Impact of Inflation on the Ghanaian Banking Industry: A Blessing or a Curse?

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Abstract — The purpose of this research was to determine the effect of the volatility of the macro economy on credit risk, interest rate spread and the performance of banks using inflation volatility as a proxy for the macro economy. The study used both secondary and primary data for the analysis. The research covered all the thirty-three banks that operated in Ghana between 1990 and 2010. The GARCH model was adopted in modelling inflation volatility. Analysis was carried out in three scenarios: analysis of questionnaire, descriptive data analysis and regression analysis. Regression analysis was run using the panel root, co-integration and Fully Modified Ordinary Least Square methods. Primary data source was questionnaire completed by 853 bank customers. The results established a positive relationship between past volatility of inflation and current period inflation. It was also confirmed that inflation influenced credit risk, interest rate spread and bank performance significantly. The results suggest that policymakers must pay attention to both the macro and microeconomic variables to achieve efficiency in the industry and the economy.

Index Terms — credit risk, interest rate spread, bank performance, volatility, efficiency.

INTRODUCTION

Even though most developing countries have gone through costly banking sector reforms, the sector is still characterized by persistently high interest rate spreads, high loan losses and high level of inefficiency. The situation has been aggravated by the high levels of inflation that has bedevilled these economies for a very long time. The business of banking involves taking and managing risks. A major activity of banks is lending which involves the risk that the borrower will not pay back the loan as promised, and paying a fixed rate of interest on term deposits. Also lending rates could drop, leaving the bank earning less on its investments than it is paying out on deposits. The debate on the justification for studying bank activities by focusing on risk management can be traced to Merton (1974) who argued that financial systems should be analysed in terms of a functional perspective rather than an institutional perspective since over long periods of time, functions have been much more stable than institutions. In the words of McKay and Sowa (2008), one of the defining characteristics of the Ghanaian macro economy has been its high and often variable rates of inflation. High and variable inflation is typically seen as a symptom or indicator of macroeconomic instability.

This paper investigates the effect of inflation on the activity of banks, using secondary data from Ghana covering the period 1990 to 2010 and also a survey using questionnaire completed by 853 bank customers. Inflation can have positive and negative effects on an economy. Negative effects include a decrease in the real value of money and other monetary items over time; uncertainty about future inflation may discourage investment and saving. Positive effects include a mitigation of economic recessions, and debt relief by reducing the real level of debt. Economists believe that negative effects of inflation far outweigh the positive effects and this calls for concern in a country like Ghana that experiences high and volatile inflation. A study of the effect of inflation on credit risk, interest rate spread and the efficiency and profitability of the banking sector is therefore very important for a country like Ghana.

This study assesses the influence of macroeconomic volatility, with particular focus on inflation volatility on credit risk (CR), interest rate spread (IRS) and bank performance (BP) using a short unbalanced panel data for thirty-three banks in Ghana for the period 1990 to 2010. Sources of secondary data are the Bank of Ghana and the various commercial banks in Ghana. The study began with an analysis of the survey data where possible and the results confirmed with the regression analysis:

(a) The relationship between inflation and inflation volatility.
(b) The effect of inflation and inflation volatility on CR.
(c) The effect of inflation on IRS.
(d) The effect of inflation on bank performance.
(e) Other macroeconomic factors influencing CR, IRS and bank performance.
(f) Microeconomic factors influencing CR, IRS and bank performance.

METHODS

This section presents the results of empirical studies done in the area of inflation and inflation volatility and their impact on credit risk, interest rate spread and bank performance respectively, the research methodology, model specification.
Relationship between Inflation and Inflation Volatility

Dagha (2007) referred to volatility as the frequency on movement on upside or downside. It is considered a measure of risk, and investors as well as businesses want premium for investing in risky assets. According to Berry (2010), volatility clustering models attempted to capture the volatility of the financial markets, which are sometimes low, sometimes high, over a given period of time. But within each state (and over a short time period), there is a strong chance that a day of high volatility will be followed by another day of high volatility. Therefore, we may estimate volatility conditionally to the observation of previous days. Nor (2009), Kontonikas (2004) Cukierman and Meltzer (1986) also have observed that on the theory side, there is a positive relationship between the level of inflation and inflation uncertainty. Higher inflation leads to greater uncertainty. Rother (2004) confirmed the above assertions by researchers but added that the harmful effect of inflation on growth is driven by inflation volatility. That high inflation induces high inflation volatility and uncertainty on growth. However, Holland (1995) presented a dissenting view that greater inflation uncertainty leads to lower average inflation, not higher inflation rate if central bank attempts to minimize the welfare losses arising from inflation uncertainty. A similar study done recently on Jordan by Ananzeh, Jdaitawi and Alwan (2014) and Hassain (2014) also modeled inflation in GARCH process to generate conditional volatility of the inflation series. The results of the GARCH model according to their study indicated strong support for the presence of a positive relationship between the level of inflation and its uncertainty.

Relationship between Inflation and Inflation Volatility and Credit Risk

Pioneering works by Stiglitz and Weiss (1981) and Williamson (1987) on the relationship between inflation volatility and credit emphasised that increased uncertainty in the economy causes the banks to ration credit leading to disequilibrium in credit markets and this has been confirmed by Landskrone & Ruthenberg (1985), and Miller (1992) who have found a negative relationship between total credit and inflation uncertainty due to increased bank costs. According to the consultative paper issued by the Basel Committee on Banking Supervision in July 1999, the major cause of serious banking problems continues to be directly related to among others a lack of attention to changes in economic or other circumstances that can lead to deterioration in the credit standing of a bank’s counterparties. According to Saxton (2005), tests on both developed and developing economies have indicated that inflation uncertainty has significant effect on credit markets either directly or indirectly regardless of the depth of financial markets. Therefore, the removal of inflation uncertainty will decrease the risk and will ensure efficiency in the allocation of resources and growth of investment in a country. Even though there are a number of studies on the relationship between inflation and inflation volatility and credit, not much has been done on credit risk. This present work has attempted to fill that gap.

Relationship between Inflation and Interest Rate Spread

Hadjimichalakis and Hadjimichalakis (1995) and Ngugi (2001) also observe that as anticipated inflation rises, borrowers expect to repay their debt in inflation-cheapened dollars and, thus, are willing to pay a higher interest rate. Lenders demand a higher interest rate to compensate them for the expected loss of purchasing power from inflation. An earlier work by Cukierman and Hercowitz (1990) explains that when the number of banking firms is finite, an increase in anticipated inflation leads to an increase in interest spread but when banking firms approach infinity (competitive case), there is no correlation between interest spread and inflation. Bawumia, Belnye and Ofori (2005) also confirmed that the inflation variable, representing inflationary changes, taken as the second difference of the CPI, is positively associated with interest spreads. Tennant and Folawewo (2008) find that inflation has a consistently positive and significant impact on both changes in and levels of banking sector spreads. This suggests that low inflation is a critical element in the minimization of banking spreads.

Relationship between Inflation and Bank Performance

Most studies, for example Bourke (1989), Molynex and Thornton (1992) observe a positive relationship between inflation and bank performance. Boyd, Levine and Smith (2001) showed that countries with high inflation have underdeveloped financial systems and banks, while, Huizinga (1993), and George and Motriset (1995) claimed that uncertainty of inflation would sometimes lead to higher profit fluctuations and may result in increased investment.

Other Macroeconomic Variables

This research laid emphasis on macroeconomic factors that it considered important for its objectives. These factors are, inflation and inflation volatility, Treasury Bill Rate (TBR), Discount Rate (DR), Government borrowing (GB) and Required Reserve (RR). Also investigated is the Gross Domestic Product Per Capita (GDPPC) which is considered as a proxy for Economic Growth.

Microeconomic Variables

Microeconomic factors are part of the models to ensure a balance between the macro and micro economic forces, since existing literature has emphasized the role of both bank-specific and industry-specific factors in addition to the macroeconomic factors in the activity of banks. Ownership structure, that is, whether the banks are foreign or local (Demircig-Kunt & Huizinga, 1998; Koeva, 2003 and Grenade, 2007) and Management Efficiency (ME) measured as cost/income ratio are known as two of bank-specific factors influencing CR, IRS and BP. Two important industry-specific factors featuring in the models are Financial Sector Development (FSD) and competition.
FSD is measured in this research in two ways; firstly as the ratio of money supply to GDP (M2+/GDP), (FSD 1) and secondly as the ratio of bank assets to GDP (FSD 2). The research used the Hirschman-Herfindahl Index (HHI) as an indicator for the level of competition.

**Model Specification**

Empirical literature identifies several factors as impacting CR, IRS and BP in the banking industry. These have categorized the factors into three broad groups: bank specific factors, industry and macroeconomic factors (Das and Ghosh, 2007; Gonzalez-Hermosillo, Pazarbasioglu and Billings 1997; and Demetrides and Luintel, 1996). Also Rajaraman, Bhaumik and Bhatia (1999), Das and Ghosh (2007) identify macroeconomic factors affecting credit risk.

**Credit Risk, Interest Rate Spread and Bank Performance Models**

This study investigates the influence of macroeconomic volatility on CR, IRS and BP using the panel models below adopted from the works of Garr (2013) and Garr and Kyereboah-Coleman (2013). The models express credit risk, interest rate spread and bank performance as a function of a vector of controls including bank level characteristics, industry variables and macroeconomic indicators:

\[
CR_t = \alpha + \sum \varphi_j X_{jt}^F + \sum \psi_j X_{jt}^I + \sum \gamma_j X_{jt}^M + \varepsilon_t
\]

\[
PERF_t = \alpha + \sum \varphi_j X_{jt}^F + \sum \psi_j X_{jt}^I + \sum \gamma_j X_{jt}^M + \mu_t
\]

\[
IRS_t = \alpha + \sum \varphi_j X_{jt}^F + \sum \psi_j X_{jt}^I + \sum \gamma_j X_{jt}^M + \mu_t
\]

where CR represents credit risk, measured by the ratio of Loan Loss Provision to total bank asset and the ratio of net interest income to total bank asset; IRS represents interest rate spread, measured as the difference between bank lending rate and bank borrowing rate (Garr 2013; Garr and Kyereboah-Coleman 2013; Folawewo and Tennant 2008; Sologoub 2006; Moore and Craigwell 2000; Demirgüç-Kunt and Huizinga 1998); and PERF represents bank specific unobserved heterogeneity and \( \varepsilon_t \) is the error term.

**Measuring Inflation Volatility**

Volatility in inflation is modeled using the Generalized Autoregressive Conditional Heteroskedasticity Mean (GARCH-M) process. The model for inflation is specified as follows:

\[
\pi_t = \mu_t + \sum \beta_j \pi_{t-j} + \mu_t, \quad t = 1990 \ldots 2010
\]

Where \( \pi_t \) represents inflation rate and \( \mu_t \) is assumed to be normally distributed with zero mean and variance \( h_t \). Thus

\[
\mu_t \sim N(0, \sigma_t)
\]

The conditional variance, \( \sigma_t^2 \), equation described above is a function of three terms: the conditional mean information about volatility from the previous period, measured as the lag of the squared residual from the mean equation, \( \mu_{t-m}^2 \) (ARCH term); and last periods forecast error variance, \( \sigma_{t-1}^2 \), (the GARCH term). The ARCH-M process is specified as:

\[
\sigma_t^2 = \alpha + \sum_{n=1}^2 \delta_n \sigma_{t-n} + \sum_{m=1}^q \gamma_m \mu_{t-m}^2
\]

If \( \delta = 0 \) then the model reduces to the ARCH-M process. The choice of \( p \) and \( q \) is informed by the Akaike Information Criterion (AIC), and the Schwartz Bayesian Information Criterion (SBIC). This study allows for heterogeneity only through individual effects in both the conditional mean and conditional variance equations.

**Estimation Procedure**

The study employed the panel data model below:

\[
Y_{it} = \alpha + \delta_i + \beta X_{jt} + \varepsilon_{it} \quad t = 1, \ldots, T; \quad j = 1, \ldots, k \quad & i = 1, \ldots, N
\]

where \( \alpha \) represents cross sectional heterogeneous effect which is time invariant; \( \delta \) time variant effect but cross-sectionally invariant, \( X_{it} \) is a vector of explanatory variables, \( i \) represents the number of Banks, \( j \) is the number of explanatory variables and \( t \) represents time period, measured in years. \( \varepsilon \) is the unobserved time specific effect and \( \mu \) is the idiosyncratic error term.

**Techniques, Tools, Approaches, and Devices**

The methodological approach is in three scenarios, namely, panel data using regression analysis, descriptive data analysis with the aid of graphs and survey data analysis. The regression analysis used the panel root, co-integration and Fully Modified Ordinary Least Square method. The principal method used to analyse the cross-sectional time series behaviour of the data involves panel root, co-integration, and fully modified ordinary least square model (FMOLS). To estimate dependent variables the study uses panel cointegration framework. The cointegration analysis of panel data involves three steps:
First, Panel Unit Root Tests; the purpose of unit root tests is to check the stationary of data. Two different test statistic, ADF - Fisher Chi-square and ADF - Choi Z-stat are used for the unit root testing. Secondly, Cointegration Tests; Cointegration test is primarily used to investigate the problem of spurious regression, which exists only in the presence of non-stationary. The Kao (1999) test is also used to check cointegration of data. Kao Residual Cointegration Test technique is used in estimating the cointegration to determine whether each of the series is integrated of the same order. The number of co-integration ranks (r) is tested with ADF - Fisher Chi-square and ADF - Choi Z-stat test statistic. The ADF - Fisher Chi-square and ADF - Choi Z-stat statistic tests the null hypothesis of no cointegrating vector against the alternative of at least one cointegrating vector. Lastly, Panel Fully Modified OLS estimates the individual long run relationship by using fully modified ordinary least square (FMOLS) technique developed by Pedroni (2000). The resulting Fully Modified OLS (FMOLS) estimator is asymptotically unbiased and has fully efficient mixture of normal asymptotic allowing for standard Wald tests using asymptotic Chi-square statistical inference. The FMOLS estimator not only generates consistent estimates of the β parameters in relatively small samples, but it controls for the likely endogeneity of the regressors and serial correlation. Formally, the FMOLS estimator for the i-th panel member is given by

$$\hat{\beta}_i = (X_i'X_i)^{-1}(X_i'y_i^* - T\delta)$$

where \(y^*\) is the transformed endogenous variable, \(\delta\) is a parameter for autocorrelation adjustment, and \(T\) is the number of time periods. The Autoregressive Conditional Heteroskedasticity Mean (ARCH-M) model is used in estimating inflation volatility.

RESULTS AND DISCUSSION
This section discusses the results of the study.

Relationship between Inflation and Inflation Volatility
The GARCH (1, 1) Model has been used in measuring inflation volatility. Before ARCH model can be used, we need to estimate the mean equation as indicated in Appendix 1a. It can be seen that DR and TB rate significantly influence inflation at the 5% significance level. The residual of inflation in Figure 1 helps to determine if the ARCH model can be used. It can be seen from Figure 1 that there is a prolonged period of low volatility from 1990 to 1992 and also there exists a prolonged period of high volatility from 1993 to 1995. In other words, periods of high volatility are followed by periods of high volatility and periods of low volatility tend to be followed by periods of low volatility. This suggests that the residual or error term is conditionally heteroskedastic and can be represented by ARCH model.

Residual derived from mean equation is used in making variance equation in Appendix 1a. The @SGRT(GARCH) in the mean equation is the standard deviation of GARCH. The @SGRT(GARCH) is significant at the 5% significance level and has a positive coefficient. Whenever @SGRT(GARCH) is significant and positive it means CPI is a very risky variable. From the variance equation it can be seen that GARCH(-1) significantly influences inflation volatility at the 5% significance level. This means that previous year residual variance or volatility of inflation influences current period volatility of inflation. The RESID (-1)^2 which is previous year’s squared residual or previous year’s inflation information about volatility also known as ARCH significantly influences current period inflation volatility. It means that inflation volatility is influenced by its own ARCH and GARCH factor or shock. This means inflation volatility are internal causes or shocks caused by own family.

![Figure 1: Residuals of Inflation for 21 years](image)

This suggests that indeed the past values of inflation are sufficient to determine the current value of inflation. In other words, when given the value of inflation at time t-1, as well as the disturbance period at that same time, volatility in inflation can be determined. The relationship is such that, there exists a positive relationship between inflation at time, t and inflation at time, t-1. Hence, the model suggests that inflation at time, t would consistently be higher than previous inflation levels for the industry since an increase in inflation at time, t-1 points to an increase at time, t as well. The results confirm the findings of Cukierman and Maltzer (1986), Kontonikas (2004), Jdaitawi and Alwan (2014), and Hossain (2014).

The Heteroskedasticity test in Appendix 1b tests the presence of arch effect. The test is significant, meaning that no arch effect. This means that ARCH model can be run. This model was chosen because of its lowest Akaike Information Criterion value.

Relationship between Inflation and Inflation Volatility and Credit Risk
The @SGRT(GARCH) is significant at the 5% significance level and has a positive coefficient. Whenever @SGRT(GARCH) is significant and positive it means CPI is a very risky variable. As the variance equation shows, previous year residual variance or volatility of inflation influences current period volatility of inflation and also previous year’s inflation information about volatility significantly influences current period inflation volatility. The regression analysis suggests that CPI influences CR1 and the relationship is negative. It is also established that previous period volatility of inflation influences current period inflation. It can therefore be concluded that CR is influenced by the volatility of inflation significantly. This confirms the results of the work done by Rother (2004), and Nor (2009) that inflation uncertainty has significant effect on credit markets. The descriptive data analysis
confirms that there is a negative relationship between inflation and inflation volatility on one hand and CR measured by LLP/bank asset ratio especially between 1990 and 2001.

Relationship between Inflation and Credit Risk

Analysing the results of the regression methodology, a significant relationship is found between inflation (CPI) and CR1 but not with CR2 and this relationship is negative suggesting that as inflation increases CR1 reduces and vice versa. CR may reduce because assets reduce in real value during times of high inflation making loan repayment much easier. Bank customers enjoy debt relief as increase in inflation reduces the real level of debt. This confirms the result of the works of Al-Smadi and Ahmed (2009) who indicated that a high inflation rate leads to decrease in CR and Hadjimichalakis and Hadjimichalakis (1995) who observed that when inflation rises borrowers repay their debt in inflation-cheaped dollars. The implication of this is that as inflation increases the ratio of LLP to bank assets reduces suggesting an improvement in bank loan performance. The negative relationship between CPI and CR1 was conspicuous between 1992 and 1999 as shown in Figure 2. Using the descriptive data analysis, we can conclude that the period 1990 to 2001 was a period of very high and volatile inflation compared to the period after it. The relationship as revealed by the graph indicates a positive relationship between CR 2 and inflation, suggesting that banks earn more NII relative to assets during periods of high and volatile inflation than periods of low and stable inflation. From the foregoing analysis, it can be concluded that increases in inflation rate are good for banks in terms of credit performance.

![Figure 2: Relationship between inflation and credit risk](image)

Again according Boyd (2001), countries with high inflation have underdeveloped financial systems and banks and so in this research the period 1990 to 2001 in Ghana can be described as a period of a relatively less developed banking industry. According to the survey the impact of inflation on the business lives of the respondents was that inflation affects staff cost and operating cost more than it affects the interest paid on bank loans. This suggests that an increase in the rate of inflation, all things being equal, will push the operating cost of businesses up more than it affects cost of loans. On the effect of inflation on loan repayment, it was the opinion of majority of respondents that the default that results is due to the general increase in the cost of living due to inflation and increase in cost of production due to increase in inflation. Again, the impact of increase in the cost of living due to inflation and increase in the cost of production due to inflation as the main causes of loan default was emphasised by majority of respondents. The assertions above are supported by the fact that most loans are fixed interest rate loans and not variable interest rate loans. Interest payment on existing loans hardly changes even if there is a general increase in interest rates.

Policy makers’ reliance on inflation targeting in managing the economy might not yield the desired results for banks as the negative relationship between inflation and credit risk implies the lowering of inflation will lead to an increase in LLP as a ratio of Total assets. Discount rates are normally adjusted upwards anytime there is an increase in inflation and therefore borrowing from the central bank becomes more expensive. Commercial banks therefore have to transfer this high DR to their customers in the form of higher lending rates. Because of increase in the cost of production during times of high inflation loan default rates are supposed to be high but the inverse is the result portrayed by this research because as discussed above, loans become cheaper. It also means that banks are more careful with their lending in times of high inflation than in times of low inflation. This could be the case because in times of high inflation other products and services compete with bank loans in revenue generation. For instance during times of high inflation, interest rates on TBs also rise providing safer and compensatory means for revenue generation for banks and banks may not be reckless in their loan processing activities. Government TB rates generally increase in times of high inflation and making them more attractive to banks than loans. Administratively, investing in and managing TBs are easier and less costly than managing customer loans, therefore if TB rates are high then loans can only be granted at a much higher premium otherwise banks would prefer investing a chunk of the surplus funds in TBs. Moreover, banks in Ghana have a large percentage of customer deposit on which interest is not paid or even if paid, is at a very low rate. These deposits are demand deposits and the percentage of demand deposits to total deposits is quite high averaging about fifty percent of total deposits. With high amount of interest-free deposits, banks can afford to invest in low-yielding assets and still make good returns.

The problem with inflation targeting in most developing countries is that, inflation is to be brought down by increasing the interest rate through increases in the policy rate or DR. This strategy assumes that there is excess money supply in the economy and hence there is the need to reduce this excess. The aim is to reduce the demand for goods and services. Unfortunately, according to Bawumia (2008) inflation in developing economies is not as a result of excess demand but rather high cost of production. The effect of these is more on the supply side than the demand side thus any increase in prices of these items are bound to cause increase in domestic inflation. Increases in the policy rate with the aim of reducing the money supply and then bringing down inflation is not effective in such an environment as high interest rates will continue to raise the cost of borrowing in the country and increase the cost of production and reduce the amount of goods supplied and further raising the cost goods and services.
Relationship between Inflation and Interest Rate Spread

The regression analysis, in Appendix 4, establishes a significant positive relationship between inflation and IRS. According to Hadjimichalakis and Hadjimichalakis (1995) during periods of high inflation, because debts become cheap, borrowers are willing to pay higher interest rates. That lenders also demand a higher interest rate to compensate them for the expected loss of purchasing power from inflation. In the 1990s, when inflation was very high and volatile, as shown in Figure 3, both lending and borrowing rates were rising but the IRS was smaller. This changed after 2000 when both lending and borrowing rates began to decline with the spread becoming wider. This means that during times of rising inflation, banks borrow at very high rates but are not able to adjust the lending rates quickly upwards, but in times of declining inflation borrowing rates are adjusted downwards much more quickly than the lending rate. This confirms the fact that bank deposits have shorter maturity periods than bank loans. Again in times of high inflation, customers are likely to increase their borrowing as a result of increase in overhead cost, leading to shortage of funds and making loans expensive. Lenders of funds to the banks who are savers will demand a higher return on their savings because of uncertainty and the general increase in the price of goods and services. It is also noted that between 1990 and 2000, when the economy was much more characterised by high and volatile inflation, most of the local banks were state owned and so Government's control of lending and borrowing rates was a dominant factor in determining the rates. The positive relationship between inflation and IRS based on the regression analysis, however, suggests that reducing inflation will lead to a reduction in the IRS. The lower IRS experienced between 1990 and 2000 also confirms the interference from Government in setting the borrowing and lending rates.

The attractiveness of the TB investment is confirmed by the fact that about half of the 356 respondents who had investment in TB had over 60 percent of all their funds invested in it. Concerning the level of lending rates in Ghana, majority of respondents claimed both the bank lending and bank borrowing rates were too high. When asked to state and rank what they thought were the main cause(s) of high interest rates in Ghana, respondents attributed it to high inflation rates, central bank's restrictive policy, high credit (default) risk and the general macroeconomic uncertainty in that order. For reasons ranked second, we have high CR, high inflation rate, central bank's restrictive policy, high credit (default) risk and the general macroeconomic uncertainty in that order. For reasons ranked second, we have high CR, high inflation rate, central bank's restrictive policy, high credit (default) risk and the general macroeconomic uncertainty in that order. For reasons ranked second, we have high CR, high inflation rate, central bank's restrictive policy, high credit (default) risk and the general macroeconomic uncertainty in that order.

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The regression analysis points to a lowering of the TC during periods of relatively lower and stable inflation. This suggests that banks either incur lower cost relative to income or higher income relative to cost during times of high and volatile inflation than in times of relatively lower and stable inflation. Again based on this observation we can conclude that high and volatile inflationary periods are the best periods for banks confirming the result arrived at when analysing CR.

The CPI (Appendix 6) also does not have a significant relationship with the solvency index meaning the index does not change with changes in inflation rates. The descriptive data analysis as shown in Figure 4, however, indicates generally a positive relationship between inflation and the solvency index. However, some peak periods of inflation are matched by low levels of the solvency index confirming an earlier observation made under credit risk that loan repayments improve during times of high inflation.

CPI according to the regression analysis in Appendix 7 does not influence ROA significantly, but again, the descriptive data analysis in Figure 4 suggests that ROA increased during the time inflation was high and volatile and declined as inflation dropped and became more stable. Again this result supports the findings under CR in this research that banks perform better in periods of high and volatile inflation than periods of low and stable inflation.

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FSD2 significantly influence CR 2, defined as the ratio of NII to total asset at the 5% significance level and the relationship is positive for all. Secondly, four variables namely FSD1, ME, TB rate and RR significantly influence IRS at the 5% significance level. Here too the relationship is positive for all. Thirdly, five variables namely ME, Competition, Ownership, GDPPC and DR significantly influence SI at the 5% significance level. The coefficients of the DR and the GDPPC are negative while the other three have positive coefficients. The TC significantly influenced at 5% significance level by six variables, namely FSD1, FSD2, RR, the TB, DR and competition. Three of the variables FSD2, RR and TB rate have positive coefficients while the rest have negative coefficients. Finally, three variables namely FSD2, DR and GDPPC significantly influence ROA, measured as the ratio of Profit Before Tax (PBT) to total assets at the 5% significance level with only the GDPPC having a negative coefficient with ROA while the others have positive coefficients.

CONCLUSIONS

While there have been several contributions to the literature on the impact of the volatility of the macro economy on inflation, and also the impact of inflation on credit risk, IRS and bank performance empirical studies have been at variance on the results. This research attempted to address these shortcomings by extending the scope of the methodology to embrace three scenarios-questionnaire data analysis, descriptive data analysis and regression analysis, instead of limiting it to only the regression analysis which has always been the case. There are specific theoretical and policy implications falling from the results of this study. There are implications for the banks, the industry and the economy in general. Even though this work cannot be considered as having completely filled existing gap in the subject of study, it has added to existing knowledge. This section discusses these implications.

Implications for Theory

The findings revealed that inflation influences bank CR exposure, IRS determination and BP in various ways. Concerning the relationship between inflation and inflation volatility it has been established through this research that periods of high volatility are followed by periods of high volatility and periods of low volatility tend to be followed by periods of low volatility. Also past values of inflation are sufficient to determine current value of inflation and previous year’s inflation information about volatility significantly influences current period inflation volatility. It is also established that CPI has a negative relationship with CR; that is as CPI increases, CR measured by LLP/total bank assets ratio falls, however as indicated by the descriptive data analysis, the NII/total bank asset ratio increases. These results confirm that banks are better off during times of high and volatile inflation. However, an increase in inflation is likely to result in an increase in operating cost of bank customers than increase in the cost of bank loans leading to a loss in the value of bank assets.

Implications for Practice and Policy

There are several implications for practice and policy that can be gleaned from the results of the research. Evidence suggests that there is a strong chance that a year of high volatility will be followed by another year of high volatility. Therefore as suggested by Jdaitawi and Alwan (2014), Hossain (2014) and Dagha (2007) which confirmed the earlier works of Kontonikas (2004) and Cukierman and Meltzer (1986) that there is a positive relationship between past inflation and uncertainty about future inflation, we may estimate volatility conditionally to the observation of previous years. The policy implication for high inflation countries is to aim at lowering the average inflation rates in order to reduce the negative consequences of uncertainty like high cost of production for firms and a reduction in the real value of bank loans which in the long run may make banks worse-off. Lowering and stabilising inflation is also good for both the bank and the investor in the sense that interest rate fluctuations are curtailed and therefore making forecasting and planning easier. In a volatile macro economy, if anticipated changes do not take place, or changes take place in opposite direction, banks can experience heavy losses.

Also during times of rising inflation, investors must avoid interest-sensitive securities and long-term debt instruments. On the other hand in periods of declining inflation, long-term debt obligations are typically sound investments. Lenders may not be willing to lend money for long periods if the purchasing power of that money will fall below the original value at the time of repayment. To minimise this problem, banks resort to high IRS (demanding inflationary premium) and short term lending which might not be suitable for projects with long term gestation periods.

If inflation increases causing policy makers to increase the DR and also the TB rate as has always been the case, immediate benefits may seem to accrue to the banks and their customers. However, if high inflation persists it may turn out to be a disadvantage to both banks and their customers as real value of assets continue to fall. An increase in inflation leads to a fall in LLP as ratio of bank assets (i.e., a lower CR) and increase in IRS. However, the improved performance caused by an increase in inflation is due to the fact that bank loans have become cheaper and therefore banks receive lower real value for their loans. An increase in IRS could mean a very low deposit interest rate which may discourage savings and a high lending rate which may also discourage bank lending. A situation of this nature does not auger well for the development of the financial sector. Policy makers should therefore adopt policies that will ensure narrowing of the IRS to promote financial intermediation. A policy recommendation arising from this analysis is that achieving effective monetary and fiscal adjustments may be necessary conditions for deepening and increasing the efficiency of the banking industry.

The macro economy of developing economies is very volatile and significantly influences CR and IRS. This suggests that the banking environment is quite risky and therefore banks should make the necessary effort to adopt strong risk management frameworks, systems and processes to ensure regulatory compliance, operational excellence and optimal risk management.
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**Biography**

Dr. David Kwashie Garr holds a PhD in Business Administration from Open University, Malaysia, Master of Business Administration (Finance) and a Bachelor of Arts Degree in Economics all from University of Ghana, Legon. He worked in the banking and microfinance industries for a total of 28 years engaging mostly in banking operations. He has been a facilitator in Corporate Finance, Investment Analysis and Banking courses at Accra Institute of Technology for five years at the post graduate level and also a lecturer at Islamic University College, Ghana since 2013 in Bank Management, Banking Operations and Ethics and Banking Law and Practice at the undergraduate level.