

Income diversification and profitability of banks: Evidence from Ghana's banking sector

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Abstract

Non-interest income accounts for a significant percentage of operating income of commercial banking industry. However, current studies on income diversification and profitability of banks have centered on the implications of diversification without investigating the threshold effects and transmission channels through which income diversification affects banks' profitability. The study addresses these gaps in the literature relying on panel data from 10 banks in Ghana spanning 2006–2016. We employ both the fixed and random estimation approaches. The study finds that, while increased diversification proxied by non-interest income is associated with higher profitability of banks in Ghana, the effect is not robust. Further results also suggest that, the effect of income diversification on profitability is monotonic and does not show evidence of threshold. On the channels of manifestation, the study observes that, income diversification increases profitability and non-performing loans heighten the positive relationship between non-interest income and profitability.

Keywords: Income diversification; Non-interest income; Profitability; Banks.

1. Introduction

During the financial liberalization era which can be traced back to the year 1970s, there was an increasing role of financial markets to engage in different operations rather than only traditional lending activity. Examples of such operations are investment banking, trading, insurance and intermediation in financial markets. Although the traditional revenue source of banks is interest income, they have more intensively engaged in non-interest income generating activities especially in developed countries in the aftermath of the financial liberalization. In this respect, share of non-interest income in net operating income has increased all around the world, especially in the last three decades (Gurbuz *et al.*, 2013).

Indeed, the broad spectrum of studies espoused two conflicting theories concerning the optimal degree of diversification. While traditional banking and portfolio theory opine that, banks should diversify as possible to reduce their risks of suffering a costly bank failure, corporate finance theory suggests that a bank should focus on specific sectors or lines of business in order to enjoy the comparative advantage of developing expertise in the areas they focus and their key operation so as to obtain the greatest possible benefit from management's expertise and to reduce agency problems.

For most part, income diversification in banking sector revolves around charging of fees for banking services, net trading profits and other non-interest income within the net operating income of a bank. Also, different studies examining the impact of income diversification on risk-adjusted banks overall performance shows that diversification may also increase the volatility of banks operating earnings. A study by DeYoung and Roland (2001) define three primary motives why non-interest income can increase the volatility of banks operating income: a) mortgage-primarily based activities require switching charges as compared to charge-based totally activities, b) lending activities require decrease operating leverage than price-based activities, and c) lending activities require lower monetary leverage than price-based activities.

A developing financial sector like Ghana's banking sector has seen significant growth over the years. In the year 1988, the total number of banks was nine, and by 2011, it rose to 27. There were only two foreign controlled banks in the year 1988 which increased to seven out of a total of 16 banks in the year 2000. By 2008, out of the 26 registered banks the number of the foreign controlled and the domestic controlled banks evened up. As of 2011, the number of foreign banks surpassed the number of local banks with 52% to 48% out of the 27 total number of banks recorded. The total number of universal licensed banks rose

up to 34 by the year 2018 with the foreign banks recording 17, and 17 of which are local banks (PwC, 2017). The banking industry's efficiency indicators point towards a general improvement in efficiency in April 2018 as compared to April 2017. The industry's primary profitability indicators, specifically, return on equity (ROE) and return on assets (ROA) pointed in the direction of declining profitability within the banking industry for the duration ending April 2018 as compared to the same period in the preceding year. The ROA declined from 4.0% in April 2017 to 3.6% in April 2018. Additionally, the industry ROE fell to 17.3% in April 2018 from 19.3% in April 2017.

The industry's cost to income ratio declined from 86.0% to 84.5%, while the cost to total assets ratio declined from 5.4% to 4.4% during the period under review. The operational cost to total assets ratio also declined from 2.9% to 2.7% within the same comparative period, pointing to some improvement in the industry's operational efficiency. The sector's operational cost to gross income ratio, however, increased from 46.7% in April 2017 to 51.3% in April 2018 (Bank of Ghana, 2018).

Undoubtedly, the relationship between diversification and profitability of banks has received significant research attention in recent times. Indeed, banks all over the world get their income from interest and non-interest income. With an increasing credit risk and dwindling interest income, many financial institutions in developing countries including banks are looking at an alternative way of enhancing funds from non-interest sources as an avenue for diversification. Elsas *et al.*, (2010) identify that commercial banks normally increase diversification by moving into fee-based services whilst banks with already strong fee-based revenues expanded into trading activities.

According to Aduda and Gotinga (2011), the last two decades have seen a number of banks folding up in Ghana due to their inability to effectively and efficiently manage credit risk. Evidence from the recent 2018 banking sector report by Bank of Ghana shows that, the banking industry's net income stood at GH¢782.20 million as compare to GH¢ 1.59 billion in the year 2017 which shows significant reduction in the growth rate of net interest income. In addition to the significant drop in the net interest income, an increase in the growth rate of provisions on non-performing loans led to the slowdown in growth of banks' net income. DeYoung and Rice (2004) are of the view that, the increasing presence of non-interest income at commercial banks has been widely documented and discussed but only a few academic studies have investigated the impact of non-interest income on the financial performance of

banks. More precisely, few existing studies (see Rime and Stiroh, 2003; Tortosa-Ausina, 2003) have examined the influence of non-interest income on banks' profitability. Notwithstanding the tremendous input of these studies to literature, they have closely been focused in Asian, America and Europe. Once more, the outcomes of these studies have produced mixed outcomes because of contextual variations. In different instances, studies in comparable contexts have produced divergent perspectives (for example Stiroh *et al.*, 2004). Doumplos *et al.* (2016) concluded in their study that, diversification in the banking sector is useful for banks operating in developing nations as compared to banks in developed and emerging economies.

Notwithstanding this, empirical evidence on non-interest income–profitability nexus in Ghana is lacking. More tellingly, while anecdotal evidence may suggest the contribution of non-interest income to banks' profitability, the precise empirical effect of non-interest income on profitability is dearth with conclusion often drawn from public discourse with very little theoretical and empirical backing. Furthermore, whether the impact of non-interest income on profitability of banks exhibit threshold effects is unexplored in the literature. In other words, whether non-interest income increases or decreases profitability above or below which the effect changes sign is yet to be studied. Indeed, the direct effect of non-interest income on profitability may not be instructive since it potentially affects profitability through some crucial channels. However, we do not also know the transmission channels through which non-interest income affects profitability. These issues warrant intense investigations which have been largely ignored in existing literature. To the extent that the banking sector of Ghana is evolving, knowledge of these nuances is important in guiding the workings of the sector.

This study significantly contributes to the literature in so many ways. To the best of our knowledge, it is the first study examining how income diversification affects the different proxies of profitability in Ghana's banking sector. Through this, the study brings clarity on how income diversification empirically impacts on profitability. Furthermore, whether income diversification-profitability nexus exhibits non-linearities is unearthed. Beyond this, the study uncovers the transmission channel through which income diversification impacts on profitability which hitherto remains unknown. In this essence, the study is instructive and useful to policy makers given its identification of the precise empirical effect, threshold effect (if any) and transmission channel of non-interest income to profitability of banks. Methodologically, the findings of the

study is reliable for policy formulation since the study departs from the use of ordinary least squares to invoking an approach that utilizes the heterogeneity of the various banks and in so doing, produces consistent and efficient results.

The study finds that, while increased diversification proxied by non-interest income is associated with higher profitability of banks in Ghana, the effect is not robust. Further results also suggest that, the effect of income diversification on profitability is monotonic and does not show evidence of threshold effects. On the channels of manifestation, the study observes that, income diversification increases profitability and non-performing loans heighten the positive relationship between non-interest income and profitability. In the light of the banks diversifying their source of income, we recommend that banks increase their income diversification drive in order to maximize performance.

The rest of the paper is organized as follows: Section 2 presents some brief stylized facts on non-interest income and profitability in Ghana's banking sector while Section 3 reviews the literature on income diversification–profitability nexus. Section 4 outlines our methodology with Section 5 discussing the empirical findings. Section 6 concludes the study with some implications for policy.

2. Stylized facts on banks' non-interest income in Ghana's banking industry

There has been increased concern about the continued deterioration in the asset quality of Ghanaian public sector banks in recent times, as a result banks have channeled their focus from depending solely on interest income to maximizing revenue from fee generating activities (Damankah *et al.*, 2014). According to Bank of Ghana (2018), banks generated greater earnings from their investments as compared with earnings generated from loans advanced. With a share in overall earnings of 42.6%, earnings from investments were the biggest earning source for the banks in April 2018, growing from 40.5% in April 2017. The proportion of earnings from loans, which in preceding years was the biggest element of total earnings, however, declined from 43.6% in April 2017 to 38.0% in April 2018. Other earnings generating sources accelerated in significance for the banks as the proportion of fees and commissions in overall earnings increased from 10% in April 2017 to 12.6% in April 2018, and the share of banks' other income sources also, recorded a 100 basis points increase from 5.9% to 6.9% over the same period.

According to Bank of Ghana (2017) report, the banking industry posted a stronger income statement performance in December 2017 compared with the

performance in December 2016. This reflected in an improvement in the year-on-year growth of the industry's net operating income from 4.3% in December 2016 to 11.1% in December 2017 on account of slowdown in the industry's operating expenses, particularly staff costs. The industry's net interest income however recorded a slower year-on-year growth from 17.3% to 12.6% during the period under review. The improved net operating income performance translated into an improved income before tax performance with a 13.3% growth in December 2017 from 3.4% a year earlier. Similarly, the industry's net profit after tax posted a 10.0% growth in December 2017 after contracting by 1% a year ago.

DeYoung and Roland (2001) is of the view that, there are three reasons why non-interest income (NII) may increase the volatility of bank earnings. First, loans that are held in a bank's portfolio – especially loans to businesses – are relationship based. Second, a bank that shifts its product mix from traditional assets base interest-generating activities to nontraditional fee-based activities tends to increase its degree of operating leverage. Lastly, most non-interest income activities require banks to hold little or no fixed assets unlike interest-based activities like lending, non-interest income activities like trust services, mutual fund sale and cash management require little or no regulatory capital. According to the authors, this allows the banks to finance huge amount of their income-generating activities with debt, which increases fixed interest expenses.

Table 1 presents background statistics on non-interest income of some selected local and foreign banks. GCB bank recorded the lowest non-interest income of 0.03% in 2006 but Barclays bank recorded the highest non-interest income of 3.2% within the same period. Around the same period, non-interest income for CAL Bank, Standard Chartered Bank were above 2.5% while the remaining 8 banks recorded below 1% of non-interest income. It is also evident that between 2014 and 2016, the behavior of non-interest income is non-monotonic and does not follow a definitive pattern. For instance, non-interest income for Zenith Bank increased from 14.85% in 2013, 19.98% in 2015 before decreasing to 5.56% in 2015 and assumed an increasing trend thereafter in 2016. Similar trend is observed for HFC bank.

These notwithstanding, Societe Generale have the highest non-interest income of 34.64%, followed by Sahel Sahara with 24.22% over the period 2006–2016 while Ecobank and Standard Chartered Bank has the lowest with non-interest income of 15.62% and 17.89 respectively. Among the local banks, HFC Bank has the highest non-interest income relative to CAL Bank, GCB Bank. Indeed,

both local and foreign banks are always increasing their non-interest income as seen in the Table below.

TABLE 1: TRENDS OF NON-INTEREST INCOME (%) FOR THE PERIOD (2006-2016)

Banks	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
CAL Bank	3.57	1.80	2.81	2.58	2.53	4.48	7.37	11.44	21.38	23.79	18.24
HFC Bank	0.65	0.89	3.38	4.21	3.56	4.99	7.63	13.97	21.91	18.83	20.00
Ghana Commercial Bank	0.03	4.86	4.68	6.06	4.86	7.15	8.50	10.13	21.68	13.44	18.62
Standard Chartered	2.59	2.72	3.89	6.01	6.22	6.38	10.72	13.30	17.89	14.99	15.29
Barclays Bank	3.21	3.46	4.67	4.26	4.06	6.85	8.49	10.67	14.54	16.51	23.27
Sahel Sahara	-	-	0.22	0.99	4.02	8.43	12.33	12.04	14.16	23.58	24.22
Ecobank	0.64	0.82	5.68	5.40	15.62	8.27	12.05	12.43	15.27	12.53	11.29
Guaranty Trust	0.07	0.33	2.02	2.68	4.24	7.32	11.70	15.41	18.83	18.81	18.59
Societe General	0.04	5.56	7.38	8.17	7.48	10.10	17.58	15.68	23.36	26.32	34.64
Zenith Bank	0.27	1.37	3.07	7.75	6.24	9.86	10.59	14.85	19.98	5.56	20.46
Total	11.07	21.81	37.8	48.11	58.83	73.83	106.96	129.92	189	174.36	204.62

Source: Bank of Ghana (2016).

3. Relationship between income diversification–profitability: A brief review

Literature on non-interest income–profitability nexus has grown in an astounding fashion (DeLong, 2001; Staikouras and wood, 2003; Radecki, 1999; Atellu, 2012). These studies have been torn between the developed and developing economies. For instance, a study conducted by Chiorazzo *et al.* (2008) using annual data from Italian banks on the links between non-interest revenues and profitability suggests that non-interest activities are often associated with profitability gains but also with higher risk because of their unstable nature. Again, it was revealed that there are limits to diversification gains as banks get larger. Small banks can make gains from increasing non-interest income, but only when they have very little non-interest income share to start with. Similar work was done by Landskroner *et al.*, (2005) considered diversification as a means to improve profitability and operational efficiency and allows the bank to develop customer dependability. In connection with this, Elyasiani and Wang, (2012) examines whether diversification is associated with improvement production efficiency. Using a sample data over the period 1997–2007, it was identify that,

technical efficiency is negatively associated with activity diversification and the effect is primarily driven by banks that did not diversify. On the other hand, the degree of change in diversification over time is not associated with total factor productivity change but it is negatively associated with technical efficiency change. The paper concluded that, diversification on average is associated with lower production efficiency of banks.

In another development, Berger *et al.* (2010) investigated the effects of income diversification on bank performance using data on Chinese banks during the period 1996–2006. Their diversification dimensions were loans, deposits, assets, and geography. They concluded that, all four dimensions of diversification are associated with reduced profits and higher costs. These results are robust regardless of alternative measures of diversification and performance. Furthermore, they observed that banks with foreign ownership (both majority and minority ownership) and banks with conglomerate affiliation are associated with fewer diseconomies of diversification, suggesting that foreign ownership and conglomerate affiliation may play important mitigating roles. Similarly, Meslier *et al.* (2014) examines the effect of bank revenue diversification on the performance of banks in developing economy. Using a dataset with detailed information on non-interest earnings, it was revealed that, a shift in the direction of non-interest activities will increase bank profits and risk-adjusted earnings particularly when banks are more involved in trading in government securities. It also indicated that foreign banks gain extra from such a shift than their domestic counterparts. On the other hand, Bapat and Sagar (2016) examine the relationship between income diversification, asset quality on bank profitability. They use data from 46 public and private sector banks in India over the period 2006 to 2013. They identify significant difference for diversification measures when comparing public sector banks with private sector banks. The authors further find a negative relationship between non-performing assets and return on assets. It was also revealed that diversification exhibits a positive relationship with return on assets. Sanya and Wolfe (2011) investigated the effect of revenue diversification on bank performance and risk. Using a panel dataset of 226 listed banks across 11 emerging economies, they observe that diversification decreases insolvency risk and enhances profitability. The results also show that these benefits are largest for banks with moderate risk exposures.

Existing studies opined that management of income diversification can be seen as a tool for predicting the profitability of banks using non-interest income as a measure of income diversification (DeYoung and Roland, 2001). According to Moon (1996), diversification improves cost efficiency through lower risk

from diversification if it occurs, and lowers the required risk premiums on uninsured debt and other contingent claims. Banks with high non-interest income services charge lower interest rates and default risk is underpriced (Lepetit *et al*, 2008) and may use loans as a loss leader. Golin (2001) affirms that adequate incomes are required in order for banks to maintain solvency to survive, grow and prosper in a competitive environment. Mundi (2019) reveals that fee income and fund income are moderately positively correlated with return on equity. Whilst some studies found that well managed income diversification impacts positively on banks profitability, others found a negative relationship and with some other researchers suggesting that there are other factors rather than non-interest income that affect bank financial performance (see Sanyaolu, 2019; Lee *et al.*, 2014; Eldomiaty *et al.*, 2015).

Moving our attention to Ghana context, study by Damankah *et al.*, (2014) revealed that interest income is the main driver of profitability of commercial banks in Ghana while non-interest income was identify to be play amplifying role. Bokpin (2013) used stochastic frontier analysis to analyze 26 banks during 1999 to 2007 and finds that banks are relatively cost efficient but not necessarily profit efficient. The study suggests that bank size have strong significant effect on profitability, which leads banks to make riskier loans that invariably increases loan loss provision. Alhassan and Biekpe (2016) used Malmquist index to study 18 banks from 2003 to 2011. They find that income diversification is negatively related to profitability growth.

Without a doubt, the existing studying on non-interest incomes are largely mixed. The different methodologies and settings may be driving these inconclusive findings. Beyond the inconclusive evidence, none of the existing studies have examined the threshold and transmission effects on profitability of banks. We fill this gap in the literature by first discussing our methodology in the next section.

4. Methodology

4.1. Data and data sources

This study relies on annual panel data from 10 local and foreign banks gleaned over the spanning from 2006 to 2016.¹ We use two separate measures of

¹ The foreign banks consist of Barclays Bank of Ghana Limited, Banque Sahélo-Saharienne pour l'Investissement et le Commerce (BSIC Ghana Limited), Zenith Bank (Ghana) Limited, Ecobank Ghana Limited, Societe General Ghana Limited, Guaranty Trust Bank (Ghana) Limited and Standard Chartered Bank (Ghana) Limited. The local banks included CAL Bank Limited, Home Finance Company (HFC) Bank Ghana Limited and Ghana Commercial Bank (GCB) Limited.

profitability in this study. We measure ROA which is taken to indicate how efficient and profitable a bank is managed relative to the total assets (Guru *et al.*, 2002). Specifically, ROA is calculated as the ratio of net income (or profit after tax) to total assets expressed as a percentage. Indeed, this indicator has also been extensively used in the literature to measure profitability (see Dietrich and Wanzenried, 2011; Pasiouras, and Kosmidou, 2007; Afriyie and Akotey, 2013; Petria *et al.*, 2015; Tee, 2017). ROE which also represent profitability is used to measure the amount of net income after taxes earned for each Ghana Cedi of the equity capital paid by shareholders. In other words, ROE values the total profitability of fixed income per Ghana Cedi of equity. ROE which is computed as the ratio of net income (or profit after tax) to total equity capital has been used in several studies (Matthew and Laryea, 2012; Kishan and Opiela, 2000; Petria *et al.*, 2015; Albulescu, 2015; Alper and Anbar, 2011) to proxy profitability.

We use non-interest income to proxy income diversification of banks. Non-interest income is the returns that come from activities other than banks primary businesses or investments which is regarded as a significant indicator where their low (high) values indicate low (high) profit (Chiorazzo *et al.*, 2008). The other non-interest income sources include charges for any kind of services provided by a bank to customers, such as providing safe deposit lockers, issuing demand drafts, cheque book charges, clearing cheques, underwriting initial public offerings, capital gains from dealing in government securities and equity markets, trading income, gains from foreign exchange markets, revaluation of fixed assets such as office buildings, selling miscellaneous assets, monthly or annual account maintenance charges and income from selling insurance.

We also control for bank-specific variables such as total overhead costs and non-performing loans in order to examine how they impact profitability of banks. In addition, we include macroeconomic indicators such as private sector credit to GDP ratio and inflation. Indeed, all these controls are chosen in line with the standard literature. With regard to the data sources, all the data on non-interest income, profitability and bank-specific variables were sourced from the annual reports of the consolidated financial statements of all the banks while data on the macroeconomic variables were taken from the World Development Indicators of the World Bank.

4.2. Empirical strategy

This section discusses the empirical strategy used in examining the impact of non-interest income on profitability of banks where we relied on fixed and random effects estimation approaches.

4.2.1. Fixed effects estimation approach

In this estimation method the constant is treated as group-specific. This means that the model allows for different constants for each group, it is also known as the least-squares dummy variables (LSDV) estimator because in order to allow for different constants for each group, it includes a dummy variable for each group. Fixed effect estimations also suggest that it is crucial to consider parameter heterogeneity to understand the effects of profitability for the different banks. Specifically, we examine the impact of non-interest income on banks' profitability by specifying the profitability model in a compact form as:

$$PRO_{it} = f(NII_{it}, NPL_{it}, TOC_{it}, INF_{it}, PC_{it}, \varepsilon_{it}) \quad (1)$$

$i = 1, 2, \dots, N; t = 1, 2, \dots, T.$

where PRO_{it} is a vector of profitability; NII_{it} is non-interest income; NPL_{it} is non-performing loan; TOC_{it} is total overheads cost; INF_{it} represents inflation, PC_{it} represents private credit while ε_{it} is the error term; i and t are the bank and time indices respectively.

To examine the impact of income on profitability, we re-write equation (1) as follows:

$$PRO_{it} = \alpha_1 + \alpha_2 NII_{it} + \alpha_3 NPL_{it} + \alpha_4 TOC_{it} + \alpha_5 INF_{it} + \alpha_6 PC_{it} + \varepsilon_{it} \quad (2)$$

We include the square term of non-interest income in order to examine whether it exhibits a threshold effect. The study also hypothesizes that non-interest income affects profitability through non-performing loans. On this score, we include a multiplicative interactive term of non-interest income and non-performing loans into the profitability equation in (2). This produces equation (3) below:

$$PRO_{it} = \alpha_1 + \alpha_2 NII_{it} + \delta NII_{it}^2 + \alpha_3 NPL_{it} + \alpha_4 TOC_{it} + \alpha_5 INF_{it} + \alpha_6 PC_{it} + \rho(NII_{it} \times NPL_{it}) + \varepsilon_{it} \quad (3)$$

We estimate equation (3) using the fixed effects approach where the constant term; β_i is taken as group-specific hence allowing for different values for each group. On this score, this approach is also known as the least-squares dummy variables estimator. Following from this, we re-write equation (3) in matrix notation of the form:

$$Y = D\varphi + Z\gamma + \varepsilon$$

$$Y = \begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_N \end{pmatrix}_{NT \times 1} \quad D = \begin{pmatrix} i_T & 0 & \cdots & 0 \\ 0 & i_T & \ddots & 0 \\ \vdots & \vdots & \cdots & \vdots \\ 0 & 0 & \cdots & i_T \end{pmatrix}_{NT \times N} \quad Z = \begin{pmatrix} Z_{11} & Z_{12} & \cdots & Z_{1k} \\ Z_{21} & Z_{22} & & Z_{2k} \\ \vdots & \vdots & & \vdots \\ Z_{N1} & Z_{N1} & & Z_{NK} \end{pmatrix}_{NT \times K} \quad (4)$$

$$\text{While } \varphi = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_N \end{pmatrix}_{NT \times 1} \quad \text{and} \quad \gamma^1 = \begin{pmatrix} \gamma_1 \\ \gamma_2 \\ \vdots \\ \gamma_N \end{pmatrix}_{k \times 1}$$

where the dummy variable permits different group-specific estimates for each of the constants for all the different banks. Thus, although the constants may differ across the different sections, each individual's intercept is time invariant over time. This notwithstanding, we examine whether to allow the different intercepts for each group using the standard F -statistics which test the null hypothesis that all $\beta_1, \beta_2, \dots, \beta_N$ are homogenous against heterogeneous alternative hypothesis. Our F test statistic is computed as:

$$F = \frac{(R_{FE}^2 - R_{CC}^2) / (N-1)}{(1 - R_{FE}^2) / (NT - N - k)} \approx F(N-1, NT - N - k) \quad (5)$$

where R_{FE}^2 represent the coefficient of determination of the fixed effect model while R_{CC}^2 is the coefficient of determination of the common constant model. We have evidence to reject the null hypothesis if the computed F -statistic is sufficiently larger than the F -critical and the associated p -value is less than the conventional significance levels at 1%, 5% and 10%.

4.2.2. The random effects method

According to Green (2000), the difference between fixed and random effect is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model not whether the effects are stochastic or not. Hence the variability of the constant for each section comes from the fact that:

$$\alpha_i = \alpha + v_i \quad (6)$$

where v_i is a zero mean standard random variable. The random effects model therefore takes the following form:

$$PRO_{it} = (\alpha + v_i) + \alpha_2 NII_{it} + \delta NII_{it}^2 + \alpha_3 NPL_{it} + \alpha_4 TOC_{it} + \alpha_5 INF_{it} + \alpha_6 PC_{it} + \rho(NII_{it} \times NPL_{it}) + \varepsilon_{it} \quad (7)$$

5. Findings and discussion

This section presents and discusses findings based on the empirical estimations on the effect of income diversification on profitability of banks using fixed and random effects approach. Profitability is proxied using return on asset and return on equity while income diversification and credit risk are measured by non-interest income and non-performing loans respectively. To examine the robustness of the findings, the measures of profitability are alternated.

5.1. Descriptive statistics

This section of the study presents the descriptive statistics of the variables in Table 2. The aim here is to present some basic statistics on the variables.

TABLE 2: DESCRIPTIVE STATISTICS

	ROA	ROE	NII	NPL	TOC	INF	PC
Mean	2.264	16.332	3.79e+07	-1.552	-6.21e+07	13.430	16.374
St. Dev	3.625	22.750	4.81e+07	3.538	1.03e+08	3.616	2.631
Skewness	-2.501	-2.555	1.897	-7.336	-2.648	0.212	-0.067
Kurtosis	12.016	14.677	7.417	65.134	11.140	1.459	2.570
Observations	110	110	110	110	110	110	110

Notes: ROA, ROE, NII, NPL, TOC, INF and PC respectively denote return on assets, return on equity, non-interest income, non-performing loans, total overheads cost, inflation and private credit.

From Table 2, on the measures of profitability, we find that, irrespective of the type of bank, a typical bank makes an average return on assets of 2.264% with a standard deviation of 3.625 while the mean of return on equity is exceedingly higher and measures at 16.332% with a corresponding higher standard deviation of 22.750. Return on assets is heavily skewed to the left where the median is greater than the mean. Values of the skewness and kurtosis give pointers to the normality distribution of the variables which requires zero skewness and kurtosis value of three. Given this, our finding shows that the return on assets is not normally distributed suggesting that the return on assets distribution is leptokurtic. Return on equity is even more leptokurtic, having regard to its non-normal distribution relative to values of its skewness and kurtosis.

On the macroeconomic variables, financial development proxied by private credit averaged 16.374%. The values of the skewness and kurtosis suggest that, the distribution of private sector is almost normally distributed. Thus, the low values of private credit reflect the country's underdeveloped domestic financial market. This is consistent with recent studies on financial sector development in Africa (see for instance Ibrahim and Sare, 2018; Ibrahim, 2018; Ibrahim and Alagidede, 2017; 2018).

5.2. Empirical results based on the fixed effects estimations

This section presents findings on the effect of income diversification on profitability of banks. We first present results based on the fixed effects as shown in Table 3.

TABLE 3: FIXED EFFECTS RESULTS

	1	2	3	4	5
Constant	1.492765 (.4517) [0.001]	2.1324 (.4425) [0.000]	-1.0401 (2.1632) [0.632]	-1.59807 (2.2441) [0.478]	-1.9281 (2.2298) [0.389]
NII	2.04e-08** (8.61e-09) [0.020]	2.78e-08*** (1.04e-08) [0.009]	1.37e-08 (1.26e-08) [0.279]	-3.90e-09 (2.25e-08) [0.863]	1.02e-08 (2.38e-08) [0.669]
NPL		0.3599*** (0.0847) [0.000]	0.31852*** (0.08193) [0.000]	0.3160*** (0.082029) [0.000]	0.2843*** (0.0832) [0.001]
TOC		5.79e-09 (5.08e-09) [0.257]	6.05e-09 (4.86e-09) [0.216]	7.61e-09 (5.14e-09) [0.142]	6.56e-09 (5.12e-09) [0.203]
INF			-0.2973*** (0.09554) [0.002]	-0.32105*** (0.09886) [0.002]	-0.3006*** (0.0986) [0.003]
PC			0.46717*** (0.17188) [0.008]	0.546616*** (0.19153) [0.005]	0.5399*** (0.1896) [0.005]
NII ²				9.01e-17 (9.56e-17) [0.348]	4.94e-17 (9.76e-17) [0.614]
Transmission channel					7.37e-09* (4.31e-09) [0.091]
Diagnostics					
R-squares:					
Within	0.0536	0.2097	0.2934	0.1997	0.3214
Between	0.0692	0.0013	0.0620	0.1570	0.1641
Overall	0.0553	0.1382	0.2001	0.1997	0.2212
Rho	0.2147	0.2813	0.2994	0.30416	0.3038
F-statistic	5.61	8.58	7.89	6.72	6.29
p-value	0.0198	0.0000	0.0000	0.0000	0.0000

Notes: *, ** and *** denote significance at 10, 5 and 1% levels respectively and () and [] denote standard error and *p*-value respectively.

In column 1 where only non-interest income is used as the independent variable, we find a positive and significant effect of non-interest income on profitability proxied by return on assets. In particular, the coefficient of non-interest income is 2.04e-08 suggesting that a 1% increase in income diversification increases profitability by 2.04e-08%. The implication is that higher diversification spurs banks' profitability. Thus, non-interest income is expected increase profitability

since many authors regularly attribute record bank profitability in recent years to the significant growth of noninterest income. This finding is consistent with Doumpos *et al.*, (2016), who concluded that revenue diversification is more beneficial for banks working in developing countries as compared to banks in developed countries. In column 2, we control for non-performing loans and total overheads cost in examining their effect on profitability. In this regression, the coefficient of non-interest income does not only maintains its positive and significant effect on return on assets, the magnitude of effect increased. More specifically, a unit-percentage increase in non-interest income spurs banks' profitability significantly by 2.78e-08%. The view that, non-interest income is profit-enhancing is consistent with the findings of Ahamed (2017) whose findings show that higher share of non-interest income leads to higher profitability of banks in India. This notwithstanding, our evidence does not support Lee *et al.*, (2014) whose study suggest that, while non-interest activities of Asian banks reduce risks, they do not increase profitability. Total overheads cost is also positive with coefficient value 5.79e-09 which suggests that 1% increase in income diversification increases profitability by 5.79e-09%.

Unlike the non-performing loans, total overheads cost is statistically insignificant which means that it has no impact on profitability of banks, that is total overheads effect on income diversification is statistically equal to zero. This finding is inconsistent with the study of Eldomiaty *et al.*, (2015) who in their results revealed that operating expenses are positively associated with bank profitability. To examine how macroeconomic variables influence profitability, we include private credit and inflation as key variables in the return on assets regression in column 3. We observe that, the coefficient of private credit is positive suggesting that increases in financial sector development spur profitability while that of inflation is negatively associated with return on assets. The impact of private credit and inflation is both significant at conventional levels. Indeed, higher inflation may imply higher consumption expenditure and reduced savings and deposits. To the extent that banks make profit based on customer deposits suggest that bank profit falls with lower deposits. Thus, the dampening effect of inflation is intuitive and consistent with Demirguc-Kunt *et al.*, (1999). They argue that higher inflation rate increases uncertainty and reduces demand for credit. However, the significance of private credit could be attributed to the development of the financial markets. However, financial sector development enables banks become more efficient with sound corporate governance, and reduction in transaction costs which may subsequently translate into higher profit.

Beyond the impact of macroeconomic variables, we determine threshold effect in column 4 by including the square term of non-interest income into the profitability equation in addition to the bank-specific and macroeconomic variables. From the table, at the level effect, the coefficient of non-interest income is positive and the square term is also positive and since both are positive, we can conclude that there is no threshold effect of income diversification on profitability of banks in Ghana.

With regard to the transmission channel, we aim to determine how income diversification affects profitability via non-performing loans. Four outcomes are notable. If the coefficient of both α_2 and ρ are negative, it means income diversification does not promote profitability and non-performing loans increases the negative effect of income diversification on profitability. Also, if the coefficient of both α_2 and ρ are positive, it means income diversification increases profitability and non-performing loans heighten the positive relationship between non-performing loans and profitability. Again, if the coefficient of both α_2 is negative and ρ is positive, it means income diversification does not promote profitability and non-performing loans dampen the negative effects of income diversification on profitability. Finally, if the coefficient of both α_2 is positive and ρ is negative, it means income diversification increases profitability and non-performing loans dampen the positive effects income diversification on profitability.

Our findings from Table 3 reveal that the coefficient of the transmission channel is positive and statistically significant. Given the positive coefficient of the non-interest income, our evidence based on column 5 implies that income diversification increases profitability and non-performing loans heighten the positive relationship between non-interest income and profitability. Our findings in column 5 however show that, the level effect of non-interest income coefficient is positive and insignificant at all conventional levels.

5.2.1. Sensitivity analysis

This section presents findings based on the random effects approach where profitability is proxied by return on equity.

From Table 4, column 1 where non-interest income is used as the independent variable, we find a positive and significant effect of non-interest income on profitability. In particular, the coefficient of non-interest income is 1.93e-08 suggesting that a 1% increase in income diversification increases profitability.

TABLE 4: RANDOM EFFECTS RESULTS

	1	2	3	4	5
Constant	1.5360 (0.6399) [0.016]	2.1343 (0.6738) [0.002]	-0.8724 (2.1457) [0.684]	-1.2188 (2.1877) [0.577]	-1.6429 (2.1940) [0.454]
NII	1.93e-08** (7.76e-09) [0.013]	2.59e-08** (1.02e-0) [0.012]	1.40e-08 (1.18e-08) [0.237]	5.20e-08 (1.98e-08) [0.979]	1.27e-08 (2.12e-08) [0.549]
NPL		0.3437*** (0.0841) [0.000]	0.3069*** (0.0812) [0.000]	0.3084*** (0.0808) [0.000]	0.2775*** (0.0817) [0.001]
TOC		5.08e-09 (4.89e-09) [0.300]	4.84e-09 (4.71e-09) [0.304]	6.26e-09 (4.89e-09) [0.201]	5.62e-09 (4.87e-09) [0.248]
INF			-0.2957*** (0.0951) [0.002]	-0.3145*** (0.0967) [0.001]	-0.2960*** (0.0960) [0.002]
PC			0.44934*** (0.1627) [0.006]	0.5066*** (0.1737) [0.004]	0.5102*** (0.1729) [0.003]
NII ²				8.04e-17 (8.77e-17) [0.359]	4.34e-17 (8.98e-17) [0.629]
Transmission channel					7.40e-09* (4.21e-09) [0.079]
Diagnostics					
R-squares:					
Within	0.0536	0.2097	0.2927	0.2988	0.3207
Between	0.0692	0.0019	0.0217	0.0733	0.0709
Overall	0.0553	0.1387	0.2054	0.2100	0.2280
Rho	0.1751	0.2292	0.2506	0.2919	0.3344
F-statistic	6.16	24.62	38.45	42.564	53.679
p-value	0.0131	0.0000	0.0000	0.0000	0.0000

Notes: *, ** and *** denote significance at 10, 5 and 1% levels respectively and () and [] denote standard error and p-value respectively.

To examine how macroeconomic variables influence on profitability, we include private credit and inflation as key variables in the return on equity equation in column 3. We observe that, the coefficient of private credit is positive suggesting that increases in financial sector development spur profitability while that of inflation is negatively associated with profitability. Both effects are significant at conventional levels.

Beyond the impact of macroeconomic variables, we determine threshold effect in column 4, we find that, the coefficients of the level and threshold effects are both positive albeit insignificant confirming the earlier findings based on the fixed effect estimation. Thus, there is no threshold effect of income diversification on profitability. On the side of transmission channel, our findings in column 5 indicate a positive and significant coefficient of the interactive term consistent with the earlier findings.

6. Conclusion and policy implications

Examining income diversification impact on banks' profitability is vital for overall health of the banking sector. In this study, the impact of income diversification on banks' profitability in Ghana is examined relying on data from 10 banks over the period 2006 to 2016. We find that, that higher non-interest income spurs profitability although the effect is not statistically robust. Further results also suggest that, the effect of income diversification on profitability is monotonic and does not show evidence of threshold. On the channels of manifestation, the study observes that, income diversification increases profitability and non-performing loans heighten the positive relationship between non-interest income and profitability.

The findings have important implications for managers and regulators in the banking industry in Ghana and other developing countries in the sense that the study revealed that, banks can diversify beyond interest-generating activities in order to increase their financial position and remain competitive.

Given the findings of this study, it would be interesting to see how the results turn out using more banks over a relatively longer period. It is imperative to note that, both fixed and random effects techniques do not control for potential endogeneity and for that matter, further studies could consider relying on estimation approach that addresses possible endogeneity eminent in the data. Lastly, we suggest further research in this area in different geographical location in showing whether findings on income diversification-profitability link is location-specific.

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