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Non-performing loans and monetary policy dynamics in Ghana

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Abstract

Purpose – The sharp rise in non-performing loans (NPLs) with its associated effect on financial institutions in Ghana has become very alarming. This has led to the collapse of distressed institutions and associated repercussions such as loss of private savings, investments, businesses and livelihoods. The purpose of this paper is to test the hypothesis that the monetary policy rate can be used to influence NPLs in Ghana.

Design/methodology/approach – Using quarterly data spanning from 2000 to 2016, the authors used the autoregressive distributed lag econometric approach to estimate the effect of monetary policy on the percentage growth of NPLs in Ghana. The results are presented for both short-run and long-run periods.

Findings – In the short run, the authors find evidence of no statistically significant effect of monetary policy on the percentage growth of NPLs. However, in the long run, the authors find a statistically significant effect of monetary policy on the percentage growth of NPLs.

Practical implications – The authors recommend that policymakers should focus on building a strong financial environment, so that monetary policy can be used to influence the commercial bank's interest rate. In effect, this will help reduce the growth of NPLs, reduce risk and attract competitors into the financial market, increase asset base, increase credit to support viable ventures and subsequently boost economic growth in Ghana.

Originality/value – The paper shows its value by using quarterly data whereas most literature have considered annual data. Also, the paper includes a policy variable measured by the Monetary Policy Rate (MPR) as the key variable of interest which is normally not the case with most studies.

Keywords Ghana, Dynamics, Monetary policy, Non-performing loans

Paper type Research paper

1. Introduction

In most developing countries, such as Ghana, a key problem that has beset the main sectors of the economy has been access to loanable funds. Many strategic financial institutions had been established to help ameliorate this problem by making loanable funds available to support both the private and the public sectors. However, with the rise in the rate of non-performing loans (NPLs), a sizeable number of these financial institutions became distressed. For banks, in the last quarter of 2017, this problem – the rise in the rate of NPLs – has contributed to the taking over of Capital and UT Banks by the Ghana Commercial Bank. More recently (i.e. first quarter of 2018) Unibank has been taken over by the Bank of Ghana and given to Klynveld Peat Marwick Goerdeler (KPMG) to manage. Again, in the second quarter of 2018, five banking institutions were collapsed and consolidated into one bank by the Central Bank of Ghana for various reasons. A major causal factor of these infringements was rising levels of NPLs. For microfinance or deposit/savings financial institutions, the Bank of Ghana since 2008 has moved to close a greater number of such distressing institutions (Belnye, 2012). Given the absence of deposit insurance in Ghana, the severity of the repercussions of such fold-ups on savings, businesses and livelihood cannot be overemphasized (Boateng *et al.*, 2016). It has been explained by experts that these actions were necessary to prevent a weak banking sector,

which is characterized by limited access to credit and high lending rates, especially to the private sector, which has been described as an engine of growth.

In Ghana, a primary cause of distressed financial institutions or bank failure or fold-ups is the high rate of bad debts or NPLs (Amuakwa-Mensah *et al.*, 2017). Generally, the literature is quite clear on the causes and processes through which NPLs occur (see Hennie, 2003; Fofack, 2005). One key source mentioned in the literature has been global financial shocks. For example, since the global financial crises in 2007, a fragile and open economy like Ghana has experienced high rates of NPLs. Several other studies have mentioned the fact that volatility in stock prices may result in high default through wealth effects and a decrease in the value of collaterals.

Interest rates in Ghana have been reported as being some of the highest in the sub-region and on the continent. With such high interest rates in a fragile economy, high default rates are normally expected. Haneef *et al.* (2012) posited that high default rates on the part of borrowers of money from banks have resulted in high NPLs, which hinders banks' efficiency. This inefficiency suggests that banks are unable to direct accurately, loanable funds to areas that are more productive and reliable *vis-à-vis* credit payback. Inefficiencies as a result of high NPLs are potentially inimical to banks' performance and the sustainability of the financial sector.

Monetary policy has been actively implemented by the Central Bank of Ghana, to control commercial banks' interest rates, with the aim of ensuring that the financial sector is resilient enough to support growth through credit creation. In light of the recent increase in trends of NPLs, and subsequent closure of distressed financial institutions, the focus of attempting to address the rising nature of NPLs is renewed because of its effect on banks survival. Although the literature refers to the default rate and high lending rates as promulgating NPLs in Ghana, the efficiency of the current monetary policy regime has not been called into question. Empirical evidence examining influence of monetary policy on NPLs, to the best of our knowledge, has not yet been found in Africa, particularly Ghana. The closest empirical evidence we have found is by Ghosh and Sensarma (2004) and Ghosh (2005) in which NPLs and different types of firm-level debt are modeled as a function of monetary policy indicators. These studies are on the Indian economy and are in no way related to Africa or Ghana. This creates an opportunity for this study to fill the gap.

The central question to be addressed by the paper is as follows:

RQ1. Does the monetary policy rate (MPR) have an influence on NPLs in Ghana?

This research question is relevant, in light of the increase in trends of NPLs in Ghana, and subsequent closure of distressed financial institutions because of NPLs. From such recent occurrences, the focus on NPLs is renewed because of its effect on banks survival.

Primarily, the paper seeks to draw out the unique relationship between NPLs and monetary policy in Ghana. Our key results provide a potential empirical explanation in an attempt to answer the question of whether MPR has a significant influence on NPLs in Ghana. Using time series quarterly data from 2000 to 2016 and a dynamic econometric model, we present our results in two-time periods.

The rest of the paper is presented as follows. In Section 2, we present the stylized facts about NPLs in Ghana from 2000 to 2016. The theoretical framework and empirical literature follow in Sections 3 and 4, respectively. Section 5 describes the empirical strategy while Section 6 presents the results of the study. Section 7 concludes the paper with policy implications.

2. Stylized facts
In Ghana, the average trends in NPLs and the MPR, from 2000 to 2016, have been oscillating. Unfortunately, this trend is also ascribed of to the deposit interest rate in Ghana, which is used in this case based on the absence on data on lending rates or interest spread.

Indeed, Ghana has been eluded by sustainable patterns in the average NPL trends. To some extent, this performance has not given credence to claims regarding the efficacy of policies and programs such as the GPRS I (2003–2007) and II (2006–2009), and GSGDA I (2010–2013) and II (2014–2017), which have been designed to achieve stable and sustainable financial market development. One cannot also lose sight of the impact of the 2007–2009 global financial crisis on the trends of NPLs and MPR.

Since 2014, the average NPLs have been rising sharply together with MPR. Indeed, we can observe long periods of some similar patterns in the trends especially from 2003 to 2009. This perhaps could be attributed to the Financial Sector Strategic Plan in 2003, which amongst other factors saw the restructuring of distressed banks and liberalization of interest rates. Further, as noticed from Figure 1, the interest rate movements show a decreasing trend from 2003 to 2007.

Thereafter, NPLs and interest rates appear to have trended downward, with interest rates being lower than NPLs until 2006 thereabout, where interest rates started an upward trend. From 2007, all three indicators started an upward trend and continued in the same direction reaching a peak in 2009. This we believe was associated with the global financial crisis that affected major banking and financial sectors. Interestingly, interest rates appear to dip before NPLs, given that after 2009, interest rates started a downward trend again. The trend in NPLs changed a year after 2010 until 2014, where it is obvious that there was an overlap between interest rates and NPLs. The concern, however, is that after 2014, while one would expect that interest rates and NPLs move in the same direction, interest rates appear to be trending downwards while NPLs appear to trending upward. Given that, the MPR is also a determinant of commercial bank lending rate, one would expect that most interest rates and lending rates would use the commercial bank lending rate as a reference point and, hence, follow the same trend of the MPR. However, in Ghana's case, especially from 2013, this does not appear to work as we observe a divergence instead of a convergence. The trends (shown in Figure 1) show a divergence between MPR and interest rates, which hitherto, were trending in the same direction. Also, from Figure 1, the MPR and NPLs appear to be taking an upward trend since 2014 while interest rates appear to be taking a downward trend. Now, what is a bit worrisome is the fact that the average NPLs is higher than the peaked value during the global financial crisis of 2008/2009.
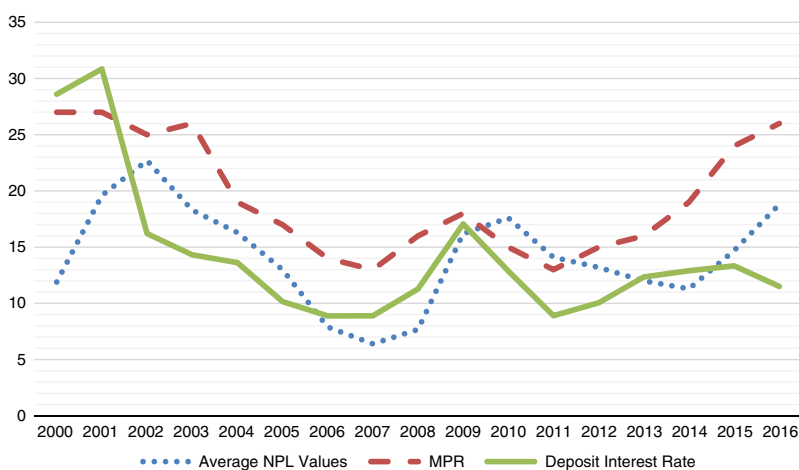

Figure 1.
Trends in average
NPL, deposit interest
rate and MPR from
2000 to 2016

Source: Authors' own estimations using data from Bank of Ghana and WDI

Given that the NPLs contribute to low deposit interest rates and high lending rates, we hypothesize that the control of NPLs can be done using the MPR, as this is the lead policy instrument available to the Central Bank of Ghana. If this is possible, the trends of NPLs shown in Figure 1 can be influenced in a direction that will benefit the economy of Ghana. Although not direct, an effect of the MPR through the NPL is feasible. The ambiguity in the MPR, NPLs and interest rate trends, however, raises much concern and provides justification as to why this study is relevant to policymakers in Ghana.

From Figure 1, it is easy to see that the trend in NPLs from 2014, on average, is an increasing one. This increasing trend has been the case since 2014 to 2016. One should not be surprised, therefore, that recent collapses of financial institutions in 2017 and 2018 have been due to factors such as NPLs. This would suggest that a strong policy intervention would be needed to correct such anomalies in the financial sector in order to reverse the trend of NPLs in Ghana.

3. Theoretical framework

We present a simplified theoretical framework under the assumption that the behavior of the firm (herein referred to as financial institutions) is based on profit maximization. This is in line with most economic analysis of the firm's behavior. Following from Varian (1992), here, we assume that financial institutions accept deposits and give out loans to customers as their core functions. These activities of the firm constitute their actions, which is represented as:

$$(a_1, \ldots, a_n). \tag{1}$$

We posit that the primary purpose for these actions is to maximize profit as follows:

$$R(a_1, \ldots, a_n) - C(a_1, \ldots, a_n). \tag{2}$$

where $R(a_1, \ldots, a_n)$ and $C(a_1, \ldots, a_n)$ are the revenue and cost functions, respectively. We argue that the rising NPLs will increase the cost of operations of the financial institutions while decreasing NPLs will decrease the cost of operations. We re-write Equation (2) to follow the profit maximization problem of the firm. This is shown as in the following equation:

$$\max_{a_1, \ldots, a_n} R(a_1, \ldots, a_n) - C(a_1, \ldots, a_n). \tag{3}$$

We obtain the optimal set of actions of the firm that will maximize profit as:

$$a^* = \left(a_1^*, \ldots, a_n^*\right). \tag{4}$$

The optimal actions of the firm are characterized by the following marginal revenue and marginal cost conditions:

$$\frac{\partial R(a^*)}{\partial a_i} = \frac{\partial C(a^*)}{\partial a_i} \quad i = 1, \ldots, n.$$

The theoretical intuition underlying the conditions is that if the marginal cost of financial institutions should rise, perhaps as a result of rising levels of NPLs and given that the associated revenue remains the same, it would pay to decrease the level of economic activity of the financial institution. This implies that rising level of NPLs is inimical to the sustainability of financial institutions. On the other hand, if the MPR to a larger extent is used to control the levels of NPLs so that marginal revenue becomes greater than the marginal cost, it would pay to increase the level of economic activity of financial institutions. For the transmission mechanism, if the MPR should fall, assuming a constant spread by the financial institutions, commercial bank interest rate on credit will fall. This will incentivize the private sector , which

is believed that is believed to be the engine of growth. By this, one would expect levels of economic activities to rise. On the contrary, rising levels of MPR will increase NPLs, serve as a disincentive to the private sector borrowing and stifle potential levels of economic activity.

4. Empirical literature

First, it is important to mention again that to the best of our knowledge, no paper has used quarterly data to investigate both the short- and long-run roles of MPR in determining NPLs in a developing country such as Ghana. However, based on the theoretical expectation, and the historical evidence in the case of Ghana, we hypothesize that the MPR must play a significant role in addressing NPLs. We realize that most literature have investigated the determinants of NPLs, which happens to be the dependent variable of interest. We follow the same trend and present relevant literature that guides the statistical modeling in this paper.

Most empirical studies have been very general in investigating the macroeconomic determinants of NPLs in different economies. Recent studies have been conducted on economies of developing countries like Nigeria (Adeola and Ikpesu, 2017; Tyona et al., 2017), Namibia (Sheefeni, 2015), Arab countries like Morocco, Tunisia, Saudi Arabia and Oman (Touny and Shehab, 2015) and Croatia (Benazic and Radin, 2015). In addition, studies on developed countries, such as Italy, Greece and France, have been conducted (Messai and Jouini, 2013). These studies have used macroeconomic variables such as inflation, lending rates, exchange rates and the Gross Domestic Product (GDP) in their regression estimations and found mixed evidence of the influence of inflation, exchange rates as well as lending rates on NPLs in their economies.

Further, Prasanna (2014) worked on determinants of NPLs in the Indian banking system with data on 31 banks covering the period 2000–2012. The study used panel data analysis covering 372 banks over the period of the study. The study also included macroeconomic variables such as GDP growth, construction expenditure growth, growth of foreign reserves, inflation and stock market index growth. The study found that higher inflation and interest rates contributed positively to rising NPLs in India and that higher growth in savings and GDP was associated with a drop in NPLs in India.

Haniifah (2015) also examined economic determinants of NPLs in Ugandan commercial banks with data on the entire population of 25 commercial banks covering the period 2000–2013. The study uses a linear regression approach to analyze the data and uses the model explained by Carlos and Bonilla (2012). The study selected interest rate, inflation rate, exchange rate and GDP growth as key independent variables in the linear regression model. The study found that inflation and interest rates had a negative relationship with NPLs, contrary to the findings of Prasanna (2014). Also, Haniifah (2015) found that GDP growth had a negative relationship with NPLs in Uganda, which is similar to the finding by Prasanna (2014). However, the relationship between GDP growth and NPLs in Uganda was found to be insignificant.

In West Africa, Akinlo and Emmanuel (2014) examined the determinants of NPLs in Nigeria using annual data, sourced from the Central Bank of Nigeria, covering the period between the years 1981 and 2011. Based on a macroeconomic model with GDP, credit to the private sector, unemployment, lending rates, stock market price index, inflation and exchange rate, the study sought to analyze these relationships between such variables and NPLs in Nigeria. Using unit root testing, the Johansen method of co-integration an error correction technique, the study found that GDP growth was negatively related to NPLs in the long run; a finding that is similar to that from Prasanna (2014) and Haniifah (2015). Furthermore, the study finds that unemployment, credit to the private sector and exchange rates have a positive influence on NPLs in Nigeria, which is contrary to what Prasanna (2014) and Haniifah (2015) found.

Nonetheless, literature available on Ghana is not fully saturated. Amuakwa-Mensah and Boakye-Adjei (2015) investigated determinants of NPLs in the banking industry. Using a panel regression approach, the study relied on data from the Bank of Ghana and

World Development Indicators database. The study found that bank-specific variables such as bank size, current year loan growth and net interest margin, and macroeconomic variables such as inflation, GDP per capita and the real effective exchange rate, significantly influence NPLs in the banking industry in Ghana. The study further separates the sample and analyses the results for small and large banks. The results show that for large banks, macroeconomic factors influence NPLs more than bank-specific factors (current year loan growth) whereas, for small banks, bank-specific factors are important in explaining NPLs. The literature is further extended by Amuakwa-Mensah *et al.* (2017) who focuses on re-examining the determinants of NPLs by considering the role of the 2007–2009 financial crises. They observed that NPLs in Ghana are affected by bank-specific, industry and macroeconomic variables, hence, confirming the results obtained by Amuakwa-Mensah and Boakye-Adjei (2015). In addition, they added that in relation to the financial crises, the effect on NPLs was conditioned on the level of credit risk.

This study models variation in NPLs as a function of some key variables that have been used in the literature. These include inflation, credit to the private sector, the MPR and a measure of political dispensation (PD). First, higher inflation reduces the real value of income and reduces the purchasing power of consumers. For those who are financing loans, they are less able to service these debts because of the reduced value of their income. Such people are fixed income earners who have fixed interest rates on loans that they have taken. This would suggest a positive influence of inflation on NPLs. Alternatively, higher inflation could make debt servicing easier for another group of people because the real value of the loan is reduced (Amuakwa-Mensah *et al.*, 2017). Such people are flexible income earners who also have fixed interest rates on loans that they have taken. In this sense, a negative relationship is implied. The evidence from the literature has shown mixed results and this study adds on to the available evidence. Second, increase in NPLs reduce the value of private investment and makes the private sector susceptible to defaulting on their loans, resulting in less credit being given to them. By way of expectation, higher NPLs lead to a reduction in credit to the private sector, whereas increase in credit to the private sector would result in a reduction in NPLs (Akinlo and Emmanuel, 2014). Increase in credit to the private sector also has been supported by the theory that suggests that the private sector can act as an engine of growth in an economy (AfDB and OECD, 2006).

The point of reviewing the literature is to identify the contribution of past studies and show how this study fills a gap. A point of departure from our work is that the studies on Ghana have not evaluated the role of MPR as part of the determinants of NPLs. In addition, even where studies on other countries use interest rate variables, they do not explicitly account for the role of the MPR, as these countries may not be following an IT policy framework. Finally, differences in countries make it important to customize regression models to capture the relevant variables that apply for that economy. In this sense, a dummy variable that captures different levels of PD is included as these variations pertain to the Ghanaian case and help us determine whether there could be any possible political influences on NPLs in the country. For studies on Ghana, we find that the MPR was a key variable that was not included in earlier studies. Such a key omission may have contributed to the relatively small size of their reported coefficient of determination (R^2 and adjusted R^2). In addition, we include private sector credit based on the argument that the private sector is the engine of growth for developing economies such as Ghana. As part of our contribution, we focus on the MPR and its effect on NPLs both in the short run and the long run using a dynamic model that deals with potential identification issues.

5. Empirical strategy
Data
This study makes use of data from secondary sources only. The study used quarterly data spanning from 2000 to 2016, sourced from the Central Bank of Ghana and the World

Development Indicators database, published by the World Bank. Amuakwa-Mensah and Boakye-Adjei (2015) and Amuakwa-Mensah *et al.* (2017) showed evidence from the literature that NPLs in Ghana, are primarily influenced by macroeconomic and bank-specific factors. However, macroeconomic variables are used in both our short-run and long-run estimations. We present the descriptive statistics of all variables used in our estimation in Table AI.

The data on the rate of NPLs and MPR were mostly available as annual data. Even where there were monthly data, the data sets showed many missing data points. For this reason, the study opted to use quarterly data, which was constructed by the authors. We find that this has not been used in previous literature that have investigate the determinants of NPLs in African economies. We assume the constancy of the rate of NPLs for all quarters of each year and apply this to the period under study. In this sense, the study was able to address the difficulty that arose from having missing data points (in the case of monthly data) and having low number of data points (in the case of annual data). In addition, since many banks collapsed between the last quarter of 2017 and first quarter of 2018, it was interesting to look at quarterly data instead of annual data.

Econometric methods
In this study, we follow the theoretical framework presented in Section 2, to build an empirical model that examines the relationship between monetary policy dynamics (proxied by MPR) and NPLs to see both the short-run and long-run effects.

For estimation purposes, we argue that ordinary least squares (OLS) may not be the best because it assumes stationarity (no unit root) in generating the individual series. However, this assumption may not hold water for all macroeconomic time series models which may render our regression spurious. So, we go through some sequential steps as part of our identification strategy. To begin with, we test for unit root to ensure that our series are stationary. Both Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) Unit Root tests were conducted (see Table I). This is done to prevent the possibility of having series that are integrated of orders higher than one (e.g. I (2)). We follow this up with a test of co-integration to determine whether there is a long-run relationship between NPL and the determining series. To achieve this, we rely on the autoregressive distributed lags (ARDL) approach as proposed by Pesaran *et al.* (2001) to investigate the long-run dynamic relationship between NPLs and MPR (our variable of interest) with relevant controls. In the literature other approaches which include Engle and Granger (1987) in the

| Variables | | ADF | | PP | |
Level	1st difference	I (0)	I (1)	I (0)	I (1)
INF		−8.3005***	−9.571***	−8.31***	−66.74***
	D(INF)	−9.49***	−7.301***	−65.67***	−119.9***
MPR		−1.523	−5.31***	−1.393657	−5.031***
	D(MPR)	−5.267***	−11.185***	−5.268***	−19.47***
PD		−0.926971	−8.124***	−0.927	−8.124***
	D(PD)	−8.124***	−9.57***	−8.124***	−13.75***
PSC		−3.541***	−10.37***	−3.533***	−10.61***
	D(PSC)	−10.37***	−7.750***	−10.61***	−43.072***
NPL		−1.711075	−8.0231***	−1.787	−8.0231***
	D(NPL)	−7.961***	−11.812***	−7.961***	−34.49***

Note: ***Variable is significant at 1 percent level

Table I.
Unit root test results

bivariate cases and Johansen and Juselius (1990) for multivariate cases, require that all the series are integrated at the order of integration I (1). Apart from the fact that the ARDL approach is superior to other approaches in small samples (see Narayan, 2005), it is applicable whether the underlying variables are integrated of order zero, I (0) or one, I (1). This dynamic approach is employed to account for possible bias in such estimates as a result of non-stationarity and endogeneity issues in the data. Lastly, the ARDL equation for our estimation is presented as follows:

$$
\begin{aligned}
\text{NPLs}_t = {} & \beta_i + \beta_0 \sum \text{DMPR}_{(t-1)} + \beta_1 \sum \text{DPD}_{(t-1)} + \beta_2 \sum \text{DINF}_{(t-1)} + \beta_3 \sum \text{DPSC}_{(t-1)} \\
& + \beta_4 \sum \text{DINF}_{\text{NPL}(t-1)} + \beta_5 \sum \text{DNPLs}_{(t-1)} + \delta_1 \text{MPR}_{t-1} + \delta_2 \text{PD}_{t-1} + \delta_3 \text{INF}_{t-1} \\
& + \delta_4 \text{PSC}_{t-1} + \delta_5 \text{INF}_{\text{NPL}\ t-1} + \varepsilon_t,
\end{aligned}
$$

where NPLs refers to the percentage growth of NPLs per quarter, MPR refers to the monetary policy rate per quarter, INF_NPL measures the interaction between inflation and NPLs and represents the transmission mechanism per quarter, PD is a dummy variable which indicates the different PDs, PSC refers to credit to the private sector, as a percent of GDP per quarter and INF refers to the inflation rate per quarter. The letter D as a prefix represents the first difference values of the variables used in the equation. All differenced variables are prefixed with this letter. $\sum$ is the representation of the white noise process, consistent with regression theory.

In an attempt to frame our hypothesis and present our expectations regarding signs of coefficients, we are mindful of that fact that uncertainty and volatility are characteristic of an economy that struggles to keep interest rates at appreciable levels for businesses and consumers. This general picture, which appears in the Ghanaian case, is part of the motivation for this study.

In such a case, while lenders struggle with recovering credit from customers because of the possibility of default, customers also struggle to earn enough income as economic activities are hampered because of low incomes, inflation and high costs of living. The point here is that in an uncertain and volatile economy, economic activities do not yield enough income for consumers and firms. In between these two groups of economic agents, banks that lend credit to people may find it difficult to recover loans on time because of the risk that some of the loans will not perform. In this context, we now present the prior expectations.

As part of *a priori* expectations, the coefficient of INF on NPLs is expected to be positive because increased cost of living may reduce the ability of people to satisfy their loan obligations and possibly increase chances of default. Also, the coefficient of PSC is expected to be negative since we anticipate that a productive sector will be able to generate income to satisfy their loan obligations over time. The coefficient of MPR is expected to be negative because reducing the policy rate should also cause lending rates to go down, which will reduce the cost of borrowing and the chances of defaulting.

The lags of NPLs are included as part of the ARDL approach and for this reason, it was expected that the coefficients on these lags would be positive. This is because previous NPLs add on to the stock of NPLs for the current period. Further, the dummy variable, PD, was used to represent PDs over the period of the study. The expectation for the coefficient of PD was to be either positive or negative because changes in PDs affect incomes of people and affect their loan obligations differently.

For robustness purposes, this paper used four types of regression techniques. In the same sequence, we first estimated the results using the OLS technique, then continued with the Fully Modified (FMOLS) and Dynamic OLS (DOLS) and finally ended with our preferred model the ARDL. The latter is considered as our preferred model because it does not impose strict exogeneity assumptions and allows the inclusion of regressors with different levels of

stationarity properties. The FMOLS and DOLS estimation techniques are adjustments to the OLS estimation technique and account for co-integration relationships, which are indicative of a long-run association between the variables in the study (Acikgoz *et al.*, 2016).

The FMOLS estimation technique was originally developed by Phillips and Hansen (1990) to produce unbiased estimates of variables that are co-integrated, after accounting for serial correlation and endogeneity in the models (Phillips, 1993; Pedroni, 2000). The counterpart to FMOLS, the DOLS, is also ideal for regression of variables with co-integration relationships, which is attributed to Stock and Watson (1993), who used this method to study the long-run money demand (M1). The DOLS is also ideal for estimating long-run relationships in small samples (Masih and Masih, 1996).

Finally, the ARDL approach is also a useful econometric technique for time series analysis that provides estimates for both short-run and long-run periods. In addition, the estimates produced by this ARDL technique are unbiased and consistent, hence giving it an advantage over the other methods.

6. Results

We present the unit root results in Table I. Clearly, for both ADF and PP, it can be observed that most of the series (MPR, PD, NPL) are not stationary at levels. This necessitated a first difference approach which saw all the series to be stationary. The results show that the variables are all integrated at levels or to the first order, which is a pre-requisite to our identification strategy. Thus, we have both I (0) and I (1) variables and not I (2). Table I shows the results of the methods used.

Given the absence of an order of integration higher than 1, we proceed with the co-integration test using the ARDL bounds testing approach. With a null hypothesis of no existing co-integration relationship as against the alternative of co-integration, we estimate an *F*-statistic to be compared with the upper and lower bound critical values. We found that our *F*-statistic of 4.515 is higher than the upper bounds at both 5 and 10 percent levels of significance. So, we reject the null hypothesis and accept the alternative that the series are co-integrated (Table II). Also, our stability test (see Figure A1) shows that the parameters of our model are relatively stable over time. Also, from Figure A2, with a root mean squared error and systematic error (bias proportion) of approximately 1.846 and 0.000, respectively, we posit that our model has a high predictive power.

Having satisfied these conditions, we proceed to estimate our short-run and long-run regression. Results of our regression are presented in Table III shows regression estimates for both long-run and short-run periods. For long-run estimates, additional estimations were conducted to check for robustness and provide some credibility to the results obtained. For this reason, we used the FMOLS and DOLS estimation techniques, which provided a full sense of the dynamics between the long run and short run.

From the estimation, MPR was found to have a negative relationship with NPLs in the short run. All be it, not significant. This finding is intuitive and is explained by Amuakwa-Mensah *et al.* (2017) who argue that operating costs of banks go up in the short run due to NPLs and make them inefficient in the short run. In such an instance, the spread between the interest rate of loans and the MPR rises and contributes further to the

Test statistic	*F*-statistic	95% bounds		90% bounds	
		I (0)	I (1)	I (0)	I (1)
FNPL (NPL|MPR, PD, INF_NPL)	4.515	2.62	3.79	2.26	3.35

Notes: Accept if *F* or *t* < critical value for I (0) regressors, reject if *F* or *t* > critical value for I (1) regressors; $k = 5$, Obs = 66

Table II.
ARDL bounds test

Variables	(1) LR-OLS	(2) LR-FMOLS	(3) LR-DOLS	(4) LR-ARDL	(5) SR-ARDL
Long-run estimates					
MPR	0.2237** (0.084)	0.2630*** (0.038)	0.2634*** (0.020)	0.6210** (0.242)	
Political dispensation	−1.1281*** (0.326)	−1.0558*** (0.200)	−1.0329*** (0.087)	−2.1739* (1.132)	
INF	−0.7348*** (0.094)	−0.7415*** (0.030)	−0.7009*** (0.014)	−0.6152*** (0.163)	
PSC	−0.0238 (0.019)	−0.0238*** (0.009)	−0.0645*** (0.005)	−0.0244 (0.051)	
INF_NPL	0.0436*** (0.004)	0.0427*** (0.002)	0.0426*** (0.001)	0.0295*** (0.010)	
Short-run estimates					
Error correction term (ADJ)NPL $= L$					−0.2651*** (0.081)
MPR $= D$					−0.1808 (0.119)
Political Dispensation $= D$					−3.5172*** (0.912)
INF $= D$					−0.3739*** (0.080)
PSC $= D$					0.0223* (0.013)
INF_NPL $= D$					0.0227*** (0.004)
Constant	12.9219*** (1.322)	12.5207*** (0.565)	13.2071*** (0.255)		2.0017 (1.435)
Observations	67	66	64	66	66
R^2	0.909	0.888	0.956	0.861	0.861
Adjusted R^2	0.901	0.879	0.936	0.833	0.833
Log likelihood	n/a	n/a	n/a	−72.405	−72.405
BIC	252.266	n/a	n/a	195.087	195.087
AIC	239.038	n/a	n/a	168.811	168.811
Mean VIF	4.56				

Notes: Dependent variable: non-performing loan; robust standard errors in parentheses. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table III.
Regression estimates

possibility of NPLs. The storyline changes in the long run where the MPR is found to be significant in explaining NPLs. Across all the estimations, the results show a positive relationship between MPR and NPL in the long run, which is intuitive. The results show that a 1 percent increase in MPR will increase NPLs by 0.6210 percent, keeping all other influences constant. In the long run, where the assumption of full employment applies, monetary policy may have a very significant role in influencing NPLs. In the long run, increases in the MPR affect NPL through interest rate and inflationary pressures, which are significant in the long run according to our results. Subsequently, increases in the interest rate and inflation can increase the burden of borrowers especially those with flexible interest rates and heighten the possibility of defaulting.

According to classical notion, inflation is a monetary phenomenon. Hence, inflation was included to control for possible market dynamics. The results indicate that inflation had a negative relationship with NPLs, contrary to the expectation of a positive relationship. In the short run, we find that a 1 percent increase in inflation reduces NPLs by 0.374 percent, keeping all other influences constant. This relationship is found to persist even in the long run, across all models, where the results indicated a negative relationship between inflation and NPLs. The results obtained showed that in the long run a 1 percent increase in inflation results in 0.615 percent reduction in NPLs, keeping all influences constant. While this finding contradicts that obtained by Branco (2015) and remains in line with those obtained by Prasanna (2014), the interesting observation is that the interaction between inflation and NPL, represented as INF_NPL, shows a positive relationship that is significant in influencing NPLs in Ghana, even in the long run. This suggests that when inflation interacts with NPLs, there is a significant influence on the percent growth of NPLs in Ghana, even in the long run. In the short run, results showed that a 1 percent change in the interaction between inflation and NPLs would increase NPLs by 0.0227 percent, keeping all other influences constant. In the long run, the value of the coefficient of this transmission mechanism (INF_NPL) increases, indicating a much more significant influence of the transmission mechanism over time. From our results, NPL interaction with inflation at any point in time could be detrimental as it raises NPLs once the two interact. What our results fail to show is whether this interaction occurs prior to the increase in NPLs or after. However, the results suggest that keeping inflation mainly in check should drive down NPL growth and hopefully reduce the impact from the interaction.

Further, in view of the private sector's role as an engine of growth, credit to the private sector was included in the estimations. The results showed that credit to the private sector was found to have a positive and significant relationship with NPLs in the short run, suggesting that a 1 percent increase in private sector credit, results in a 0.0223 percent increase in NPLs, keeping all other influences constant. This finding is intuitive because, in the short run, complementary goods may not immediately be responsive to offer the full opportunity for credit received by the private sector to translate into decreasing NPLs. For example, a farmer after accessing credit may need several complementary factors to have good harvest and returns to pay back loans acquired. However, the absence of such complementary factors can hamper such expectations. Instead of a decrease in NPLs in the short run, the reverse is possible. Implying that complementary factors especially on the part of the government (example: good roads, electricity, tax system, etc.) are critical for the private sector to thrive. Also, where the loanable funds obtained by the private sector are not managed well, defaulting will have a significant impact on NPLs in the short term. If this does not happen, the private sector builds its credit profile for the long term. In the long run, where most resources are fully employed, the private sector is expected to be very active and efficient, thus making good use of resources and credit provided based on sound credit profiles developed over time, and avoiding measures that contribute to NPLs. The expected negative sign is consistent across all the models. This is highly significant in models 2 and 3, howbeit insignificant with models 1 and 4.

Since Ghana has gone through different PDs over time, we considered including variables such as the PD, a dummy that indicates periods of active political administrations, and an error correction term, which will indicate the speed of adjustment of this relationship between NPLs and the regressors in the short term. From the table above, we find that the PD variable is significant in both short-run and long-run estimations. The results showed a significantly negative relationship between the PD variable and NPLs over the time the study considered in both short-run and long-run periods. In fact, in the short run, the coefficient of the PD variable is higher than the coefficients of the same variable in the long run, both of which are significant at 5 percent level of significance. This finding suggests that irrespective of the period, the PD is critical to reducing NPLs, and the stronger influence of the PD is best felt in the short run. The results suggest that irrespective of the name of the party in power, having the current dispensation of democracy is key to reducing NPLs in Ghana. This finding is an additional contribution to the literature for Ghana.

On the other hand, the error correction term estimated in the short run refers to the speed of adjustment of the interactions between NPLs and the regressors. This indicates that changes in the regressors will reduce NPLs at a speed, indicated by the value of the coefficient (-0.27). Thus, approximately 30 percent of the model adjusts significantly to shocks to its equilibrium relationship with its determining factors which include past values of NPL. In our view, the speed is not high and indicates that there are possibly other factors that could cause a delay in influencing NPLs when the regressors change. This finding is also an additional contribution to the literature for Ghana.

Finally, the goodness of fit of the regression models appeared to be fine, given that the models could explain more than 80 percent of the variations in NPLs in Ghana and about 79 percent after adjusting for degrees of freedom. Further, with a mean variance inflation factor of 4.56, the model estimates do not show signs of severe multicollinearity.

7. Conclusion

The findings from the study speak to the relationship between the monetary policy rate MPR and NPLs for Ghana. The results obtained showed that the MPR has a positively significant influence on growth of NPLs in the long run, although in the short run the influence is not significant. Thus, our results suggest that the influence of the MPR through the commercial bank interest rate is weak in the short run. This we believe is due to rising operating costs that are caused by NPLs, potentially resulting in inefficiencies of banks. In such an instance, the spread between the cost of loans (interest rate) and the MPR rises and contributes further to the possibility of NPLs rising. This spread has to be reduced if NPLs can effectively be addressed. It is important that the interest rate channel for the MPR works practically to reduce the trends in the growth of NPLs. Prior to offering our recommendation for this observation, we must draw additional conclusions.

The study also finds that variables such as inflation significantly contribute to trends in NPLs in Ghana. More so, when inflation interacts with NPLs, the influence on NPLs is heightened. Also, financial contributions to the private sector in the form of credit were found to significantly influence NPLs in Ghana. This finding makes a case for the need to strengthen measures that will control inflation and inflation expectations. Whiles doing this, policymakers must consider the private sector to lead the drive to reduce NPLs in the country, by ensuring that there is a workable environment for the private sector to operate whiles ensuring that the private sector builds a solid credit profile.

Furthermore, the study presents the case for the importance of a sound political environment which is found to negatively influence NPLs in Ghana. While the MPR-interest rate-NPLs nexus is built on the functioning of the relationship and the work of policy agents, a sound PD can provide all persons with an optimal environment to promote productivity and growth within the economy. With further support to maintaining a stable macro and

political environment, it is possible to create the enabling environment that will support businesses and growth in both private and public sectors, reverse the rising trend of NPLs based on forecasts and encourage economic growth.

The study recommends that government should focus on building a strong financial environment as a first step. This can be achieved by controlling costs of borrowing and operation costs of banks, reducing the spread between interest rates and the monetary policy rate and providing an opportunity for the private sector to actively contribute to development. In line with the relationship between the monetary policy rate, the commercial bank interest rate and ultimately the NPLs, the Ghana Reference Rate should be enforced for transparency in determining the commercial interest rate as another step. In effect, this will help in providing more credit to the private sector, reduce the risk of default and non-performance of loans, attract more private sector into the financial market, increase credit to support viable ventures, reduce the growth of NPLs and boost economic growth in Ghana.

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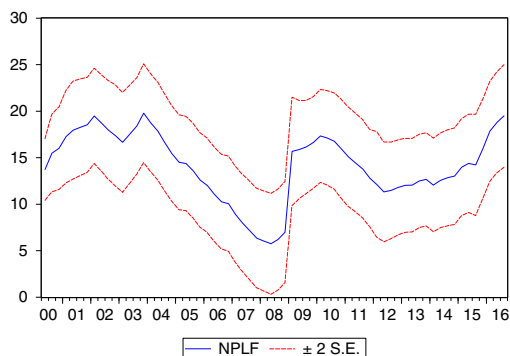
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NPLs and
monetary
policy
dynamics

Appendix

(a)

(b)
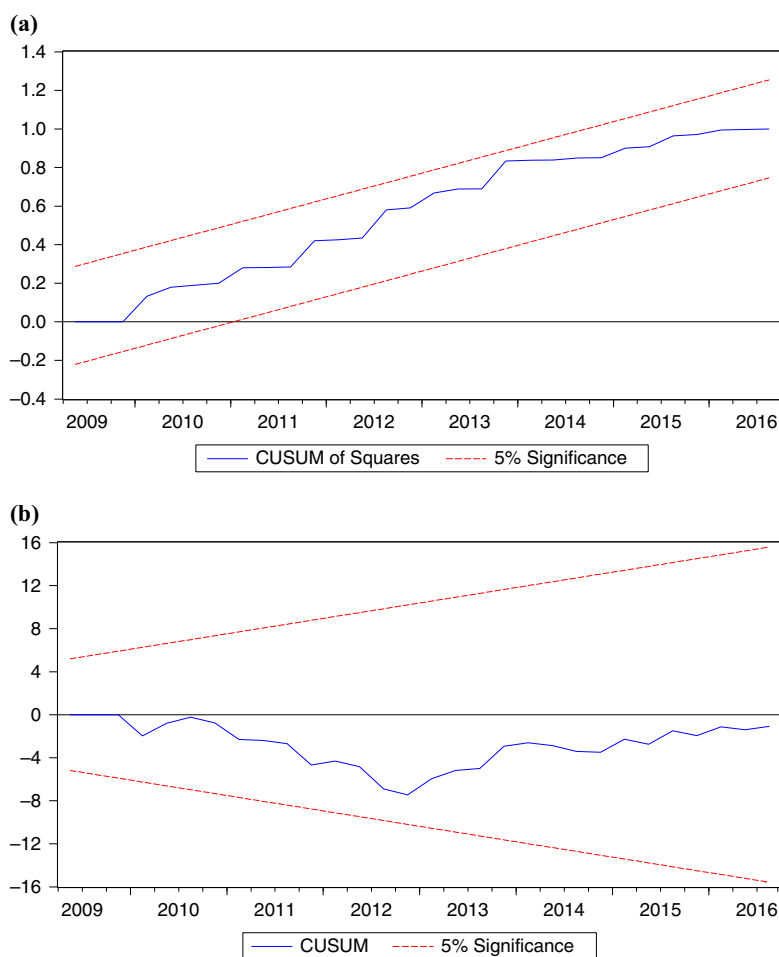
Notes: (a) Stability test; (b) Stability test: CUSUM

Figure A1.
Stability tests
(CUSUMSQ
and CUSUM)

Figure A2.
Forecasting

Variable	Obs.	Mean	SD	Min.	Max.	Exp. sign
NPL	68	14.2165	4.39556	6.4	22.7	n/a
MPR	68	19.2324	5.21217	12.5	27.5	(−)
PD	68	0.52941	0.50285	0	1	(−)
INF	68	18.4279	7.73197	8.4	41.9	(+)
PSC	67	34.4085	13.2802	8.49	62.36	(−)
INF_NPL	68	274.367	165.902	65.28	821.24	(+)

Table AI.
Descriptive statistics

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