Assessment of Management Accounting Decision Making in Banking: Alignment and Appropriation of Distribution Cost

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Abstract

This study investigated how the management accounting decision-making framework is applied in the alignment of distribution cost within the banking business model by analyzing the extent of pass-through of commercial banks' distribution cost to interest rates on loans and advances. Data from 2010 to 2018 on commercial banks' lending rate and financial statement variables thought to influence commercial banks' distribution cost structure were extracted from the annual financial reports of ten commercial banks. Using the Arellano-Bond and Bover Dynamic Panel Generalized Method of Moments Estimator (GMM), the study finds that, the pass-through from commercial banks' cost structure to lending rate is significant but low. It was ascertained that, a percentage increase in commercial banks' cost structure causes an increase from 11% to 15% in lending rate. The study further finds a long-run relationship between cost expenditure of commercial banks' and the factors thought to influence cost structure. Cost management and strategic pricing behaviour other than what economic theory proposed were eminent in the findings of this study.

Keywords

Management Accounting, Decision-Making, Distribution Cost, Cost Alignment, Lending Rate, Commercial Banks, Dynamic GMM Estimator

1. Introduction

Cost accounting and management are crucial in every corporate organization, particularly in an era of ever increasingly competitive business environment (Jain & Yadav, 2006). In the retail banking sector, competitive pressure emanat-

ing from revolutionized financial technology and operational process optimization seems to challenge the traditional management accounting systems, which sometimes, do not permit the identification and appropriation of profitable customer relationships (Pienaar et al., 2009). The alignment, optimization and appropriation of distribution costs have become increasingly important because of the need to integrate management accounting systems with customer-related activities to enable customer profitability analyses and decision making (Lancioni, 1991).

In recent years, players within the banking industry were keen on seeking optimized delivery routes within the banking business model to minimize distribution costs and maximize the financial viability of the delivery routes of financial services. Consequently, commercial banks consistently seek for ways of aligning their distribution cost, as they are required by the convention of a regulatory order and International Accounting Standard (IAS), to undertake interest rate sensitivity analysis when repricing the rate of their financial products, which includes credit products among others. The interest rate repricing gap analysis on these credit products is usually undertaken by monitoring the sensitivity of the respective bank's financial assets and liabilities to a number of standard and/or non-standard interest rate scenarios. The standard scenario that is mostly considered by various commercial banks in the interest rate repricing gap analysis on a monthly basis, is a threshold, mostly, 100 basis points parallel shift in all various yield curves. This entails the analysis of the respective bank's sensitivity to any increase or decrease in market interest rates with the assumption of no symmetric movement in the yield curves alongside a constant balance sheet position.

In an extremely competitive business environment characterized by numerous industry actors with standardized products and services, the most crucial determinant of business profitability is the cost of rendering the services, which is referred to in management accounting and for the purposes of this study as distribution cost. The reason is that, prices in the banking business model (interest rates on advances, rates of various fee-based services, etc.) are uncontrollable variables in a competitive scenario and are therefore mostly market-determined. Consequently, there is a need for the installation of sound cost management and accounting systems within the banking industry. Moreover, an integrated system for cost and management accounting is a necessary pre-requisite for the adoption of contemporary/modern management accounting practices like the benchmarking system used by commercial banks in their sensitivity analysis involved in the interest rate repricing gap analysis as well as the famous Business Process Reengineering (BPR) framework adopted by the commercial banks.

A recent study carried out by the Bank for International Settlements established that, there has been a rising sentiment in the global banking landscape that commercial banks across the globe are plagued with a shrinking net inter-

est margin and as a result, there is rising pressure on banks' profitability (BIS, 2016). Faced with this condition, the key question worth noting is how do the commercial banks, in their cost and management accounting framework, align the cost structure to maintain sustainable profitability? Against this background, this study aims to investigate how commercial banks' decision-making aligns with their cost structure and through what channel. Specifically, the study aims to empirically examine the pass-through of commercial banks' distribution cost to interest rates using the Ghanaian Banking industry as a case study. Examining the distribution cost structure of commercial banks vis-à-vis the interest rate dynamics is necessary to offer somebody of knowledge on the developments in the banking sector which has drawn a rapidly increasing interest by policy makers and enterprises alike. However, limited empirical studies exist in this regard. The literature that exists in Ghana examined the issue by considering the cost productivity of the commercial banks without relating it to the interest rate dynamics and without specific recourse to distribution cost. As a rule of thumb, this study argues that, banks could productively be efficient by shifting the cost component of their operation to the final consumer in a form of higher interest rates. As a result, this study further hypothesizes that commercial banks' pricing decisions are skewed towards shedding off high operational costs emanating from the distribution of their products and services to consumers through the high-interest rate. To ascertain this hypothesis, this study aims to: 1) explore and establish a statistical relationship among the factors thought to influence commercial banks' cost structure; 2) develop a quantitative model of the distribution cost of commercial banks in Ghana; 3) use the developed model to ascertain the extent of pass-through of commercial banks' distribution cost on their lending rates. These objectives when extensively investigated would contribute to body knowledge on the issue of distribution cost alignment by commercial banks in their decision-making. Particularly this paper would provide insights on how Ghanaian commercial banks align their operational cost given the lack of existing literature that examines the distribution cost alignment in the banking business model in Ghana.

The remaining sections of this study are organized as follows: Section 2 substantiates the problem statement by highlighting key developments in the Ghanaian Banking industry, Section 3 details the theoretical underpinning of this study. Section 4 outlines the review of related literature, Section 5 provides details of the empirical model and estimation, Section 6 presents the result and its analysis and Section 7 present the conclusion of the findings of this study.

2. Developments in the Ghanaian Banking Sector—A Precursor

An investigation undertaken by the Central Bank of Ghana and reported by Kwakye (2010) indicates that, high lending rates phenomenon in Ghana is associated with high cost of funds. Interestingly, while the benchmark market rates

has witnessed some declines over the past years in Ghana, lending rates of commercial banks continue to be upward bias as shown in Figure A1 in the Appendix. Commercial banks' base rate exhibiting high trend, shows no asymptotic movements with the key benchmark rates, even though there seems to be some occasional correlation to underscore the consideration in interest rate sensitivity analysis. Surprisingly, funding of commercial banks in Ghana comprises of deposits and foreign currency, which is even dropping in relation to commercial banks' foreign assets as shown in Figure A2 in the Appendix.

Domestic funding with deposits continues to increase exceeding 85% in 2018. Meanwhile, over 22% of commercial banks liabilities constituting about 53 percent of banks' borrowing was in foreign currency as at February 2019. Coupled with this development in the banking system, the proportion of foreign assets to foreign liabilities aptly demonstrates a significant drop to 1.14 times in terms of share of commercial banks funding from 2017 to 2019 with 1.72 times drop from 2017 to 2019 as shown in Figure A2. Foreign asset of commercial banks recorded a year-on-year growth of 19.4 percent in April 2019 from 6.9 percent in February 2019 while foreign liabilities plummeted from 84.6 percent in February 2019 to 35.4 percent in April 2019. Premised on the developments in commercial banks' foreign asset and liability structure coupled with low-interest rates on deposits, this study hypothesis that, the high distribution cost structure is the progenitor of the high lending rate of the commercial banks in Ghana.

The balance sheet position of commercial banks is constantly being reshaped by the advent of financial technology and regulatory requirements that are positioned to ensure financial system stability through capital adequacy mechanisms. The financial asset and liability components of the balance sheet are heavily influenced by the need for operational process optimization and agency/branch system of operation triggered by financial technology. To this end, commercial banks in Ghana are faced with high cost structure amidst high cost of capital. The cost structure of commercial banks in Ghana comprises the distributional cost (operational cost), macroeconomic instability cost, and latent cost on high capital reserve requirement. Despite the rising non-performing loans in the banking system, commercial banks constantly declare huge profits, including the defunct banks even up to the wake of their liquidation in 2018 financial year.

3. Theoretical Framework

Without doubt, cost and management accounting frameworks in banking have enormous strategic significance in the contemporary banking sector. The systems can improve the quality of managerial decisions significantly and to a large extent can ensure sustainable banking business profitability and productivity. Consequently, the application of cost and management accounting principle such as the cost management theory and pricing theory is necessary to examine the behavior of banks in off-loading their distribution cost to consumers.

3.1. The Cost Management Theory

Proponent of the theory posits that, cost management analyses the ways to minimize or decrease cost and/or improve differentiation of a firm's product by exploiting linkages in the value chain and aligning cost drivers (Lord, 1996). Cost management offers the scope for cost reduction and hence a good control over costs is assured on an ongoing basis amidst the identification and elimination of wastes and redundancies (Manoj, 2005). Thus, the theory offers a holistic framework in examining how commercial banks align their distribution cost than mere strategy proposed by Porter in his seminal works (Porter, 1985), which came under attack by management accounting researchers who questioned how the source of competitive advantage aligns with decisions taken by management accountants (Christopher et al., 2006).

3.2. The Pricing Theory

Management accounting has made significant contribution to the pricing theory in recent times. Managerial economics perspective posits that, firms are usually part of a free and competitive market in which firms cannot have a definite "pricing strategy" on account of volatile price which is set by the market (Sloman & Kevin, 2007). However, in an imperfect market, economic theory cannot be precisely applied to the setting of optimum price level that maximizes profitability (Glynn et al., 2003). Economic theory on pricing posits that firms have perfect knowledge of their demand curves and the cost of production which in reality cannot be accurately known (Greenberg & Baron, 2000). Management accounting therefore offers a more realistic framework for pricing strategy such as cost-plus pricing strategy, which is based a manufacturing cost and a mark-up factor (Bhimani et al., 2012), consumer based pricing which is based on counter needs and requirements, cost based pricing which takes in the cost-plus strategy pricing, and competitor based pricing which considers competition on the market place. Most of these pricing strategies are adopted in contemporary banking industry and as such, in analyzing the alignment of distribution cost within the banking system, it is necessary to consider the application of management accounting pricing strategies than the one offered by economic theory.

4. Literature Review

A colossal amount of study has been carried out on cost structure and interest rates. However, the study that narrowed the focus on distribution cost within the banking system is rare. Moreover, in the Ghana context, no literature, and even if exist, it is very rare, examined the relationship between the distribution cost and interest rates and those that exist examined only the cost and production functions within the banking sector.

Anagba (2015) estimated the cost productivity of commercial banks in Ghana. The study deployed data from 2000 to 2013 on the following variables: loans and advances, securities and money market investments as output variables, with to-

tal deposits, staff cost and fixed asset as input variables and the ratio of personnel expenses to total assets, total interest to total deposits, other operating cost to fixed assets as input prices. Using Data Envelopment Analysis following the cost Malmquist productivity analysis, the study finds that the banking industry experiences a cost productivity growth of 3.2% with a 1.7% technical productivity. It was further ascertained that environmental factors such as size of the bank, competition, inflation, treasury bill rates, growth rate, capitalization and ownership structure significantly influence the cost productivity of banks in Ghana.

Rezvanian & Mehdian (2000) examined the cost structure and production performance of commercial banks in Singapore. The study used the financial intermediation as the trajectory for the production process with the following variables entering the model as input and output variables: 1) Output variables—total loans, security investments and other earning assets; 2) Input variables include borrowed funds proxied by interest expense, and other inputs proxied by non-interest expenses. Using the parametric technique within the framework of translog cost function coupled with non-parametric technique within the linear programming framework, the study finds a U-shaped average cost curve of the Singaporean banks with evidence of economies of scope for all commercial banks irrespective of the size of the bank. The study further noted that Singaporean banks could have been able to reduce cost by about 43% should they be cost efficient. The study associated the cost inefficiencies emanating from the banks to both allocative and technical inefficiencies.

Kimutai & Weche (2018) investigated the influence of cost structure on interest rates levels of microfinance banks in Kenya. The study deployed financial cost, credit administration cost, loan default cost and cash holding cost as indicative variables for cost structure against the respective interest rates charged by the selected microfinance banks. Using a descriptive survey study design with a sample size of 56 respondents selected through stratified random sampling method from a target population of 126 along with a structured questionnaire, the study finds that financial cost, administrative cost, loan default cost and cash holding cost have significant influences on interest rate. The impact coefficients for financial cost, administrative cost, loan default cost and cash holding cost on interest rates are 0.442, 0.566, 0.364, and 0.311 respectively. The coefficients are all statistically significant at 5% level.

Dean & Stewart (2012) examined the relationship between funding cost and lending rates of banks in Australia. Synthesizing data on funding composition of banks in Australia comprising term deposits, wholesale debt, money market interest rates, variable housing rates, and outstanding business loans, the study finds that, cost of funding, pricing of different kinds of risk and growth strategy have significant influence on lending rates. The study noted that though both lending rates and funding cost have over the past years been witnessing a significant drop, the lending rate seem to be falling more than the funding cost for Australian banks. The study associated the rising cost of funding relative to the lending rate to com-

petition for term deposits and the wide spread on wholesale debt to investors' concerns about the banking industry globally.

Islam et al. (2014) examined cost structure and financial sustainability of microfinance institutions in the light the imposition of interest rate cap in Bangladesh. The study deployed financial cost proxied by the ratio of financial cost to average loan outstanding, administrative cost proxied by the ratio of general administrative cost to average loan outstanding as indicative variables for cost structure against interest rate spread and size to ascertain financial sustainability. Using both Ordinary Least Square (OLS) and logistic regression within the framework of management accounting, the study finds that microfinance institutions in Bangladesh have lower administrative cost and a high interest rate spread and more likely to be sustainable prior to the coming into force the interest rate cap.

5. The Empirical Model and Estimation

5.1. Data Diagnostics

Annualized longitudinal data from 2010 to 2018 on ten (10) commercial banks in Ghana is used for this study as shown in the Appendix. The data is obtained from the published financial statements and annual reports available on the website and online of the selected banks. Unlike the previous studies that deployed the use ratios of the input and output variables, this study uses the log difference of the selected variables to circumvent the challenges associated with the use of ratios (see Paradi et al., 2011). One key weakness in the use of ratios pointed out by Smith (1990) is that ratios implicitly assume a constant return to scale, a situation not practical in real life situation, and more particularly, in this study where commercial banks with different complexities are being considered in a longitudinal framework. Details of the sample data is presented in Table 1 and Table A1 in the Appendix.

5.2. Panel Unit Root Test

Time series characteristics of non-stationarity are embedded in pooled data. As such most pooled series are not meaning reverting. The existence or nonexistence of stationarity in the selected series plays a key role in the model selection. A non-stationary series is made to be mean reverting by taking the first difference. Ascertaining stationarity of pooled data can be represented in a simple mathematical expression in a simple AR (1) process as follows;

$$Y_{it} = \delta\gamma_{it-1} + \mu_{it}\gamma_i + \varepsilon_{it} \tag{1}$$

In [1], $i = 1, 2, 3, \cdots, k$, cross section units observed over $t = 1, 2, 3, \cdots, T$ periods. μ_{it} represents exogenous regressors that may consist of a fixed effect with or without individual trend. And λ represents the autoregressive parameters to be estimated and ε_t being the idiosyncratic disturbance assumed to be mutually independent. By convention, if $|_i| < 1$, then the dependent variable y_i is deemed

Table 1. Summary description of data.

Variable	Definition	Description
Cost expenditures	Interest expenses + non-interest expense	Variables thought to constitute the distribution cost structure of banks and cost residuals.
Loans	Loans and advances	Comprise major types of loans the commercial banks grants such as commercial loans, consumer loans, Agric production loans, etc.
Transaction and liquidity services	Proxied by volume of deposits	Comprises deposits volumes received by the commercial banks from customers and other banks.
Fee based service	Proxied by net fee income	Comprises commission received from trading activities less commission paid on trading activities.
Prices of factors of production	Proxied by staff cost + cost of borrowed fund + cost of plant and equipment	Staff cost comprise wages and other benefit. Cost of borrowed fund is proxied by ratio of interest expenses to total deposits. Cost of plant and equipment comprise purchase of tangible and intangible assets less any realization from the sale of plant and equipment in the same financial year.
Banks risk exposures	Proxied by risk-weighted assets	Total risk weighted assets calibrated by the respective commercial banks in the computation of their capital adequacy ratio.
Market and regulatory environment	Proxied by changes in equity capital	This indicates the state or condition in which the commercial banks operate.

Source: Author's own computation.

to be weakly stationary causing the variance of y to increase overtime to approach infinity. On the other hand, y_i is said to contain a unit root if $|_i| = 1$. This study, therefore, test the hypothesis of stationarity and non-stationarity using the Levin, Lin, & Chu (2002) test assuming a null of common unit root process and the Fisher-type tests using ADF proposed by Choi (2001) assuming an individual unit root process. The results which show that the variables contain unit root is presented in Table A2 in the Appendix.

5.3. Panel Cointegration

This study deploy the Pedroni Engle-Granger based examination of the residuals, obtained from the estimation of the spurious regression with I(1) variables. The Engle & Granger (1987) cointegration stipulates that, an I(0) process of the residuals from the spurious regression provides a cointegrated condition in relation to an I(1) process. The model's framework was extended to the estimation

of equations involving panel data (see Pedroni, 1999, 2004; Kao, 1999). A number of cointe- gration tests that allows for heterogeneity of intercepts and trends in the cross sections were proposed by Pedroni (2004). This study considers a regression model expressed as the equation below:

$$Y_{it} = \mu_{it} + \phi_{it} + \beta_{1i}\delta_{1it} + \beta_{2i}\delta_{2it} + \cdots + \beta_{ki}\delta_{kit} + \varepsilon_{it} \tag{2}$$

where $t = 1, 2, \cdots, T$, $i = 1, 2, \cdots, N$ and $k = 1, 2, \cdots, K$. Y and δ are assumed to be integrated under an order I(1) process while μ_i and θ_i are individual and trend effects. The residual, $\varepsilon_{i,t}$ is expected to follow an I(1) process under the null hypothesis of no cointegration. The result is presented in **Table A3** in the Appendix.

5.4. Granger Causality Test

This study considers the Granger (1969) approach to examine the magnitude of the variations in our cost expenditure variable (y) that can be explained by its past values, given the addition of the lagged values of our explanatory variables (Xs)—the variables thought to influence the cost expenditure of commercial banks. If cost expenditure variable is granger caused by the variables through to influence it, then a valid conclusion can be reached that our regressors can help in the prediction of cost expenditure of commercial banks in Ghana. The result is presented in **Table A4** in the Appendix.

5.5. Dynamic Generalized Method of Moments (GMM) Estimation

The outcome of the various tests run of this study data shows a strong statistical relation between cost expenditure and the variables or factors thought to influence the commercial banks' cost expenditure. The study estimate the cost structure of commercial banks using the GMM model employing the dynamic panel data technique prose for the panel technique by Arellano & Bond (1991). The study considers a simple baseline linear conditional mean specification as expressed below:

$$Y_{it} = \alpha + X_{it}\mu + \delta_i + \pi_i + \varepsilon_{it} \tag{3}$$

where Y_{it} represents the dependent variable, X_{it} represents the k-factor of repressor and ε_{it} is the disturbance term. $i = 1, 2, \cdots, N$ and $t = 1, 2, 3, \cdots, T$. The constant parameter for the model is represented by α while $_i$ and π_i represent entity or time specific effects. From equation [3] the GMM estimates are based on a dynamic panel form represented in the equation as:

$$Y_{it} = Y_{it-j} + X_{it}\mu + \delta_i + \lambda_i + \varepsilon_{it} \tag{4}$$

From (4), the study deploys the computation of the orthogonal deviation proposed by Arellano & Bover (1995) to transform the original equation to eliminate the entity effect. The residuals produced from the orthogonal deviation transformation results in an optimal first-stage weighting matrix similar to the two stage least square. The estimation of the GMM model under the dynamic panel techniques was carried through the following three stages. First, the study specified

the instruments. Second, the study chose the weighted matrix. Third, the estimator was determined. The results are presented in Table A5 and Table A6 in the Appendix.

6. Result and Analysis

Dynamic panel data estimators have been applied in several empirical studies (Abrigo & Love, 2015). In the application of dynamic panel data estimators, addressing the unobserved heterogeneity is key. This can be done by applying a sort of transformation through an entity demeaned for a fixed effect model or taking the first difference (Christopher, 2013). Love & Zicchino (2006) applied a dynamic model to a firm level panel data to ascertain the relationship between a firm's financial condition on investment dynamic. Chukiat et al. (2010) applied a panel cointegration analysis to examine the long run relationship between the arrival of international tourists and selected macroeconomic variables. Ramirez (2006) applied panel unit root and cointegration test to examine the effect of public and private capital on aggregate output and labour productivity.

Premised on the foregoing studies, this study applied the Arellano—Bond Dynamic Panel GMM Estimator to panel data of ten commercial banks to examine the relationship between cost structure and interest rates. The panel cointegration test was also carried out to examine the long run relationship among the variables thought to influence commercial banks cost structure. The joint test of the null hypothesis of no cointegration among the selected variables is rejected at 1% significance level as presented in Table A3.

The study considers the unidirectional flow from the regressors to the cost expenditure variable. The result is presented in Table A4. The unidirectional flow of granger causality is predominantly from the variables thought to influence commercial banks' cost expenditure to the distribution cost variable. This is useful for the scenario analysis to be examined in this study.

To test the hypothesis of this study, the study applied a two-step process. First, the study estimated the distribution cost structure of the selected commercial banks using the variables thought to influence the distribution cost. The result is presented in Table A5. The result indicates that, all the variables thought to influence the distribution cost of commercial banks are statistically significant at 1%, 5% and 10% significance level. The signs on the coefficients also came out of the model as expected. Investment securities which is significant is considered in the models on account of the granger causality test carried out. Thus, with the weak significance level, it has been established to have a statistical predictive capacity on distribution cost. From the result, this study estimates the distribution cost model of the selected commercial banks as follows:

Distribution Cost
$$
\begin{aligned}
&= -0.2735\big(\text{costexp}(-1)\big) + 0.0870\big(\text{total deposits}\big) - 0.0337\big(\text{investment securities}\big) \\
&\quad + 0.0731\big(\text{price of factors of production}\big) + 0.0898\big(\text{Risk weighted Asset}\big) \\
&\quad - 0.4094\big(\text{Total fee income}\big) + 0.0371\big(\text{total loans}\big) + 0.2927\big(\text{equity capital}\big)
\end{aligned}
$$

Second, based on the estimated cost model, the study computes the fitted values of the cost structure to examine and establish the relationship with lending rate. The interest rate used in this analysis is the commercial banks base rate published by the central bank coupled with the ratio of interest income on loans and advances to total loans obtained from the financial statement of the selected commercial banks as a proxy for their lending rate. The study estimates GMM model using the dynamic panel technique. The variables were transformed into their logarithm and first difference form other than the orthogonal deviations in order to capture the dynamic pass-through of cost to interest rate. Given the estimates of the residuals from the 1-step estimation for i.i.d innovations, this study replaces the weighting matrix with different computational forms consistent with white period covariance estimation. The 2-step and the *n*th iterative convergence computation have been used to examine the model fit and settle on the best option. The result from the estimation is presented in Table A6. The results indicate that, when commercial banks base rate is used as a proxy for the interest rate charged by the commercial banks, a 1% increase in cost structure would increase interest rate charged by about 11%. On the other hand, a 1% increase in cost structure would increase individual banks interest rate charged on loans and advances by about 15.5%. The coefficients of the impact of cost structure and the two benchmark interest rates from both models falls within the same region as shown in Figure A3 in the Appendix.

The study considers the pair-wise confidence interval of 95% from both models to conclude that, since both have their confidence interval centered, a 1% increase in the distribution cost would increase interest charged on loans and advances by about 11% - 15% on average.

7. Conclusion

Commercial banks are major traditional participants within the financial system in Ghana. The banking system provides indirect financing through the financial intermediation process. To this end, banks serve as the intermediary between households and corporations. The banks receive deposits from households and provide liquidity to corporations in a form of bank loans. Traditionally, Ghana has a stronger and larger indirect financing system than the direct financing system. As a result, corporations heavily depend on the banking system for liquidity provision to fuel their operational activities. In their financial intermediary role, commercial banks are faced with many theoretical issues such as information asymmetry, moral hazards and adverse selection. These among other things increase the risk framework of the commercial banks paving way for a strategy to remain afloat on their operations with profitability being the prime objective function.

A major source of banks' profitability is interest income, particularly on loans and advances to customers. Given high-interest rate regime in Ghana, commercial banks consistently have been declaring high profits despite the high non-per-

forming loans build-up within the commercial banking sector. Even commercial banks which had their license revoked and liquidated by the regulator were declaring profit prior to their liquidation. Another interesting phenomenon reshaping and increasing commercial banks' cost of operation is the advancement of financial technology. It is at the back of these interesting developments within the Ghanaian banking sector that this study hypothesized commercial banks might have adopted an operational strategy to shed off their cost emanating from the distribution of products and services to the interest rate charged on loans and advances to customers.

The high-interest rate regime in Ghana has attracted attention from both policy makers and international observers alike. In April 2017, the central bank introduced the Ghana Reference Rate (GRR) pegged at 16.82%. Commercial banks are mandated to peg their lending rates at the GRR plus individual banks' risk assessment attached to a particular loan. The GRR is anchored to the monetary policy rate, 91-day treasury bill rate and the interbank market rate, as such changes in these rates are expected to influence the reference rate.

According to pundits in the banking sector, commercial banks' cost of capital and operational cost are the major factors influencing the lending rates in Ghana. However, no empirical study, even if it exists, very rare, had been carried out to ascertain the true state of affairs. More particularly, given the increasing volume of deposits-cheap funds, coupled with high-interest rate spread in Ghana, examining the empirical relationship between the costs structure and interest rate is necessary.

This study, therefore, carried out an empirical investigation on the impact of commercial banks' distribution cost structure and interest rate using a dynamic GMM model to offer somebody of knowledge to the discussion. The study found a significant but low pass-through of commercial banks' cost structure to the lending rate.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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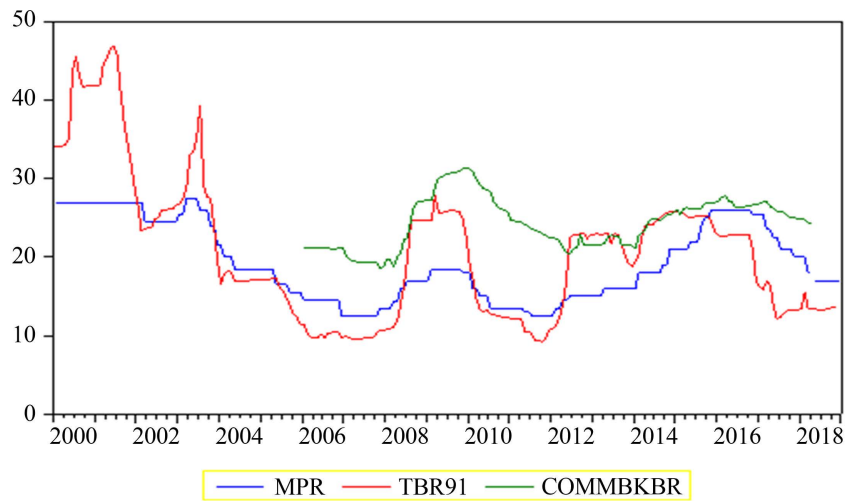
Appendix

Figure A1. Interest rates movement in Ghana. Data source: Bank of Ghana.

MPR and TBR91 represent the benchmark market rates. MPR is the monetary policy rate showing the upward and downward swings from the 90s to 2018. TBR91 is the 91 days treasury bill rate also depicting much volatilities in its historical trend from the 90s to 2018. COMMBKBR is the commercial banks' lending rate which in comparism to the two benchmark market rates has maintained and continuously exhibit and upward trend on average in its historical values.
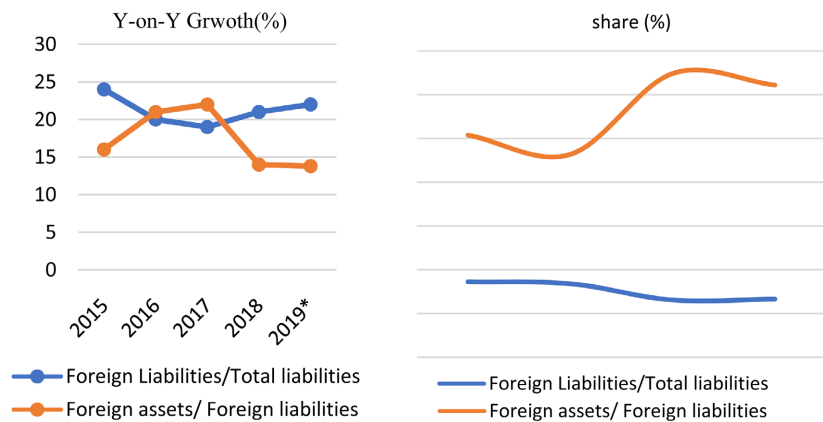

Figure A2. Commercial banks foreign asset and liability position. Data source: Bank of Ghana banking sector report.

The ratio of foreign liabilities to total liabilities in Ghanaian commercial banks exhibits and upward trend though with some ebbs between 2016 and 2018 in its year-on-year. However, its share in the funding of commercial banks has shown a declining trend from about 24.1% in 2017 to approximately 14% in 2019. This translates into a decline from its historical value of 1.72 times in ratio terms (24.1/14) in 2017 to 2019. Similarly, the ratio of foreign assets to foreign liabilities showing a downward trend on average indicates that, foreign liabilities have

been increasing in the Ghanaian commercial banks on average. However, its relation to the share in the total funding of commercial banks in Ghana has been declining on average over the period given that the ratio of foreign assets to foreign liabilities is depicting an upward bias trend from about 53.2% in 2017 to 60.8% in 2018. The decline in the share of commercial banks funding is about 1.14 times in ratio terms (60.8/53.2) from 2017 to 2019.
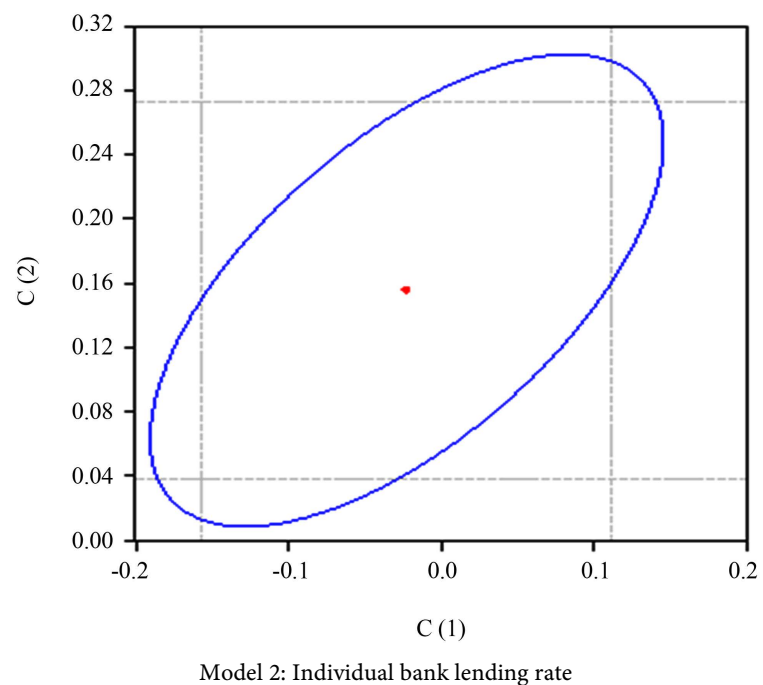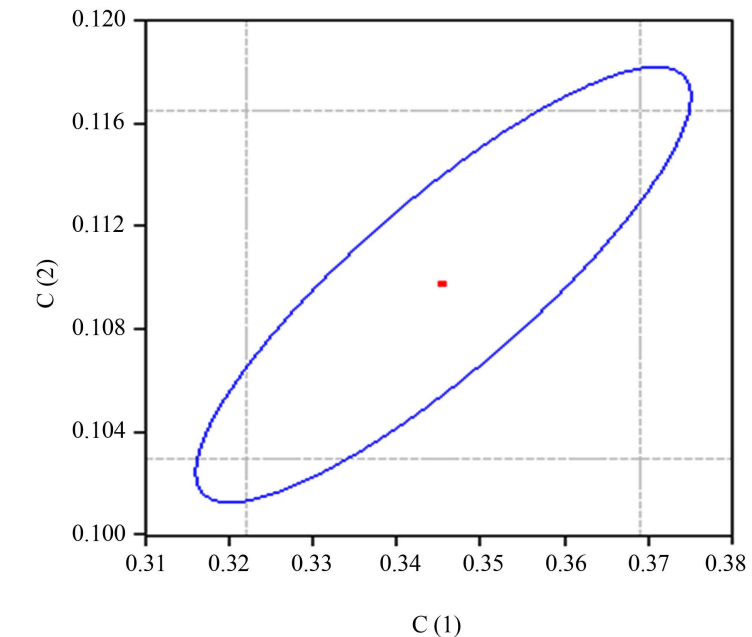
Model 1: Commercial banks base rate

Model 2: Individual bank lending rate

Figure A3. Confidence eclipse for GMM model coefficients. Source: Authors' own computation.

The output of the descriptive statistics depicted in **Table A1** indicate that all the variables; cost expenditure(costexp); deposit transactions(trnsdep); investment in securities (Investsec); price of factors of production(pxfprod), risk-weighted assets (Rwa), total fee income (TFinco) total loans(Tloans) and equity capital (Equity); are not symmetrically distributed given skewness of above zero. The distribution of the variables has a long-left tail. In relation to the peak and flatness of the distribution, it can be ascertained that the variables have their kurtosis greater than 3 on average depicting an asymptotic normality distribution. The Jarque-Bera statistics indicate that, the null of normal distribution is rejected at 1% significance level on average.

Table A1. Summary descriptive statistics.

	Costexp	Trnsdep	Investsec	Pxfprod	Rwa	TFinco	Tloans	Equity
Mean	265,056	2,153,166	908,276	213,441	1,634,693	83,981	1,296,189	154,786
Median	215,181	172623	578,985	154,623	1,272,494	64,860	1,005,302	100,961
Maximum	789,352	8,334,979	4,878,155	1,201,974	5,961,394	345,650	8,059,657	500,000
Minimum	15,738	91,845	5678	3846	53,137	7012	18,211	7200
Std. Dev.	186,872	1,724,042	995,536	217,024	1,445,893	70,328	1,206,214	118,198
Skewness	0.7615	1.4643	1.9217	2.0117	1.2481	1.4817	2.6996	1.3132
Kurtosis	2.7485	5.2934	7.0722	8.1249	4.2490	5.1798	13.9083	3.7069
Jarque-Bera	8.0422	46.6983	105.8244	143.277	26.2966	45.673	499.985	24.968
P-Value	0.0179	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Obs.	81	81	81	81	81	81	81	81

Source: Authors' own computation.

Table A2. Unit root test.

Variable	Levels		Differenced	
	Levin, Lin & Chu	ADF-fisher chi-square	Levin, Lin & Chu	ADF-fisher chi-square
Cost expenditure	−0.839 (0.200)	10.895 (0.949)	−8.594 (0.000)	45.706 (0.001)
Total deposits	3.970 (1.000)	1.088 (1.000)	−12.561 (0.000)	58.064 (0.000)
Investment securities	4.450 (1.000)	4.365 (0.999)	−8.988 (0.000)	72.042 (0.000)
Factors of production	4.655 (1.000)	3.562 (1.000)	−9.516 (0.000)	55.303 (0.000)
Risk weighted assets	−1.397 (0.081)	15.221 (0.647)	−3.721 (0.000)	66.102 (0.000)
Total fee income	0.527 (0.700)	11.845 (0.921)	−3.368 (0.000)	40.072 (0.005)
Total loans	4.692 (1.000)	14.297 (0.815)	−3.971 (0.000)	39.164 (0.001)
Equity capital	3.580 (0.999)	8.344 (0.973)	−8.505 (0.000)	55.976 (0.000)

Source: Authors' own computation. Test statistics with p-value in bracket.

Table A3. Cointegration test.

ADF	t-Statistics	Probability
	−3.3711***	0.0004

Augmented Dickey-Fuller Test Equation

Variable	Coefficient	t-Statistics	P-Value
Resid (−1)	−2.0812	−5.211***	0.000
DResid (−1)	1.1748	3.717***	0.001
DResid (−2)	0.7260	2.898**	0.006
DResid (−3)	0.6327	2.702**	0.010
	R-Square	0.5678	
	Adjusted R-Square	0.5362	

*** Significant at 1% level, ** Significant at 5% level.

Table A4. Granger causality test.

Unidirectional flow	F-statistics	Probability
Total deposit to distribution cost	10.354***	0.013
Investment securities to distribution cost	3.206**	0.027
Price of factors of production to distribution cost	4.978***	0.009
Risk weighted asset to distribution cost	5.210***	0.008
Total fee income to distribution cost	1.905	0.157
Total loans to distribution cost	4.333**	0.017
Distribution cost to equity capital	5.200***	0.008

Source: Authors' own computation. *** 1% significance level, ** 5% significance level.

Table A5. Result from the dynamic panel GMM model for cost structure.

Variable	Coefficient	t-Statistics	Probability
Costexp (−1)	−0.2735	−2.663***	0.010
Total deposits	0.0870	6.493***	0.000
Investment securities	−0.0337	−1.854*	0.069
Price of factors of production	0.0731	2.188**	0.033
Risk weighted asset	0.0898	6.162***	0.000
Total fee income	−0.4094	−2.305**	0.025
Total loans and advances	0.0371	4.760***	0.000
Equity capital	0.2927	2.133**	0.037

*** 1% significance level, ** 5% significance level, * 10% significance level. Source: Authors' own computation.

Table A6. Dynamic GMM estimation of cost structure and interest rate.

Variables	Coefficient	t-Statistics	Probability
Dependent variable: commercial banks base rate			
Base rate (−1)	0.346	29.33***	0.000
Distribution cost structure	0.110	32.53***	0.000
Dependent variable: Individual bank's lending rate			
Lending rate (−1)	−0.0233	−0.34	0.737
Distribution cost structure	0.1555	2.65***	0.010

*** Significance at 1%. Source: Author's own computation.