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Article

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Cogent Economics & Finance

Provided in Cooperation with:

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Suggested Citation: Azumah, Cornelius Yao; Owusu-Ansah, Anthony; Amewu, Godfred; Ohemeng, Williams (2023) : The effect of banking sector reforms on interest rate spread: Evidence from Ghana, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 11, Iss. 1, pp. 1-14, <https://doi.org/10.1080/23322039.2023.2175463>

This Version is available at:

<https://hdl.handle.net/10419/303973>

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To cite this article: Cornelius Yao Azumah, Anthony Owusu-Ansah, Godfred Amewu & Williams Ohemeng (2023) The effect of banking sector reforms on interest rate spread: Evidence from Ghana, Cogent Economics & Finance, 11:1, 2175463, DOI: [10.1080/23322039.2023.2175463](https://doi.org/10.1080/23322039.2023.2175463)

To link to this article: <https://doi.org/10.1080/23322039.2023.2175463>



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Received: 20 September 2022
Accepted: 27 January 2023

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Reviewing editor:
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Stirling, United Kingdom

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

The effect of banking sector reforms on interest rate spread: Evidence from Ghana

Cornelius Yao Azumah^{1*}, Anthony Owusu-Ansah², Godfred Amewu³ and Williams Ohemeng¹

Abstract: The wide interest rate spread has been a matter of concern for many developing economies. In Ghana, the perception is that the interest rate spread is too wide and that banks have linked it to various variables affecting them. This study examines the effect of banking sector reforms on bank interest rate spread in Ghana over the period 2008–2020, using an unbalanced panel-data dynamic-equation regression model. The findings reveal that bank size, profitability, gross domestic product, and inflation rate significantly influence Ghana's bank interest rate spread. Results also suggest that these factors account for determining the interest rate spread in the universal banking industry in Ghana. The industry needs to mitigate the interest rate spread by improving the macroeconomic environment, address industry-specific issues, strengthen institutional systems, such as governance and supervision, and also continue to ensure stability in the political environment. The study provides valuable insights regarding the design and formulation of competitive policies and regulatory changes on interest rate regimes, to help promote the competitiveness of the universal banking industry in the country. Policymakers and regulators should emphasize enterprise risk management practices in Ghana's universal banking industry to check credit risk and other risk forms.

Subjects: Political Economy; Banking; Risk Management; Corporate Governance

Keywords: Banking reforms; interest rate spread; two-step system GMM; macroeconomic factors; bank-specific factors; regulatory changes

1. Introduction

The transition to a stable and well-organized banking system in Ghana is an ongoing process. One of the key developments in Ghanaian banking industry is the promulgation of its universal banking regime, which commenced in earnest in 2003, leading to improved bank competition and performance (Blankson et al., 2022).

Far earlier in 1896, Standard Chartered Bank of the United Kingdom, which later became the British Bank for West Africa, commenced business operations. Subsequently, Barclays Bank of the United Kingdom kicked off in 1917. The Commercial Bank of Ghana, which gave birth to the Central Bank of Ghana in 1957, was established in 1953. The 1970 Banking Act imposed a minimum paid-up capital requirement for foreign and locally owned banks of GH¢2 million and GH¢0.5 million (US \$ 2 million and US\$0.5 million—1970 estimated equivalent), respectively.

The Banking Act 2004 (Act 673) replaced the Bank of Ghana Act 2002 (Act 612), all in a bit to strengthen the regulatory and supervisory roles. In February 2003, the Bank of Ghana, to enable

competition in the industry, introduced the Universal Banking Business License (UBBL), which was expected to improve competition within the industry.

In 2007, another capital reform was to take effect in December 2010. The minimum capital requirement was further raised in 2017 from 120 million Ghana Cedis (US\$27.05 million) to GH ₵400 million (US\$90.19 million) with a recapitalization deadline of 31 December 2018. According to the Bank of Ghana, the deposit money banks (DMBs), the number of staff employed, deployment of automated teller machines (ATMs), the number of point of sale (POS) terminals, loan and advances, deposits and total assets increased significantly in 2017, relative to 2016. (Attama & Yuni, 2022).

One of the significant reasons for these reforms in Ghana is the narrowing of the interest rate spread by the universal banks, resulting in a remarkable improvement in the size of their balance sheets and growth in their credit delivery, particularly to households, commerce, and industry.

Since Ghana's universal banking practices have been implemented, several other banking reforms (See Table 6 under the appendix) have also impacted universal banking governance in terms of size, profitability, liquidity, credit delivery, and efficiency. However, despite the many banking reforms between 2008 and 2020, Ghana's universal banking industry was still plagued with a broader interest rate spread (lending rate minus deposit rate), non-performing loans, capital and liquidity impairments, etc. For instance, Adjei-Frimpong et al. (2014), Bokpin (2013), Ohene-Asare (2011), and more recently, the Bank of Ghana (2018) reported that the banking sector in Ghana is not so efficient despite the many banking reforms. Ayensu et al. (2019) and Sarpong et al. (2013) have also concluded that despite the various banking reforms, Ghana's interest rate spread is still wide, compared to that in other developing countries in sub-Saharan Africa. The developments in the Ghanaian economy are characterized by elevated demand pressures in the foreign exchange markets, reflecting, among others, mounting uncertainties, rising inflation, and the resultant coordinated tightening of the monetary policy stance by the central bank. The execution of the budget for the year has been challenging. All these challenges negatively impact the effectiveness of the banking industry and, by extension, the interest rate spread. Therefore, it is essential to establish the relationship between the banking reforms, instituted by the regulators to forestall these challenges, and their effect on the interest rate spread.

Unfortunately, there has been little research, so far, on interest rate determination and banking sector reforms in developing economies, particularly in Ghana, despite the importance of these factors, as established above. The apparent lack of concrete evidence on the impact of banking reforms on the determination of interest rate spread in the Ghanaian banking industry creates a gap that this study seeks to fill. Further, the global financial crisis that occurred from 2007 to 2008, coupled with the recent banking crisis experienced in Ghana, which witnessed the collapse of 420 banks and special deposit-taking institutions, rekindled the discussion about the need to reassess banking sector reforms and their effectiveness in narrowing the interest rate spread. This study seeks to fill the literature gap by providing empirical evidence on the banking sector reforms which impact the interest rate spread. The study uses data on the universal banks operating in Ghana from 2008 to 2020 to examine the effect of the ongoing banking reforms on the interest rate spread. The study also determines whether the interest rate spread persists, and if any reforms are responsible for determining this spread in Ghana. An unbalanced panel-data static and dynamic-regression model were employed in this study to examine the banking sector reforms and their impact on the interest rate spread in Ghana's universal banking industry.

The rest of the paper is outlined as follows. The next section reviews the literature relevant to the study. The third section describes the research methodology. Section four presents the data analysis and empirical findings. The last section summarizes and concludes the paper.

2. Literature review

2.1. Theoretical literature

The most influential theoretical model for the determination of interest margins is the “Bank Dealership Model” by Ho and Saunders (1981). It explains the size of bank interest margins on the basis of the uncertainties associated with deposit and loan markets, hedging behavior, and expected utility maximization. Banks are assumed to be risk-averse dealers in their role as financial intermediaries. The model is based on the premise that banks receive deposits at random intervals, while loan requests appear in a stochastic manner, and these requests must be satisfied. This randomness, and therefore the uncertainty caused by the unpredictability of deposits and loan requests, implies that banks face an inventory risk, which has to be compensated through a spread between loan and deposit rates, or the pure interest spread. The interest margin, as computed by the Ho and Saunders model, is based on certain assumptions, that banks that offer similar or homogeneous loans and deposits, and differences in interest margins across banks are due to average transaction costs, changes in interest rates, risk-taking behavior of bank managers and the extent of competition within the bank’s market (See, Allen, 2011)

Subsequent studies modified some of the assumptions of the Ho and Saunders (1981) model; for instance, McShane and Sharpe (1985) assume that banks face uncertainty in the short-term money market interest rates, as opposed to deposit and loan interest rates. In undertaking intermediation between depositors and borrowers, they assume that banks maximize expected utility and risk aversion in loan and deposit markets. The expectations are a positive relationship between bank interest margins and market power, the degree of bank risk aversion, interest rate uncertainty, and average transaction size.

In a separate study, Allen (1988) extends the Ho and Saunders (1981) model to treat banks as passive dealers, akin to specialists in securities exchanges. Consequently, they change their prices to match the demand for their products—deposits and loans. Lending rates are set by discounting default-risk adjusted accurate prices of the loan, while deposit rates are determined by marking up the default-risk adjusted correct price of the deposit. According to Allen (1988), the spreads are influenced by monopoly power and risk premium. In risky neutrality situations, interest spreads are minimized since there is no need for a risk premium to compensate banks for the uncertainty surrounding the arrival of deposits and requests for loans. Multiple factors have emerged from the literature determining interest rate spreads and margins. These include bank risk aversion, the banking sector’s market structure, the volatility of money market interest rates, regulation, banks’ efficiency, and bank portfolio. Other factors include credit risks, liquidity of banks, share of foreign capital, bank size, as well as industry-specific or macro-economic factors.

Some researchers have also used other approaches to determine interest rate spread. Several other theories apply to interest rate determination. The notable ones include the classical, multiple-lending, loan pricing and the loanable fund theories, and the expectations theory of interest rate. The rest include the Keynesian liquidity preference theory, the neo-Keynesian modern theory, and the dynamic modern interest rates theory. The dynamic modern interest rate theory is an improvement on the other theories of interest rate determination. It considers the effect of bank-specific or banking industry-specific, and macroeconomic factors on the equilibrium interest rates (Churchill, 2013; Maudos & Fernández de Guevara, 2004; Wray, 1990). Therefore, this model’s dynamic nature makes it possible to employ multiple vectors of bank-specific, banking industry-specific, and macroeconomic variables to empirically examine the determinants of interest spread rate.

As Ghana’s universal banking industry is assumed to be dynamic and imperfect, this study’s main objective is to empirically examine how the ongoing banking reforms impact the industry’s interest rate spread. This study follows the dynamic modern interest rate theory approach as used by Adolfo Barajas and Salazar (1999), Churchill et al. (2014), Demirgiç-Kunt and Huizinga (1999),

Ho and Saunders (1981), Maudos and Fernández de Guevara (2004), Ofori et al. (2005), and Sarpong et al. (2013). In this study, the banks' net interest margin in the sample (a proxy for interest rates spread in Ghana) is a function of not only the specific factors of a bank and of the universal banking industry, but also of the macroeconomic factors in Ghana. Therefore, the net interest margin (NIM) is regressed on the combined vectors of the bank-specific, banking industry-specific, and macroeconomic variables to empirically examine the effect of the ongoing banking reforms on interest rates spread in Ghana. It covers the period from 2008 to 2020, and employs a dynamic panel regression estimator.

2.2. Empirical literature

There have been numerous studies on the impact of interest rates spread determination with evidence from developed and developing economies. However, the literature on Ghana, so far, is relatively scant. So far, the empirical literature reviewed in this study has been focused on the studies of the determinants of interest rate spread in emerging economies, with particular evidence from Ghana. Following the dynamic modern interest rates theory, the factors determining interest rate spread in a given industry could exogenously emanate either from the economy, or from the industry. They could also originate endogenously from the bank itself. Much of the empirical literature in recent studies, including that of Ghana, has employed the dynamic modern interest spread model. While some previous studies have considered the impact of both endogenous (bank-specific) and exogenous (banking industry-specific and macroeconomic) factors on Ghana's interest rate spread determination, others have considered the effect of only the former. For instance, Ofori et al. (2005) assessed the impact of bank-specific and macroeconomic factors on interest rates spread in Ghana's universal banking industry from 2000–2004 using an unbalanced panel data analysis. The authors reported that bank-specific and macroeconomic factors significantly determined interest rates spread in Ghana. The findings of Ofori et al. (2005) were corroborated by Aboagye et al. (2008) that bank-specific and macroeconomic factors are significant in determining interest rates spread in Ghana. Sarpong et al. (2013) also examined the effect of banking reforms on the interest rate spread of the universal banking industry in Ghana from 2005 to 2009. They reported that only endogenous or bank-specific factors are significant in determining the interest rate spread of the universal banking industry in Ghana, while macroeconomic factors are insignificant. A study by Churchill et al. (2014) confirmed the above results.

According to Churchill et al. (2014), Ofori et al. (2005), and Sarpong et al. (2013), the bank-specific characteristics used to examine interest rates spread of the universal banking industry in Ghana include bank size, bank capitalization, credit risk, and bank profitability. Liquidity, market concentration, competition, policy rates, specialization, competition, risk aversion, etc., may also account for Ghana's interest rate spread. Some authors have reported a positive and significant effect, while others have reported a negative and significant impact of these factors on interest rates. Therefore, according to the empirical literature reviewed in this study, there is no common consensus on the effects of these explanatory factors on the determination of Ghana's interest rate spread. Again, as shown in the empirical literature, inflation, GDP growth rate, and foreign exchange rates are the most widely used macroeconomic determinants of interest rates spread in Ghana. According to the authors, these macroeconomic determinants have significantly influenced the interest rates in the country. For instance, Sheriff and Amoako (2014) reported a significant impact of GDP growth on Ghana's universal banking industry's interest rates. This result was also confirmed by the findings of Churchill et al. (2014). Regarding inflation, Ofori et al. (2005) reported that the overall changes in Ghana's inflationary trends have positively and significantly impacted the interest rate spread of the country's universal banking industry over the years. Churchill et al. (2014) also corroborated the findings of Ofori et al. (2005) that there has been a positive and significant association between inflation and interest rate spread in Ghana over the years. Recent studies on Ghana's banking sector were focused on the determinants of interest rate spread but were not explicitly linked to the various banking reforms instituted by the central bank after the global financial crisis. This study investigates the impact of banking reforms that central banks in Ghana instituted on the interest rates, particularly lending and deposit rates, and their spread. The

study is essential because Ghana's banking industry faces unique financial and banking challenges that deeply affect the economy's performance, particularly the interest rate spread. Banks play a significant part in supporting economic growth through efficient resource allocation, and understanding the impact of the banking reforms on interest rate spread demands an empirical investigation (Shayanewako & Tsegaye, 2018).

3. Methodology

3.1. Data

The study uses a quantitative approach, and secondary is gathered. The study population is a pool of 19 universal banks in Ghana during the study period 2008 to 2020. The selection of banks depends on their years in operation. It also depends on the information available and whether the bank is still in existence at the study time. The universal banks in operation from 2008 to 2020 are used in the sample. The study excluded banks that were not operational before 2008, and were liquidated between 2008 and 2020. Also, banks whose available information were not up to three years, were excluded. An unbalanced panel data of 19 out of the 23 universal banks in Ghana with 233 annual observations accounted for about 90 percent of Ghana's universal banking industry's total assets. The banks used in this study are shown in the appendix as Table 7. The bank-specific data, used in the study as explanatory variables, were collected from their annual reports, captured in PricewaterhouseCoopers (PwC) reports. These included their year-end balance sheets, and the income statements reported following the adoption of international financial reporting standards (IFRS). The information was cross-validated with corresponding data from the Bank of Ghana. The macroeconomic variables were obtained from the World Development Indicators (WDI) of the World Bank. Version 15 of the STATA software package examined the determinants of bank interest rate spread in Ghana.

3.2. Empirical model for the determination of interest rate spread in Ghana

The study employs the quantitative research methodology to examine the interest rate spread determination in the Ghanaian banking industry. The interest rate spread is regressed on the combined vectors of bank-specific, efficiency or management, and macroeconomic variables. Equation (1) below follows the static equation panel model of Tarus et al. (2012).

$$NIM_{it} = \beta_1 CAP_{it} + \beta_2 ROA_{it} + \beta_3 LTA_{it} + \beta_4 LIQ_{it} + \beta_5 LLP_{it} + \beta_6 CIR_{it} + \beta_7 GDP_t + \beta_8 INF_t + \eta_i + \epsilon_{it} \quad (1)$$

Where:

The individual bank and time are represented by i and t , respectively.

Bank-Specific Variables

NIM_{it} = annualized net interest margin, proxy for interest rate spread

CAP_{it} = capitalization, measured by owners' equity divided by total assets,

ROA_{it} = return on assets, measured as a proxy for profitability,

LTA_{it} = bank size, measured as the natural logarithm of total assets,

LIQ_{it} = bank liquidity, measured as a ratio of liquid funds to total assets

LLP_{it} = loan loss provision is proxied as credit risk and measured as

impairment allowance as a percentage of gross loans and advances,

Efficiency/Managerial Variable

CIR_{it} = cost to income ratio

Macroeconomic Variables

$GDPG_t$ = gross domestic product growth rate,

INF_t = inflation rate measured as a change in the consumer price index,

β = parameters to be estimated,

η_i = individual bank specific-effect,

ϵ_{it} = error term.

Following the works of Adolfo Barajas and Salazar (1999), Churchill et al. (2014), Demirgüç-Kunt and Huizinga (1999), Ho and Saunders (1981), Maudos and Fernández de Guevara (2004), Ofori et al. (2005), and Sarpong et al. (2013), the static panel model was modified by including a one-year lagged net interest margin (NIM_{it}) to account for the dynamic nature of the universal banks in Ghana. The annualized net interest margin (i.e., dependent variable) is regressed on a lagged annualized net interest rates margin, and the other explanatory variables specific to the universal banks in Ghana, other exogenous explanatory variables particular to the universal banking industry, and the Ghanaian economy as a whole, for the study period.

The dynamic panel equation model, with the inclusion of a one-year lagged annualized net interest margin as a predetermined explanatory variable, is presented in the following equation:

$$NIM_{it} = \beta_1 NIM_{it-1} + \beta_2 CAP_{it} + \beta_3 ROA_{it} + \beta_4 LTA_{it} + \beta_5 LIQ_{it} + \beta_6 LLP_{it} + \beta_7 CIR_{it} + \beta_8 GDP_t + \beta_9 INF_t + \eta_i + \epsilon_{it} \quad (2)$$

Where:

NIM_{it-1} = one-year lagged annualized net interest margin.

The dependent and explanatory variables employed in this study's static and dynamic panel equation are described in Table 1. The annualized net interest margin is the dependent variable in the static and dynamic model. Explanatory variables such as the lagged annualized net interest margin, bank size, bank capital, profitability, and liquidity are presented under the equation's bank-specific category.

Due to Ghana's universal banking industry's dynamic nature, the dynamic model equation is estimated by the generalized method of moments (GMM). The fixed effect generalized least square and the random effect estimators were used to estimate the static model. A Hausman test was conducted to determine whether the fixed effect estimator or the random effect estimator is appropriate for estimating the static equation model. A Breusch-Pagan Lagrange Multiplier test was conducted to choose between the fixed or random effect generalized least square estimator. The coefficient in the static equation for the study was estimated using the white/Huber 1980 standard robust errors test to control for the existence of heteroscedasticity.

This study also employs the GMM estimator to estimate the coefficients in the dynamic equation above. The GMM estimator was chosen because it can accommodate lagged-dependent variables, unobserved heterogeneity, and exogenous and endogenous explanatory variables. This study employs the two-step system GMM variation of the GMM techniques, which according to Arellano and Bover (1995) and Blundell and Bond (1998), is superior to the first difference GMM technique. Also, following Roodman's (2009) recommendation, this study used the forward

Table 1. Definition of empirical model variables

Variable	Symbol	Description	Expected sign
Dependent Variable:			
Net Interest Margin	NIM	Estimated using the annualized NIM	(+)
Bank-specific Factors:			
Lagged NIM	NIM_{t-1}	Lagged Annualized Net Interest Margin	(+)
Bank Size	LNSIZE	Natural logarithm of total assets	(±)
Bank Capital	CAP	Total owners' equity over total assets	(±)
Return on Assets	ROA	Return on assets as a proxy for profitability	(±)
Liquidity	LIQ	Ratio of total loans over total deposits	(±)
Loan Loss Provision	LLP	Loan loss provision over total loans	(+)
Efficiency Factors:			
Cost-to-income ratio	CIR	Operating cost to income ratio	(+)
Macroeconomic Factors:			
GDP Growth Rate	GDPG	A proxy for economic growth in Ghana	(±)
Inflation Rate	INF	Change in consumer price index	(+)

orthogonal deviation in place of the first difference because of the unbalanced nature and small sample data used in this study. This study's dynamic equation coefficients were estimated using the two-step system GMM of Windmeijer (2005). This will correct the minor biases in small samples and control potential autocorrelation heteroscedasticity.

As shown in Adjei-Frimpong (2013) and Adjei-Frimpong et al. (2014), capital and loan loss provision are assumed to be endogenous explanatory variables for interest rate spread and, for that matter, are instrumented with their lags in the two-step system GMM model. The second and third lags of capital and loan loss provision were used as collapsing instruments to avoid over-fitting the endogenous variables and reduce the number of instrument counts in the system GMM estimations. According to Roodman (2009), this technique will give this study a more reliable estimation. Finally, to test the validity of the instruments used in the system GMM for the dynamic equation, this study used the Hansen and second-order autocorrelation test.

4. Empirical results and discussions

Table 2 presents the descriptive statistics of the explanatory variables. The minimum and maximum values of the bank-specific factors depict significant variations across Ghana's banks for the period considered. The dispersions in bank size (i.e., Std. Dev. = GHS 1,837) and bank capital (i.e., Std. Dev. = 0.127) suggest that the banks in Ghana vary in size and capital structure. The table, however, depicts a worrying trend in the values of the ratio of loan loss provision in Ghana. The maximum ratio of 72 percent and the average of 8.6 percent suggest that the rate of deterioration in the banks' assets, as shown in their books, is still high. The high rate could be attributed to the inability of bank managers to fully implement the enterprise risk management (ERM) model under the Basel II/III risk management framework. However, Ghana's banks were quite liquid during the study period. The average bank in Ghana has a liquidity ratio of 57.7 percent, with the highest liquidity recorded peg at 98 percent. The improvement in banks' liquidity ratios could be attributed

Table 2. Summary Statistics of the Explanatory Variables

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
SIZE	233	1,926	1,837	95	9,721
CAP	233	0.170	0.127	0.006	0.833
ROA	233	0.029	0.026	-0.102	0.190
LIQ	233	0.577	0.164	0.240	0.980
LLP	233	0.086	0.096	-0.045	0.720
CIR	233	0.543	0.167	0.009	0.960
GDP	233	0.062	0.035	0.005	0.140
INFL	233	0.125	0.040	0.071	0.193

CAP, ROA, LIQ, LLP, CIR, GDPG, and INFL are recorded ratios; SIZE is in a million Ghana Cedis.

to the flow of excess liquidity from the other financial sectors in the country, that are plagued with the problem of mistrust, insolvency, and other forms of financial soundness issues coupled with the recapitalization after the 2017 banking crisis in Ghana.

Table 3 demonstrates low correlations among the explanatory variables employed in this study, which alleviates the fear of multicollinearity problems.

Further, to identify the collinear explanatory variables, a variance inflation factor (VIF) analysis was conducted in this study, and the results are presented in Table 4 below. Following Zhu et al. (2007) and Smith et al. (2009), a VIF below the value of 10 indicates no excessive multicollinearity problem with the explanatory variables. The table depicts a value of 1.74 as the highest VIF among the explanatory variables, alleviating the fear that the explanatory variables used in this study are collinear.

This study examines the determinants of interest rate spread in Ghana and presents the findings in Table 5. The table depicts the p-value of the F-test to be 0.000, which suggests that the explanatory variables used in the equation are jointly relevant in determining the interest rate spread of the universal banking industry in Ghana. The analysis of the residual depicts the presence of heteroscedasticity. White/Huber robust standard error and the Windmeijer (2005) robust standard error were used to estimate the static and dynamic panel model coefficients. For the static model equation, the Hausman test was conducted with a p-value of 0.000, which confirms the superiority of the random effect estimator over the fixed effect estimator. This was also confirmed by the Breusch-Pagan Lagrange test with a p-value of 0.000. Additionally, this study used the two-step system GMM technique to evaluate the coefficients in the dynamic panel model. From the table, the test statistics of Arellano-Bond AR (1) (i.e., p-value = 0.340) accept the null hypothesis that no first-order serial autocorrelation exists in the error term. The Arellano-Bond

Table 3. Pairwise Correlation Matrix of Interest Rate Spread Determinants

	LSIZE	CAP	ROA	LLP	LIQ	CIR	GDP	INFL
LSIZE	1.000							
CAP	-0.291	1.000						
ROA	0.217	-0.222		1.000				
LLP	-0.170	-0.001	-0.130	1.000				
LIQ	0.099	-0.066		0.084	-0.119	1.000		
CIR	-0.147	-0.083	-0.230	0.256	-0.338	1.000		
GDP	-0.246	0.247	-0.062	0.122	-0.206	0.184	1.000	
INFL	-0.041	0.085	-0.210	0.032	0.282	0.097	-0.427	1.000

Table 4. Variance Inflation Factor—Interest Rates Spread Determination

Explanatory Variables	VIF	1/VIF (Tolerance)
Gross Domestic Product Growth (GDPG)	1.74	0.576
Inflation (INFL)	1.67	0.600
Liquidity Ratio (LIQ)	1.38	0.726
Cost-to-income ratio (CIR)	1.31	0.766
Bank Capitalization (CAP)	1.26	0.792
Natural Log of Bank Size (LSIZE)	1.20	0.832
Bank Profitability (ROA as proxy)	1.19	0.837
Credit Risk (LLP as proxy)	1.10	0.906
Mean VIF	1.36	

Table 5. Determinant of bank interest rate in Ghana

Variables/Estimates	RE Model	Two-step System GMM
NIM_{t-1}	-	-0.238(0.238)
LSIZE	0.004** (0.002)	0.008* (0.004)
CAP	0.001 (0.013)	0.015 (0.018)
ROA	0.199 (0.121)	0.303** (0.107)
LLP	0.014 (0.013)	-0.021(0.014)
LIQ	0.021 (0.013)	0.032 (0.019)
CIR	-0.028** (0.013)	-0.005 (0.011)
GDP	0.054(0.053)	0.207** (0.082)
INFL	0.100 *(0.060)	0.248* (0.132)
CONS	0.061*** (0.022)	-0.029 (0.041)
F-Statistics (p-value)	0.000	0.000
Number of Banks	19	19
Number of valid instruments		22
Number of Observations	233	214
Hansen J test (p-value)		0.715
Arellano-Bond tests:		
AR (1) p-value		0.340
AR (2) p-value		0.476
Difference-in-Hansen test (p-value):		
GMM instruments for levels		0.155

*The significance level at 10%, 5%, and 1% are denoted by *, **, and ***, respectively. T-statistics are in parentheses below the estimated coefficients.*

AR (2) test statistics confirmed the absence of serial autocorrelation. The p-value of 0.476 is significantly above 10 percent, and the specification of the error term is not rejected.

Further, the number of observations (i.e., 233) is more than the number of valid instruments (i.e., 22). The p-value of the Hansen test of over-identification of instruments is 0.715, which suggests that the instruments used in the two-step system GMM of this study are valid. The validity of the instruments used in the system GMM is further strengthened with test statistics of the difference-in-Hansen test of homogeneity score of 0.155. The significance of the test statistics of the difference-in-Hansen analysis of homogeneity suggests that the instruments used for the levels

Table 6. The List of the Banks Used in This Study

Name of Bank	Code	Year of Establishment	Ownership Type	Number of Branches
Access Bank (Ghana) LTD	ABG	2008	Foreign	47
Agricultural Development Bank LTD	ADB	1965	State-owned	78
Bank of Africa Ghana LTD	BOA	1997	Foreign	26
Barclays Bank Ghana LTD	BBG	1917	Foreign	60
callback LTD	CAL	1990	Private Local	30
Ecobank Ghana LTD	EBG	1990	Foreign	68
FBNBank Ghana LTD	FBN	1996	Foreign	18
Fidelity Bank Ghana LTD	FBG	2006	Private Local	72
First Atlantic Bank LTD	FAB	1994	Foreign	31
First National Bank LTD	FNB	2015	Foreign	7
GCB Bank LTD	GCB	1953	State-owned	183
Guaranty Trust Bank (Ghana) LTD	GTB	2004	Foreign	32
Prudential Bank LTD	PBL	1993	Private Local	40
Republic Bank Ghana LTD	RBL	1990	Foreign	43
Societe General Ghana LTD	SGB	1975	Foreign	43
Stanbic Bank Ghana LTD	SBG	1999	Foreign	39
Standard Chartered Bank Ghana LTD	SCB	1896	Foreign	27
United Bank for Africa (Ghana) LTD	UBA	2005	Foreign	28
Zenith Bank (Ghana) LTD	ZBG	2005	Foreign	27

equation in this study are exogenous. The Hansen test's importance and the difference-in-Hansen test of homogeneity indicate that the instruments used in the system GMM, the levels equation, and the error term are not serially correlated. This study's dynamic panel equation is correctly specified for estimating the dynamic panel's coefficients. This confirms the dynamic panel model's superiority over the static panel model in determining the spread of interest rates in Ghana's universal banking industry.

The results of the two-step system GMM estimation presented in Table 5 show that the bank size, return on assets, gross domestic product, and inflation are the significant vital variables determining interest rates spread in the Ghanaian banking industry. The positive impact of bank size on the interest rate spread in Ghana at the 10 percent significance level, as shown in Table 5, implies that size matters in determining interest rate spread in Ghana. This finding supports the ongoing banking industry consolidation reforms instituted by the central bank and the policy-makers since the passage of the Banks and Specialized Deposit-Taking Institution Act, 2016 (Act 930). The finding is consistent with the results of Blankson et al. (2022), which reported that bank size matters in determining bank efficiency in Ghana, which eventually affects interest rate spread.

Table 7. Major Reforms in the Ghanaian Banking Industry from 2008 to 2020

Year	Key Reforms
2008	Borrowers and Lenders Act, 2008 (Act 773), Non-Banking Financial Institutions Act, 2008 (Act 774), Home Mortgage Finance Act, 2008 (Act 770), and Anti-money laundering Act, 2008 (Act 749).
2008	Banks to comply with International Financial Reporting Standards (IFRS)
2008	Introduction of E-zwich, the biometric smart card
2008	BOG's notice for the requirement of the minimum stated capital of GH¢60 million to maintain Class 1 (Universal) Banking status
2009	Introduction of the cheque-codeline clearing system
2010	The guideline for licensing and operations of Credit bureaux under the Credit Reporting Act 2007 (Act 726) was published by the Bank of Ghana.
2011	Introduction of collateral registry in Ghana backed by Act 773
2011	Bank of Ghana reduced the Net Open Position (NOP) of Banks to make the cedis attractive
2012	BOG's notice for the requirement of the minimum stated capital of GH¢120 million to maintain Class 1 (Universal) Banking status
2013	Introduction of the GH-link mobile by GhIPSS
2013	Introduction of a new Base Rate calculation formula by the Bank of Ghana
2013	Introduction of the limit on over-the-counter cheque payments to third parties
2013	Introduction of a new VAT law on the business of banking
2014	Introduction of Instant Payment Schemes by GhIPSS
2015	The Energy Sector Levies Act 2015 (Act 899) passed by Parliament
2015	Introduction of the guidelines for E-money Issuance in Ghana
2016	Banks and Specialised Deposit-Taking Institution's Act, 2016 (Act 930) passed to repeal all the Existing Banking Laws of Ghana; Depositors' Protection Act, 2016 (Act 931) passed into law
2016	Adoption of IFRS-9 for Banks in Ghana
2017	BOG's notice for the requirement of the minimum stated capital of GH¢400 million to maintain Class 1 (Universal) Banking status
2017/19 Licensing of new financial institutions put on hold	

Another bank-specific factor that affects interest rate spread is the return on assets. Confirming this study's expectation, the return on assets (a proxy for bank profitability) is positive and statistically significant at a 5 percent level, with a coefficient estimated at 0.199. This suggests that when the banks' profitability increases by 1 percent, the interest rate spread increases by approximately 0.20 percent. This positive sign is expected and suggests that universal banks' profit maximization motive in Ghana culminates in a broader spread in Ghana. In transition economies like Ghana, because of uncertainty coupled with sensitivity to market risk, banks may widen the

spread to cover impairment of assets, inefficiencies in their operations, etc. This is consistent with Sarpong et al. (2013), who reported similar findings on Ghana.

Another explanatory variable consistent with this study's expectation is inflation, which exerts a positive and significant impact on interest rates spread in Ghana's universal banking industry. All things being equal when inflation increases by 1 percent, the interest rate spread increases by 0.10 percent. The finding suggests that the higher the inflation rate in Ghana, the wider the Ghanaian banking industry's interest rates spread. This positive significance also indicates that Ghana's universal banks can charge higher rates, even with higher inflationary trends, to compensate for higher returns. The studies of Aboagye et al. (2008), Ofori et al. (2005), and Sarpong et al. (2013) corroborate the findings of this study that the impact of inflation on interest rates spread in the universal banking industry over the years has been positive and significant.

5. Conclusion and policy implications

The transition to a stable and well-organized banking system in Ghana is an ongoing process. One of the significant benefits of the universal banking reforms in Ghana, for instance, is the narrowing of the interest rate spread by the universal banks in the country. However, despite the many banking reforms, Ghana's universal banking industry is currently plagued with a broad interest rate spread, non-performing loans, capital and liquidity impairments, etc. (Bank of Ghana, 2019).

Using an unbalanced panel data of 19 of the 23 universal banks that operated in Ghana from 2008–2020, with 233 observations, this study examines the impact of the ongoing banking reforms on interest rate spread using a static and dynamic equation regression model. The two-step GMM regression analysis of capital, liquidity, cost-to-income ratio, and credit risk has no significant effect on Ghana's interest rate spread determination. According to the findings, bank-specific factors such as capital, liquidity, and credit risk do not matter in Ghana's interest rate determination. The situation could be attributed to the lack of appropriate banking supervision, governance, and regulatory regime to control some of these imperfections at the micro or bank level.

This study's findings would offer necessary policy implications for the design and formulation of competitive policies, and regulatory changes on interest rate regimes, in general, to help promote the competitiveness of the universal banking industry in the country. For instance, the significant and positive impact of the inflation rate on bank interest rates suggests that the universal banks in Ghana may increase the volume of lending activities at higher lending rates, even in times of inflation, due to profit maximization motives of bank managers. The positive and significant impact of bank profitability on interest rate spread suggests that Ghana's profitable banks can charge more interest on bank loans and advances, making lending more attractive in Ghana. Further, increasing lending at the expense of a proper monitoring regime may increase non-performing loans and adversely impact Ghana's interest rates. Therefore, policymakers and regulators should emphasize enterprise risk management practices in Ghana's universal banking industry to check credit risk and other risk forms. Future studies can examine the determinants of the interest spread by dividing it into deposit and lending rates, to identify the reforms impacting the various elements in the spread. Also, all the 23 banks as well as the specialized deposit-taking institutions in Ghana may be considered in future research.

Acknowledgements

We would like to thank Editage (www.editage.com) for English language editing.

Funding

No external funding has been received.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on request.

Citation information

Cite this article as: The effect of banking sector reforms on interest rate spread: Evidence from Ghana, Cornelius Yao Azumah, Anthony Owusu-Ansah, Godfred Amewu & Williams Ohemeng, *Cogent Economics & Finance* (2023), 11: 2175463.

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