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The Impact of 'Banks Specific Regulations" on Determinants of Financial Performance: Empirical Evidence from Ghana - A PMG ARDL Approach

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ABSTRACT: The world financial cataclysms bring tremendous monetary flaws in the financial framework for the entire world. In many countries, the situation in the financial division turned out to be severe to the point that the legislature was forced to begin to expand the bundle to maintain the financial segment. In this study, a PANEL approach was use to assess the impact of bank specific regulation (BSR) on financial performance (FP) of bank in Ghana for the period of 10 years. In this examination, the association is divided between financial performance (FP) and BSR (the interest rate (IR), foreign exchange rate (FER) and credit risk (CR)) between banks in Ghana. To begin with, the direction of stationary factor was affirmed. A panel test by Pedroni and Kao is used to achieve the long-term relationship between the factors in the model, in which FP is endogenous variable and BSR is exogenous. Also, the test of causation was built by (Granger, 1969) to direct whether a causal relationship exists among the factors. The examination showed long-term relationship depending by the Granger causal relationship which shows a bi-directional, Uni-directional connection in the middle of a factor.

KEYWORDS: bank-specific regulations, credit risk, foreign exchange rate, interest rate

Introduction

According to (Ng & Rusticus 2011) banks are vital pieces of a country's development. In their standard position as fiscal middle people, banks make certain the transmission of value go from surplus to deficiency contraptions and serve to fulfill the need of the individuals who need subsidizing. Banks encourage spending and speculation, which fuel boom inside the financial framework. However, regardless of their fundamental job inside the economy, banks are anyway powerless against disappointment. Banks, similar to some other venture, can cross bankrupt. However, with the presence of globalization, banking sports are presently not controlled to the fringes of any individual us of a with go-outskirt banking exercises hurriedly expanding, the need for universal collaboration in monetary foundation law has in like manner extended. (Sami Ben Naceur & Omran 2011) illuminated that the current money related emergencies have discovered the hugeness of bank principles to support against the inordinate risk credited to disparities in banks" permanency sheets. In assistance, they work provident methodology that mitigates the aftereffects of money related emergencies on the stableness of the financial framework and next going with macroeconomic results.

On the other hand, lopsided rules may furthermore development the cost of intermediation and decline the gainfulness of the financial business. Altogether, as banks end up being more prominent constrained, their ability to build credit and commitment to financial increment can be hampered. (Williams & Nguyen 2005) sorted financial regulations into organizations as indicated by their interests and abilities. The three most extreme regulation orders are characterized as (1) Structural approaches are the hindrances situated on modern banks deciding the games wherein they could take an interest from the ones from which they are suspended. Permitting of modern banks and denials from doing mechanical exercises, are instances of auxiliary guidelines utilized. (2) Prudential law underscores the administration of methodical threat through primarily accounting

report imperative alongside capital sufficiency and admissible bank fixation (level of banks resource held with the guide of a chose edge or individual) proportions; and it sets up pointers to keeps money with the intention of keeping up security and soundness of the financial contraption and cautious the clients of fiscal administrations, for example, setting limits on home loan to a solitary borrowers or companies. (3) Monetary law is the way toward putting financial inclusion orders intended to result in foreordained macroeconomic results by method for that spend significant time in intrigue costs.

Chortareas, Girardone, & Ventouri (2012) have examined "Bank the board, mandate, and viability proof from the European Merger." with the guide of taking for an example of 22 EU countries. They have utilized non-parametric information Envelopment Investigation (DEA) way to deal with catch actualities about banks‟ productivity, notwithstanding the conventional methodology. They have utilized summed up straight molds and a truncated relapse model joined with bootstrapped confidence interims the utilization of an as of late created econometric system by utilizing (Simar & Wilson 2007). Likewise, they have played out an affectability assessment utilizing partial logit estimator to crosscheck the impacts. Their confirmation demonstrates that there might be a strong hyperlink among different kinds of banking law and supervision and monetary establishment execution. The essential research on the elements of the bank in general execution in creating countries was accomplished. On account of Colombia (Barajas, Steiner, & Salazar 1999) record the huge effect of money related progression on bank side interest edges in Colombia. Despite the fact that the general spread has not declined after money related change, the pertinence of the different factors in the back of the financial foundation spreads had been influenced by such measures. Another trade associated with the progression procedure become the development of the coefficient of home loan top notch after the advancement. (Afanasieff, Lhacer, & Nakane 2002) utilize panel insights systems to locate the essential determinants of the monetary establishment pastime spreads in Brazil. A step method because of (Ho & Saunders 1981) are utilized to degree the general effect of the smaller scale and full-scale components. The results recommend that macroeconomic factors are the greatest significant components to give a clarification for bank diversion unfurl in Brazil.

Samy Ben Naceur & Goaied (2001) reviewed the elements of the Tunisian bank exhibitions eventually of the 1980-1995 interims. They infer that the extraordinary showing up banks are the ones who've attempted to improve work and capital profitability, the ones who've kept up an over the top level of store cash owed in respect to their possessions and at last, the ones who have been equipped for meat up their reasonableness. Guru, Staunton, & Balashanmugam (2002) endeavor to recognize the determinants of effective store manages an account with a reason to offer practical distributions for improved gainfulness normally communication execution of these foundations. The examination is basically founded on an example of seventeen Malaysian business banks over the 1986-1995 lengths. The gainfulness factors were apportioned in principle classes, explicitly the internal components and the outside determinant. The discoveries of this yield a glance at found that effective costs the board transformed into one of the greatest sizable in clarifying over the top money related foundation productivity. In the middle of the full-scale pointers, high-interest proportion becomes identified with low monetary establishment productivity and swelling become seen to have an astounding impact on bank execution.

Hazlina Ahmad, Ramayah, Wilson, & Kummerow (2010) have considered "Determinants of Profitability and Efficiency Of World Islamic Banks" by means of taking an example of seventy-eight banks certainties for time of 1992-2009, where Profitability is estimated the utilization of ROA, and that they established that the proportion of working consumptions to add up to resources (OE/TA), that is utilized to offer information on bank's effectiveness of overseeing running costs contrary to resource have, exhibit pleasant seeking with money-related foundation gainfulness. Bank length has resolved to be unquestionably connected with gainfulness bigger banks revel in preferable income over littler keeps money with the guide of misusing economies of scale. Alluding with the impact of capitalization, it changed into found that EQUITY/TA uncovers phenomenal pursuing with productivity. Samy Ben Naceur, Ghazouani, & Omran (2008) played out an

examination on the name "The Effects of Bank Protocols, Competition, and Monetary Restructurings on MENA Banks‟ Profitability" by method for the utilization of 173 banks from 10 nations, from 1988-2005 periods. Much has been composed with respect to governments' job in managing business budgetary establishment exercises because of the way that banks' danger taking conduct has money related ramifications and adds to monetary unsteadiness. Studies have demonstrated that bank action guidelines adversely affect bank effectiveness and capital principles development bank soundness because of the way that capital prerequisites and stringency diminish bank chance taking conduct. Ongena, Popov, & Udell (2013) better bank execution is thought to be subject to higher capital sufficiency necessities, since banks', contributors', and moneylenders' motivations could be adjusted to decrease the danger (Admati, DeMarzo, Hellwig, & Pfleiderer 2010). Accordingly, those are open intrigue benefits; though the non-open intrigue see contradicts these capital prerequisites making the not uncommon case that reasonableness is lavish. The individual leisure activity sees additionally asserts that other administrative limitations, together with confining a monetary establishment's games, might need to diminish a banks expansion, consequently bringing down its establishment charge and decreasing motivators for green conduct (Beltratti & Stulz 2012).

The objective of banking law is to blast a budgetary organization's dissolvability and liquidity and to make a stable monetary quarter (BCBS III, 2011). In spite of the fact that there's a settlement between controllers, investors, and scholastics that stricter guideline will prompt financial equalization, there's no accord near the effect on money-related foundation productivity (Lee & Chih 2013). As indicated by (Barth, Caprio Jr, & Levine, 2013), there's no unmistakable forecast of monetary foundation guidelines on money-related organization proficiency. There are clashing points of view on this locale: the "open premium view" and the "non-open side interest see," where the past is spoken to by methods for governments following up in the interest of the open's top-notch enthusiasm to produce a solid monetary area and the last is spoken to through a minority that says money related foundation rules block banking exercises and slow down monetary increment (fundamentally asserting a change-off among budgetary strength and budgetary development, as (Admati et al. 2010) announced. In view of a current see by methods for (Barth et al. 2013) veiling 4050 bank perceptions speaking to 72 nations from 1999 to 2007, it transformed into established that confinements on banking exercises adversely impact bank effectiveness and stringent capital guideline decidedly impact bank execution.

These contradicting results are something to be considered through policymakers. Reinforcing genuine supervisory vitality additionally demonstrated a compelling impact on bank proficiency, however best for countries that had gifted and fair supervisory specialists. Likewise, banks that had additional straightforward records and monetary divulgence moreover affirmed a heavenly effect on banking proficiency. Much has been contemplated and composed on bank execution; in any case, in venture with (Barth et al., 2013) no total research on the effect of bank guideline, supervision, and observing on budgetary organization execution exists. The reason, as characterized, is because of obliged certainties accessibility which obstructs developing important measures to speak to banking law. As indicated by the small scale prudential and the large scale prudential speculations there might be a relationship among guidelines and monetary execution in budgetary foundations. The speculations goal of achieving fiscal equalization and protecting citizens' leisure activities. This may furthermore have the effect of hindering the monetary presentation of business banks (Hanson et al. 2011). The global monetary subsidence of 2008 has instructed us that there is a essential to manage financial foundations (Sherman 2009).

However, various research has been explored on banking regulations and determinants of banks' performance all around, the little center has been given regarding banks in Ghana unequivocally. As for past explores among others, the above articles, for the most part, researched the effect of BSR on the FP of banks utilizing various estimation factors just as various districts together with various techniques. As for Ghana restricted examinations have explored both the elements of high BSR and the repercussions on both the nation and bank productivity

notwithstanding the circumstance that standard of these investigations has been in different locales and nations. A ration of the vital elements of moneymaking banks productivity incorporate BSR which is among the few examinations. In the Ghanaian point of view, the examination on BSR yield into the record the determinants from various discernments and various factors to gauge BRS. This paper contrasted with the previously mentioned examinations utilized a bank-explicit variable to gauge FP, for example, (IR, FER, and CR) for the primitive researched the effect of BSR on FP dependent on board PMG approach. The Panel PMG estimator has various advantages in examination with other econometric strategies. For example, Panel PMG estimator through the ARDL technique paying little respect to whether factors are joined of request I(0) or I(1), the long haul and transient evaluations can be acquired regardless of whether the event of cointegration isn't formally dappled and well gives strong outcome in the event of heterogeneous boards. Further, the PMG model is a board blunder amendment perfect with short-keep running just as long-run impacts assessed together from an ARDL ideal with the short-run result being permitted to vary through countries.

Additionally, however there exist an important number of investigates looking at the result of BSR on FP, those using the panel case frequently utilize econometric strategies that accept as well as cross-sectional autonomy or potentially heterogeneity. Depending on cross-sectional freedom and homogeneity alone is prerequisite to create deceptive outcomes in the event that the panel being utilized is really cross-sectional dependent and heterogamous. Along these lines not at all like different examinations, we utilize a homogeneity test by (M. H. Pesaran, Ullah, & Yamagata 2008) just as cross-sectional dependence test by (M. H. Pesaran 2004) in order to avow that the panel times series information occupied with this investigation has cross-sectional connectedness and heterogeneous. The examination in this way contrasted with previously mentioned inquiries about applies panel estimation techniques that effective and powerful to the event of cross-sectional reliance and heterogeneity.

Data and Econometric methods

This examination utilizes a panel time series information to research the impact of BSR on FP for 15 business banks in Ghana covering the period 2007 to 2017 for the factors which incorporate IR, FER, and CR. The information with detail to the aforesaid factors was accomplished from the surveyed money related reports of the 15 plausible banks in Ghana. The prime bank of Ghana requires all banks to distribute their evaluated fiscal report freely on a yearly premise. The information per every factor was changed over into common logarithm in order to derive the parameter estimations with regards to the definitiveness of the reliant variable (BSR). Tested banks for this investigation includes Ecobank Ghana Limited, Access Bank Ghana Limited, Agricultural Development Bank (ADB), Ghana Commercial Bank (GCB), Barclays Bank Ghana Limited, Fidelity Bank Ghana Limited, UT Bank Limited, Sahel Sahara Bank Limited, Guarantee Trust Bank Limited, Universal Merchant Bank Limited, HFC Bank Ghana Limited, First Atlantic Bank Ghana Limited, National Investment Bank Ghana Limited, First National Bank Limited, and Cal Bank Limited. These are the biggest banks and added to over partial of the financial framework resource and have been appraised by the degree.

Results from the information were brought forth utilizing EVIEWS 9.0 and STATA 13.0 together with SPSS 20.0. Table 1 shows the outline of the informational index while the engaging measurements (mean, standard deviation, skewness, and kurtosis) of the different factors incorporated into the panel time's series information are delineated in Table 2. Table 1 delineates the profile of the aforementioned factors (all in common logarithm amid the time of 2007-2017). The drifting of the graphs could give the suggestion that the factors utilized in the examination are non-stationary. This, accordingly, should additionally be affirmed by the panel unit root test which introduced in the ensuing area. The information utilized in the examination were as per the following.

Table 1. Data set

Variable	Definition	Source
FP	Financial performance of banks	Bank of Ghana
IR	Interest rate	Bank of Ghana
FER	Foreign exchange risk	Bank of Ghana
CR	Credit risk	Bank of Ghana

Descriptive statistics

Synopsis of Table 2 demonstrates the graphic indicators for the factors Financial Performance, Interest Rate, foreign exchange rate, and credit Risk separately. Every one of the factors from Table 2, as expressed as of now are changed over into a characteristic logarithm. Engagingly, Table 2 uncovers that, for the sample of banks utilized in the investigation, FP and CR on the normal are 14.361% and 1.374 with a standard deviation of 0.414 and 1.374 individually, which are genuinely enormous contrasted with the mean and standard deviation of IR (M=1.105, SD=0.279). FER conversely, when contrasted with every one of the factors had a base mean estimation of 7.537 and SD=0.209. CR with the most elevated standard deviation estimation of 1.374, implying that CR influence FP of banks in Ghana. With respect to the skewness, every one of the factors is adversely skewed, complimenting to one side when contrasted with the ordinary dissemination. With respect to the kurtosis, FP is over the ordinary esteem demonstrating the sharp of FP is leptokurtic whiles the sharp of IR, FER, and CR are mesokurtic since they have their individual kurtosis incentive to be roughly 3. By and large, for an arrangement to be regularly disseminated the skewness and kurtosis should around be 0 and 3 individually. In this manner, the primary end from the shape insights is that every one of these circulations FP, IR, FER, and CR can't be declared to be ordinarily appropriated. This is in agreement with the JB-TEST which delineate that, there is an adequate affirmation to dismiss the typicality invalid theory for all the circulation. There, the arrangement isn't ordinarily dispersed.

Table 2. Descriptive statistics (data transformed in natural logarithm)

Statistic	FP	IR	FER	CR
Mean	14.361	1.105	7.537	10.077
Median	14.420	0.936	7.601	10.218
Std. Dev.	0.414	0.279	0.209	1.374
Skewness	-0.370	-0.451	-0.634	-0.668
Kurtosis	3.553	1.641	2.047	2.735
Jarque-Bera (JB) test value	2.735	18.2875***	17.294***	12.771***
Probability of JB	0.053	0.000	0.000	0.000
Observation	165	165	165	165

Note: *** indicates the rejection of the Jarque-Bera (JB) null hypothesis of normality at 1 percent significance level.

Correlation analysis and multicollinearity test

The results from Table 3 demonstrate a dynamic graphical vitrine in the middle of the arrangement of the factors IR, FER and CR have a factual momentous positive connection with FP, the resilience esteem, the VIF and pairwise connection network among the arrangement of indicators gives an assorted variety of measures for surveying the problem of Multicollinearity in a numerous relapse diagnostics. Multicollinearity is contamination of one of the desires for relapse investigation. (Dormann et al., 2013) proposed a strategy for diagnosing and identifying Multicollinearity. A resistance estimation of a little measure of 0.10 or 0.20 which is comparable to a VIF of 5 or 10, p value>0.05 and the pair-wise connection appearing straight reliance of 0.90 or more. The outcomes uncover that the VIF for indicators IR, FER, and CR cognizant us that the fluctuation of the normal elements is incredibly expanded and exceedingly associated with at any rate one of the mediators in the model. The results determine that IR has a huge moderate positive association with FP (r=0.640, P<0.01). This infers a rate increment in IR compares to an ascent in profits for resources as an estimation of FP of banking foundations considered for the examination. Essentially, FER(r=0.544, P<0.01) and CR(r=0.582, P<0.01) have a measurably moderate association with profits for resources utilized as an estimation of FP. The outcomes likewise infer that FER has a moderate positive association with the loan fee (r=0.850, P<0.01) and CR has a moderate association with IR(r=0.611, P<0.01). Additionally, credit risk from the outcomes likewise demonstrates a moderate positive association with FER (r=0.636, P<0.01).

Table 3. Correlation analysis and multicolinearity test

Variables		FP	IR	FER	CR	Tolerance	VIF
FP	Pearson correlation	1					
	Sig (2-tailed)						
IR	Pearson correlation	0.640**	1			0.270	3.708
	Sig (2-tailed)	0.000					
FER	Pearson correlation	0.544**	0.850**	1		0.256	3.903
	Sig (2-tailed)	0.000	0.000				
CR	Pearson correlation	0.582**	0.611**	0.636**		0.577	1.733
	Sig (2-tailed)	0.000	0.000	0.000	1		

Note: ** indicates the significance at 5%. The statistical significance or insignificance at 5% level refers to sample evidence which allows the researcher to reject or not to reject the null hypothesis with a probability of type 1 error of 5%.

Analytical Model

This examination looks at the relationship in the midst of bank-specific regulation and the effect on FP of banks in Ghana by including IR, FER, and CR as estimation factors estimating BSR to shape a multivariate structure. These factors (IR, FER, and CR) for the most part are found to affect the FP of banks. Henceforth, our proposed model concerning the impact of BSR takes the accompanying structure

$$\mathrm{FP} = \mathrm{f(BSR)} \tag{1}$$

where BSR represents bank specific regulations and FP denotes financial performance measured using Return on Assets (ROA).

Since the variable bank-specific regulations are measured using the measurement variables; interest rate, foreign exchange risk, and credit risk, equation (1) is rewritten as;

$$\mathrm{FP} = \mathrm{f(IR, FER, CR)} \tag{2}$$

where IR represents interest rate, FER is foreign exchange risk, and CR denotes credit risk.

The relation from equation (2) essentially indicates that financial performance (FP) is a function of interest rate (IR), credit risk control (CR), and liquidity risk (LR).

For the purpose of econometric estimation and the data employed being time dependent which spans from 2007 to 2017, equation (2) can be written as in the following form:

$$FP_t = \beta_o + \beta_1 IR_t + \beta_2 FER_t + \beta_3 CR_t + \mu_t \quad (3)$$

where t represents the time in years.
Since the investigation exclusively focusses on a panel data involving (15) banks in Ghana from 2007 to 2017, equation (3) can additionally be written in a board model structure as pursues;

$$FP_{i,t} = \beta_o + \beta_1 IR_{i,t} + \beta_2 FER_{i,t} + \beta_3 CR_{i,t} + \varepsilon_{i,t} \quad (4)$$

where i represents the individual commercial banks.
So as to address issues of heteroscedasticity, every one of the factors incorporated into the proposed financial performance execution work in condition (4) are changed into a characteristic logarithm. The log-linear model used to investigate the impact of BSR (interest rate, foreign exchange rate, and credit risk) on the FP of banks is accordingly figured as;

$$\ln FP_{i,t} = \beta_o + \beta_1 \ln IR_{i,t} + \beta_2 \ln FER_{i,t} + \beta_3 \ln CR_{i,t} + \varepsilon_{i,t} \quad (5)$$

where $lnFP_{i,t}$,$lnIR_{i,t}$, $lnFER_{i,t}$, and $lnCR_{i,t}$ are the natural logarithms of financial performance, interest rate, foreign exchange rate and credit risk of an individual bank i at time t, and $\varepsilon_{i,t}$ represent the individual error terms.

Econometric methods

In order to dissect the result of BSR on the FP of recorded banks in Ghana from 2007 to 2017, the scrape of whether a cross-sectional reliance and homogeneity exist in the midst of the factors inside the panel data must be built up. Cross-sectional reliance and homogeneity among factors inside a panel time series data show the conspicuousness with respect to the variety for extra tests utilized in the examination which contains pane unit root tests just as panel cointegration tests. This investigation thus previously assessed the cross-sectional independency among the factors with the (M. H. Pesaran 2004), CD test and (M. H. Pesaran & Yamagata 2008) CD_{LMadj} test and homogeneity test by (M. H. Pesaran & Yamagata 2008) utilizing the balanced delta tilde. After the cross-sectional reliance test and homogeneity test, the examination later investigated the joining dimension of the factors utilizing as of late created panel unit root tests by (M. H. Pesaran 2007) which incorporates the Cross-sectional Augmented Dickey Fuller (CADF) and Cross-sectional IPS (CIPS) panel unit root tests. Having set up the cross-sectional conditions and non-stationarity of the factors, the examination went further to research the nearness of an auxiliary long-run relationship in the midst of the factors utilizing the two Pedroni panel cointegration test by (Pedroni 2004) and Westerlund-Edgerton bootstrap panel cointegration test likewise by (Westerlund & Edgerton 2007). The investigation at last utilized the pooled mean gathering estimator (PMG) estimator through a panel Autoregressive Distributed Lagged (ARDL) model in order to decide both the long haul and momentary evaluations of the aforementioned factors utilized in the examination. The panel ARDL model as of late has been used all the more attributable to some significant advantages it has over different models which incorporates (I) paying little mind to whether the arrangement is I(1) or I(0), this model can be utilized and (ii) both the present moment and long haul assessments can be gotten in the meantime.

The $ARDL(p,q)$ model comprises of lag p for the dependent variable and lag q for the independent variables. Generally, the $ARDL(p,q)$ model as proposed by (A. Pesaran, Keyser, & Burch 1999) is given by the relation as follows;

$$y_{i,t} = \sum_{j=1}^{p} \mu_{ij} y_{i,t-j} + \sum_{j=0}^{q} \Omega'_{ij} x_{i,t-j} + \varepsilon_{i,t} \quad (6)$$

where$i = 1,2,3, \dots, N$ represents the number of individual banks used in the study;$t = 1,2,3, .., T$ denotes the time in years, y_{it} is the response variable, x_{it-j}represents a $m \times n$vector consisting of the natural logarithm of the explanatory variables, μ_{ij} is a scalar vector, Ω'_{ij} represents the $m \times$ 1coefficient vector whereas ε_{it} is the error term with zero mean and a finite variance.

Taking into account a maximum lag of one for all the variables (both dependent and independent variables), the ARDL (1, 1, 1,1) model from equation (6) is formulated as;

$$y_{it} = \mu_{1i} y_{it-1} + \sum_{j=0}^{1} \Omega'_{1j} x_{it-j} + \varepsilon_{it} \tag{7}$$

Equation (7) can be reparametrized in error correction form as;

$$\Delta y_{it} = \psi_i (\Delta y_{it-1} - \Theta'_i x_{it}) + \sum_{j=1}^{p-1} \mu_{ij} \Delta y_{it-j} + \sum_{j=0}^{q-1} \Omega^{*\prime}_{ij} \Delta x_{it-j} + \varepsilon_{it} \tag{8}$$

where $\psi_i = -(1 - \sum_{j-1}^{p} \mu_{ij})$, and $\Theta = \frac{\sum_{j=0}^{q} \Omega_{ij}}{\psi_i}$.

Θ represents the long-run relationship between the response and explanatory variables (y_{it} andx_{it}) whereas Ω^*_{ij} in furtherance of signifies the short run effect in the x_{it}'s on the y_{it}'s. The ψ_i again denotes the error correction term which is used from measuring the speed of convergence of the response variables in moving to its long-run equilibrium as the explanatory variable changes. ψ_i is expected to be both negative and significant to show the existence of stability in the long-term relationship.

Per our study, the modified model with financial performance (FP) measured using ROA as the response variable from equation (1) can, therefore, be formulated in the panel ARDL format as;

$$\Delta FP_{i,t} = k + \psi_i \left(\Delta FP_{i,t-1} - \Theta'_{1i} IR_{i,t} - \Theta'_{2i} FER_{i,t} - \Theta'_{3i} CR_{i,t}\right) + \sum_{j=1}^{p-1} \mu_{ij} \Delta FP_{i,t-j} + \sum_{j=0}^{q-1} \Omega^{*\prime}_{1ij} \Delta IR_{i,t-j} + \sum_{j=0}^{q-1} \Omega^{*\prime}_{2ij} \Delta FER_{i,t-j} + \sum_{j=0}^{q-1} \Omega^{*\prime}_{3ij} \Delta CR_{i,t-j} + \varepsilon_{it} \tag{9}$$

Equation (9) is evaluated using the PMG estimator. As compared to other estimators, the PMG has several merits. For instance, this estimator limits the long run estimates to be constant across all cross-sections with a panel but allows the intercepts along with the short-run coefficients and error variances to vary across countries. Correspondingly, it can be used regardless of whether the series is I(1) or I(0) and interpretation of long and short-run connections can be drawn even though the occurrence of cointegration is not formally identified

As earlier reported in many studies, the confirmation of structural long-run relationship (cointegration) further implies the existence of causalities among the variables. The study, therefore, documents Granger Causality. Causality is a significant conception in the empirical investigation and refers to the ability of one variable to forecast or effect the other. The (Granger, 1969) connection technique is established to test for a causal relative. Conferring to Granger, Y effects X if the past value of Y can be used to predict X more exactly then merely using the previous values of X and vice versa. Consequently, the significance of this experiment is to regulate the direction of causation amid two variables (X and Y) in panel data. The idea overdue this examination is to run the following bi-variety regression models if we want to decide the direction of connectedness amid X and Y.

$$X_{t=}\gamma_0 + \sum_{i=1}^{n} \delta_i X_{t-1} + \sum_{j=1}^{m} \delta_j Y_{t-j} + \mu_{it} \tag{10}$$

$$Y_t=\alpha_0+\sum_{i=1}^{n}\alpha_i X_{t-1}+\sum_{J=1}^{n}\beta_j Y_{t-J}+\mu_{2t} \quad (11)$$

where m and n are the number of lagged, X and Y are the terms respectively, μ_{it} are the random errors, equation (10) predicts that is related to past values of itself as well as that of an equation (11) forecasts comparable trend for if we decide to check whether X causes Y or / and Y causes X we carry out F-test on the joint significance.

H_0: $\sum_{i=1}^{n}\delta_j=0$ and H_0 $\sum_{i=1}^{n}\alpha_i=0$, respectively
we reject, if the calculated, k is the number of parameters estimated in equation (11) and (12), n is the number of clarifications then we do not reject.

Empirical results and Discussions

Both CD_P-test and the CD_{LMadj} test are utilized to research variable in other to investigate whether panel time series data has cross-sectional conditions. The results from the previously mentioned cross-sectional reliance tests are classified in Table 4. Signifying to the related likelihood values, the invalid assumption of cross-sectional independence for interest rate, foreign exchange rate and credit risk is rejected. This, consequently, gives the suggestion that the panel time's series data which incorporates the broke down factors has cross-sectional independence. Moreover, in advancement to the homogeneity test utilizing the (Dogan & Seker 2016a), the findings uncover that the invalid theory of homogeneity is dismissed additionally at 1% noteworthy dimension showing that, the slope coefficients are heterogeneous over every cross-area. Expected the measurement that the panel time's series data including the factors under confab show cross-sectional conditions and heterogeneity the paper stays with panel systems that accept cross-sectional conditions and heterogeneity. Henceforth this paper in the accompanying stage utilizes the CIPS and CADF panel unit root test in the resulting segment to research the incorporation properties of the factors.

Table 4. Results from cross-sectional dependence test and homogeneity test

Variable	Cross-sectional dependence test			
	CD_P-test	p-value	CD_{LMadj} test	p-value
FP	30.906^{***}	0.000	57.079^{***}	0.000
IR	33.985^{***}	0.000	70.672^{***}	0.000
CR	32.440^{***}	0.000	63.644^{***}	0.000
FER	33.985^{***}	0.000	70.671^{***}	0.000

Note: *** represents the rejection of the null hypothesis at a 1% level of significance. The CD_P-test of (M. H. Pesaran, 2004) and CD_{LMadj} test of (M. H. Pesaran & Yamagata, 2008) tests the null hypothesis cross-sectional independence.

Panel unit root test

As indicated in the methodology of this examination, CIPS and CADF panel unit root tests are utilized as an option of ordinary unit root test, for example, Breitung, IPS, and LLC panel unit root tests (Gengenbach, Palm, & Urbain 2009). This is because of the reality the ordinary panel unit root test makes them inadequacy regarding the existences of cross-sectional independence. Most fundamentally, the CADF and CIPS unit root test produce reliable outcomes in the event of cross-sectional independence as kept up by the consequences of (Dogan, Seker, & Bulbul 2017). Results of the CIPS and CADF test are then expressed in Table 6. The two tests illuminate that the factors

under investigation are not stationary at their first difference. Therefore, this gives the sign that the factors interest rate, foreign exchange rate, and credit risk are altogether coordinated at a similar request (I(1)).

Table 5. Results from panel unit root tests

Variables	CADF				CIPS				Decision
	Levels		First difference		Levels		First difference		
	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	
FP	-3.678	-3.958	-4.349***	-4.322***	-3.969	-3.968	-4.345	-4.227	I(1)
IR	2.610	1.700	2.610	1.700	2.610	1.700	2.610	1.700	I(1)
FER	2.610	1.700	2.610	1.700	2.610	1.700	2.610	1.700	I(1)
CR	-3.011	-3.198	-3.011***	-3.198***	-3.635	-3.581	-5.065	-5.302	I(1)

Note *** and **, and * represents the rejection of the null hypothesis at 1% and 5% and 10% level of significance respectively. The CADF and CIPS panel unit root tests assume the null hypothesis of non-stationarity among the series. I(1) indicates the order of integration of the variables used in the study.

Panel cointegration test

Table 6 introduces the findings in advancement to the (Pedroni 2004) Panel Cointegration test. Among the seven measurements from the Pedroni panel cointegration test, five proposed to the rejection of no cointegration null hypothesis. Inside this arrangement of five statistics, we discovered Panel PP and Group PP-measurement just as Panel ADF and Group ADF-statistics as progressively noteworthy and solid. Per the outcome from the Table 6, the invalid assumption of no cointegration is rejected at 5% by the Panel V-statistics while the PP-statistics for both Panel and Group alongside the ADF-statistics additionally for both Panel and Group rejects the invalid theory at a significant of 1%. We can, therefore, conclude that there exists a long-run connection in the midst of Financial Performance, Interest Rate, foreign exchange rate, and credit risk in our example of 15 banks.

Table 6. Results from (Pedroni, 2004) panel cointegration test

Common AR coefficients (within-dimension)		
	Statistic	Weighted statistic
Panel v-statistic	1.805*	-1.439
Panel rho-statistic	1.287	2873
Panel PP-statistic	-8.613***	-3.723***
Panel ADF-statistic	-4.671***	-5.048***
Individual AR coefficient (between-dimension)		
Group rho-statistic	3.932	
Group PP-statistic	-7.011***	
Group ADF-statistic	-4.671***	

Note: *** denotes the homogeneous coefficients at the crucial stage regressors over the cross-section using the equivalent approaches as the Pedroni cointegration test.

With respect to the results of the Kao panel cointegration test showed in Table 7, it is recognized that the investigated factors are cointegrated and consequently have Cointegration associations. This is on the realities that there is sufficient proof to dismiss the invalid theory of no cointegration for the elective hypothesis of cointegration at 1% significant level. On the other hand, the consequences of both the Pedroni and Kao panel cointegration tests, we reach on the nearness of cointegration between the investigated factors utilized in the examination.

Table 7. Results from the Kao panel Cointegration test

	t-statistic	Probability value
ADF	-1.890	0.029

***represents the rejection of the null hypothesis at the 1% significance level. The Kao panel cointegration test is based on the null hypothesis of no cointegration

Moreover, the Pedroni and Kao Cointegration tests are effective and widely utilized in writing they have their own curbs with regards to the existences of cross-sectional connections and heterogeneity. As per (Dogan & Seker, 2016b), the disappointment for a strategy for cointegration to have the option to address the issues of cross-sectional reliance and heterogeneity prompts loss of proficiency in uncovering the nearness of a long-run relationship among factors. In this way in checking for the robustness of the previous outcomes from the Pedroni and Kao Panel Cointegration test separately. The examination further utilized the Westerlund-Edgerton Panel bootstrap cointegration test. This panel cointegration test is viewed as a second era cointegration test and considers the issues of cross-sectional conditions and heterogeneity. This test also considers various measurements dependent on gathering and panel individually. Outline of findings from the Westerlund-Edgerton board bootstrap cointegration test is accounted for in Table 8. From the outcomes in table 8, G_t, G_a, P_t, and P_a recorded the null assumption of cointegration considering the P-values. Considering the P-value which was attained from bootstrapped p-values (where the p-values are bootstrapped) the unacceptable assumption of no cointegration is not terminated by all cases demonstrating more grounded proof of auxiliary long-run relationship in the midst of Financial Performance, Interest Rate, foreign exchange rate, and credit Risk among banks in Ghana. In order to utilize (Pedroni 1999), (Kao 1999), (Westerlund 2005) Panel cointegration tests, there should not be a cross-sectional reliance in a model. In spite of the fact that there is no cross-sectional reliance, following panel cointegration tests planned by (Westerlund & Edgerton 2007) panel cointegration test structured by (Westerlund & Edgerton, 2007) was utilized in our examination. The test can be utilized together in instances of cross-sectional reliance and freedom. Moreover, the test permits heterogeneity among the units framing the panel. Along these lines, they are more finished than (Pedroni 1999), (Kao 1999), (Westerlund 2005) tests.

Table 8. Results from (Westerlund & Edgerton 2007) bootstrap panel cointegration test

Statistic	Value	P-value	Robust p-value
G_t	-0.607	1.000	0.705
G_a	-0577	1.000	0.715
P_t	-4.622	0.642	0.365
P_a	-.1.278	0.967	0.440

Note: The Westerlund-Edgerton bootstrap panel cointegration test considers the null hypothesis of no cointegration. The number of bootstrap replications used to obtain the bootstrap p-values (robust p-values) is set to 200; this is robust against cross-sectional dependencies.

As determined in the previous sections, the bootstrap strategy can be utilized when there happens cross-sectional reliance in a model. In the nonexistence, the asymptotic standard conveyance is dominant. Giving to the bootstrap strategy, both the gatherings and the panel are factually unimportant. As per the asymptotic standard dissemination, both the gatherings and the panel measurements are factually significant. Hence, the unacceptable theory of no cointegration is dismissed in asymptotic conveyance despite the fact that it is not dismissed in the bootstrap

technique. In our model, the consequence of the asymptotic standard conveyance is thought about since there is no cross-sectional reliance on the model. In this unique circumstance, we can make a conclusion that there is a cointegration in our model and IR, FER, and CR, are connected over the long-run.

Results of the Granger causality test

Table 9 present outcomes from the Granger causality test performed in the investigation to characterize the basic long-run connection between the factors: Financial Performance (FP), Interest Rate (IR), Foreign exchange rate (FER) and Credit risk (CR). The outcomes show Uni-directional causation among IR and FP significant at 1% level correspondingly. There is Uni-directional causation which keeps running from FER to FP measurably noteworthy at 1% level and a Uni-directional relationship in the midst of CR and IR at 10% significant dimension. On the other hand, the outcomes additionally demonstrate that CR ganger causes FP at 5% factual noteworthy and show a bi-directional association and FER granger cause IR at 5% demonstrating bi-directional causation. At long last, there is no-causality running from CR to IR. The Granger causality test result demonstrates proof of causal relations in the midst of bank-specific regulations (IR, FER, and CR) and financial performance estimated with ROA affirming the theory of causal relations between bank-specific regulations and FP of Banks in Ghana.

Table 9. Results from the Granger causality test

hypothesis	Obs	F-statistics	P-value	Decision	Type of causality
IR-FP	150	18.372***	0.001	Reject	Uni-directional
FP-IR		0.098	0.754	Fail to reject	
FER-FP	150	19.851***	0.002	Reject	Uni-directional
FP-FER		2.681	0.104	Fail to reject	
CR-FP	150	5.464**	0.021	Reject	Bi-directional
FP-CR		5.904**	0.016	Reject	
FER-IR	150	53.517***	0.002	Reject	Bi-directional
IR-FER		62.649**	0.006	Reject	
CR-IR	150	2.820*	0.095	Reject	Uni-directional
IR-CR		0.179	0.673	Fail to reject	
CR-FER	150	0.000	0.980	Fail to reject	No-causality
FER-CR		0.398	0.529	Fail to reject	

Conclusions and policy implications

The world monetary emergency brought about extraordinary monetary pain in the money related segment and uncovered shortcomings in the financial framework all through the world. In numerous nations, the circumstance in the financial part turned out to be severe to the point that legislatures were compelled to start to expand salvage bundles to keep the money related division. Henceforth, in the wake of the world economic emergency, much spotlight has been put on the best way to control banks later on, so as to wipe out or possibly lessen the danger of such an intricate emergency reoccurring, or if nothing else diminish the results of such. In this discourse, it is anyway important to draw on the experience from the occasions on the world money related emergency, to evaluate the proficiency of the guideline connected, and survey which results guideline had on the performance of banks. Build up another comprehension of the job BSR play in a nation and the effect on economic performance to offer significant arrangement suggestion on the motivation behind computing exceptional financial strategies concerning BSR into the nation. This paper researches the effects of BSR on the FP of banks utilizing IR, FER, and CR as an

intermediary to quantify FP by utilizing yearly information from 2007-2017. In heading to direct the stationary qualities of the factors being referred to, we utilized the CADF and CIPS tests approach. We likewise utilize a panel cointegration strategy created by (Westerlund & Edgerton 2007), to recognized the long-run effects of factors on one another to get suitable outcomes.

Managerial implication

The results of this paper give some development suggestions to BOG and different supervisors that are concern with the planning of money intermediation in the nation, for example, the Microfinance sector, small scale credit, singular moneylenders and the business banks. ROA is reasonable as an estimation variable for BSR to guarantee banks execution is not constrained and could be enhanced by researchers all around and can offer increasingly characterized and impeccable policy mandates for the economy. This paper gives the feeling that banks and policymaker should think of approaches to attract strategy orders to guarantee great and successful BSR due to the nearness of common relationship existing among these factors and for the long run understanding advantages to be figured it out. Firstly, this article investigated how BSR impacted the performance of banks. We accordingly recommend the utilization of these administrative instruments by expressing that they will settle and build the flexibility of the financial division. In particular, low IR is contended to diminish the danger of bank runs and accordingly settle the financial area, just as to secure the individual investors of the bank. Secondly, striking FER then again contended to diminish bank chance taking, as it influences the managers of the bank to put a greater amount of their assets in the bank and henceforth, chance experiencing more noteworthy misfortunes expanded risk-taking. In conclusion, CR management is said to lessen banks' capacity to participate in progressively hazardous business regions, which will likewise settle the center financial exercises. By relapsing these administrative factors on a few bookkeeping performances estimates the dimension of execution, there is commonly discovered help for the worries about expanded good risk. Bank regulation is an intricate subject, which still needs further examination. Also, a few of the referenced examinations in the proposition demonstrate that the impacts of guideline potentially have various impacts relying upon both the market structure and individual attributes of the banks. Consequently, there still remain zones of worry to be explored. The consequences of this paper anyway demonstrate that guideline of banks is anything but a subject to be dealt with gently and feature a few territories of worry about the future guideline.

Limitations

This examination was constrained by the assumption of the outcome. The results of the paper remained grounded on an example of 15 banks and excluding other financial associations, for example, the microfinance institutions, rural banks, credit and loans, and so forth that offer credit to the business. In spite of the fact that these money related associations envelop a lot of the Ghanaian business market and they are said to add around 70 percent to Ghana's total national output and report around 92 percent of organizations in Ghana (Villars 2004). An extra constraint concerns the systems utilized in the displaying examination per the variable, there are different factors that could be of significance to quantify the performance of banks, for example, (bank scope, the board estimate, liquidity risk) which this investigation did not address for. The examination considers a couple of bank-explicit and nation explicit determinants of banks credit. It does not address all credit determinants factors which measure financial performance. These additional parts of credit the board ought to certainly justify thought in an approaching investigation on the loaning systems of the other money-related establishment that gives credit.

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Appendix A

Table 1 the long-run and short-run estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
LN_IR_	1.399258	0.343874	4.069103	0.0001
LN_FER_	2.455297	0.182738	13.43613	0.0000
LN_CR_	-0.478978	0.135241	-3.541651	0.0006
Short Run Equation				
COINTEQ01	-0.139527	0.040968	-3.405766	0.0009
D(LN_IR_)	0.135024	0.227899	0.592474	0.5548
D(LN_FER_)	-0.503538	0.206635	-2.436851	0.0165
D(LN_CR_)	0.064183	0.034754	1.846785	0.0677