the existing research works in terms of scope.

Theoretical Literature Review

Credit Rationing Theory

According to Credit Rationing Theory, lenders restrict the quantity of credit available to borrowers by using existing interest rates and available collateral or collateral substitutes (Keeton, 2017). The lenders' decision to lend or not lend is based on the level of protection that the borrower provides to the lender. Borrowers are encouraged to default on their loans when other alternatives to collateral are available, because their relationship with the lender is strained when collateral is involved. According to the credit rationing concept, the interest rate is particularly

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essential in determining how much a financial institution can lend and assessing the borrower's willingness to repay the loan.

Interest Rate Spread in the Banking Sector

The interest rate is the fee a bank charges for using capital lent from a finance firm, or a premium charged on lent assets (Chen et al., 2018). The term "capital rent" is widely used to describe interest. Interest rates are an important part of a "capitalist society," and they are commonly expressed as a year-over-year rate. The rate of return as the currency's value represents market knowledge about the predicted shift in the purchasing power of money or future inflation (Ngugi, 2001).

Financial institutions mobilise funds by providing depositors with a range of payment choices and channeling resources to borrowers and investors via loans and advances (Goedecke et al., 2018). The gap between the rate at which banks lend money to borrowers and the rate at which they pay creditors is known as the interest rate spread (IRS). The IRS and the Net Interest Margin are two economic indicators used to assess the banking sector's performance (NIM). The Internal Revenue Service (IRS) is a key measure of how efficient the banking sector is. This depicts the ability of financial firms to maximize earnings (Wanbugu, 2014).

The spread of interest rates in the banking business has piqued the curiosity of scholars all around the world over the last decade. Financial institutions, particularly banks, are critical to the smooth operation of most economies. Any economy's economic progress can be influenced by the effectiveness of financial intermediation. The net return on savings and the gross return on investment are both affected by capital accumulation (Rognlie, 2016). The topic of bank net

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interest margin has recently sparked intense public debate in Ghana, as the benefits of macroeconomic sustainability have not been translated into a significant reduction in interest rate risk.

Performing Loans

A credit facility is described as a commercial agreement between two or more persons in which the creditor commits to make a considerable sum of money available to the debtor, according to the statutory definition (Hiferding, 2019). In such a contract, the debtor agrees to pay the agreed-upon amount to the collateral in one lump sum or over a predetermined period of time. The arrangement may include the payment of additional rental expenses on the cash transferred to the borrower for the period that the funds are in the debtor's control (s). Extra payments are made in addition to the amount given out, such as interest rates, processing fees, commissions, and monitoring costs.

Indeed, if made in accordance with the conditions of the credit arrangement, these extra payments reflect the lender's / creditor's interest income. If both the principal and interest payments are redeemed on the agreed-upon date between the lender and the borrower, the loan / credit facility is regarded to be performing. Loans are considered standing under the Bank of Ghana (BoG) criteria if the principal and interest payments are current. Furthermore, if there are daily actions (swings) in the account with no indicators of hard-core debt build-up, an overdraft is labeled as existing or successful (Agbavor, 2019).

Non-Performing-Loans

The global financial crisis, according to Boudriga, Taktak, and Jellouli (2009), has resulted in large losses in numerous financial institutions in both developed and developing countries over the last decade. According to them, the crisis' progression has increased concerns about financial market stability and the necessity for central banks to rigorously monitor and supervise bank lending activities. Financial institutions continue to extend credit facilities or loans to clients expecting interest income while the loan is being serviced, despite the volatile and unpredictable financial environment.

NPLs (NPLs) are defined as loans that do not earn interest and are therefore not repayable (Amuakwa-Mensah and Boakye-Adjei, 2015). In contrast to a good loan, which travels the full length required by a credit contract, NPLs are frequently referred to as bad loans or bad debts. Balgova et al. (2016) defined NPLs as delinquent loans for this reason. NPLs are loans that have not been settled, not only in interest but also in principle, during the life of the loan contract, in non-compliance with the terms of the agreement.

According to Ang and McKibbin (2007), financial statistics on cumulative NPLs among financial institutions in developing and developed countries show distinct characteristics or patterns. It explains why, whereas financial institutions in developing countries are vulnerable to NPLs of more than 15%, those in industrialized countries are less vulnerable.

Bank Specific Determinants of NPLs

Provisioning Program

Banking institutions create and implement money provisioning methods. Loan losses that have been planned utilizing a variety of methods. Some banks, according to Ozili and Outa (2017), have taken a backward-looking strategy to making provision for loan losses. They stated that these banks use historical data on loan default incidences to determine how much tolerance should be made for a certain business cycle.

Boudriga, Taktak, and Jellouli (2009) found that micro or bank-specific variables, such as credit loss provisioning, credit development, and foreign ownership of banks, had an effect on the NPL levels of a sample of 46 banks from 12 Middle Eastern and North African countries, using aggregate data from 2002 to 2006. Furthermore, Pain (2003) reported that a large percentage of risky credit activities for commercial companies are linked to higher provision by banks, using a panel regression analysis technique to analyze the influence of macroeconomic and bank-specific factors on non-performing credit levels among some major UK banks.

Bank Capitalisation

Theoretically, capital sufficiency and asset risk have a positive connection (Boadi et al., 2016). Commercial banks under pressure to increase capital, according to Boadi et al. (2016), would do so by increasing asset risk, resulting in higher NPLs.

According to Boudriga et al. (2009), no inference concerning the study's existence can be formed. In the empirical literature, various studies have found a link between NPLs and capital adequacy, with varying results. Malimi (2017) discovered that banks with higher capital adequacy ratios have lower NPL numbers. In a similar study, Makri, Tsagkanos, and Bellas (2014) discovered variables that influence nonperforming loans (NPLs) among eurozone banks (using aggregate banking). Financial data demonstrated a strong and negative correlation between capital adequacy and nonperforming loans.

Proprietorship Status

The bank's ownership status is one of the intriguing characteristics that leads to the rise in NPLs among commercial banks. Banks can be either state-owned or privately held. It's worth noting that differences in managerial efficiency levels between public and private institutions also extend to NPLs. Research on NPLs between government and private institutions shows that the former is more prone to recording more NPLs than the latter. In addition, the literature tries to explain why state-owned enterprises are taking on more risky credit ventures.

According to Salas and Saurina (2002), state-owned financial institutions have a tendency to extend more credit facilities to small, medium, and other growing enterprises in the economy in order to achieve higher economic growth, even though the majority of these enterprises are unable to meet their credit obligations. Furthermore, state-owned financial institutions are unable to recover their debts due to poor recovery capacities, resulting in higher NPLs. 2004 (Micco, Panizza, and Yanez).

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Profit Orientation of Bank

Financial institutions engage in business activities with the intent of making a profit for their shareholders and owners. Return on equity, return on asset, and net interest margin are the most common indicators used to describe these profits. However, commercial banks have established that these indexes have a high link with NPLs. In other words, bank profitability determines the risk-taking attitude of bank executives (Boudriga et al. 2009).

The stress tendency of banks to fall into the trap of giving out unsafe loan facilities is reduced in instances where banks have better profit levels. On the other hand, financial institutions with low profit margins due to managerial inefficiencies are more likely to grant out riskier credit facilities in order to boost their revenue portfolio. In the case of the latter, Musengamana (2019) claims that most managers lack the necessary skills to appropriately assess and manage the risks that come with lending to clients, which leads to a high rate of NPLs.

Commercial Banks Loan Classification and Provision

It is reasonable for licensed financial systems to track and analyze their credit and risk assets on a quarterly basis at the very least. Standard, sub-standard, questionable, and loss are the four risk categories for assets. Assets in risk classes (ii) through (iv) are considered potentially-performing and hence are not subject to income taxation. In light of these circumstances, the Bank of Ghana (BoG) has set prudential criteria for commercial banks that take into account these two folds' characteristics. Loans from commercial banks should be examined on a regular basis, both internally and externally.

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Customers' credit facilities are anticipated to be checked by the Risk and Operations divisions. On the exterior front, the Central Bank's Supervision Department is in charge of conducting regular creditworthiness inspections on commercial banks. These credit facilities are classified as either current or overdue. A overdue loan is one for which the interest or expected principal payment has not been received by the due date. Interest revenue from outstanding loan accounts is not permitted by the BOG.

Loan Processing among Commercial Banks

Since the anticipated redemption does not occur, there appears to be a risk aspect in any loan granted. A lender makes a loan in exchange for a promise that the principal and interest will be repaid in the future (Kay Associate Ltd, 2005). Because of the risk of loan repayment failure, lenders must plan ahead and make a wise decision to ensure that the loan is repaid on the agreed-upon date. Accessible literary works concentrate far too much stress on the creditor's role in making effective loan allocation decisions in order to limit the chance of default.

The creditor should always endeavor to determine the size of the risk associated with the amount borrowed and minimize the elements that could jeopardize repayment. As a result, the creditor should gather all essential information to help him or her make an informed judgment on the credit offer. Due to the danger of non-payment, which leads to NPLs, commercial banks have established standard loan application standards and guidelines, which are normally found in the Credit Policy Manual, to assist credit officers and clients seeking loans.

The following are some of the factors that commercial banks assess when offering credit facilities:

1. The conduct of potential borrower

2. Borrower's requested amount

3. Charges (interest payable, commission fees and other related charges)

4. The objective of the loan facility

5. Borrower's capacity to handle business efficiently

6. A credible repayment sources

7. Collateral provided by customer/ borrower

8. Operational viability of the business.

Customers who are in dire need of credit facilities go through some procedures before credit facilities are handed over to them for onward productive activities.

Preliminary Screening

The screening stage is the most important step before a potential customer can obtain a loan from a commercial bank. This stage is used to determine whether or not prospective borrowers are eligible for the loan. The loan applicant makes initial contact with the bank to express their desire to get a lending facility. Applicants are given questions about the present state of their business and family finances in order to determine if they are eligible for such a loan based on the loan facility's guiding regulations. This is the fundamental stage, where loan officers and credit issuing organizations can examine a borrower's credit worthiness.

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Loan proposal and Credit Committee

At this point, a potential loan application is referred to a specific loan officer at a commercial bank, who is entrusted with conducting additional loan facility verification. Before assigning the loan facility, this loan officer pays a visit to the loan applicant's business or home. The information acquired during the initial screening procedure as well as the subsequent house visit will be compiled into a formal loan proposal and given to the loan committee for consideration. The amount and term of a lending facility are determined by how well cash flows into the borrower's business, the availability of suitable collateral, and the agreement of underwriters to endorse the loan facility.

Monitoring and Repayment

Following the disbursement of the agreed-upon amount to the loan applicant, the loan officers monitor the applicant's business to ensure that the loan facility's stated purpose is met. The purpose of this campaign is to notify the loan application of their upcoming payment. According to Seifu (2017), it is a gray area because many banks or lenders pay little or no attention, but if correctly examined, the occurrence of NPLs can be significantly reduced. Internal records, visits and interviews, as well as reviewed and management financial accounts, are some of the methods he discovered that aid to accommodate for monitoring and control operations.

When borrowers miss the opportunity to redeem their loan amount, the arrears accrue, and legal action is pursued to reclaim the amount owed against the borrower and the guarantor.

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Implications of NPLs for Commercial Banks

Retained revenues from loans are critical to commercial banks' long-term viability. When loans are past due, however, they have a major negative influence on the commercial bank's health and operation. One of the fundamental reasons for this is that, under Bank of Ghana rules, the loan-giving bank must account for and charge for credit failure (bad debt/impairment), which reduces earnings.

According to existing research, many failed commercial banks have large amounts of NPLs on their records. NPLs prior to default and asset quality remain an important signal of insolvency in many banking industries, according to Bholat et al. (2016). Indeed, several local financial institutions in Ghana have collapsed due to NPLs. The difficulties stated above demonstrate the seriousness of the impact of NPLs on commercial bank operations, and this study aims to investigate the impact of interest rates on NPLs across Ghanaian commercial banks.

Minimising NPLs among Commercial Banks

NPLs can be reduced by requiring that loans be granted only to borrowers who can repay the loan on the agreed-upon date. Potential borrowers' credit profiles should be reviewed in a professional manner in order to determine their risk profile and make an informed loan decision. Furthermore, debt repayment should be pursued consistently, and if there is a deficiency in repayment, prompt action should be done. Commercial banks should also avoid lending to high-risk customers or speculative projects, keep track of loan repayments, and restructure loans if borrowers have difficulty repaying them (Kay Associates Ltd, 2005). Bonga et al. (2019) go on to say that

Complacency

This is the tendency to believe that because things have gone well in the past, they will continue to go well in the future. Over-reliance on signatures, proven financial worth, or historical debt repayment performance are common instances, as things have always gone successfully in the past.

Carelessness

Insufficient loan agreements, lack of up-to-date bank arrangements or other necessary information in the payment history, and lack of security covenants in the credit agreement are all examples of carelessness. Both of these factors make predicting the borrower's performance and detecting concerns until they become unsustainable difficult.

Ineffective communication

This occurs when a lender's, particularly a bank's, goal of providing credit is not properly communicated to potential borrowers. It frequently leads to lending difficulties. Managers of credit facilities should effectively communicate and implement loan policies, and loan officers should notify the financial institution's leadership as soon as specific lending issues arise.

Contingencies

Lenders' proclivity to ignore or dismiss events that could lead to loan default falls under this category. The priority is to come up with a workable solution rather than identifying risk weaknesses.

Competition

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Competition includes pursuing rival conduct rather than sticking to the lender's own loan requirements. Mimicking a competitor's policies and practices does not always imply that it is a wise business decision.

Empirical Literature Review

Determinants of NPLs

Policy Rate

In every economy, financial institutions serve as a link between the central bank and the clients (Sheefeni, 2016). Financial institutions, particularly banks, play this role by mobilizing cash from excess units and providing borrowers with a variety of lending options. Banks, like any private enterprise seeking to maximize profit, charge both higher and lower interest rates on loans and deposits, thus distributing the interest rate charged by the central bank on their lending (that is, spread between lending rate and deposit rate). Sheefeni (2016) explains that the bank has supervisory obligation on two main pertinent problems while considering distributing interest rates. First and foremost, banks consider the uncertainty that exists in the lack of loan and deposit harmonization, which results in interest rates for banks. The second point to consider is the rate of loan default. Sheefeni (2016) claims that as a result of information asymmetry, banks are unable to predict the possibility of loan default among clients. As a result, according to Samahiya and Kaakunga (2014), banks spread their interest rates to protect themselves against prospective loan failure.

GDP

The rising phenomena of global GDP growth ups and downs is a major contributor to commercial banks' high non-performing loan levels. As a result of

this situation, such economies are unable to generate the necessary revenue to service their debt. Radivojevic and Jovovic (2017) found that in the Ghanaian economy, high unemployment rates are inversely related to households' disposable income and, as a result, their failure to repay borrowed funds. Furthermore, according to Olayinka and Mofoluwaso (2014), GDP has a detrimental impact on the economy's revenue-generating ability to service debt.

Broad money supply

The broad money supply is one of the macroeconomic variables that has a significant impact on NPLs. Theoretically, the amount of domestic interest is linked to the broad money supply, which dictates the level of demand and supply in the economy. High interest rates raise the cost of borrowing, affecting loans taken out on the financial market by investors.

Inflation Rate

The rate of inflation is one of the macroeconomic variables that has a significant impact on NPLs (NPLs). In theory, increases in the overall price level of goods and services are inversely proportional to production costs, resulting in high prices for goods and services. Low demand for goods and services is facilitated in economic situations marked by an excessively high rate of inflation. This reduces borrowers' ability to meet credit facility givers' (financial institutions') financial requests, resulting in a high level of NPLs (Radivojevic and Jovovic, 2017).

Policy Rate on NPLs

NPLs are a critical part of any commercial bank's sustainability because they jeopardize the institution's solvency, especially in Ghana's banking industry.

While not conclusive, the available empirical evidence suggests that interest rates play a role in the high frequency of NPLs that leads to commercial bank collapse.

Several studies have looked at the impact of interest rates on NPLs in the banking sector. Interest rates, according to Mucheke (2001), have a part in Kenya's high non-performing loan rate. This issue arises because a high interest rate diminishes a debtor's net worth through lowering investment and financial intermediation, resulting in an increase in nonperforming loans (NPLs) and bank failures. In such settings, adverse selection and moral hazard encourage high-return, high-risk initiatives.

High interest rates, according to Ndii (2000), contribute considerably to high default rates in Nigeria, and a decrease in interest margins suggests that delinquent borrowers may be able to resume repaying their credit facility. This also demonstrates a dramatic shift in operating tactics, with a focus on volume profitability and non-interest revenue streams. Given that the real interest rate has remained high, reflecting a high level of investment expenditure, this could help the government manage macroeconomic concerns such as inflation.

Bader and Javid (2013) investigated the long- and short-term correlations, as well as the impact of microeconomic variables on commercial bank NPLs, in a study (NPLs). The five key macroeconomic factors analyzed by the authors were interest rate, inflation, gross domestic product, exchange rate, and money supply. It was concluded at the conclusion of the research that there was a long-term relationship between macroeconomic indices and NPLs. Non-performing money

supply loans and interest rates have a long-term link, according to the study. However, there is a correlation between NPLs and bankruptcy in the short run.

Fofack (2005) looked at nonperforming loans (NPLs) in Sub-Saharan Africa to see if they were a major cause of financial institution failure. He used a correlation and probability analysis with a number of macroeconomic variables, including inflation, interest rate, GDP per capita, interest rate dispersion, real exchange rate changes, and a huge supply of money, to study the drivers of NPLs (M2). At the conclusion of the study, it was discovered that real interest rates, inflation rates, and GDP per capita growth serve as the foundation for numerous NPLs in most countries. The interest rate and inflation levels were also looked at in the study.

Using annual data from 1981 to 2011, Olayinka and Mofoluwaso (2014) found a robust, positive correlation between interest rate and NPLs in Nigeria in a regression study. The amount of NPLs in the banking industry was largely determined by the interest rate disparity between commercial banks. Commercial banks boosted their interest rate margins in order to reclaim more profits, resulting in a huge number of nonperforming loans (NPLs). Despite the fact that borrowers are unable to repay credit facilities provided by commercial banks due to erratic economic conditions, this was the case. In other circles, Chege (2014) and Mondal (2016) discovered a negative relationship between the two elements.

NPLs are mostly caused by poor economic shocks, which are generally associated by high investment capital costs and low interest margins, according to a World Bank policy statement on the prevalence of nonperforming loans (NPLs)

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in Sub-Saharan Africa (Loul, 2018). Economic volatility, economic uncertainty, depreciating terms of trade, high interest rates, excessive reliance on overly high-priced inter-bank borrowings, moral hazard, and insider borrowing activities are also key ingredients in the accumulation of NPLs in the banking sector of many economies, according to the authors.

Summary

This chapter examined extant literature on the subject of interest rate linked NPLs portfolio among commercial banks in Ghana, and gave various applicable theories and a conceptual framework. The study's methodology, as well as how the data was obtained and processed to meet the researcher's goals, is presented in the next chapter.
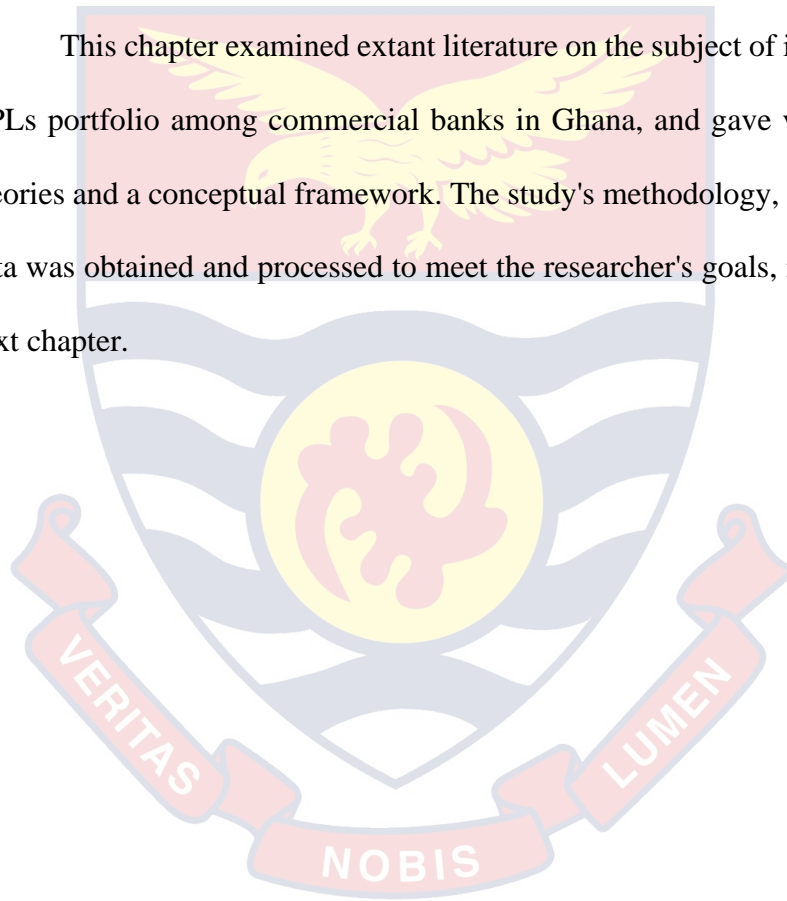
CHAPTER THREE

RESEARCH METHODS

Introduction

The study examined the impact of policy rate on NPLs in Ghana. This chapter presents the methods used to test the variant hypotheses of the study. The chapter presents the research design, the data source, theoretical model specification, the empirical model specification, measurement of the variables used for the study and finally how the post estimation tests were conducted.

Research Design

The study employed a quasi-experimental research design. This design was chosen because, unlike experimental designs, quasi-experimental designs do not allocate participants to a group at random before measuring the dependent variable, which helps to alleviate the directional problem that plagues many experimental research designs (Cook & Campbell, 1979). This research is based on the positivist philosophy. Validity, dependability, objectivity, and precision are used by positivists to assess the accuracy of quantitative investigations. As a result, the study is subject to the scientific process of inquiry, and the results are objective and reliable.

Theoretical Model Specification

Stationary and non-stationary times series

Many economic time series variables can increase in value with time. Failure to realize that the econometric variables are trended has a significant impact on the conclusions drawn from the regression model (Woodridge, 2012). Another

factor to consider is whether the series are stationary or non-stationary. This determines the type of model to use. The data series must be stationary for a meaningful econometric estimation of a model employing time series data.

According to Granger and Newbold (1974), econometric estimation with non-stationary time series data frequently yields incorrect results. A unit roots test is used to assess whether variables are stationary or not. The covariance between two values from the series depends entirely on the length of time between the two values, not on the actual times at which the variables are observed, and the variable is said to be stationary if the mean and variance of the time series variable yt are constant across time. That is, the time series yt is stationary if:

$$E(y_t) = \mu \qquad \text{(constant mean)} \qquad (1)$$

$$var(y_t) = \sigma^2 \qquad \text{(constant variance)} \qquad (2)$$

$$cov(y_t, y_{t+s}) = cov(y_t, y_{t-s}) \qquad\qquad (3)$$
$$= \gamma_s \text{(covariance depends on s, not t)}$$

Unit Root Testing

To avoid a false regression issue, the presence of unit roots was tested. A time series variable is I(0): t. if the covariances of the elements,y-t. and,y-s. trend to stationary values that are only dependent on |t-s|. Such a series is referred to as "integrated to order zero," or I. (0). This is a necessary but insufficient criterion for a stationary process. As a result, while I (0) processes are all stationary, not all I (0) processes are stationary (Woodridge, 2012). A nonstationary time series is said to be integrated of order one, or I (1), if the sequence of its first differences is I (1). (1). (0).

Once again, a time series is a collection of events that occur over a period of time.

Kwiatkowski, Phillips, Schmidt and Shin Unit Root Test

The root unit tests ADF and PP are well-liked. The participants, on the other hand, were highly critical of these unit root tests: The power of testing is limited when a process is stationary but has a root near the non-stationary boundary. Given small sample sizes, the tests, for example, have little statistical ability to distinguish between =1 and =0.976. Unit root tests like as ADF and PP are similarly vulnerable to finite sample power and size limitations. In both tests, the alternative hypothesis that the series is stationary (or TS) with a significant autoregressive root has low power. Furthermore, both tests reveal severe size distortion (in the direction of over-rejecting).

The KPSS test was intended to remedy the problems that the ADF and PP tests had caused. The KPSS can be used to figure out whether a trend is deterministic or stochastic. The KPSS examines the null hypothesis that the series is level or trended stationary using a difference stationary alternative.

Johansen Method of Testing Cointegration

To use the Johansen method of testing cointegration, the researcher ensured that none of the variables are integrated at the second difference I(2). The model is thus specified as;

$$z_t = A_1 z_{t-1} + \ldots + A_k z_{t-k} + u_t; u_t \sim IN(0, \Sigma \qquad (4)$$

where **zt** is (n x 1) and each of the **Ai** is an (n x n) matrix of parameters. Thus,

$$\Delta z_t = \Gamma_1 \Delta z_{t-1} + \ldots + \Gamma_{k-1} \Delta z_{t-k+1} + \Pi z_{t-k} + u_t \qquad (5)$$

where

$$\Gamma_1 = -(I - A_1 - \ldots - A_i); \ i = 1, \ldots k - 1 \qquad (6)$$

and

$$\Pi = -(I - A_1 - \ldots - A_k) \qquad (7)$$

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Short run adjustment to changes in Zt are captured by $\hat{\Gamma}_i$

Long run adjustment by $\hat{\Pi}$

If zt is a vector of I (1) variables then all the terms in Δz_{t-k} (13) that involve are I

(0) while Πz_{t-k} must also be I(0) for error term to be 'white noise' i.e. $u_t \sim I(0)$.

When the criterion z-tk.I(0) is met, there are three possibilities. The first is that all variables in Zt are stationary. The second criterion is that the variables are not cointegrated, that is, no linear combinations of the Zt are I(0), and so the matrix is a (nxn) matrix of zeros. Finally, when there are up to (n-1) cointegration relationships, a frequent task is to calculate how many r(n1) cointegrating vectors exist (Johansen, 1998).

Autoregressive Distributed Lag Model (ARDL)

The main argument here is that the E-G approach is limited in cases where you have more than one explanatory variable. Let consider a situation where the independent variables in the model are more than one and let assume that,

$$\phi(L, p)y_t = \sum_{i=1}^{k} \beta_i (L, q_i)x_{it} + \delta' w_t + u_t \qquad (8)$$

$$\phi(L, p) = 1 - \phi_1 L - \phi_2 L^2 - \ldots - \phi_p L^p \qquad (9)$$

$$\beta_i(L, q_i) = \beta_{i0} + \beta_{i1} L + \ldots + \beta_{iq} L^q \qquad (10)$$

Where, L is the lag operator such as $Ly_t = y_{t-1}$ and w_t a $s \times 1$ Vector of deterministic variables (intercept, trends, exogenous variables, etc.)

Empirical Model Specification

ARDL Model

The study ensured that none of the variables be integrated at the second difference I(2) and that the unconstrained error correction model be created in order to use the ARDL model. Using the Akaike Information Criterion, the proper lag structure for the ARDL model was identified. The model's mistakes were tested using a serial correlation test to determine that they were serially independent. The following is the ARDL empirical model specification:

$$
\begin{aligned}
\Delta PR_t = \beta_0 &+ \sum_{i=1}^{a} \beta_1 \Delta PR_{t-i} + \sum_{i=1}^{a} \beta_2 \Delta GDP_{t-i} + \sum_{i=1}^{a} \beta_3 \Delta inflation_{t-i} \\
&+ \sum_{i=1}^{a} \beta_4 \Delta BMS_{t-i} + \sum_{i=1}^{a} \beta_5 \Delta DS_{t-i} + \sum_{i=1}^{a} \beta_6 \Delta Trade_{t-i} \\
&+ \gamma_1 GDP_{t-1} + \gamma_2 Inflation_{t-1} + \gamma_3 BMS_{t-1} + \gamma_4 DS_{t-1} \\
&+ \gamma_5 Trade_{t-1} + u_t
\end{aligned}
\tag{11}
$$

Similarly, for the effect of policy rate on NPLs, the ARDL model specification is given as:

$$
\begin{aligned}
BNPL_t = \beta_0 &+ \sum_{i=1}^{a} \beta_1 \Delta PR_{t-i} + \sum_{i=1}^{a} \beta_2 \Delta GDP_{t-i} + \sum_{i=1}^{a} \beta_3 \Delta inflation_{t-i} \\
&+ \sum_{i=1}^{a} \beta_4 \Delta BMS_{t-i} + \sum_{i=1}^{a} \beta_5 \Delta DS_{t-i} + \sum_{i=1}^{a} \beta_6 \Delta Trade_{t-1} \\
&+ \sum_{i=1}^{a} \beta_6 \Delta BNPL_{t-1} + \gamma_1 GDP_{t-1} + \gamma_2 Inflation_{t-1} \\
&+ \gamma_3 BMS_{t-1} + \gamma_4 DS_{t-1} + \gamma_5 Trade_{t-1} + \gamma_6 PR_{t-1} \\
&+ \lambda ECT_{t-1} + u_t
\end{aligned}
\tag{12}
$$

Data Source and Description

The study employed time series data from the World Development Indicators (WDI) and the Bank of Ghana for this empirical analysis. Because the data for NPLs existed only up to 2018 at the time of the study, the analysis employed seven series in Ghana, spanning 1971 to 2018. The NPL data came from

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the Bank of Ghana's website, while the remainder came from the World Development Index. The data includes the Gross Domestic Product Growth Rate (GDPG), Bank Nonperforming Loans (BNPL), Inflation (defined as the country's total persistent price level), Policy rate (LIR), Annual Broad Money Supply to Total (BMS), Total Trade as a percentage of GDP, and T.

Measurement of Dependent Variables

The dependent variable in this study is the banks NPLs. This variable is strictly continuous and measures the level of loans default that the commercial banks records and span from 1971 to 2018.

Measurement of the Independent Variables

The lending interest rate is the major independent variable in the analysis. The policy rate is the interest rate offered by the central bank (Bank of Ghana) to commercial banks, which affects the interest rate charged by banks on the amount of loans they give their customers. The variable is continuous and spans the years 1971 to 2018. To simulate the behavior of the dependent variable, six control variables were used (banks non-performing loan). These are the policy rate (LIR), the gross domestic product growth rate (GDPG), the degree of inflation measured as the country's overall persistent price level, the annual broad money supply to total (BMS), and total trade as a percentage of GDP.

Table 1: Definition of variables and A prior Signs

Variable	Type	Definition	Sign
BNPL	continuous	Bank non-performing loan	
PR	continuous	Policy rate	+-
GDP	continuous	Annual growth rate of GDP	
Inflation	continuous	The general price level	+_
DS	Continuous	Debt service	+
BMS	Continuous	Total broad money supply as percentage of GDP	+
Trade	Continuous	Total Trade as a percentage of GDP	-

Source: Field Data, (2021)

Post Estimation Test

To implement the bound test procedure, the modelled a conditional ARDL-error

correction model as

$$\Delta BNPL_t = \beta_0 + \sum_{j=1}^{n} \beta_j \Delta PR_{t-j} + \sum_{j=1}^{n} \delta_j \Delta GDP_{t-j} + \quad (13)$$
$$\sum_{j=1}^{n} \mu_j \Delta Inflation_{t-j} + \sum_{j=1}^{n} \phi_j \Delta BMS_{t-j} + \sum_{j=1}^{n} \varphi_j \Delta DS_{t-j} +$$
$$\sum_{j=1}^{n} \varphi_j \Delta Trade_{t-j} + \eta_1 PR_{t-1} + \eta_2 GDP_{t-1} + \eta_3 Inflation_{t-1} +$$
$$\eta_4 BMS_{t-1} + \eta_5 Trade_{t-1} + \eta_6 DS_{t-1} + u_t$$

Equation (13) was estimated using OLS as the starting point for the research. The

second step is to check for cointegration by limiting all estimated coefficients of

lagged level variables to zero, which is the null hypothesis of no cointegration

(H0) is compared to the alternative, (H1) by the mean of an asymptotic non-

standard distribution F-test.

Chapter Summary

This chapter presented the methods employed in achieving the objectives of

the study. The chapter begun with research design which is the quasi-experimental

research design. The study employed data from World Development indicators.

Again, the study used all the methods of testing unit roots, specifically, the Dickey

Fuller test, Phillips Perron and KPSS and criticised how Dickey Fuller and Phillips

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Perron are weak in rejecting the existence of unit roots. Furthermore, the chapter discussed the application of Johansen methods of testing cointegration and proceeded to specify ARDL model for estimating the determinants of policy rate and the effect of policy rate on NPLs. The chapter ended with the post estimation diagnosis using the bound test.

CHAPTER FOUR
RESULTS AND DISCUSSION

Introduction

This Chapter present the results and the discussion of the findings from the study. Specifically, this Chapter presents the summary statistics of the variables used in the analysis, present the trends of the variables and their autocorrelation functions; test the hypothesis of independent and non-correlated series of the variables; the Dickey Fuller unit root test, Phillips-Perron unit root test and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) unit root test. Again, this Chapter presents the results on Johansen cointegration test and the results on Autoregression Distributed Lag (ARDL) model and finally, the chapter summary.

Summary Statistics

The dependent variable used in the analysis is the banks non-performing loan. As noted in Table 2, the minimum and maximum value of non-performing represent 7.68 percent and 21.59 percent with a mean value of 14.14 percent which is very high with respect to the advanced countries. Each value of the non-performing loan deviates from the mean by an approximately 1.853. This means that the non-performing loan has a uniform distribution and thus there has been a persistent rise over the years. Policy rate had a mean of 20.260 percent with a standard deviation of 10.43 which is smaller than the mean and thus suggest that policy rate has regular distribution over the years. As shown in Table 2, the minimum and the maximum GDP growth rate from the 1971 to 2018 is -12.43 percent and 14.05 percent while mean are 3.8 percent.

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Further, total trade as a percentage of GDP had a mean of 56.807 with a standard deviation of 28.565 which is smaller than the mean. The minimum value recoded over the period is 6.32 while the maximum value 116.048. Thus, with respect to international trade, Ghana has been doing well over the years with such a great openness. A careful observation of the annual broad money supply as a percentage of GDP reveals a similar pattern. With a minimum value of 11.123 and a maximum value of 68.53, while the mean and the standard deviation respectively recorded 35.739 and thus reveals the uniformity within the period studied.

Further, the minimum value of total debt service 2.405 while the maximum value 56.917. The mean value recorded for the period i.e., 1971 to 2018 is 17.141 with a standard deviation of 13.063. Comparing the range of annual broad money supply with that of the debt service, the study observe that the means of the debt service varies wider when compared to annual broad money supply with a similar range. Considering the period of the study, the rate of inflation had a mean value of 30.908 percent with a standard deviation of 22.183. This is not surprising as during the dark period of 1970s and 1980s, the rate of inflation in the country was galloping.

Table 2: Summary Statistics

Variable (N=48)	Mean	Std. Dev.	Min	Max
Non-performing loan	14.148	1.853	7.678	21.591
Policy rate	20.260	10.437	6	45
GDP growth rate	3.801	4.522	-12.432	14.047
Trade (% of GDP)	56.807	28.565	6.32	116.048
Broad money supply ((% of GDP)	35.739	14.141	11.125	68.53
Debt service	17.141	13.063	2.405	56.917
Inflation	30.908	22.183	5.182	123.061

Source: Field Data, (2021)

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Trends on the Macroeconomic Variables

GDP Growth Rate

The distribution of the GDP growth rate over the period studied i.e., from 1971 to 2018 shows that the growth rate has been unstable over the period. After recording a negative growth rate in 1972-1979 and 1981 to 1983 as shown in Figure 1, the growth rate recovered from the negative growth rate and reached an annual average of 8.65 percent in 1984. Worthy to note is that Ghana adopted structural economic recovery programme around the same period i.e., in 1983 with the IMF. Thus, this GDP growth rate can be attributed the structural economic recovery programme which was implemented in 1983. From 1984 to 2010, there has been an unstable trend in the GDP growth rate with slightly ups and downs but in a steadily upward trend in the GDP growth rate. Noted in Figure 2 also is the highest growth ever of the GDP recorded in 2011 which is approximately 14.05 percent. This growth is primarily attributed to the rebasing of the GDP from the 1993 to 2006 and the large export of Crude oil. The major observation worthy to note in Figure 1 is that there is no steadily trend in the series and thus we can estimate GDP growth rate either with a drift or include a trend to observe the behaviour in the model.

Bank Non-Performing Loan

Again, Figure 1 shows the annual distribution of NPLs from 1971 to 2018. As depicted in the graph, there is steadily upward trend of the bank's non-performing loan since Ghana. Thus, over the years the rate of banks NPLs has been increasing which is worrisome. After computing an average for the missing years

1971 to 2007, the study observed that banks NPLs has been increasing after reaching average of 7.68 percent in 2008. After 2008, the bank's NPLs has never reached a single digit rate with the maximum rate occurring in in 2017 (21.59 percent). What is noticeable with non-performing loan series is that there seem to be an upward trend with some drift along the years.

Inflation Rate

Figure 1 further shows the annual distribution of the rate of inflation from 1971 to 2018. Unlike the non-performing loan, the inflation rate over the period studied has been decreasing. After recording a higher rate between 1977 (67.25 percent) and 1988 (73.31 percent), Ghana witnessed a galloping interest rate in 1983 (123.06 percent). Afterwards, the rate of inflation has been decreasing asymptotically with seasonal increase along the years. Although galloping inflation can be sign of bad economic managements but low inflation has a serious repercussion on the growth of the economy, particularly, GDP growth rate. Low inflation could be a sign of low investment resulting from low of confidence in the economy and thus affect the GDP growth of the country. Now, the graph depict that the rate of inflation has downwards trend as shown in its asymptotical movement from the left to right.

Policy Rate

Figure 1 also depicts the distribution of policy rate from the period 1971 to 2018. As observed from the Figure 4, the policy rate increasing from 1971 (8 percent) and peaked at 19.5 percent in 1981 where it falls slowly but higher that periods levels and peaked again at 26 percent in 1989. Figure 1 shows that the

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period preceding the dictatorship period through to 1990, policy rate has been increasing. From the period Ghana started democratic governance (1990), policy rate was zero for the banks. Thus, banks can give loans to entrepreneurs and small and medium enterprises even at zero percent interest rate. Beyond 1990 through to 2017, the policy rate has been increasing over time at double digit. The graph reviews no clear trend over the period under study.

Broad Money to Total Reserve

Money supply is very important element in monetary economics. This is because the total amount of money in circulation has a role to play in the interest rate of every economy. However, the amount of money supply provides a direct observation of the strength of the central bank and their ability to manage monetary policy effectively to achieve the desired growth. The graph in Figure 5 shows that Ghana's money supply to do not follow any systemic pattern. A careful observation of the distribution of the graph in Figure 5 shows that on average, the rate has been low. That is, Ghana prints more money irrespective of the amount of the external reserve that the nations gain from its export which in effect affect the interest rate banks give to their customers. Noted in Figure 5 is that the annual broad money supply in 1980 was approximately 33.80 percent. The rate remained below 3 percent until 1992 when it recoded 3.1 percent. From 1993 to 1997 the rate remained below 3 percent again until 1998 when the rate grew by an approximately 3.7 percent. The rate fell again in 1998 and reached its highest in point in 2000 by a 4.5 percent. The rate has decreased since then with in increasing money supply in the economy as shown in the diagram.

Total Debt Service

The total debt service as observed from Figure 1 exhibits a trended series from 1975 to 1988. Now, Ghana as a developing country depends heavily on external borrowing to finance many of its developmental projects which results in accumulation of external debt that needs to be paid. The study observed a steadily rise of the total external debt from 1975 to 1988 where it recorded the highest debt service. The total debt service declined after 1988 but remained reasonably high until 2000 when the country joined the World Bank and IMF HIPC programme. It is worthy to note that beginning from 2000, Ghana surrendered to the Internal Monetary Fund (IMF) and the World Bank and declared its status as heavily indebted poor country, which came with a package of debt relief. Thus, from 2000 to 2006, this programme aimed to progressively cutdown the external debt of Ghana through debt relief and consequently the amount of debt service paid and thus can be observed from the steadily decline of total debt service after 2000 up to 2010. However, after Ghana stopped receiving funds from the HIPC programme by the IMF and the World Bank, Ghana's external debt begun to rise again from 2010 to till date.

Total Trade as Percentage of GDP

Figure 7 shows the graph of total trade as a percentage of gross domestic product. As noted, total trade as percentage of GDP has been increasing over the years with the lowest peak occurring in 1982 (6.32 percent). It is also worth mentioning that the year 2000 saw the highest total trade as percentage of GDP

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(116.05 percent). Total trade as percentage of GDP series exhibits a trend as it has been rising and falling but still keeps the upward trend which begun in 1982.
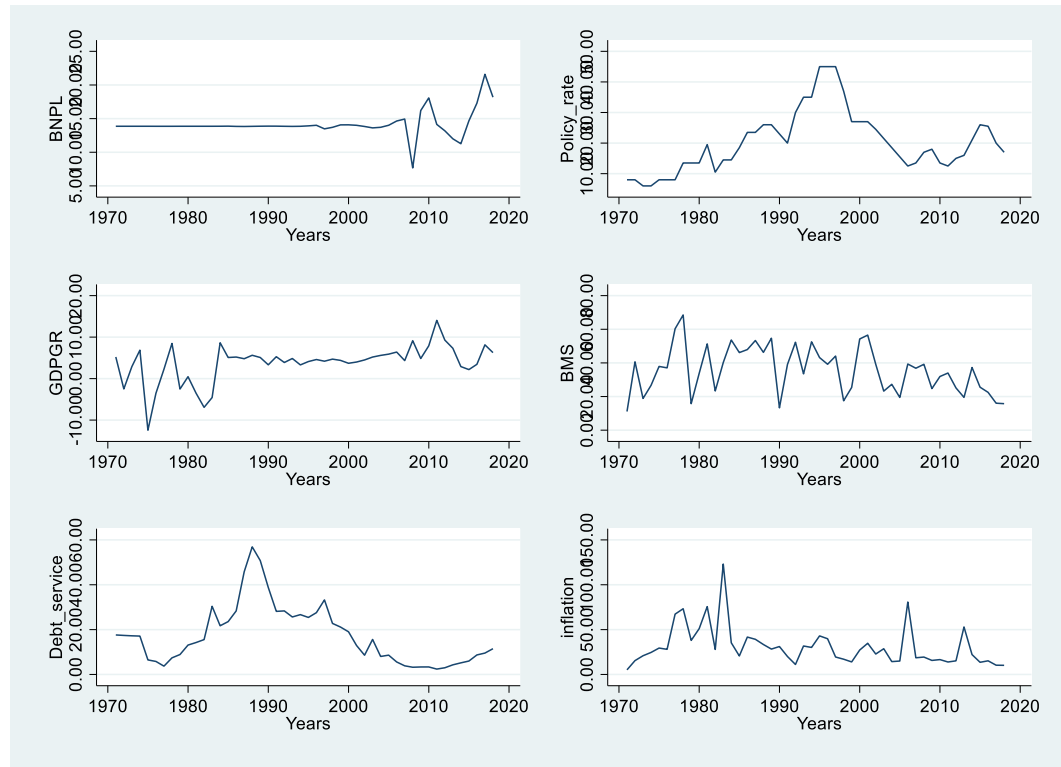
Figure 1: Graph of Macro-Economic Variables
Source: Field Data, (2021)

Autocorrelation Graphs

Figure 8 shows the autocorrelation function depicts that GDP growth rate has a maximum lag length of 9. This means that if the positive trend observed in the GDP growth after 1984 is statistically significant with previous GDP growth rate, it does with 9 lag periods. Thus, GDP growth rate has long memory with is past levels of GDP growth rate. This followed by the autocorrelation function of banks non-performing loan. The autocorrelation function reveals that NPLs has lag one. Thus, the appropriate lag level for the NPLs if the trend observed is statistically significant is lag one. Again, the autocorrelation function of the rate of inflation reveals that the rate of inflation has memory of the past. As show in the diagram,

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the rate of inflation has a maximum lag length of eight. Thus, the ACF line falls below zero after the lag length eight. This study deducts ACF of the rate of inflation and concludes that inflation rate has memory in the past.

Further, the autocorrelation function of the policy rate reveals that indeed policy rate has long memory to the past. The ACF shows that, beginning from lag one to lag nine, the policy rate is above the ACF line. However, from the lag tenth lag to lag 25, policy rate is below the ACF line. This shows that the maximum lag length that this study can employ is nine. Again, this also means that if the trend observed is statistically significant, the failure to account for this trend in the model will either underestimate or overestimate the true effect policy rate on banks NPLs rate. Again, the autocorrelation function of the annual broad money supply shows that irrespective of the lack of clear trend in the movement of the annual broad money supply, there is potential autocorrelation in this series. The ACF shows that this series has one lag as only lag cross the ACF line. That is, the maximum lag section for annual the broad money supply one.

With respect to total debt service, the ACF line indicates that the variable remembers its past. Notably, from lag one to ten, total debt service is above the ACF line while from lag 11 to 20 are all below the ACF line. This depicts that the total external debt remembers its past to a period of 10 years. In other word, the series of total debt service correlates with its lag levels to a period of about ten years. This means that there is the need to test for the statistical significance of this trend and be able to estimate the true effect of external debt to GDP growth rate after accounting for the trend in the series. Again, from lag one to fourteen, total

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trade as percentage of GDP is above the ACF line while from lag 15 to 20 are all below the ACF line. This depicts that the total external debt remembers its past to a period of 14 years. In other word, the series of total trade correlates with its lag levels to a period of about 14 years.
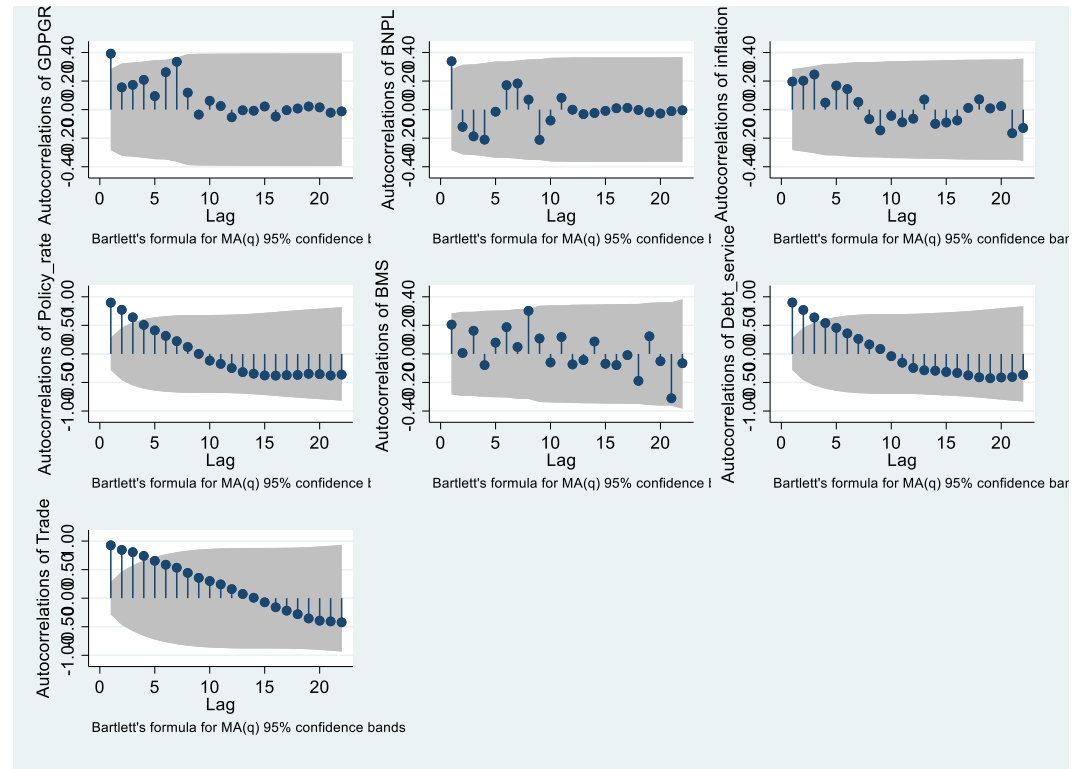
Figure 2: Autocorrelation Plot
Source: Field Data, (2021)

Test of Independent and Non-correlated Series

Table 3 shows the Box-Ljung test results which test the null hypothesis that the series are independent and non-correlated against the alternative hypothesis of dependent and correlated series. In Table 3, the Box-Ljung test statistics along the corresponding P-value are shown. Evident in Table 3, the Box-Ljung test for bank non-performing loan (BNPL) produced a chi-square of 5.873 which is statistically significant at 5 percent alpha level. Thus, BNPL series are correlated and non-

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independent. Similarly, policy ratehad a chi-square statistic of 33.027 which is significant even at zero percent and thus the study concluded that policy rateseries is correlated and non-independent. Further, GDP growth rate had a chi-square value of14.24. The corresponding P-value for the GDP growth rate is 0.001. This means the study rejects the null hypothesis of independent and non-correlated series and conclude that indeed the GDP growth rate is not an independent and non-correlated series. This means that the lags of GDP growth rate correlate among themselves and is absolutely not independent.

Again, a careful observation of Table 3 reveals that all the series in this study are not independent and a are correlated with the lags of the themselves with exception of the annual broad money supply. The exceptionality of the rate of annual broad money supply can be deduced from its autocorrelation function as witness earlier that this particular series do not follow any trend as compared to the other series in this study. Thus, this study concludes that BNPL, lending interest rate, GDP growth rate, total debt service, total trade and annual broad money supply are not an independent and indeed they are correlated with their lags with exception of the rate of annual broad money supply.

Table 3:Test of Independent and Non-correlated Series

Variable	Box-Ljung test X-squared	P-value
BNPL	5.873	0.015
Lending interest rate	33.03	0.000
GDPG	7.845	0.005
Debt service	41.445	0.000
Inflation	8.228	0.004
BMS	2.151	0.143
Trade	43.777	0.000

Source: Field Data, (2021)

Unit Root Test

Kwiatkowski, Phillips, Schmidt and Shin (KPSS)

Now, as discussed in Chapter three, the augmented Dickey Fuller test and Phillips-Perron has some limitation (DeJong, et al, J. of Econometrics, 1992). For this reason, the study conducted KPSS unit root test. KPSS test the null hypothesis that series are level or trended stationary against the alternative hypothesis of non-stationary (has unit root). Table 4 reveals that almost all the series are level or difference stationary excepting GDP growth rate and Trade as percentage of GDP growth that the test statistic lies above the critical regions. Thus, the study fails to reject the null hypothesis at 1% level of significance and concludes that GDP growth rate is non-stationary which is in contradiction to both the Dickey Fuller and Phillips-Perron test. The KPSS fail to reject the null hypothesis for Trade and Debt service which Dicky Fuller and Phillip-Perron test predicted to be non-stationary and conclude that the two variables in the series are trended or level stationary.

Table 4: KPSS Test of Unit Root

Variable	Test statistic	1% critical value
Non-performing loan	0.268	0.730
Lending interest rate	0.566	0.730
GDP growth	0.982	0.730
Trade as %GDP	1.70	0.730
BMS	0.51	0.730
Inflation	0.567	0.730
Debt service	0.681	0.730

Source: Field Data, (2021)

Johansen Test of Cointegration

To address the long-run relationship in the series, the study conducted Johansen test of cointegration. From the Table 5, the level of cointegrating relationship is represented by the r which ranges from zero (0) to six (6). Evidenced in the Table 8, the test statistic of at least two cointegrating vectors among the series is failed to be rejected with trace statistic of 38.251 and a critical value of 47.21. That is null hypothesis of r=r* cointegrating vectors is failed to be rejected and conclude that there is two cointegrating relationship among the variables.

Table 5:Johansen Test of Cointegration

Trend: constant		Number	Of	obs =	46
Sample: 1973 -2018				Lags =	2
Maximum				Trace	5% critical
Rank	Parms	LL	Eigenvalue	Statistic	Value
0	42	-981.809	.	113.7272	94.15
1	53	-960.972	0.59583	72.0549	68.52
2	62	-944.07	0.52043	38.251*	47.21
3	69	-934.923	0.32814	19.9561	29.68
4	74	-930.351	0.18027	10.812	15.41
5	77	-926.214	0.16462	2.5382	3.76
6	78	-924.945	0.05368		

Source: Field Data, (2021)

Determinants of Policy rate ARDL (2 2 2 0 2 1)

The results of the policy rate determinants are presented in Table 6. The findings demonstrated that policy rate lags, inflation, yearly broad money supply lags, and their lags all have a considerable impact on policy rate. As previously stated, a one-percentage-point rise in the initial lag of policy rate is associated with a 1.213 percent increase in policy rate, which is statistically significant. Similarly, a unit increase in the second lag of the policy rate is related with a reduction of 0.317, which is statistically significant at the 5% alpha level.

Furthermore, the findings demonstrated that the policy rate has a positive link with both the first and second lags of GDP growth rate. As previously stated, a unit rise in the GDP growth rate's first lag is related with 0.207, whereas the second lag is connected with 0.204. Furthermore, a 0.035 increase in the policy rate is connected with GDP growth, however this is not statistically significant. This means that if the economy grows for a period of time, the central bank will likely boost the rate at which it lends to commercial banks.

Further, the rate of inflation and the second lag of inflation rate both has a statistically significant relationship with the policy rate. As noted, a unit increase is the rate of inflation is associated with 0.062 increase in policy rate. This means that as the general level of prices sours up, policy rate increases as well. Again, the results shows that the second lag of inflation is associated with 0.056 increase in policy rate and this is statistically significant at five percent. The first lag of the rate of inflation, however, had a negative relationship with policy rate although this is not statistically significant. Debt service as a percentage of GDP also had a positive effect on policy rate, however, this was found not to be statistically significant.

Further, the results shows that the annual broad money supply as a percentage of GDP had a positive and significant relationship with policy rate as well as the second lag of annual broad money supply but with a negative direction. Specifically, a unit increase in annual broad money supply is associated with 0.141 increase in policy rate which is statistically significant at one percent alpha level. This means that increasing broad money supply comes with increases in the policy rate. This result is similar to the relationship which exist between the first lag of

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annual broad money supply and the policy rate. However, the second lag of broad

money supply is associated with a negative reduction of the policy rate by 0.119.

This finding is consistent Matemilola, Bany-Ariffin, and Muhtar (2015) and

Svensson (2012).

Table 6: Determinants of Policy rate ARDL

VARIABLES	ARDL Policy rate
L.Policy rate	1.213***
	(0.156)
L2.Policy_rate	-0.317**
	(0.146)
GDPGR	0.035
	(0.126)
L.GDPGR	0.207
	(0.129)
L2.GDPGR	0.204
	(0.134)
Inflation	0.062*
	(0.031)
L.inflation	-0.043
	(0.029)
L2.inflation	0.056**
	(0.027)
Debt_service	0.033
	(0.048)
BMS	0.141***
	(0.045)
L.BMS	0.025
	(0.047)
L2.BMS	-0.119**
	(0.045)
dTrade	0.073
	(0.053)
L.dTrade	-0.052
	(0.054)
Constant	-4.010
	(2.698)
Observations	46
R-squared	0.928

Source: Field Data, (2021)

Effect of Policy rate on NPLs

The findings of the autoregressive distributed lag model are shown in Table 7. As the pace of adjustment is negative and statistically significant, the results demonstrate that the previous period's errors will be remedied in the current period. In the long run, the data demonstrates that, all other things being equal, an increase in the policy rate is related with a 0.026 increase in bank NPLs. Studies show that the policy rate impacts the rate at which commercial banks lend to their borrowers, which has a negative impact on non-performing loans (Karadima & Louri 2021; Zheng Bhowmik & Sarker 2020; Khan, Siddique & Sarwar 2020; Messai & Jouini 2013). In the long run, a higher GDP growth rate reduces NPLs.

In the long term, the external debt service to GDP ratio reduces bank non-performing loans, however the coefficient is not statistically significant. Furthermore, the yearly wide money supply reduces bank NPLs by 0.04 percent, which is statistically significant at the ten percent alpha level, while the trade-to-GDP ratio reduces bank NPLs by 0.009.

However, in the near run, the results show that non-performing loan delays, GDP growth rate and its lags, inflation rate and its lags, and external debt to GDP ratio all have a favorable impact on bank NPLs. The change in the latency of bank nonperforming loans is associated with 0.432, which is statistically significant at the 5% level of significance. Furthermore, a change in GDP growth rate is linked to a 0.134 rise in bank NPLs, while a change in the first lag of GDP growth rate is linked to a 0.179 increase in bank NPLs, which is statistically significant at the 5%

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alpha level. Furthermore, a 0.044 increase is linked to a change in the rate of inflation.

Table 7: Effect of Policy rate on NPLs

VARIABLES	ARDL
ADJ	
L.BNPL	-1.095***
	(0.223)
LR	
Policy_rate	0.026
	(0.035)
GDPGR	-0.141
	(0.100)
Inflation	-0.052*
	(0.025)
Debt_service	-0.005
	(0.024)
BMS	-0.043*
	(0.021)
Trade	-0.009
	(0.014)
SR	
LD.BNPL	0.432**
	(0.193)
D.GDPGR	0.134
	(0.087)
LD.GDPGR	0.179**
	(0.070)
D.inflation	0.044**
	(0.019)
LD.inflation	0.035**
	(0.013)
D.Debt_service	0.063
	(0.047)
Constant	19.548***
	(3.621)
Observations	46
R-squared	0.555

Source: Field Data, (2021)

Chapter summary

The chapter presented the results and the discussion of the study. Specifically, the study presented summary statistics of the variables used in the study. The study revealed that the minimum and maximum value of non-performing represent 7.68 percent and 21.59 percent while the mean value was 14.14 percent. Again, the study revealed that each value of the non-performing loan deviates from the mean by an approximately 1.853. Policy rate had a mean of 19.78 percent with a standard deviation of 10. Furthermore, the minimum and the maximum GDP growth rate was -12.43 percent and 14.05 percent with mean are 3.8 percent respectively. Further, total trade as a percentage of GDP had a mean of 56.807 with a standard deviation of 28.565. Again, the annual broad money supply had minimum value of 11.123 and a maximum value of 68.53 percent while the mean and the standard deviation respectively recorded 35.739 and 14.141. Further, total debt service had a minimum value of 2.405 and a maximum value 56.917. The mean was 17.141 with a standard deviation of 13.063.

Further, the study presented the trend of the dependent and the independent variables used in the study. It was evidenced from the graphs that NPLs had a long memory while policy rate behaviours the otherwise. Again, the graphs revealed that GDP growth rate, annual broad money supply, total trade as percentage of GDP, inflation rate and total debt service exhibited no series trends. Furthermore, the autocorrelation plot of the series revealed that the maximum lag selection for the GDP growth rate is one. In addition, the autocorrelation plot also revealed that the maximum lag selection for non-performing loan is one, policy rate is ten, GDP

growth rate is one, annual broad money supply is one, total debt service is nine, inflation rate is eight while trade as percentage of GDP is fifteen. Furthermore, the independent test showed that the series are not independent and they are correlated series with exception of annual broad money supply.

Besides, the study performed KPSS unit root test. KPSS revealed that all the variables are level or trended stationary except GDP growth rate. Again, the study revealed that the test statistic of at least two cointegrating vectors among the series was failed to be rejected with trace statistic of 38.251 and a critical value of 47.21 and concluded that there is two cointegrating relationship among the variables.

The results on the determinant of policy rate revealed that among the four variables that were in the model, three of them shown statistical significance with the dependent variable-lending interest rate. The finding reveals that the cost of heavy borrowing as a country result in the central bank increasing the policy rate or the banks which affects the interest rate that each of the banks give to their customers. Further, the results reveal that annual broad money supply has a positive effect on lending interest rate. Again, total trade as percentage of GDP increases policy rate by 0.204 units and is significant at one percent alpha level.

Further, the ARDL results of the effect of policy rate on NPLs revealed that the lag levels of non-performing loan negatively affect the present level of banks non-performing loan. Again, both the third and the fourth lag are statistically significant with the same direction which indicates that banks adjust to the presents levels of loans decisions using the knowledge of earlier loan defaults which

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decreases the risk of non-performing loan in the present level. Further, the study revealed that the second lag of inflation is statistically significant with non-performing loan.

The results of the error correction model reveals that the deviations from the equilibrium of the NPLs quickly adjust with an approximately 1-year period. Again, in the short-run, the lags of the dependent variable-non-performing loan positively affect the NPLs in present levels. Again, the study observed that the rate of inflation is positive and statistically significant in the short-run. However, in the long-run, the relationship is negative although the results are not statistically significant. This means that the rate of inflation increases NPLs in the short-run but in the long-run, the rate inflation increases. Again, the policy rate affects NPLs by 0.008 and is statistically significant at five percent. Thus, in the long-run, a higher policy rate has an adverse effect on NPLs in the country. Furthermore, the chapter presented the results on the determinants of policy rate. The results revealed that both the first lag and the second lag of policy rate affect policy rate. Again, inflation rate and its second lag as well as annual broad money supply as percentage of GDP affect policy rate.

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Introduction

The study looked at the policy rate on nonperforming loans in Ghana. This chapter contains the summary, conclusion, and suggestions. The chapter opened with an introduction, which was followed by an overview of the inquiry, key findings from the study, a conclusion, a recommendation, and a suggestion for further studies.

Summary

This study examined policy rate and NPLs in Ghana. Specifically, the study begun with the background of the study where the issue of non-performing in Ghana was highlighted and motivated. The study continued with the problem statement of the where the highlighted the gap which exist in investigating the role of lending interest on NPLs with respect to the nation Ghana. The sought to provide empirical findings to the following objectives; to determine the trend of NPLs in Ghana; to explore other determinants of NPLs in Ghana and to estimate the effect of policy rateon NPLs in Ghana. The study also presented the significance, delimitation and the limitation of the study.

Further, the Chapter two presented the theoretical literature on credit rationing theory, Keynesian liquidity preference theory, interest rate spread in the banking sector, performing loans, NPLs, determinants of NPLs, provisioning program, bank capitalisation, proprietorship status, profit orientation of bank, macroeconomic determinants, review on interest rate, unemployment, inflation,

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commercial banks loan classification and provition, loan processing among commercial banks, preliminary screening, loan proposal and credit committee and monitoring and repayment. Further, the study provided review on implications of NPLs for commercial banks, minimising NPLs among commercial banks which include complacency, carelessness, communication ineffectiveness and competition. Again, the presented a conceptual framework, empirical review on NPLs, the gaps that exist in the literature and finally the chapter summary.

The Chapter three presented research design, data source and description, measurement of dependent variables, measurement of independent variables, the theoretical measurement specification, stationary and non-stationary times series, unit root testing, Dickey Fuller unit root test, Phillips-Perron unit root test, Kwaiatkowski, Phillips, Schmidt and Shin (KPSS) unit root test, Engle-Granger cointegration test, Johansen unit root test, autoregressive distributed lag model, error correction model and finally some post estimation test.

In addition, the study presents the results and discussion in Chapter four. Specifically, the study presented the trend of the dependent and the independent variables used in the study. It was evidenced from the graphs that NPLs had a long memory while policy rate behaviours the otherwise. Again, the graphs revealed that GDP growth rate, annual broad money supply, total trade as percentage of GDP, inflation rate and total debt service exhibited no series trends. Furthermore, the autocorrelation plot of the series revealed that the maximum lag selection for the GDP growth rate is one. In addition, the autocorrelation plot also revealed that the maximum lag selection for non-performing loan is one, policy rate is ten, GDP

growth rate is one, annual broad money supply is one, total debt service is nine, inflation rate is eight while trade as percentage of GDP is fifteen. Furthermore, the independent test showed that the series are not independent and they are correlated series with exception of annual broad money supply.

Besides, the study performed augmented Dickey fuller unit root test, Phillips-Perron unit root test and KPSS unit root test. Both the Dicky Fuller and Phillips-Perron test revealed concluded, lending interest rate, total trade and debt service are stationary, however, the BNPL, Trade, BMS, GDP growth rate and inflation are all non-stationary. But KPSS revealed that all the variables are level or trended stationary except GDP growth rate. Again, the study concluded that there is at least two cointegrating relationship among the variables.

The results on the determinant of policy rate revealed that among the four variables that were in the model, three of them shown statistical significance with the dependent variable-lending interest rate. The finding reveals that the cost of heavy borrowing as a country result in the central bank increasing the policy rate or the banks which affects the interest rate that each of the banks give to their customers. Further, the results reveal that annual broad money supply has a positive effect on lending interest rate. Again, total trade as percentage of GDP increases policy

The results of the error correction model reveals that the deviations from the equilibrium of the NPLs quickly adjust with an approximately 1-year period. Again, in the short-run, the change in non-performing loan positively impact the behaviour of NPLs. Again, the study observed that the rate of inflation is positive

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and statistically significant in the short-run. However, in the long-run, the relationship is negative although the results are not statistically significant. This means that the rate of inflation increases NPLs in the short-run but in the long-run, the rate inflation increases. Thus, in the long-run, the study concludes that a higher policy rate has an adverse effect on NPLs in the country.

Conclusion

The study examined policy rate and NPLs in Ghana. The study concludes that total debt service, annual broad money supply, and total trade as a percentage of GDP affect the policy rate in the country. The findings reveal that the cost of heavy borrowing results in the nation increasing the policy rate for the banks whereas annual broad money supply and the total debt service also increase the policy rate in the same direction.

Further, the study concludes that the lags of non-performing loan affect the present level of banks non-performing loan. Further, the study concludes that banks adjust to the presents levels of loans decisions using the knowledge of earlier loan defaults which decreases the risk of non-performing loan in the present level. Further, the study concludes that inflation is affect non-performing loan. Similarly, the study concludes that the changes in the debt service and annual broad money supply affect the behavior of NPLs. Again, the study concludes that the rate of inflation affects NPLs in the short-run. However, in the long-run, the relationship is negative. Finally, the study concludes that policy rate affects NPLs in the country.

Recommendation

Based on the findings, the study recommends that Bank of Ghana (BoG) must strengthen monetary policy regulation to ensure that policy rate is kept to at the lowest minimum as higher levels increasing NPLs. This can easily be achieved by the Bank of Ghana ensuring the monetary policy rate stays a single digit to ensure that commercial banks can borrow at a cheaper rate from the central bank to lower interest rate commercial banks give to their customers.

Again, the government of Ghana must implement export-based policies to increase the percentage of trade to GDP. This is because, the results revealed that trade as percentage GDP decreases non-performing loan. Thus, if the central government direct policies which target the economy to be export-export oriented with minimal import, then, the resulting growth will decrease the rate of NPLs in the country.

Further, macroeconomic stability should be a core mandate of the central government and the central bank. This is because volatility in any one of the key macroeconomic variables influences inflation which determines cost of goods and services in the economy and thus in the long-run the rate of inflation will be affect which in turn cause a shift in the behaviour of NPLs.

Bank of Ghana and government must work closely with the finance ministry to stimulate the right kind of growth which will bring about economic growth. This can be achieved if the Bank of Ghana and the central government work closely to target policies like the right form of inflation which will stimulate growth and thus decreases the rate of NPLs.

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Lastly, the Bank of Ghana must endeavour to regular the supply of money in the economy. That is the supply of money must match of with the production of goods and services in the economy. This can be achieved if the central government lay down proper monetary system to ascertain the rate at which non-performing loan response to the money supply in the economy.

Suggestion for further Studies

Base on the limitation of this study, this study proposed that further studies should consider a cross-sectional unit of countries over time to ascertain if the same conclusion can be made with respect to the present study will differ significantly.
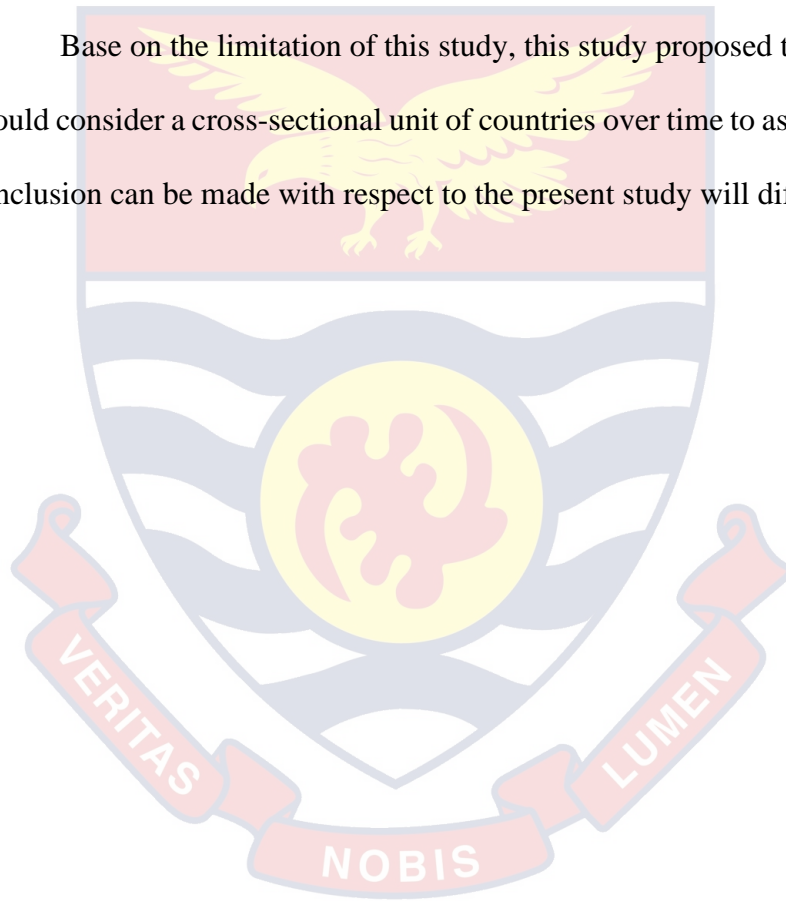
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APPENDICES

A: Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	Df	P-value
2	0.377	2	0.8282

B: White's Test

chi2(45)	Prob > chi2
46.00	0.431

C: Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	P-value
Heteroskedasticity	46	45	0.4306
Skewness	16	12	0.1619
Kurtosis	3.59	1	0.0581
Total	66.27	58	0.2131

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