Applied Science and Innovative Research
ISSN 2474-4972 (Print) ISSN 2474-4980 (Online)
Vol. 3, No. 3, 2019
www.scholink.org/ojs/index.php/asir

Original Paper

The Effect of Financial Sector Reforms on Bank Net Interest Margins in Ghana

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Received: February 13, 2019 Accepted: March 2, 2019 Online Published: August 5, 2019

doi:10.22158/asir.v3n3p133 URL: http://dx.doi.org/10.22158/asir.v3n3p133

Abstract

This paper examines the effect of financial sector reforms on net interest margin of Ghanaian banks during the period 1997-2006. Changes have taken place in Ghana as in other countries. However, net interest margins have not declined as much in Ghana as they have elsewhere due to the influence of the degree of risk aversion, high operating costs and uncompetitive nature of the market structure. Although banks have relied heavily on fee- and commission-based services as additional sources of income to lower margins, this paper argues that despite recent developments in the Ghanaian financial landscape, financial sector reforms have not yet succeeded in bringing about a major reduction in the operating costs of banks that would translate into substantially narrower margins. This is by far the major significant effect of relatively wide net interest margin in Ghana.

Keywords

Net interest margins, banks, financial sector reforms, market structure

JEL classification: E43, E52, G21, G28, L11

1. Introduction

The role of financial sector reforms as an engine to economic development has been given much attention over the past few decades. It is largely documented from the economics literature that a liberalised financial system that has a sound and prudent banking practices creates competition, and thus leads to better delivery of financial services (Fry, 1995; Brownbridge & Harvey, 1998). Most countries in Africa experienced various episodes of financial repression during the 1970s and 1980s, of which Ghana is no exception. During this period, public ownership dominated the banking system, whilst most economies in sub-Saharan Africa could hardly boast of foreign ownership with the exception of Barclays and Standard Chartered that were established during the colonial period. Governments determined the structure of interest rates, whilst controls on sectoral allocation of credit

were imposed on banks. Brownbridge and Harvey (1998) note that these conditions led to a low cost of credit aimed at encouraging investments and subsidising favoured borrowers. Fry (1995) asserts that this practice also led to "higher and volatile inflation in most developing economies due to distress borrowing that extraordinarily increased high real loan rate of interests".

Financial sector reforms in Ghana started in the late 1980s as part of the Economic Recovery Program (ERP) introduced in 1983. Over the years, the reforms have helped to remove controls on foreign entry restrictions. The number of commercial banks has not just increased, but the requirements on these banks to extend credit to priority sectors have also been removed. Prudential regulation and the supervisory system have been strengthened by enacting new Banking Laws, whilst steps have been taken to develop the money and capital markets. Distressed banks that were in operation during the repression period have been restructured over time, of which some, especially the public sector banks have either been liquidated or privatised. Policy measures have also been taken to develop the non-bank financial institutions (NBFIs) with the aim of filling the gaps in the entire banking system.

The objectives of the financial sector reforms have been to meet various expectations, of which efficiency improvement was a key component through competition among financial institutions. The reforms were to free the interest rates to be set by the market and to allow banks to lend on commercial considerations alone. It is expected that as competition increases, the spread between lending and deposit interest rates should narrow due to efficient business practices. It is assumed that a very large spread between the two rates reflects low competitiveness and is thus a deterrent to the overall development and progress of financial intermediation. In this vein, the growth potential of an economy is lowered because most savers are discouraged from depositing their funds with low returns, whilst financing is limited to potential borrowers with high lending rates.

Faster rates of economic growth witnessed in recent years in Ghana have been accompanied by the economic and financial reforms. Inflation has tremendously declined, whilst there is an evidence of financial depth taking place (see Figures A.1 and A.2 in Appendix). Despite these developments, the exact contributions of the various aspects of the liberalisation process to economic growth are not clear. Although commercial bank lending rates (Note 1) are falling, the interest rate spread (Note 2) and net interest margin (Note 3) in Ghana still remain very high (Figures A.3 and A.4, respectively). In comparison with 5 other African reforming economies over the period 1997-2006, Ghana's net interest margin appears to be relatively high. At the end of 2006, the country's net interest margin is virtually twice of those for Botswana, Ethiopia and Nigeria (see Table A.1 in Appendix).

The essence of this paper is to examine the effect of the reforms on Ghana's bank interest margin. Despite recent empirical studies that have been embarked on this topic, limited research has been carried out on the African reforming economies. The study aims to contribute to the limited empirical literature within the sub-Saharan African region. Theoretical arguments that explain the behaviour of bank interest margins are tested and examined to ascertain how they describe the reforming economies of sub-Saharan Africa after major financial sector reforms. Implications for Ghanaian financial sector

reform policies are derived from the findings.

The remainder of the paper is organised as follows. Section 2 reviews the relevant literature surrounding the research topic. The empirical model employed is described in section 3, alongside description of data used in the study. Section 4 focuses on the results of the study, followed by the conclusion in section 5.

2. Determinants of Bank Interest Margin: A Brief Literature Review

The most widely frequently studied country with regards to bank interest margins is the U.S. (see, for example, Angbazo, 1997; Hanweck & Ryu, 2005), though a large number of recent studies have examined other countries such as Venezuela (Vera et al., 2007), Pakistan (Khawaja & Din, 2007), Tunisia (Naceur & Goaied, 2005), Brazil (Afanasieff et al., 2002), Barbados (Samuel & Valderrama, 2006) and Australia (Williams, 2007).

Financial reforms are expected to allow intermediation spreads in developing economies to converge with those experienced in advanced countries. As cited in Barajas et al. (1998), Hanson and de Rezende Rocha (1986) note that "financial systems in developing countries have been shown to exhibit significantly and persistently larger intermediation spreads on average than those in developed countries, notably due to such factors as high operating costs, financial taxation or repression, lack of competition, and high inflation rates". In spite of all the recent developments, the study of Afanasieff et al. (2002) reveals high bank interest margins in Brazil when compared to international standards. A recent study in Malawi by Mlachila and Chirwa (2002) shows that bank interest spreads remain high in the period after financial sector reforms. The same pattern has been observed in Kenya (Ngugi, 2001), Uganda (Aleem & Kasekende, 2001; Beck & Hesse, 2009) and Armenia (Dabla-Norris & Floerkemeier, 2007) after financial liberalisation. In Uganda for instance, Aleem and Kasekende (2001) assert that the steady increase of interest rate margin suggests that its banking system has yet to benefit from financial sector reforms. In the case of Colombia, Barajas et al. (2000) however find an evidence of marginal decline in bank spreads after financial sector reforms.

Cross-country studies on the determinants of bank interest margin focus on both developed and developing economies. Most authors have concentrated on either one of these or a combination of both. A considerable number of these studies emerge from Europe (Maudos & Fernández de Guevara, 2004; Carbó & Fernández, 2007), OECD countries (Hawtrey & Liang, 2008), Latin America (Brock & Suarez, 2000; Peria & Mody, 2004; Gelos, 2006) and Eastern Caribbean (Randall, 1998). In Latin America for instance, Peria and Mody (2004) find that foreign banks charge lower spreads than domestic banks. This pattern is more evident for de novo foreign banks than for those that entered through acquisition. Whilst the overall level of foreign bank participation in Latin America seems to influence spreads indirectly, primarily through its effect on administrative costs, Peria and Mody (2004) show that bank concentration has a direct effect on both spreads and costs. Brock and Suarez (2000) also find that reserve requirements and an uncertain macroeconomic environment increase bank

spreads in Latin America. In the case of Eastern Caribbean, the findings of Randall (1998) show that approximately 53% of the spread is attributable to operational costs, 41% accounted for by implicit equity return, and the remaining 6% estimated as the unremunerated reserve requirements.

The theoretical literature shows why banks charge interest margins when intermediating between demanders and suppliers of loans. Recent studies have shown that the determinants of bank interest margins vary across countries. The next section of this paper uses some of the theoretical arguments in modelling bank interest margins, and takes into account other regulatory and macroeconomic factors used in recent empirical research to explain the link between bank behaviour and banking system efficiency.

3. Methodology and Data

3.1 Econometric Approach

The determinants of bank interest margin have usually been modelled within the framework of a bank as either a profit (wealth) maximising firm or seeking to maximise the expected utility of profit (wealth). As noted by Clark (1986), the economics literature provides a considerable number of models of the banking firm with regards to bank behaviour, but no single model perfectly describes bank behaviour in its entirety although the portfolio theory is seem to have played a relevant role. Most empirical specifications have modelled the determinants of bank interest margin based on the accounting identity of income statements and balance sheet, and in some cases on the behavioural assumptions of the banking firm (Mlachila & Chirwa, 2002).

This paper is based on the dealership model of Ho and Saunders (1981) and follows the amended version of Maudos and Fernández de Guevara (2004) with some modifications (Note 4). The model views a bank as a risk-averse dealer, in which the bank acts as an intermediary between demanders and suppliers of loans. The banks are expected to deal with the uncertainty of interest rates by setting their interest rates on loans *(r_L)* and deposits *(r_D)* in order to minimise the risk of shareholders' wealth by seeking to match the maturities of assets and liabilities. This is to allow the banks to avoid the reinvestment or refinancing of risks which are likely to arise in case financial assets are either too short or too long. For this reason, the risk-averse banks are assumed to set their interest rate margins for deposits *(a)* and loans *(b)* relative to the market interest rate *r,* in the following expression:

$$r_D = r - a,\ r_L = r + b, \tag{1}$$

Thus, the unit margin or spread *(s)* between the lending and deposit rates can be given as follows:

$$s = r_L - r_D = a + b. \tag{2}$$

Apart from bank-specific indicators, recent empirical papers have added macroeconomic, regulatory, legal and institutional variables, as well as a range of other indicators, to the original model of Ho and Saunders (1981) (Note 5). The empirical specification for this paper also takes some of these factors into account, because they are deemed to be important in explaining the variation in bank interest margin. The model is specified as follows:

$$NIM_{it} = f(w_{it}, x_t, y_t, z_t, \varepsilon_{it}) \quad (3)$$

where i denotes bank and t denotes time; NIM_{it} is the annualised net interest margin of bank i at time t; w_{it} is a vector of bank-specific variables of bank i at time t; x_t is a vector of industry-specific variables at time t; y_t is a vector of macroeconomic variables at time t; z_t is a vector of variables capturing regulatory characteristics at time t; and ε_{it} is the error term of bank i at time t.

3.2 Dependent Variable

The academic literature suggests different ways of measuring interest rate spreads. The efficiency of bank intermediation can be measured by using either ex ante or ex post spreads or a combination of both. The definition of ex ante spread is based on the difference between the contractual rates charged on loans and rates paid on deposits. The calculation of ex post spread on the other hand is based on the difference between the actual interest revenue and interest expenses of banks.

Demirgüç-Kunt and Huizinga (1998) argue that the measures of ex ante spread are biased due to perceived risk differences that are reflected in the ex ante yields. Since risk bearing is an important part of the banking service, any risks difference faced by banks will likely distort spread comparisons. Brock and Suarez (2000) point out some further weaknesses of the ex post spread. Firstly, by including all assets and liabilities, the ex post spread may deviate from marginal costs and revenues of the banks. Secondly, by excluding fees and commissions from the ex post spread, the full cost to borrowers and income reduction of depositors may not be reflected.

Demirgüç-Kunt and Huizinga (1998) highlight the superiority of ex post over ex ante spread to the extent that ex post spread accounts for loan defaults and risky credits by taking into account the actual interest received and interest paid. For this reason, ex post interest spread is used in this study as dependent variable, which is net interest margin (NIM), and defined as the difference between interest income and interest expense expressed as a ratio to total assets.

3.3 Bank-specific Variables

The explanatory variables employed in the estimations are discussed below:

3.3.1 Degree of Risk Aversion (RISK)

Several approaches have been used in the academic literature to measure the degree of risk aversion. This paper follows the bank's capital ratio approach used by McShane and Sharpe (1985), measured as the ratio of shareholders' funds to total assets. In their study of the Australian trading banks, McShane and Sharpe (1985) argue that the capital ratio approach can be artificially affected by accounting conventions such as asset revaluations, loan loss provisioning, hidden reserves and the treatment of various contingency accounts. However, the approach of McShane and Sharpe (1985) overcomes this limitation.

In addition to the risk management of a bank, which is related to riskiness of the overall portfolio, McShane and Sharpe (1985) note that banks that operate in low risk sectors of loan, investment and deposit markets may choose to maintain a low capitalisation, which could imply a relatively high risk preference. However, the risk exposure of the total portfolio of a low capital ratio institution need not

necessarily be greater than that of another institution with a high capital ratio, especially if the high capital ratio of this institution is offset by a more risky loan and investment portfolio. Berger (1995) argues that well-capitalised banks face lower expected bankruptcy costs for themselves and their customers, which reduces their cost of funding. As equity is a more expensive funding source, a positive relationship is expected between the degree of risk aversion and the net interest margin, because risk averse banks will require a higher net interest margin to cater for the increase in the average cost of capital.

3.2.2 Operating Costs (OPC)

Operating costs are measured by the ratio of operating costs to total assets. This variable identifies the extent to which banks transfer their cost of operation to depositors and borrowers. It also helps to identify the efficiency of the banking system, as more efficient banks are expected to operate at lower costs. Notwithstanding, efficient banks can also operate at high cost by taking higher risk for high returns. Operating costs represent the banks' staffing costs, occupancy and depreciation, as well as other operating costs (Note 6). This measure is expected to have a positive relationship with net interest margin since banks experiencing high operating costs will apply a wider interest spread in order to make adequate profit to cover their operating expenses.

3.3.3 Managerial Efficiency (MGT)

According to Angbazo (1997), the component of the interest margin that is attributable to management quality is based on the fact that as management decisions are translated into a high-yield composition of assets and a low-cost composition of liabilities, these changes are expected to reflect in higher net interest margins. The quality or efficiency of management is measured by the cost to income ratio, calculated as the operating cost to gross income. A negative relationship is anticipated between this variable and net interest margin because an increase in this ratio implies a decrease in management quality, hence a lower interest margin will apply.

3.3.4 Fee Income (FEE)

This variable is defined by the ratio of non-interest operating income to total assets. This measure captures the portion of banks' assets that is attributable to fee- and commission-based services. It also indicates how banks rely heavily on these alternative sources of revenue. As noted by Demirgüç-Kunt et al. (2004), banks have different product mixes that may influence the pricing of loan products. A bank with well-developed fee income sources will set lower interest margins, because of cross-subsidisation of the intermediation activity. A negative relationship between this ratio and net interest margin is anticipated because the greater the dependence of the bank on these services, the less reliance there is on net interest margin as a source of income.

3.3.5 Credit Risk (CRED)

The ratio of the provisions for bad and doubtful debts to gross loans is used to reflect the risk of defaults on credit. Banks will require compensation by charging an extra risk premium on their lending rates in terms of higher margins by way of passing on the cost of non-performing loans to their

customers. Hence, a positive relationship is expected between credit risk and net interest margin.

3.4 Industry-specific Variable

3.4.1 Market Structure (HERF)

To capture the competitive structure of the Ghanaian banking market, the Herfindahl-Hirschman index of loan concentration is used, defined as the sum of squared market shares of loans in the banking sector. The values of the index range from zero (0%) representing a perfectively competitive market to one (100%) representing monopoly. Based on the structure-conduct-performance (SCP) hypothesis, the higher the market share that is controlled by a few large firms, the greater the possibility of collusion among market participants to raise prices above costs to earn extra profits. In other words, high loan concentration will result in monopoly power, enabling banks to set a higher net interest margin. Hence, a positive relationship is anticipated between industry concentration and the net interest margin.

3.5 Macroeconomic Variables

3.5.1 Discount Rate (DISC)

This study uses Bank of Ghana (BOG) discount rate to capture the effects on the banking system of monetary policy. This measure is included to identify the effects of the additional cost of borrowing by a bank, either from the central bank (BOG) or from the inter-bank market. An increase in the discount rate will increase the cost of funds to banks. Hence, a positive relationship is expected between this variable and net interest margin, because banks will tend to pass on the cost of funds to their customers through higher margins.

3.5.2 Inflation (INFL)

This variable is calculated as the annual percentage change in the consumer price index (CPI). Inflation reduces the real value of banks' capital and increases their operating costs. Inflation volatility also increases risk. Banks are expected to transfer these costs and risk to their customers in the form of higher margins. Hence, a positive relationship is anticipated.

3.6 Regulatory Variables

3.6.1 Opportunity Cost of Bank Reserves (RES)

This variable is defined as the ratio of cash and balances with the central bank to total assets. Reserve requirements imposed by the government on banks are a form of implicit financial tax, and act as a burden on the banking sector. In as much as these reserves serve as cushion against liquidity crises, they prevent banks from participating fully in the credit market, thus impacting negatively on their profits. In other words, the opportunity cost of maintaining these reserves, which earn either no interest or a low interest rate at the central bank, is the additional interest foregone that is obtainable in the open financial market. Therefore, the greater the opportunity cost of holding these reserves, the larger the compensation banks will require through higher margins. Hence, a positive relationship is expected.

3.6.2 Financial Freedom (REFM)

Finally, this variable is included to capture the effects of financial sector reforms. This variable enables one to examine how the changes in financial regulation have affected the behaviour of the bank interest

margin in Ghana. The financial freedom variable provides a ranking of progress made in the financial sector after the liberalisation period. The index is a measure of banking security and independence from government control, and it is designed to provide an overall measure of the relative openness of a country's banking and financial system. The index varies across time and provides a ranking that ranges from 1 to 5, where larger values represent more freedom and vice versa.

The objective of this paper is to investigate how reform of the financial sector has affected the behaviour of the bank interest margin in Ghana. The financial freedom indicator is firstly introduced directly in the estimations; and second, allow this index to interact with variables that reflect bank behaviour (RISK, OPC, MGT, FEE and CRED). This approach should reveal how the reforms affect the sensitivity of the net interest margin to the bank-specific variables. To the best of my knowledge, no previous empirical research has used this indicator in a single country study, in order to investigate the effects of financial sector reforms. As far as I know, this is also the first empirical research paper to critically examine with this approach the effect of financial sector reforms on net interest margin in Ghana.

According to the above indicators, the specification of the model without interaction variables is as follows:

$$NIM_{it} = \alpha_0 + \beta_1 RISK_{it} + \beta_2 OPC_{it} + \beta_3 MGT_{it} + \beta_4 FEE_{it} + \beta_5 CRED_{it} + \beta_6 HERF_t + \beta_7 DISC_t + \beta_8 INFL_t + \beta_9 RES_{it} + \beta_{10} REFM_t + \varepsilon_{it} \quad (4)$$

The specification of the model with interaction variables is as follows:

$$NIM_{it} = \alpha_0 + \beta_1 RISK_{it} + \beta_2 OPC_{it} + \beta_3 MGT_{it} + \beta_4 FEE_{it} + \beta_5 CRED_{it} + \beta_6 HERF_t + \beta_7 DISC_t + \beta_8 INFL_t + \beta_9 REFM_t + REFM * (\beta_{10} RISK_{it} + \beta_{11} OPC_{it} + \beta_{12} MGT_{it} + \beta_{13} FEE_{it} + \beta_{14} CRED_{it}) + \varepsilon_{it} \quad (5)$$

Equation (5) should reveal how the reforms affect the net interest margin with respect to each of the bank-specific indicators. For instance, the impact on NIM as a result of the increase in RISK depends on the reform variable. In this case, the interaction between the reform and risk variables, REFM*RISK, indicates how much the impact of the degree of risk aversion is affected by the reforms.

This study uses panel data, which has the advantage of detecting and measuring certain effects that may simply not be observable in pure cross-section or time-series data (Gujarati, 2003). The fixed effects model (within estimator) is used to control for the influence of unobserved omitted variables that are constant over time and specific to each bank.

The estimation begins by regressing net interest margin (NIM) on both the bank- and industry-specific variables. In addition to this initial estimate, the macroeconomic control variables are first included before allowing for the control of the regulatory indicators. The same method is adopted when controlling for each of the regulatory interactions. Although correlation matrix is not reported in this paper (Note 7), there is an evidence of high correlation between the reserve requirements variable (RES) with the degree of risk aversion (RISK) and operating costs (OPC). To address this problem, RES with RISK and OPC are not included in the same regression. The variable RES is also excluded from the interaction estimates.

3.7 Data

This study uses yearly data for the period 1997-2006. The Financial Sector Adjustment Programme (FINSAP) in Ghana was carried out in three phases, namely FINSAP-1 which covered the period 1988-1991; FINSAP-2 for the period 1992-1995; and FINSAP-3 which started in 1995. Accordingly, the study period is post-liberalisation, following all three phases.

Bank-level data, which is sourced from Bank of Ghana, is based on the balance sheet and income statements of various Ghanaian banks. All development banks in Ghana undertake some form of commercial banking activity, in addition to their usual operations. Institutions that were operating as merchant banks have also had their license changed to permit universal banking (Note 8). Accordingly, all Ghanaian commercial banks, merchant banks and development banks, are included in the sample. Only rural banks are excluded, since they operate under different regulation.

The bank-level data is unbalanced, because entry has taken place while some banks were liquidated since the financial sector reforms were implemented. The dataset includes 25 banks from 1997 to 2006, yielding a sample size of 174 bank-year observations. The number of banks per year varies from 14 banks in 1999 to 23 banks in 2006 (Table 1 reports the summary statistics of the variables employed in the empirical analysis).

Data on the macroeconomic variables are obtained from the IMF International Financial Statistics and World Economic Outlook databases. The financial freedom indicator is obtained from the Economic freedom index of the Heritage Foundation and the Wall Street Journal.

Table 1. Summary Statistics of Model Variables for the Period 1997-2006

Variables	Obs.	Mean	Std. dev.	Min.	Max.
NIM	174	0.0830	0.0351	0.0201	0.3450
RISK	174	0.1734	0.3532	-3.3474	0.9063
OPC	174	0.0896	0.0600	0.0373	0.7324
MGT	174	0.4769	0.3239	0.1550	2.4239
FEE	174	0.0541	0.0282	0.0020	0.2486
CRED	174	0.1349	0.1502	0.0093	0.8749
HERF	174	0.1287	0.0266	0.0951	0.1826
DISC	174	24.7098	9.3645	12.5000	45.0000
INFL	174	19.0856	7.2987	10.1512	32.9060
RES	174	0.0569	0.2718	-3.4340	0.4231
REFM	174	1.8908	0.3128	1.0000	2.0000

Source: BOG; IMF, IFS/WEO; and the Economic Freedom Index database.

Notes. NIM= net interest margin, defined as the difference between interest income and interest expense to total assets; RISK= shareholders' funds to total assets; OPC= operating costs to total assets;

MGT= operating cost to gross income; FEE= non-interest operating income to total assets; CRED= provisions for bad and doubtful debts to gross loans; HERF= market structure, defined by the Herfindahl-Hirschman index of loan concentration, as the sum of squared market shares of loans in the banking sector; DISC= discount rate; INFL= inflation, defined as the annual percentage change in the consumer price index; RES= opportunity cost of bank reserves, defined as the ratio of cash and balances with central bank to total assets; REFM= financial freedom.

4. Regression Results

Panel data regressions are estimated for the interest rate margin using the fixed effects model to control for the influence of variables that are constant over time and specific to each bank. The within-group estimator was employed. Tables 2 to 4 present the results of regressions for the net interest margin on bank- and industry-specific variables, macroeconomic indicators and the regulatory environment. There are 25 banks and 174 observations in each regression. The within-bank, between-bank and overall R^2 measures are reported for each regression.

4.1 Bank- and Industry-specific Effects

The estimate of equation (1) of Table 2 shows that most of the bank- and industry-specific indicators have the expected signs and are statistically significant. The signs of the coefficients on bank-specific variables are virtually unaffected when the macroeconomic and regulatory indicators enter the regression equations (2) through to (14) in Tables 2 to 4.

Table 2. Regression Results Controlling for Industry-Specific, Macroeconomic and Regulatory Environment

Variables	(1)	(2)	(3)	(4)
RISK	0.016*	0.021**		0.031***
	(0.063)	(0.012)		(0.000)
OPC	0.536***	0.550***		0.572***
	(0.000)	(0.000)		(0.000)
MGT	-0.086***	-0.081***	-0.026***	-0.085***
	(0.000)	(0.000)	(0.001)	(0.000)
FEE	-0.317***	-0.325***	-0.169**	-0.304***
	(0.000)	(0.000)	(0.041)	(0.000)
CRED	-0.012	-0.004	-0.024	-0.002
	(0.583)	(0.858)	(0.278)	(0.910)
HERF	0.143**	0.005	0.162*	0.082
	(0.013)	(0.944)	(0.064)	(0.287)
DISC		0.000**	0.001***	0.001***

		(0.048)	(0.001)	(0.004)
INFL		0.001*	0.000	0.000
		(0.083)	(0.699)	(0.142)
RES			-0.058***	
			(0.000)	
REFM			-0.011**	-0.017***
			(0.043)	(0.001)
Constant	0.073***	0.067***	0.095***	0.083***
	(0.000)	(0.000)	(0.000)	(0.000)
Fixed effects	Yes	Yes	Yes	Yes
R^2-within	0.466	0.499	0.384	0.536
R^2-between	0.712	0.739	0.762	0.698
R^2-overall	0.531	0.557	0.427	0.561
No. of obs.	174	174	174	174
No. of banks	25	25	25	25

Notes. Dependent variable is net interest margin (NIM), defined as the difference between interest income and interest expense to total assets. P-values are given in parentheses. The symbols *, ** and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 3. Regression Results Including Industry-specific Variables and Regulatory Interactions

Variables	(5)	(6)	(7)	(8)	(9)
RISK	0.193**	0.026***	0.029***	0.022**	0.019**
	(0.021)	(0.003)	(0.001)	(0.011)	(0.026)
OPC	0.565***	0.950***	0.595***	0.560***	0.543***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MGT	-0.091***	-0.095***	-0.039**	-0.090***	-0.087***
	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)
FEE	-0.306***	-0.293***	-0.302***	0.230	-0.286***
	(0.000)	(0.000)	(0.000)	(0.321)	(0.000)
CRED	-0.013	-0.019	-0.016	-0.015	0.097*
	(0.543)	(0.359)	(0.428)	(0.461)	(0.082)
HERF	0.190***	0.213***	0.212***	0.200***	0.175***
	(0.002)	(0.000)	(0.000)	(0.001)	(0.004)
REFM	0.005	0.005	0.005	0.004	0.005
	(0.325)	(0.246)	(0.242)	(0.360)	(0.339)
RISK*REFM	-0.085**				

	(0.033)				
OPC*REFM		-0.186***			
		(0.001)			
MGT*REFM			-0.030***		
			(0.000)		
FEE*REFM				-0.266**	
				(0.013)	
CRED*REFM					-0.060**
					(0.035)
Constant	0.056***	0.051***	0.051***	0.055***	0.059***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed effects	Yes	Yes	Yes	Yes	Yes
R^2-within	0.486	0.508	0.513	0.492	0.486
R2-between	0.675	0.636	0.617	0.673	0.673
R2-overall	0.530	0.525	0.522	0.530	0.522
No. of obs.	174	174	174	174	174
No. of banks	25	25	25	25	25

Notes. Dependent variable is net interest margin (NIM), defined as the difference between interest income and interest expense to total assets. P-values are given in parentheses. The symbols *, ** and *** indicate significance levels of 10%, 5% and 1%, respectively.

Table 4. Regression Results Including Industry-specific Variables, Macroeconomic Environment and Regulatory Interactions

Variables	(10)	(11)	(12)	(13)	(14)
RISK	0.253***	0.034***	0.036***	0.030***	0.025***
	(0.003)	(0.000)	(0.000)	(0.001)	(0.003)
OPC	0.580***	1.025***	0.607***	0.572***	0.553***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MGT	-0.087***	-0.091***	-0.030*	-0.085***	-0.082***
	(0.000)	(0.000)	(0.072)	(0.000)	(0.000)
FEE	-0.313***	-0.300***	-0.310***	0.391*	-0.289***
	(0.000)	(0.000)	(0.000)	(0.092)	(0.000)
CRED	-0.002	-0.008	-0.006	-0.004	0.127**
	(0.936)	(0.682)	(0.779)	(0.836)	(0.023)
HERF	0.066	0.090	0.088	0.076	0.043
	(0.395)	(0.237)	(0.242)	(0.320)	(0.575)

DISC	0.001***	0.001***	0.000***	0.001***	0.000**
	(0.010)	(0.005)	(0.008)	(0.005)	(0.019)
INFL	0.000	0.000	0.000	0.000	0.000
	(0.132)	(0.153)	(0.158)	(0.136)	(0.104)
REFM	0.003	0.004	0.004	0.003	0.003
	(0.472)	(0.363)	(0.357)	(0.546)	(0.478)
RISK*REFM	-0.111***				
	(0.006)				
OPC*REFM		-0.218***			
		(0.000)			
MGT*REFM			-0.033***		
			(0.000)		
FEE*REFM				-0.349***	
				(0.001)	
CRED*REFM					-0.071**
					(0.011)
Constant	0.047***	0.043***	0.045***	0.046***	0.053***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Fixed effects	Yes	Yes	Yes	Yes	Yes
R^2-within	0.527	0.550	0.552	0.537	0.524
R^2-between	0.701	0.664	0.644	0.703	0.704
R^2-overall	0.562	0.560	0.553	0.565	0.553
No. of obs.	174	174	174	174	174
No. of banks	25	25	25	25	25

Notes. Dependent variable is net interest margin (NIM), defined as the difference between interest income and interest expense to total assets. P-values are given in parentheses. The symbols *, ** and *** indicate significance levels of 10%, 5% and 1%, respectively.

The positive relationship between the degree of risk aversion (RISK) and the net interest margin (NIM) is consistent with theories emphasizing the need for highly capitalised banks to charge higher rates on loans and/or pay lower rates on deposits. This is due to the fact that well-capitalised banks face lower expected bankruptcy costs, and since equity is a relatively expensive funding source, any increase in equity is likely to increase the average cost of capital.

Operating costs (OPC) has a positive effect on NIM, with coefficients ranging between 0.536 and 1.025 that are statistically significant at the 1% level in all regressions. This suggests that an increase in OPC of 1 percentage point impacts NIM by this range.

The empirical results suggest that managerial efficiency (MGT), which has negative coefficients that

are statistically significant in all regressions, has declined, manifesting itself in narrower interest margins charged by banks.

There are negative and significant coefficients on the fee income variable (FEE) in almost all regressions, with the equation (8) in Table 3, which shows a positive and insignificant coefficient. The negative and significant coefficients on FEE indicate that the presence of non-interest operating income in Ghana depresses the net interest margin. The magnitude of the coefficients reflects the heavy reliance of the banking system on fee- and commission-based services as alternative sources of income. This implies that the banking system has been making efforts to innovate new banking products and services to meet the needs of customers.

Fees and commissions charged on the use of telephone banking, exchange rate transactions, funds transfer services and a few other innovative products and services have helped to influence the pricing of loan products, thus yielding lower interest margins. There is however, no evidence of cross-subsidisation of activities with the different mixes of banking products, as the supposedly developed fee income structure is not clearly reported in the profit and loss accounts of banks. This lack of transparency, such that banks report only a very limited number of their non-interest operating income sources, allows the banks to be shielded from competition.

The credit risk variable (CRED) enters with negative and insignificant coefficients in most of the regressions. This pattern is surprising, as a positive impact on NIM would reflect the expected tendency for banks to charge wider margins to compensate for non-performing loans on their portfolios. The CRED variable is only statistically significant and has the expected positive sign when controlling for its interaction with the financial freedom variable (REFM) in equations (9) and (14) in Tables 3 and 4. This may reflect improved reporting of non-performing loans since the financial sector reforms were introduced. This may have increased the cost of intermediation, reflecting an impact on NIM, because the interaction term (CRED*REFM) induces changes in the credit risk variable (CRED) due to the reforms. Ever since Bank of Ghana prepared a standardised accounting manual aimed at conforming to international accounting standards, banks have been able to recognise loan losses early through a standard system of loan classification and provisioning.

The loan concentration variable (HERF), measured by the Herfindahl index, though variable in terms of statistical significance due to the effects of the macroeconomic environment measures, has the expected positive signs in all regressions and is statistically significant in most of them. An uncompetitive market structure has the tendency to widen interest rate margins. The uncompetitiveness of the Ghanaian banking market stems from the fact that since banks rely and invest heavily in low-risk and high-yielding assets such as government securities, they are less likely to identify the lending opportunities necessary to expand their customer base. This behaviour has tended to limit the efficiency gains of the banking system.

4.2 Macroeconomic Effects

As an instrument of monetary policy, the discount rate variable (DISC) has the expected positive and

statistically significant effect on net interest margin (NIM). This is consistent with theory stressing the need to charge higher margins to reflect the additional costs of borrowing by banks. Considering the fact that the discount rate has considerably fallen over the study period, its economic effect on NIM is modest, with coefficients ranging between 0.000 and 0.001 in the estimations. This suggests that an increase in DISC of 1 percentage point impacts NIM by this range.

4.3 The Effects of the Regulatory Environment

The reserve requirements variable (RES), which is also an important monetary policy instrument, has a negative and a statistically significant coefficient at the 1% level. Though banks have usually exceeded these requirements, there have been fluctuations due to difficulties in complying with new monetary policy for banks with large foreign currency deposits and those with liquidity problems.

By investigating how financial sector reforms have affected the behaviour of the bank interest margin in Ghana, the financial freedom variable (REFM) is first introduced directly into the estimations. Regressions (3) and (4) in Table 2 suggest that the financial freedom variable (REFM) has negative coefficients of 0.011 and 0.017 that are significant at the 5% and 1% levels, respectively. This indicates a 1-2% downward effect of the REFM variable on the net interest margin (NIM).

To examine how the reforms affect the impact of different factors on net interest margin (NIM), the REFM variable is also allowed to interact with the bank-specific indicators. Tables 3 and 4 show that all interaction terms are statistically significant, with negative coefficients in all equations. This suggests that financial sector reforms have had a downward effect on the sensitivity of the net interest margin (NIM) with respect to each of the bank-specific variables.

The downward effect of the REFM interaction with the degree of risk aversion (RISK) and credit risk (CRED) variables indicates the extent to which changes in prudential regulation and supervision have helped to strengthen banks' capital adequacy position and the quality of their loans portfolios, respectively. The interaction term with the operating costs (OPC) variable indicates that the sensitivity of the net interest margin (NIM) to banks' operating costs has been reduced since the reforms. As depicted in Tables 3 and 4, the magnitude of the REFM interaction with the bank-specific indicators suggests that banks have benefited considerably from financial sector reforms through fee- and commission-based services (FEE), whilst less benefit has been derived from managerial efficiency (MGT).

The magnitude of the interaction with the FEE and REFM variables, with negative coefficients ranging between 0.267 and 0.351, reflects the extent to which financial sector reforms have contributed to the innovation of new banking products and services in meeting the needs of customers. The very small magnitude of the interaction with the MGT and REFM variables, with negative coefficients ranging between 0.030 and 0.033, reflects in part the smaller effect of the financial sector reforms on the quality of management, as bank managers have not fully acquired a competitive spirit or sensitivity to the earnings and operational expenses of their intermediation role. This has led to cost inefficiencies in the entire banking system, and has resulted in placing upward pressure on the net interest margin (NIM).

This is by far the major significant effect of wide net interest margin in Ghana. In effect, financial sector reforms, having been introduced over the past 20 years in Ghana, have not yet succeeded in bringing about a major reduction in the operating costs that would translate into substantially narrower margins.

5. Conclusion

I have empirically investigated the effect of financial sector reforms on net interest margin of Ghanaian banks from the period 1997 to 2006. This time period was characterised by the implementation of all the three phases of the Financial Sector Adjustment Programme (FINSAP). The findings of this study show that wide net interest margin is influenced by the degree of risk aversion, high operating costs, loan concentration and the discount rate. The results also reveal that the quality of management, income from fee- and commission-based services, as well as reserve requirements help explain the behaviour of bank interest margins.

In spite of the improvements to institutional structures brought about by the reforms, the findings of this study suggest that the full benefits for banking system efficiency have not yet been realised. Some of the policy variables, particularly operating costs, continue to place upward pressure on the cost of intermediation. As a consequence, financial sector reforms have had a limited effect on enhancing the efficiency of the Ghanaian banking system.

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Notes

Note 1. Each sector was accorded a different bank lending rate previously. In this vein, the calculation of bank lending rates was based on the average for each sector.

Note 2. Interest rate spread is defined here as the difference between bank lending rate and bank deposit rate.

Note 3. Net interest margin is defined here as the difference between interest income and interest expense expressed as a ratio to total assets.

Note 4. Others, such as McShane and Sharpe (1985) and Angbazo (1997) have also extended the model of Ho and Saunders (1981) by incorporating indicators that are associated with intermediation.

Note 5. See, for example, Barajas et al. (2000), Demirgüç-Kunt et al. (2004) and Beck and Hesse (2009).

Note 6. Depreciation reflects the costs incurred on equipment and other physical infrastructure, including expenses on information and communication technology (ICT), whilst other operating costs reflect the administrative expenses, advertising and marketing, travel expenses, motor vehicles, among

others, that banks incur on their operational activities.

Note 7. The correlation matrix is available on request.

Note 8. It is important to note that all these banks in Ghana were already undertaking some form of commercial banking activity before they had their license changed. Since 2003, all the three-pillar banking model—commercial, development and merchant—have been replaced by universal banking.

Appendix

Table A.1. Net Interest Margins across Selected Countries, 1997-2006 (Percent)

Period	Botswana	Ethiopia	Nigeria	Tanzania	Kenya	Ghana
1997	6.56	3.19	10.47	5.35	6.90	11.36
1998	6.05	2.85	10.05	5.48	7.93	13.37
1999	22.02	2.67	7.85	6.46	8.26	9.89
2000	8.17	3.02	8.45	7.85	7.58	8.73
2001	5.62	4.29	10.69	7.11	8.32	9.06
2002	6.02	3.08	10.35	5.18	8.28	7.72
2003	6.34	2.85	9.16	5.25	7.18	10.80
2004	5.74	3.26	8.45	5.63	6.99	10.26
2005	4.99	3.14	6.42	6.85	7.14	10.99
2006	3.56	4.04	5.55	7.30	7.42	8.25

Source: Updated version of the Financial Structure database, as described in Beck et al. (2000).

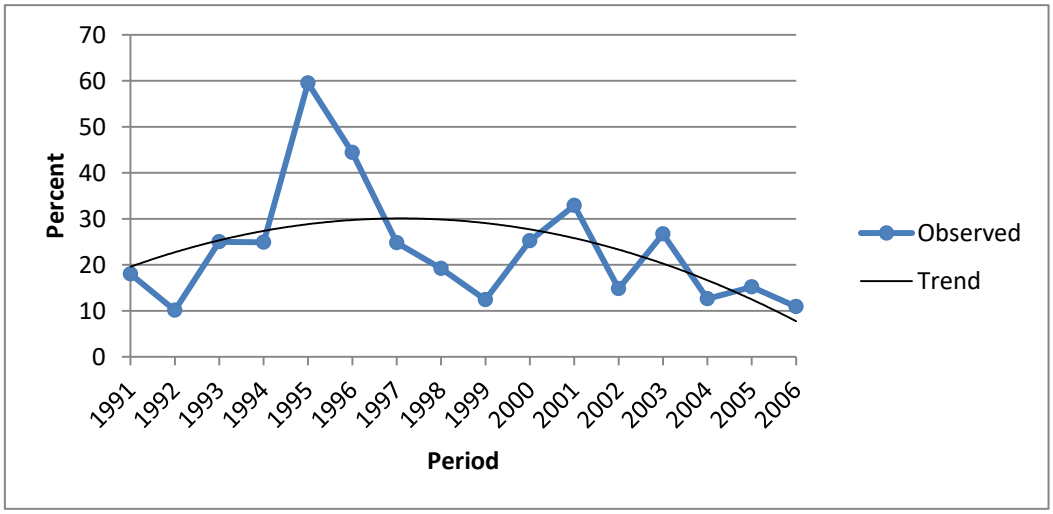

Figure A.1. Annual Average Inflation, 1991-2006

Source: IMF, WEO database.

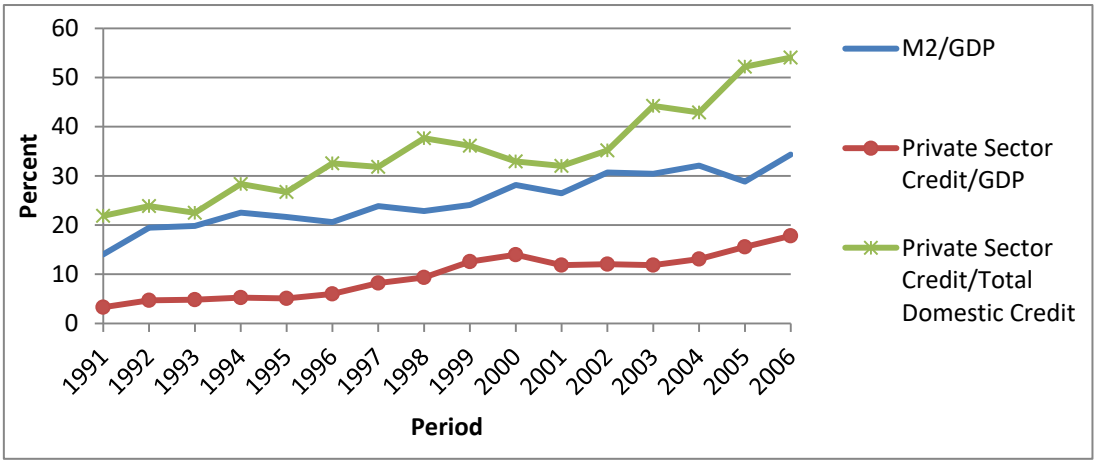

Figure A.2. Financial Depth, 1991-2006

Source: Author's estimates from IMF, IFS/WEO databases.

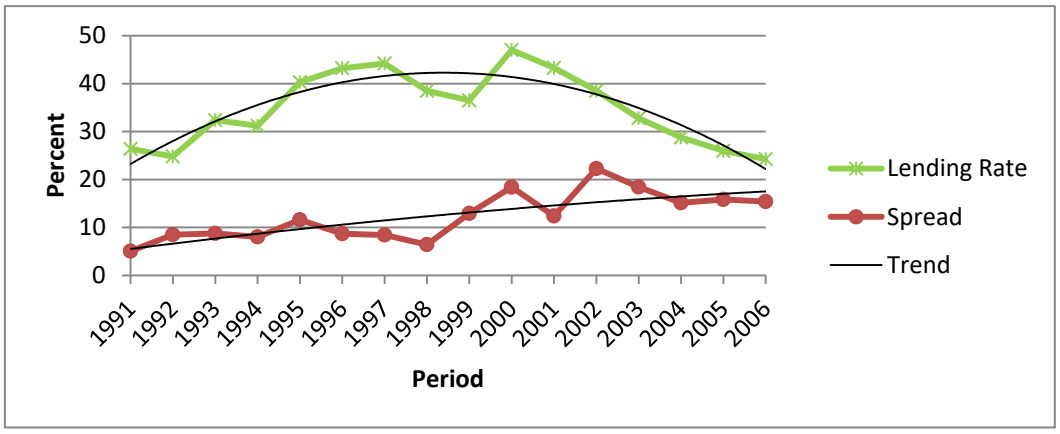

Figure A.3. Lending Rate and Interest Rate Spread, 1991-2006

Source: IMF Country Reports & Bank of Ghana Annual Reports (various issues); Author's estimation of spread were based on these sources and the deposit rates from the IMF, IFS.

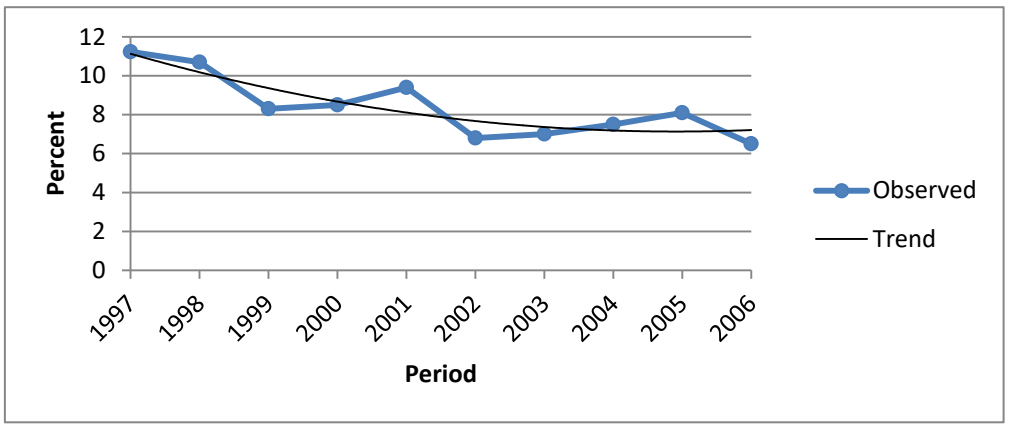

Figure A.4. Net Interest Margin, 1997-2006

Source: Author's estimates from Bank of Ghana (BOG) database.