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Agency Conflict and Bank Interest Spreads in Ghana

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Abstract

This study examines the relationship between interest rate spreads in the Ghanaian banking industry and variables that reflect convergence/divergence between managerial goals and corporate goals of which the key variables are executive compensation and bank ownership structure. Using data covering the period, 1999-2011, this study employs a panel regression to examine how agency factors affect interest rate spreads in Ghana. The results of the study indicate that, executive compensation is associated with higher net interest margins, suggesting that managers operate on higher margins since they can extract excess rents. The findings of the study also show that asset size, the level of concentration in the banking industry, the level of capital held by banks, the reserve requirement, and the level of inflation all positively contribute to the observed high interest spreads. Our results are robust to the control of several bank-specific, industry-specific, regulatory and macroeconomic factors.

1.   Introduction

The net interest margin of banks represents the social cost of financial intermediation in an economy. Therefore, when interest margins in an economy are lower, then greater welfare benefits can be achieved. African countries generally exhibit an unusually high interest rate spreads compared to developed economies. This high spread suggests that banks are operating inefficiently and this tends to have serious implications for the functioning of the private sector and the economy at large as businesses have to borrow at a significantly higher cost. Ghana has over the years been identified as one of the countries with the highest interest rate spreads in the world (see Aboagye *et*. *al*, 2008; Bawumia *et al*, 2005; Buchs and Mathisen, 2005; Gockel and Mensah, 2006). The high interest rate spreads have posed serious concerns to the government, regulators, firms and the general public. The Bank of Ghana, particularly, tried to use the policy rate to bring down lending rates. Lending rates however have continued to remain sticky downwards. The private sector through the Association of Ghana Industries (AGI) has frequently called on banks to lower their spreads to facilitate investment in the economy. Recently, some private sector groups met the parliamentary committee for finance to urge them to mandate the Bank of Ghana (BOG) to place a regulatory cap on the interest rate spreads in Ghana (see Kwakye, 2010). The banks argue that the high lending rates are necessary for them to remain profitable due to the high default rates and other structural challenges in the economy such as macroeconomic stability.

The high interest rate spread can pose serious challenges to financial deepening in an economy. This is because high spreads suggest high lending rates and low deposit rates. Low deposit rates are likely to discourage the saving public from placing their excess funds with the banks. In the presence of low deposit rates, investable funds are likely to find their way to other investment vehicles such as government treasury bills. This impairs the ability of the banking sector to mobilize surplus funds and channel them to productive investments. Thus, the banking sector's contribution to economic growth therefore becomes hindered. Despite the various reforms and policy initiatives in the Ghanaian banking industry aimed at improving efficiency in the industry in order to curtail interest rates, banks continue to exhibit high interest spreads.

Previous empirical studies have failed to provide answers to the nature of the interest rate spreads in Ghana (see Aboagye *et al*, 2008). These studies merely looked at the issue by including bank-specific financial factors, such as collateral, capital, liquid assets, operating expenses and loan quality as determinants of the bank interest rate spreads. The findings from these studies have not offered any useful policy direction for government and regulators in their attempt to keep interest rates within reasonable levels. What is lacking in the extant literature is whether issues of governance and managerial incentives provide any explanations of the bank interest rate spreads. Bank executives as agents of shareholders or the principals are mostly interested in personal goals such as salary and perquisites to the detriment of shareholder value maximization. Also, banks' inefficiencies or underperformance is often reflected in high interest spread and executives tend to bear little or no cost because they are not the principals. Bank interest rate spread may therefore be a function of the extent of agency conflict in a bank. Departing from previous studies, this current study examines the relationship between interest rate spreads in the Ghanaian banking industry and variables that reflect convergence/divergence between managerial goals and corporate goals of which the key variables are structure and size of executive compensation and bank ownership structure.

The rest of the study is structured as follows; Section two provides an overview of interest rates in Ghana, Section three discusses the literature, Section four details the methodology employed in the empirical analysis, Section five presents and discusses the empirical findings and finally Section six concludes and provides policy implications.

2.   Overview of Interest Rates in Ghana

Post-independence till the early 1980s, government had a key role in the affairs of the economy. The economy was mostly command driven with government venturing into businesses and determining prices of various commodities. Indeed, the government determined the interest rates that were offered in the financial market. The government also borrowed heavily from the banking sector and credit was directed to areas considered a priority by the government. Due to political interference in the banking sector, loans were advanced to political cronies and not so profitable projects. By the early 1980's the banking sector was saddled with huge bad debts and was under severe strain. The financial sector was indeed repressed. The Economic Recovery Programme (ERP) and the Structural Adjustment Programme (SAP) spearheaded by the World Bank laid the ground for the liberalization of the economy through the abolition of interest rate controls as well as directed credit in the economy.

In any economy, including Ghana, several interest rates are reported. These interest rates however generally follow the same trend or pattern. The most common interest rates in Ghana are the Bank of Ghana (BOG)'s Policy Rate, the Treasury bill (Notes) rates, the rates on Bank of Ghana bills, the inter-bank rate, and the rates offered by banks on their loan and deposit products. The Policy Rate is the rate set by the Monetary Policy Committee of the Bank of Ghana and represents the rate at which the BOG will lend to the commercial banks. The Policy Rate is used by the BOG to conduct monetary policy. The rate is increased if the central bank wants to signal a tight monetary stance and is decreased if the central bank wants to signal an expansive stance.
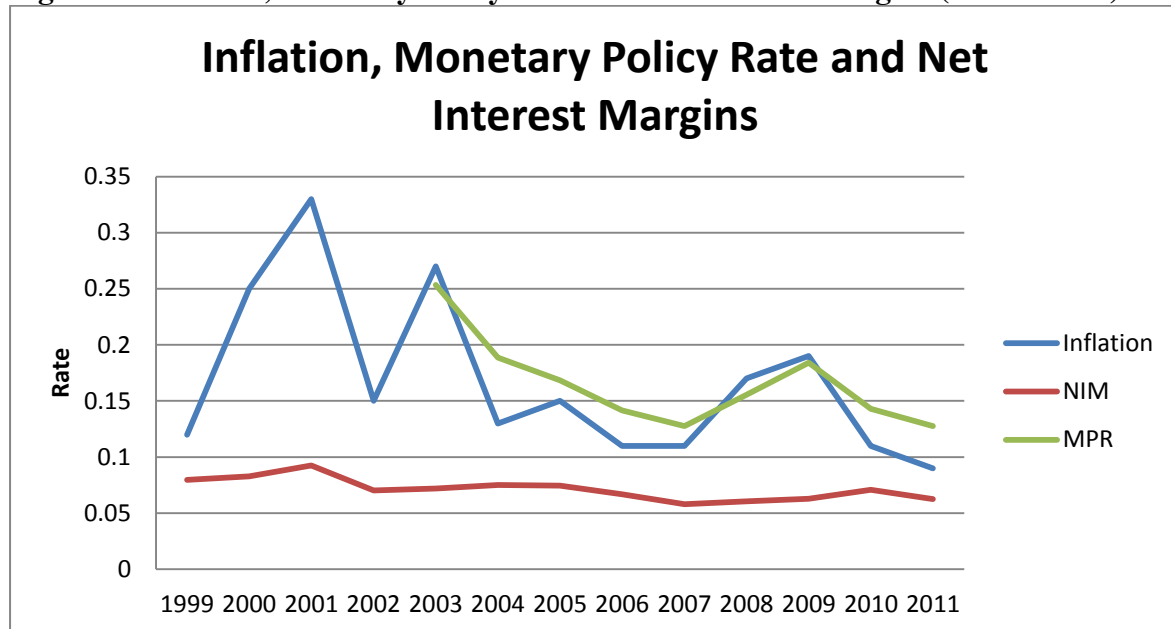
Historically, Treasury bill rates in Ghana were very high. Banks, therefore, preferred to lend to the government because government bills are considered relatively safe compared to other forms of investments. The rates on these bills were also above the rate of inflation, thus providing high positive real returns to banks. A sizeable portion of the assets of banks was therefore invested in government instruments thus leading to a crowding out of the private sector from the loan market.

Banks in Ghana offer a variety of rates on their loan products. Even for a particular bank, the rates offered to different clients differ based on the risk profile of the client and the type of loan. The rates offered by banks are usually set above the BOG's policy rate. Most banks quote a base rate which is an indicator of the interest rate that will be offered to their prime customers. Most banks offer interest rates on their savings accounts but not current accounts. The interest rates offered on deposits have been historically far below those charged on loans. Further, these rates have usually been below the rate of inflation thus producing negative real returns for savers. There is also the inter-bank rate which represents the rate at which banks lend to each other for short periods.

Figure 1 shows the inflation rate, monetary policy rate and net interest margins for banks. The net interest margin is the average for the entire banking industry for every year. The rate of inflation and the policy rate are the same for every bank in a given year. The figure shows

that inflation and the policy rate have been on a decline since 2001. Further, the inflation rate and the policy rate tend to follow the same pattern (declining and rising almost at the same time). Interestingly, Figure 1 shows that the net interest margin has not followed the trend in inflation and the monetary policy rate. Whereas, the inflation rate and the monetary policy rate have declined, the net interest margin has remained almost unchanged.

Figure 1: Inflation, Monetary Policy Rate and Net Interest Margins (1999 – 2011).

Figure: Inflation, Monetary Policy Rate and Net Interest Margins. Y-axis labelled "Rate" ranging from 0 to 0.35. X-axis years 1999–2011. Series: Inflation, NIM, MPR.

3.   Overview of Literature

Agency conflict arises due to the separation of ownership and control which suggests that managerial decisions are not aligned with those of shareholders. Managers and for that matter bank executives are expected to use the firm's resources under their control in the best interest of shareholders, but their actions are dictated, at least in part, by their own interests. The presence of agency conflict incentivizes managers to pursue their own interests and extract rents from the firm at the expense of its shareholders (Berle and Means, 1932; Jensen and Meckling, 1976; Fama, 1980; Jensen, 1986). This is especially the case because the shareholders are absentee landlords. Bank executives as agents of shareholders (principals) are mostly interested in managerial goals such as larger salary and perquisites to the detriment of shareholder value maximization (Jensen and Meckling, 1976; Fama, 1980; Jensen, 1986). The managerial tendencies enumerated above represent a cost to the firm and therefore may lower the residual value that accrues to shareholders. Agency costs arise because the shareholders have to spend money to monitor the activities of the managers of the firm so as to curb these managerial tendencies.

The business of banking involves banks taking deposits and transforming these deposits into loans. Banks earn revenue from their assets (mainly loans) and incur interest expenses on their liabilities (mainly deposits). The difference between what banks earn on their assets and what they pay out on their liabilities represent a margin to the bank. The net interest margin can be regarded as an indicator of the efficiency of the banking system (Demirguc-Kunt and Huizinga, 1999). Generally, a high spread suggests that banks are operating inefficiently since the spread measures the cost to society of the financial intermediation services provided

by banks. Furthermore, businesses have to borrow at a significantly higher cost compared to countries that have lower spreads. There are two main forms of margin for banks; the ex-ante margin and the ex-post margin. The difference between advertised lending and deposit rates represent an ex-ante measure of bank intermediation efficiency. There will be several lending rates and deposits in an economy and therefore it is impossible to refer to one single spread. The difference between the bank's actual revenues (mainly from loans) and its interest expense (mainly from deposits) represents an ex-post measure of the bank's intermediation efficiency.

Banks' inefficiencies or underperformance is often reflected in high interest spread and executives tend to bear little or no cost because they are not the principals. Agency theory therefore prescribes the adoption of effective governance mechanisms such as executive compensation, ownership structure and board governance to reduce the agency cost. Bank interest rate spread may therefore be a function of the level and type of executive compensation and the ownership structure.

Designing incentive compatible compensation packages ensures that managers work in the interest of shareholders. The level and type of executive compensation is, therefore, a key tool of aligning the interests of shareholders and managers. Executive compensation may take different forms such as salaries, pension benefits, perquisites and bonuses, and stock options. Incentive compatible solutions tend to tie managers' wealth to the wealth of shareholders so that both parties share the same goal (Kim and Nofsinger, 2007). However, managers extract rents from shareholders when their compensation levels do not reflect their level of performance. Therefore, shareholders, through the board of directors monitor the compensation level of executives to ensure that they are not excessive and provide the right incentives. If the interest of managers and shareholders are not well aligned due to high agency conflicts, then executives can extract rents from the firm and its owners. They will therefore be incentivized to charge high interest margins since they can appropriate the benefits thereof from the bank. Bebchuk and Fried (2003) view executive compensation not only as a potential instrument for addressing agency problems, but also as part of the agency problem itself. They argue that managers can use their power to negotiate compensations that are in their favour.

The ownership structure of the bank can also help mitigate agency costs. The bank's ownership structure can either enhance or minimize the agency conflict. Where managers own shares in the bank, they are likely to take decisions that will ensure shareholder wealth maximization. By owning shares of the firm, the interests of the managers are more likely to be aligned with the interests of the owners (Demsetz and Lehn, 1985; Jensen and Meckling, 1976; Demsetz, *et al*, 1997; Saunders *et al*, 1990). Therefore, a higher percentage of insider ownership is likely to reduce expected agency costs because of better alignment of shareholder and managerial control. Demsetz (1983) and Fama and Jensen (1983), however, argue that higher insider ownership may suggest that managers will have enough voting power to ensure that their position inside the company is secure. In such a situation, it becomes difficult to remove weak and incompetent management resulting in managerial entrenchment. It stands to reason that, the relationship between insider ownership and interest rate margins can be ambiguous since insider ownership can reduce agency conflict and also increase agency conflict (when management has enough votes).

Firms with more concentrated ownership structures should be better able to monitor the activities of managers. However, when shareholders are too dispersed to take action against

non-value maximizing behaviour, managers may use the firm's assets for their own personal benefit, such as shirking responsibilities and consuming perquisites (Jensen and Meckling, 1976). Institutional shareholders and blockholders are also in a better position to monitor management compared to individual investors who may not have the time, resources and sufficient clout to monitor managers. This is because agency problems are said to be minimal in firms with large block shareholders that are able to monitor management activities (Shleifer and Vishny, 1986). Blockholder monitoring is expected to be more intense in the presence of institutional blockholders with large holdings in the firm.

Foreign banks usually have more resources, higher technology and talent compared to local banks. They are also more likely to be better managed since the local subsidiaries follow the corporate governance practices of their parent firms. The literature suggests that foreign banks usually 'cherry pick' the most creditworthy customers. They are therefore less likely to suffer from bad debts. According to Unite and Sullivan (2002) foreign bank entry corresponds more generally with improvements in operating efficiencies. Most of the empirical literature suggests a negative relation between foreign ownership of bank assets and bank net interest margins. For instance, Martinez *et al* (2004) find evidence studying Latin American countries that, foreign banks exhibit lower interest margins compared to domestic banks. Using bank-level data for 80 countries, Demirguc and Huizinga (1999) show that foreign banks have higher margins and profits than domestic banks in developing countries, while the opposite holds in industrial countries. Claessens *et al* (2001) find that the increased presence of foreign banks is associated with a reduction in profitability and margins for domestic banks. Beck and Hesse (2009) also find that foreign banks in Uganda do not charge significantly higher spreads or earn significantly higher margins.

Another mechanism to reduce the principal-agent conflict is for the owners of the firm to appoint members to the governing board. This is an important corporate governance mechanism that serves to reduce the agency problem since the company's board determines the strategic direction of a company. The corporate board is central to corporate governance mechanisms and is viewed as the primary means for shareholders to exercise control over top management through monitoring and advisory roles of the board (John and Senbet, 1998). The role of the board of directors is seen as an information system that the shareholders within large corporations could use to monitor the opportunistic behaviour of management (Fama and Jensen, 1983). Keenan (2004) argues that the board has the obligation to determine the firm's overall strategy, and to ensure that adequate controls are in place to protect shareholder value. Therefore, by having representatives on the board, shareholders are able to influence the strategic direction of the firm as well as monitor its executive management. It is believed that independent non-executive directors can do a better job at monitoring the managers of the firm since they have no affiliation with the managers of the firm.

The literature suggests that bank interest spread may also be influenced by a number of bank specific factors (such as bank specific risk, bank size and bank efficiency), industry factors (market structure), regulatory factors (capital adequacy ratio and reserve requirements) and macroeconomic factors (inflation, volatility of interest rates and exchange rates). Larger banks are said to exhibit lower spreads because of the enhanced economies of scale which they may pass on to their customers in the form of lower interest rates. Ho and Saunders (1981) show that larger banks tend to have lower margins. Zuzana and Poghosyan (2011), and Poghosyan (2012) also show that, larger banks tend to have lower net interest margins. In a Ugandan study, Beck and Hesse (2009) find some evidence that larger banks in Uganda

charger lower spreads suggesting scale economies. Contrary to the findings of Beck and Hesse (2009), Aboagye *et al.* (2008), find in a Ghanaian study that, bank size has positive relationship with net interest margins.

In terms of bank-specific risk, risky banks should exhibit a larger net interest margin to compensate for their risk level. Poghosyan (2012) finds that credit risk is associated with larger margins, as banks require higher profits to compensate for risk. Using provisions for bad and doubtful debt as a ratio of total loans Aboagye *et al* (2008), do not find a significant relation between bank specific risk and net interest margins in Ghana whilst Bawumia *et al*. (2005) find that, the second quarterly lag of the provisions for bad and doubtful debt positively and significantly explains bank spreads in Ghana. The level of bank efficiency is also an important determinant of interest rate spread. Banks with a higher cost to income ratio are regarded to be less efficient. Such inefficient banks are likely to pass on this cost to customers by charging higher interest rates, and therefore exhibit higher net interest margin. Poghosyan (2012) finds that less efficient banks who exhibit higher operating costs are characterized by higher margins. Gockel and Mensah (2006) suggest that, operating costs of banks were the largest contributor to interest rate spreads in Ghana.

The market structure of an industry determines the prices that can be charged by the players in that industry. If the market structure is concentrated, that is a few market players control the industry then they can exploit the market and charge monopolistic rents. On the other hand, if there are several players in the market, then the ability of a market participant to charge excess rents is highly limited. Several indicators have been used in the literature to capture the market structure in the banking industry. These indicators include the Herfindahl index, the Lerner index, the three largest bank concentration ratio and the five largest bank concentration ratio. Amidu and Wolfe (2012) show that both the conventional and funded-adjusted Lerner index (proxying market power) exhibit a positive relation with bank interest spreads in emerging and developing countries.

Ho and Saunders (1981) theoretical model of the determinants of net interest spreads predicts that the level of bank risk aversion should affect bank interest spreads. Empirical studies such as Saunders and Schumacher (2000), Maudos and Guevara (2004), Aboagye et al. (2008) and Amidu and Wolfe (2012) proxy the level of bank risk aversion with the capital to assets (capital adequacy ratio) of banks. As expected, these studies find a positive and significant relation between the capital adequacy ratio and bank interest margins.

Most jurisdictions operate what is known as a fractional banking system. This means that banks have to 'reserve' a fraction or percentage of all deposits reserved. Banks therefore cannot give out all the deposits that they receive as loans. Central banks require banks to maintain such reserves to promote the liquidity of the banks and to promote financial stability. Banks receive several requests for loans and deposits daily and must be sufficient liquid to meet this demands. Ho and Saunders (1981) suggest that one of the market imperfections that should affect banks spread is the level of reserves that banks are supposed to maintain. Ho and Saunders in their empirical modeling of bank interest spreads using banks in the United States find a positive relation between reserve requirements and bank interest spreads. Maudos and Guevara (2004) using data on European banks find a similar situation for European banks. In Ghana, Bawumia *et*. *al* (2005) also find a positive and significant relation between actual bank liquid reserves and the net interest spread. Aboagye et al (2008), however, find a negative relation between bank liquid reserves and net interest spreads.

With regards to macroeconomic stability, banks consider inflation when pricing their loans. Bank deposits should also take into consideration inflation. Lending rates are generally more sensitive to inflation than deposit rates. Beck and Hesse (2009) find that higher inflation is associated with higher spreads and margins in Uganda. Chirwa and Mlachila (2004) also find that high inflation explains commercial bank spreads in Malawi. In Ghana, Aboagye *et al*. (2005) and Bawumia *et al*. (2005) find a positive relation between inflation and net interest margins suggesting that improvements in the macroeconomic environment in terms of lower inflation rates translate to lower net interest margins. Using data for English speaking West African countries, Crowley (2007) however, finds that inflation has a negative relation with interest rate spreads. Since banks make use of money markets to obtain and invest funds, the level of interest rates in money markets should affect the spread of banks. The dealership model developed by Ho and Saunders (1981) suggests that the volatility of interest rates in the money market should have a direct and positive effect on the spread of banks. Maudos and Guevara (2004) using banks from Europe confirm that indeed the volatility of interest rates exhibits a positive relation with bank interest spreads.

Following discussion on the extant literature, we hypothesize that a strong alignment of goals between bank owners and executives' means that executives are unable to appropriate the returns associated with high interest rate spreads and would thus operate on lower spreads than banks in which the principal-agent conflict is severe. It is also expected that bank interest spread is affected by bank-specific, industry-specific, regulatory, as well as macroeconomic factors.

4.   Data and Empirical Models

The data was obtained from the financial reports of all banks operating in Ghana and from the Bank of Ghana during the period, 1999 – 2011. We also obtained some of the ownership variables from the Registrars of the banks concerned. Detailed definitions of the variables employed for the study are provided in Appendix 1.

4.1   Theoretical Framework
Ho and Saunders (1981) developed a theoretical model that attempts to explain the net interest margin of banks. This model has been referred to in the literature as the dealership model. In this model, banks are viewed as risk-averse dealers and demand deposits whilst supplying loans. This model indicates that the optimal mark-up that banks will charge depend on four main factors. These factors are the degree of bank management risk aversion, the market structure in which the bank operates, the average size of bank transactions and the variance of interest rates. Ho and Saunders (1981) show that banks will demand a positive interest spread as the price of providing immediacy of deposits and loans in the face of uncertainty generated by asynchronous deposit supplies and loan demands. Therefore, even in a world of highly competitive banking markets, interest margins cannot disappear due to transaction uncertainties.

Ho and Saunders (1981) show that the spread is given as;

$$s = a + b = \frac{\alpha}{\beta} + \frac{1}{2}R\sigma^2{}_I Q$$

where s is the pure spread, $\frac{\alpha}{\beta}$ measures the bank's risk neutral spread, which is lower if markets are competitive. The second term represents a first order risk-adjustment term and depends on three factors: (i) R, the bank's management's coefficient of absolute risk aversion, (ii) Q represents the size of bank transactions (iii) $\sigma^2{}_I$ represents the instantaneous variance of the interest rate on deposits and loans. The difference in market values of a bank's loans and deposits determine its net inventory. If the bank has more deposits than loan requests, it can invest the excess deposits in money market instruments. On the other hand, if the bank has more loan requests than deposits then it can borrow from the money markets to finance the loan request.

In their empirical modelling of the determinants of the net interest spread, Ho and Saunders consider other market imperfections such as implicit interest, the opportunity cost of holding reserves, and the default risk on loans. Thus actual bank margins (M) are hypothesized to be a function of the pure spread (s), implicit interest expense (IR), the opportunity cost of required reserves (OR), and default premiums on loans (DP). Thus;

$$M = f(s, IR, OR, DP, U)$$

where U represents a residual error term.

The Ho and Saunders model has been extended by other authors to account for production costs (Lerner, 1981), different types of credits and deposits (Allen, 1998), uncertainty in the money markets (McShane and Sharp, 1985) and Angbanzo (1997) who considers credit risk.

Finally, as Maudos *et al*. (2004) show, banks are assumed to be maximizers of expected utility. The bank's utility function is approximated using the Taylor expansion around the expected level of wealth $(\overline{W} = E(W))$:

$$EU(W) = U(\overline{W}) + U'(\overline{W})E(W - \overline{W}) + \frac{1}{2}U''(\overline{W})E(W - \overline{W})^2$$

Where it is assumed that the bank's utility function is continuous doubly differential with $U' > 0$ and $U'' < 0$ thus suggesting that the bank is risk averse.

In sum, the theoretically predicted determinants of the bank spread as suggested by the literature include the cost of reserves, default risk, implicit interest (represented by service charge remissions and other types of depositor subsidy), the timing of deposits and loans, operating costs, the different types of credits and deposits, bank management risk aversion, the market structure that a bank contends with, volatility in interest rates, and the market values of deposits and loans.

4.2 *Empirical Model*
The empirical specification has its foundations in the theoretical models developed by Ho and Saunders (1981) and extended by other authors. We employ a 'single stage' panel regression to examine the effect of agency factors on bank interest spreads. In order to investigate this relationship, we adopt the following empirical model;

$$NIM_{it} = \alpha + \beta_1 EComp_{it} + \delta_2 BC_{it} + \omega_3 Own_{it} + \gamma_4 Bankspec_{it} + \vartheta_5 Indusspec_t + \theta_6 Reg1_{it} + \rho_7 Reg2_t + \varphi_8 Macrospec_t + \mu_{it} \dots (1)$$

with the subscript *i* representing the cross-sectional dimension and *t* representing the time series dimension.

NIM is the dependent variable representing the net interest margin which is the ex post interest spread *NIM* is the net interest income scaled by total assets. *EComp, BC* and *Own* represent the agency/corporate governance variables. *EComp* is executive compensation measured as |Directors fees and Staff Emoluments/Total assets. Whereas shareholders require management to maximize shareholder value, managers may have their own selfish interests which conflict with the interest of shareholders. A prime example is to extract larger than reasonable salaries from the firm. Therefore, large salaries (emoluments) are likely to be a symptom of agency conflicts. We therefore expect a positive relation between emoluments and bank net interest margins. *BC* represents the board composition of a bank, defined in terms of the ratio of non-executive directors to total board size. *Own* is a vector of ownership variables: the ownership structure, defined in terms of publicly listed (a dummy variable taken the value of 1 if a bank is publicly listed and 0 otherwise), foreign ownership (a dummy variable taken on the value of 1 if the ownership of the bank is more than 50% owned by foreigners and 0 otherwise), block ownership (percentage of shares held by shareholders with more than 5% of the bank's equity), institutional ownership (percentage of shares held by institutions), and 20 largest shareholding (percentage of shares held by the top 20 shareholders). We expect publicly listed banks to exhibit lower spread since listed firms may experience shareholder activism in checking the opportunistic behaviour of managers. We expect foreign banks to exhibit a lower margin since they have more resources, better technology and more talented staff compared to local banks. We expect a negative relation between bank interest margins and block ownership, institutional ownership and ownership by the 20 largest shareholders respectively. This is because a more concentrated shareholding structure suggests that shareholders have a larger share and can therefore reduce agency conflicts.

The control variables are broadly defined to include bank-specific (*Bankspec*), industry-specific (*Induspec*) regulatory and macroeconomic variables. The bank specific variables vary across banks and overtime and include, bank specific risk (loans-to-total-assets), bank size (log of total assets), and bank efficiency (cost-asset ratio). We expect a positive relation between bank-specific risk and the net interest margin since banks with a larger loan portfolio are more likely to incur losses. Such banks will therefore charge a risk premium for taking on the risk of lending. To the extent that larger banks should benefit from scale economies we hypothesize a negative relation between bank size and bank net interest margins. Banks with a high cost-to-asset ratio are deemed to be relatively inefficient. We expect a positive relation between bank efficiency and the net interest margin since inefficient banks are likely to pass on their inefficiency to their clients in the form of a higher net interest margin.

The industry specific factors do not vary across bank but vary overtime. The industry variable employed in this study is the market structure of the banking industry. The empirical surrogate for market structure is the Herfindahl Hirschman Index for assets which captures the level of competition in the banking industry. We expect a positive relation between the Herfindahl Hirschman Index and bank net interest margins. The Herfindahl index ranges from 0 to 1 with higher levels indicating high concentrated and less competitive banking sector.

Two variables are used to capture the influence of banking regulation (*Reg1 and Reg2*) on the interest spread. The first is the capital adequacy ratio (CAR) for each bank. The capital adequacy ratio therefore varies across banks and across time. The capital adequacy ratio is used to proxy bank management risk aversion as predicted by the theoretical model. However, the BOG has some influence over the capital adequacy ratio. In Ghana, banks are supposed to maintain 10% of their risk adjusted assets as capital. Banks that go below the minimum are sanctioned by the BOG. We postulate a positive relation between the capital adequacy ratio and bank interest spreads. Standard finance theory suggests that equity is more expensive compared to debt. Therefore, banks that maintain a high equity ratio are likely to charge a higher margin to compensate for the proportion of equity capital held. The second regulatory variable is the reserve requirement that banks are expected to maintain. This variable does not vary across banks but varies overtime. We expect a positive relation between reserve requirements and bank interest margins since these requirements reduces the amount of loanable funds of the banks.

The macroeconomic variables (*Macrospec*) used in the study are inflation, the volatility of interest rates (proxied by the standard deviation of the 91 day Treasury bill rate), and the exchange rate with the United State dollars. We hypothesize a positive relation between inflation and bank interest spreads. This is because banks will seek to price this risk into the rates that they charge their clients. Volatile interest rates suggest that banks are exposed to more risks. To price this risk, banks will charge a higher margin to compensate. Finally, we expect a positive relation between an appreciating US dollar and bank interest margins. When the dollar is appreciating banks are taking on a larger currency risk by investing or lending in a currency that is depreciating.

u_{it} represents the composite error term and decomposes into v_i which is time invariant and accounts for any unobservable bank-specific effect which is not included in the regression model and ε_{it} represents the remaining disturbance, and varies with the individual banks and overtime. The Hausmann specification test is used to determine the appropriate specification be it fixed effects or random effects. In a random effects model, v_i and ε_{it} are random with known disturbances. In a fixed effects estimation, v_i, the bank-specific effect and ε_{it} , a random term, are fixed parameters and are estimated together with the other parameters (Baltagi, 2005).

5.   Empirical Results

In this section, we present and discuss the results from the empirical analysis. We first examine the summary descriptive statistics in Table 1. We then examine the pairwise correlation (as shown in Table 2) between the variables of interest to aid in the empirical specifications. Finally, we present and discuss the results from the empirical analysis in Table 3.

5.1   Descriptive Statistics and Correlation Matrix
The net interest margin averages about 7% in our dataset. This suggests a high spread between lending and deposit rates of banks in Ghana. The spread as computed reflects the various rates banks charge and offer on their loans and deposits. Over the period of the study, the minimum spread was 1.73% whilst the maximum was 15.75%. Staff costs and directors' fees (total emoluments) together account for about 3.4% of banks assets in Ghana. Non-executive directors are a significant component of the board of banks in Ghana. The average bank board has a non-executive composition of about 71%. This means that executive

directors are in the minority when it comes to board representation in Ghanaian banks. The mean for publicly listed banks is 0.28 suggesting that 28% of banks in Ghana are listed and a majority (72%) of them are unlisted. The mean for foreign controlled banks is 0.45 suggesting that foreign investors (45%) are very active in the Ghanaian banking sector. The data suggests that shareholding by directors in Ghana is very limited. The ownership structure of banks in Ghana is very concentrated. Blockholders, institutional owners and the 20 largest shareholders own on the average 85.81%, 89.82% and 91.91% of bank shares.

In terms of the statement of financial position structure, less than 50% of the assets of Ghanaian banks are in loans. This implies an insufficient flow of funds to the productive sectors of the economy despite the fact that the assets of banks have increased tremendously. Bank operating costs on the average form about 3% of assets. The data suggests that the banking industry in Ghana is very competitive given that the average Herfindahl index is about 0.10. The capital adequacy ratio averaged about 17% suggesting that banks maintained a comfortable margin above the 10% CAR required by the Central Bank. The reserve requirement over the period averaged 27.63%, with a minimum of 9% and a maximum of 44%. Due to the elimination of secondary reserves by the Central Bank, this implicit tax on banks is currently 9% of all deposits. The average level of inflation over the period of study turn out to be about 17%. Given that an optimal level for inflation for Ghana is unknown, we presume that this represents an above average optimal inflation. The average volatility (standard deviation) of the 91 day Treasury bill rate averaged about 3% suggesting a low level of volatility. This thus not come as a surprise since treasury bills represent risk-free government debt and should be less risky compared to other asset classes. The average value of the Ghana Cedi per U.S Dollar was GHC 0.8952/$ with a minimum of GHC 0.2666/$ and a maximum of GHC 1.4310/$. This shows how significantly the cedi has depreciated. At the beginning of 1999 the value of the dollar was GHC 0.2666, by the end of the study period the value of the same dollar was GHC 1.4310.

[**Insert here Table 1**]

The correlation matrix in Table 2 shows that the ownership variables are highly correlated. The ownership variables are therefore not included in the same specification. The Herfindahl index exhibits a high level of correlation with the reserve requirement ratio and the exchange rate variable. Therefore, these variables are also included in separate models. These choices are informed by the high correlation as well as the fact that the empirical estimations show evidence of multicollinearity when these variables are included in the same model.

[**Insert here Table 2**]

5.2   Regression Results
The results from the empirical estimations are presented in Table 3 and 4. The choice of random versus fixed effects estimation is made based on the Hausmann test. We first explain the results regarding the agency factors before turning our attention to the control variables. Emoluments enter the empirical modeling being positive and highly significant in most of the models estimated. The results suggest that total emoluments are taken into account when banks are setting their interest rates. We observe that, in the absence of other strong corporate governance mechanisms, banks are motivated to charge high interest margins since they can

extract these from the bank by paying high salaries. Such high emoluments are a symptom of the agency conflict that exists between shareholders and managers. The results of this study thus signal the fact that non-alignment of goals between bank owners and management contributes significantly to explaining the high interest rate spreads in the Ghanaian banking sector.

Out of the three bank-specific factors employed, we found a statistically significant relation between bank size and net interest margins. The results show that, larger banks tend to exhibit a larger spread compared to smaller banks. The evidence here suggests that, larger banks are not benefiting from scale economies which should result in lower costs and a lower net interest margin. In fact, banks may be suffering from diseconomies of scale which have contributed to higher costs and margins. Indeed, larger banks charge higher margins to compensate for their investments in technology and branch networks. In Ghana, the largest banks have the largest branch networks and have made significant investments in technology. The findings with respect to size effect are consistent with that of Aboagye *et al* (2008) who also found a positive relation between the size of banks in Ghana and net interest margins.

In terms of the industry level effect, the results of the study show that the level of concentration within the banking industry, affects interest rate spreads in Ghana. The Herfindahl Index, which proxies concentration, suggests a significantly positive relation with the net interest spread. Higher level of the Herfindahl index indicates a more concentrated banking system, while lower level of the index on the other hand suggests a more competitive banking system. Therefore, the significantly positive effect of the Herfindahl Index on interest spreads suggests that as the banking industry becomes more concentrated, the tendency for banks to charge monopolistic rents and thus exhibit higher margins.

At the regulatory level, we find evidence suggesting that to a certain extent, the Central Bank has some influence on bank net interest margins. Similar to the findings of previous studies (see Saunders and Schumacher, 2000; Maudos and Guevara, 2004; Aboagye *et al*., 2008; Amidu and Wolfe, 2012), we find a positive relation between the level of bank risk aversion (proxied by the capital adequacy ratio) and bank net interest spreads. This tends to suggest that, banks that maintain a higher proportion of equity in their capital structure tend to exhibit higher interest spreads. Since standard finance theory suggests that equity is more expensive than debt, banks that use a higher proportion of equity financing tend to exhibit a higher margin to compensate for that amount of equity held.

We also find evidence to the effect that reserve requirements implemented by the monetary authority to promote financial stability contribute to the observed high spreads of banks. These reserves represent fractions of deposits that banks have to keep with the Central Bank. The banking system therefore does not have access to these funds to on lend to clients to generate a return. Such reserves, which are mainly primary reserves are unremunerated and as such represent a cost to banks. Therefore, banks tend to charge a higher margin to compensate for the opportunity cost of not having access to these funds. The evidence here indicates that, the reduction in the reserve requirement ratio by the Central Bank leads to lowering net interest spreads. The findings on the effect of reserve requirement are in tandem with findings of Maudos and Guevara (2004) and Bawumia *et*. *al* (2005).

Finally we find evidence that macroeconomic factors influence the level of bank interest spreads. Specifically, we find a positive relation between the level of inflation and bank interest spreads. The findings here indicate that, the level of inflation feeds into the net

interest margin of banks in Ghana. If bank lending and deposit rates are equally affected by changes in inflation, then there should be no net effect on the net interest spread of banks. However, the results suggest that the lending rates of banks are more sensitive to inflationary pressures compared to their deposit rates. Therefore, increases in inflation lead to an increase in bank net interest margins. This supports the findings of Chirwa and Mlachila (2004), Bawumia *et. al* (2005), Aboagye *et al.* (2008) and Beck and Hesse (2009).

[**Insert here Table 3**]

[**Insert here Table 4**]

6.   Conclusion and Implications

This study examined the role of agency conflict and corporate governance in the determination of interest rate spreads in Ghana. The findings of this study suggest that corporate governance mechanisms play a role in the way interest rate spreads are set in Ghana. If managers believe that they can extract excess rents from the bank (in terms of directors' fees and employee emoluments) then they tend to charge a higher net interest margin. With regards to bank level factors, we find that larger banks tend to operate on a larger spread compared to banks with smaller banks. This suggests that such banks are not fully benefitting from economies and need to pass on their larger investments in infrastructure and IT. Industry, regulatory and macroeconomic indicators are also found to play a key role in influencing interest rate margins in Ghana. A more competitive banking sector is found to be associated with lower interest spreads. The actual capital adequacy ratio maintained by banks is also found to be positively associated with the net interest spread. Banks that use more high cost equity tend to operate on a higher spread. The level of reserves required by the Central Bank was also found to be positively related to the net interest spread. This suggests that the lowering of the reserve requirement ratio by the Central Bank contributes to lowering observed interest margins. Macroeconomic stability is important as the findings indicate that reducing the level of inflation may aid in bringing down the spread.

This study has shed some light on the relevance of agency conflict in explaining interest rate spreads in Ghana and there are important policy implications emerging from the findings of the study. Improved corporate governance of banks will have favorable effects on the interest rate spreads. The design of executive compensation models that are more incentive compatible should engage the attention of bank regulators and boards of directors. Improved corporate governance will provide for a more transparent method of setting executive compensation and perks.

In addition to corporate governance, regulators should ensure that the banking sector remains competitive so as to curtail high interest spread. Further, regulators should balance the requirements to maintain certain levels of capital adequacy and reserves to promote financial safety against the need to reduce the social cost of financial intermediation (bank net interest margins). The need to keep inflation within reasonable levels is paramount since the level of inflation tends to feed into bank interest spreads. In this regard, a persistent effort to reduce the current high levels of government budget financing will go a long way to reduce inflation and ultimately bank interest spreads.

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Table 1: Descriptive Summary Statistics

Variable	Obs	Mean	Std Deviation	Minimum	Maximum
Dependent variable					
Net interest margin	253	0.0701	0.0249	0.0173	0.1575
Governance variables					
Emoluments	183	0.0339	0.0163	0.0012	0.1240
Board composition	242	0.7057	0.1673	0.1667	0.90
Publicly listed	264	0.2841	0.4518	0	1
Foreign ownership	250	0.4520	0.4987	0	1
Block ownership	156	0.8581	0.1495	0.4499	1
Institutional ownership	156	0.8982	0.1299	0.4077	1
20 largest shareholding	145	0.9191	0.0979	0.6435	1
Bank specific variables					
Bank-specific risk	253	0.4048	0.1443	0.0302	0.8974
Bank size	254	18.9480	1.4175	13.8366	21.6483
Bank efficiency	247	0.0341	0.0187	0.0094	0.1532
Industry specific variable					
Concentration (HHI)	351	0.1022	0.0317	0.0590	0.1498
Regulatory variables					
Capital adequacy ratio	233	0.1712	0.1114	0.0482	0.8982
Reserve requirement	351	0.2763	0.1628	0.09	0.44
Macroeconomic variables					
Inflation	351	0.1677	0.0705	0.09	0.33
Volatility of interest rates	351	0.0259	0.0211	0.0026	0.0628
Exchange rate	324	0.8952	0.3088	0.2666	1.4310

Table 2: Correlation Matrix

	Net margin	Emoluments	Board composition	Public listed	Foreign ownership	Block own	Inst. own	20 largest share	Bank specific risk	Size	Efficiency	Concentration (HHI)	Capital adequacy	Reserve Requirement	Inflation	Volatility of interest rates	Exchange rate
Net margin	1.0000																
Emoluments	0.3897	1.0000															
Board composition	-0.2465	-0.0021	1.0000														
Publicly listed	0.4077	0.1545	0.0528	1.0000													
Foreign ownership	0.0695	-0.1814	-0.3524	-0.0333	1.0000												
Block ownership	-0.1004	0.0120	-0.2040	-0.6526	0.3204	1.0000											
Institutional ownership	-0.0591	-0.0410	-0.2313	-0.5590	0.2871	0.9283	1.0000										
20 largest shareholding	-0.2116	-0.1093	-0.2669	-0.7072	0.3906	0.9524	0.9503	1.0000									
Bank specific risk	0.1516	0.0939	0.1407	0.2300	-0.4334	-0.3153	-0.2631	-0.3484	1.0000								
Size	0.0805	0.0233	-0.1788	0.3426	0.1058	-0.2470	-0.2112	-0.2343	0.3739	1.0000							
Efficiency	-0.1361	0.3095	0.1106	-0.2305	0.0718	0.1990	0.1585	0.2176	-0.1034	-0.3939	1.0000						
Concentration (HHI)	0.3157	0.0193	-0.0191	-0.0815	-0.0905	0.0480	0.0866	0.0291	-0.1313	-0.6252	0.0269	1.0000					
Capital adequacy	0.0116	-0.0032	-0.0929	-0.0343	0.3287	0.1352	0.1139	0.1795	-0.3533	-0.0564	0.0370	-0.1690	1.0000				
Reserve requirement	0.3221	0.0328	-0.0165	-0.0574	-0.1028	0.0484	0.0810	0.0306	-0.1684	-0.5728	-0.0052	0.9087	-0.1414	1.0000			
Inflation	0.2485	0.0078	-0.0489	-0.0586	-0.0489	0.0390	0.0606	0.0037	-0.0455	-0.3364	0.0696	0.5793	-0.0541	0.5106	1.0000		
Volatility of interest rates	0.1525	0.0030	-0.0507	-0.0608	-0.0135	0.0395	0.0613	0.0212	-0.0091	-0.1839	-0.0100	0.3840	-0.1333	0.2831	0.7471	1.0000	
Exchange rate	-0.2155	-0.0129	-0.0070	0.0773	0.0749	-0.0367	-0.0849	-0.0452	0.1141	0.5664	0.0193	-0.8672	0.2319	-0.7399	-0.2022	-0.2555	1.0000

Table 3: Regression Results

	(1) FE	(2) FE	(3) RE	(4) RE	(5) RE	(6) FE
Governance variables						
Emoluments	0.3480**	0.3528***	0.4270***	0.3339***	0.3307***	0.4215**
	(0.1412)	(0.1392)	(0.1462)	(0.1284)	(0.1281)	(0.1775)
Board composition	0.0378		0.0188	0.0147	0.0162	0.0381
	(0.0226)		(0.0196)	(0.0176)	(0.0177)	(0.0274)
Publicly listed	-0.0014					
	(0.0062)					
Foreign ownership		….				
		….				
Directors shareholding			0.0292			
			(0.0297)			
Block ownership				0.0013		
				(0.0212)		
Institutional ownership					0.0130	
					(0.0238)	
20 largest shareholding						-0.0256
						(0.0460)
Bank specific variables						
Bank specific risk	0.0049	0.0046	0.0151	0.0091	0.0094	-0.0050
	(0.0122)	(0.0121)	(0.0162)	(0.0151)	(0.0150)	(0.0158)
Bank size	0.0096***	0.0095***	0.0146***	0.0133***	0.0133***	0.0119**
	(0.0035)	(0.0035)	(0.0039)	(0.0035)	(0.0035)	(0.0049)
Bank efficiency	0.1496	0.1488	0.0423	0.0690	0.0677	0.1447
	(0.1153)	(0.1148)	(0.1486)	(0.1378)	(0.1375)	(0.1455)
Industry specific factors						
Concentration	0.5059***	0.5066***	0.6355***	0.6262***	0.6229***	0.6011***
	(0.1231)	(0.1226)	(0.1300)	(0.1153)	(0.1157)	(0.1643)
Regulatory factors						
Risk aversion (CAR)	0.0716***	0.0707***	0.1221***	0.0970***	0.0957***	0.0741**
	(0.0233)	(0.0229)	(0.0328)	(0.0307)	(0.0306)	(0.0341)
Macroeconomic factors						
Interest rate volatility	0.0392	0.0405	0.0240	0.0764	0.0755	0.1008
	(0.0537)	(0.0533)	(0.0773)	(0.0712)	(0.0710)	(0.0741)
R square	0.3795	0.3972	0.4540	0.4238	0.4123	0.3805
Obs	169	169	108	121	121	118
No. of banks	22	22	16	16	16	16
Wald Chi2/F	4.60	5.20	36.91	44.37	44.55	3.62
Prob>Chi2/F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007
Hausman Chi2	**18.48**	**14.55**	**9.95**	**9.70**	**10.66**	**17.64**
	0.0300	**0.0685**	**0.3547**	**0.3756**	**0.2995**	**0.0396**

Standard errors are in parentheses. ***, ** and * indicate significant at 1%, 5% and 10% respectively. Emoluments represents the fees to directors and staff emoluments scaled by total assets. Board composition is the ratio of non-executive directors to total board size. Publicly listed status is a dummy which takes on the value of 1 if the bank is listed and 0 otherwise. Foreign ownership is a dummy which takes on the value of 1 if the bank is majority owned by foreigners (more than 50% by foreigners) and 0 otherwise. Directors' shareholding represents the percentage of shares owned by directors. Block ownership represents the percentage of shares held by shareholders with more than 5% equity stake. Institutional ownership represents the percentage of shares held by institutions. The 20 largest shareholding represents the total percentage of shares held by the top 20 shareholders. Bank-specific risk represents the share of loans in the total assets of banks.

Bank size represents the log of total assets. Bank efficiency ratio is proxied by the cost-to-asset ratio. The Herfindahl Hirschman index measures the share of a bank's assets in the total assets of the banking industry and ranges from 0 to 1. Bank management risk aversion is measured as adjusted capital divided by risk adjusted assets. Interest rate volatility is measured as the standard deviation of the 91 day Treasury bill rate.

Table 4: Regression Results

	(1) FE	(2) RE	(3) RE	(4) RE	(5) RE	(6) FE
Governance variables						
Emoluments	0.2416	0.3147***	0.3515**	0.2864**	0.2689**	0.1803
	(0.1539)	(0.1098)	(0.1575)	(0.1324)	(0.1339)	(0.1976)
Board composition	0.0442	0.0087	0.0154	0.0081	0.0113	0.0351
	(0.0257)	(0.0155)	(0.0217)	(0.0179)	(0.0185)	(0.0313)
Publicly listed	-0.0015					
	(0.0066)					
Foreign ownership		-0.0011				
		(0.0062)				
Directors shareholding			0.0246			
			(0.0352)			
Block ownership				-0.0077		
				(0.0203)		
Institutional ownership					0.0101	
					(0.0236)	
20 largest shareholding						-0.0253
						(0.0494)
Bank specific variables						
Bank specific risk	0.0083	0.0171	0.0274	0.0225	0.0228	0.0047
	(0.0139)	(0.0136)	(0.0199)	(0.0178)	(0.0176)	(0.0188)
Bank size	0.0049	0.0102***	0.0133***	0.0115***	0.0114***	0.0001
	(0.0047)	(0.0029)	(0.0046)	(0.0037)	(0.0038)	(0.0068)
Bank efficiency	0.1410	0.0971	0.0191	0.0242	0.0262	0.1221
	(0.1203)	(0.1142)	(0.1600)	(0.1459)	(0.1449)	(0.1526)
Regulatory factors						
Risk aversion (CAR)	0.0616**	0.0776***	0.1046***	0.0888***	0.0828***	0.0523
	(0.0263)	(0.0231)	(0.0369)	(0.0334)	(0.0335)	(0.0408)
Reserve requirement	0.0537***	0.0695***	0.0848***	0.0834***	0.0829***	0.0577***
	(0.0165)	(0.0144)	(0.0207)	(0.0187)	(0.0187)	(0.0213)
Macroeconomic factors						
Inflation	0.0521	0.0642**	0.0804*	0.0790**	0.0777**	0.0501
	(0.0316)	(0.0303)	(0.0431)	(0.0400)	(0.0398)	(0.0444)
Interest rate volatility	-0.0007	-0.0372	-0.0526	-0.0108	-0.0092	0.0760
	(0.0770)	(0.0746)	(0.1104)	(0.1008)	(0.1000)	(0.1094)
Exchange rate	0.0001	-0.0117	-0.0058	-0.0037	-0.0029	0.0166
	(0.0113)	(0.0084)	(0.0132)	(0.0108)	(0.0109)	(0.0163)
R square	0.2468	0.4987	0.4810	0.4566	0.4356	0.1603
Obs	157	157	98	110	110	107
No. of banks	22	22	16	16	16	16
Wald Chi2	3.79	61.16	39.52	50.03	48.75	3.32
Prob>Chi2	0.0001	0.0000	0.0000	0.0000	0.0000	0.0009
Hausman Chi2	**22.34**	**14.86**	**14.85**	**16.54**	**15.78**	**22.70**
	0.0219	**0.1372**	**0.1897**	**0.1223**	**0.1496**	**0.0195**

Standard errors are in parentheses. ***, ** and * indicate significant at 1%, 5% and 10% respectively. Emoluments represents the fees to directors and staff emoluments scaled by total assets. Board composition is the ratio of non-executive directors to total board size. Publicly listed status is a dummy which takes on the value of 1 if the bank is listed and 0 otherwise. Foreign ownership is a dummy which takes on the value of 1 if the bank is majority owned by foreigners (more than 50% by foreigners) and 0 otherwise. Directors'

shareholding represents the percentage of shares owned by directors. Block ownership represents the percentage of shares held by shareholders with more than 5% equity stake. Institutional ownership represents the percentage of shares held by institutions. The 20 largest shareholding represents the total percentage of shares held by the top 20 shareholders. Bank-specific risk represents the share of loans in the total assets of banks. Bank size represents the log of total assets. Bank efficiency ratio is proxied by the cost-to-asset ratio. Bank management risk aversion is measured as adjusted capital divided by risk adjusted assets. The reserve requirement ratio is the same of primary and secondary reserves. Inflation represents changes in the CPI level. Interest rate volatility is measured as the standard deviation of the 91 day Treasury bill rate. The exchange rate represents the value of the US dollar in cedis.

Appendix 1: Definition of Variables Used in the Study

Variable	Definition	Source
Dependent variable		
Net interest margin	(Interest income – Interest expense)/Total assets	Author's computation. Interest income, interest expense, and total assets were obtained mainly from the Bank of Ghana.
Governance variables		
Emoluments	(Directors' fees + staff emoluments)/Total assets	Financial statements of banks and Bank of Ghana.
Board composition	Ratio of non-executive directors to board size	Financial statements of banks.
Publicly listed	This is a dummy variable taken on the value of 1 if a bank is listed and 0 otherwise.	The listed banks and their year of listing are obtained from the website of the Ghana Stock Exchange.
Foreign ownership	This is a dummy variable taking on the value of 1 if foreigners own more than 50% of the shares of a bank and 0 otherwise.	The classification of domestic and foreign banks was obtained from the Bank of Ghana.
Block ownership	This is the sum of the total percentage of shareholders who own 5% or more of a bank's shares.	Authors' own computation. The shareholding structure was obtained from the financial statement of the banks and from NTHC Ghana.
Institutional shareholders	This is defined as the percentage of shares held by institutions with the 20 largest shareholders.	Authors' own computation. The shareholding structure was obtained from the financial statement of the banks and from NTHC Ghana.
20 largest shareholders	This is defined as the sum of the shareholding held by a bank's 20 largest shareholders.	Authors' own computation. The shareholding structure was obtained from the financial statement of the banks and from NTHC Ghana.
Bank specific factors		
Bank-specific risk	Total loans/Total assets **Total loans is defined as**; Loan and advances to non-residents + Loans, overdrafts and other advances	Authors' own computation. The figures for total loans and total assets are obtained from the Bank of Ghana.
Bank size	Defined as the log of total	Authors' own computation.

	assets	Figures for total assets were obtained from the Bank of Ghana.
Bank efficiency	Is defined as total cost/total assets.	Author's computation. Total cost and total assets are obtained from the Bank of Ghana.
	Total cost is operating expenses + Total provisions + Losses on sale of investment + Losses on dealing assets + Exchange losses + Dividends Paid and Payable	

Industry specific factor

Herfindahl Hirschman index	Is defined as the sum of squares of the market shares of all the banks in the industry, where the market shares are expressed as fractions.	Authors' computation.

Regulatory factors

Bank management risk aversion (Capital adequacy ratio)	Is defined as bank adjusted capital/risk adjusted assets.	Bank of Ghana.
Reserve requirements	This represents the sum of primary and secondary reserves.	Bank of Ghana.

Macroeconomic factors

Inflation	Represents the percentage changes in the CPI.	World Bank African Development Indicators.
Volatility of interest rates (measured by the volatility of the treasury bill rate)	Measured as the annual standard deviation of monthly treasury bill rates.	Bank of Ghana.
Exchange rate	Represents the value of the US dollar in cedis	World Bank African Development Indicators.

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