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Revenue diversification and quality of loan portfolio

Abstract

Aim/purpose – This paper aims at examining the impact of revenue diversification on the quality of loan portfolio. The interest has been stimulated by the growing appetite for nontraditional activities among banks due to the declining interest income and rising nonperforming loans.

Design/methodology/approach – The study considers a sample of 67 countries and quarterly banking sector financial reports over the period 2016Q1-2018Q4. The data are extracted from the International Monetary Fund Financial Soundness Indicators (FSI) database and are analysed through fixed effect regression as supported by the Hausman test.

Findings – The study finds that revenue diversification impairs the quality of the loan portfolio. The findings are attributable to loss of focus, lack of expertise in managing non-lending activities, and possible agency problems. Moreover, the study controls for several banking sector-specific factors that affect the quality of loan portfolio. The results show that credit growth and banking sector performance improve the quality of loan portfolio quality. However, the banking sector capitalisation and cost efficiency lower the loan portfolio rate, but the banking sector size has no significant effect.

Research implications/limitations – Based on the findings, the study recommends that practitioners and regulators focus on innovative loans appraisal and monitoring practices instead of diversifying into non-interest generating activities.

Originality/value/contribution – Unlike previous studies that focused on the relationship between income diversification and bank performance, this study contributes to the literature by examining the relationship between revenue diversification and quality of loan portfolio, thus bringing in a new insight into the bank revenue diversification debate.

1. Introduction

The banking sector plays a pivotal role in financial intermediation by channelling funds from lenders to borrowers, thus it is an essential pillar for economic growth and financial stability (Balcilar, Gupta, Lee, & Olasehinde-Williams, 2018). Specifically, studies show that the sector influences entrepreneurial activities (Toms, Wilson, & Wright, 2019), resource allocation (Dwyer, 2018), poverty alleviation (Honohan, 2004; Abdin, 2016), education (Sun & Yannelis, 2016) and agriculture (Bustos, Garber, & Ponticelli, 2016). Moreover, monetary policies are transmitted through the financial sector, making banks among the economy's highly regulated entities (Valla, Saes-Escorbiac, & Tiesset, 2006). Therefore, an efficient banking sector is essential for the smooth functioning of the economy.

Nevertheless, the banking sector continues to grapple with a myriad of performance impediments such as mounting nonperforming assets, deregulation and financial liberalisation, the outburst of financial technologies and stiff competition from non-banking entities, which have distorted the lending business as shown by the deteriorating quality of loan portfolio (Laryea, Ntow-Gyamfi, & Alu, 2016). Empirical studies across developing and developed economies have also revealed that bank failure is usually preceded by high nonperforming loans (Zhang, Cai, Dickinson, & Kutan, 2016). Moreover, Jolevska & Andovski (2015) noted that the quality of loan portfolio influences future banks' strategies and ultimately their financial performance.

Banks are now devising innovative, non-traditional activities such as underwriting, investment banking, and securities brokerage that generate non-interest income as a supplement to declining interest income. Though the impact of revenue diversification on bank performance has been examined in the extant finance and management literature (Brighi & Venturelli, 2014; Chiorazzo, Milani, & Salvini, 2008; Gurbuz, Yanik, & Ayturk, 2013; Molyneux & Yip, 2013; Brahmana, Kontesa, & Gilbert, 2018) no study has examined the impact of revenue diversification on the quality of loan portfolio bearing in mind that the primary function of banking firms is the creation of loans. Furthermore, engaging in both lending and non-lending activities might lead to cross-subsidisation, cross-selling, agency conflict, fragmentation, and loss of focus, which can either

be an incentive or disincentive for the lending business (Abedifar, Molyneux, & Tarazi, 2014; Cosci, Meliciani, & Sabato, 2012). From this background, this paper seeks to investigate the effect of revenue diversification on the quality of the banking sector loan portfolio.

In an attempt to answer this research question, this paper is organised as follows: The next section reviews the literature on revenue diversification and quality of loan portfolio. The Section 3 focuses on the research methodology, including the empirical model, measurement of variables, and data. Finally, the main findings, discussion, and conclusions, and recommendations are presented in Sections 4 and 5.

2. Literature review

In recent years, the primary concern to policymakers and practitioners has been the deteriorating quality of loan portfolio that has led to the global financial crisis and the banking sector's fragility. A bank's loan portfolio, the aggregate of loans and advances made to the borrowers or appearing on the balance sheet, is the primary source of revenue and determinant of survival. Therefore, country's banking sector financial health is manifested by the quality of its loan portfolio. In the finance literature, the quality of the loan portfolio is also referred to as a portfolio at risk or credit risk (Satta, 2006).

According to Westley (2002), the portfolio at risk is the share of unpaid principal balance of all outstanding loans contaminated by arrears and, therefore, at higher risk of not being repaid. While Sector (2002) considers portfolio at risk as the value of all loans outstanding that have one or more instalments of principal past due more than a certain number of days. Since banks' ability to meet their obligation to a depositor depends on borrowers' willingness and ability to pay loans promptly, researchers have devoted considerable effort to understand the factors responsible for deteriorating loan portfolios' quality. Form a practical perspective, bank managers and regulators use the ratio of nonperforming loans to total loans (NPLs) and loan loss provision to total loans (LLP) as the indicator of the quality of loan portfolio (Pop, Cepoi, & Anghel, 2018).

The recent global financial crisis has cast doubt on the current intermediation-based revenue model's long-term sustainability. Thus, since credit creation is the primary source of revenue for commercial banks, the quality of loan portfolio quality is the primary determinant of banks' profitability. Besides, studies have established that low loan portfolio quality is a significant cause of economic stagnation and financial distress among banks (Hou & Dickinson, 2007).

Over time, studies have shown that the quality of loan portfolios is influenced by both macro-economic (Gulati, Goswami, & Kumar, 2019) and bank-specific factors (Hasanov, Bayramli, & Al-Musehel, 2019). A study by Louzis, Vouldis, & Metaxas (2011) in Greece used a sample of nine banks and data for 2003-2009 found that GDP, unemployment rate, interest rates, sovereign debt, and management quality had a positive influence on the quality of loan portfolio. Similar findings were reported by Messai & Jouini (2013), who studied 85 banks in three countries (Italy, Greece, and Spain) from 2004 to 2008. While Saba, Kouser, & Azeem's (2012) study focused on the U.S. banking sector singled out real GDP and inflation. These findings were replicated by Škarica (2014), who considered seven countries from Central and Eastern Europe and data from 1985 to 2010.

Akinlo & Emmanuel (2014) found that unemployment, credit to the private sector, lending rate, and exchange rate exert a positive influence on Nigeria's quality of loan portfolio. Amuakwa-Mensah & Boakye-Adjei (2015) established that real effective exchange rate, real GDP per capita growth, and previous year's inflation rate had an essential influence on Ghana's loan portfolio. Sheefeni (2015) investigated the bank-specific determinants of loan portfolio quality in Namibia and data from 2001 to 2014. The findings of this study show that return on assets, return on equity, and the ratio of total loan to total investment and bank size influenced the quality of loan portfolio. Using a cross-country analysis from the sample of 25 emerging countries and panel data, Radivojevic & Jovovic (2017) examined macro-economic and bank-specific factors that affect loan portfolio quality and found that GDP, inflation, return on asset, the ratio of bank's capital to assets, net interest margin ratio and loan loss provision affected the quality of loan portfolio. In the same line of research, Ghosh (2015), using a sample of 50 commercial banks and saving institution in the U.S. and data for the period 1984 to 2013, found that greater capitalisation, liquidity risks, low credit quality, more significant cost inefficiency, and bank size lowered portfolio quality, while high profitability improved portfolio quality.

Despite the contribution of these studies to the effort of understanding the determinants of quality of loan portfolio, none has investigated the effect of revenue diversification on loan portfolios' quality. Furthermore, revenue diversification has been a central topic of research due to the global financial sector liberalisation and competition, which have motivated banks to venture into non-traditional services. Revenue diversification is a broad concept that means expanding into new activities or operations that generate additional income. In the

context of the banking sector, revenue diversification refers to expanding into non-lending activities, such as underwriting, property management, and stock brokerage, that generate non-interest income. Revenue diversification is grounded on the modern portfolio theory, as articulated by Markowitz (1952), which claims that revenue diversification allows banks to minimise risks and maximise profits since interest income and non-interest income are imperfectly correlated. Moreover, by engaging in non-lending activities, banks can leverage managerial skills and benefit from economies of scope.

A few studies have also examined the intersection between lending and non-lending activities. Busch & Thomas (2009) investigated the revenue diversification in the German banking sector using panel data for 1995 and 2007. The study found that highly diversified banks charged lowered interest margins when credit risk is controlled. These findings confirmed the existence of cross--subsidisation between lending and non-lending activities. In another study, Abedifar et al. (2014) investigated the impact of non-interest income businesses on bank lending. The study used quarterly data from 8,287 U.S. commercial banks over 2003-2010. The findings revealed that non-lending activities lowered. In the same line, Stiroh (2002) examined revenue diversification in the U.S. banking sector with over 15,000-year observations for 1978-2000 and found that interest income and non-interest income were positively correlated. The findings revealed the presence of cross-selling and increased loan commitments.

In line with the existing empirical literature, a set of control variables are added to the econometric model to ensure that other explanatory factors do not confound the studied relationship. Low-capitalised banks assume enormous risk since they face the lower potential loss of capital. Thus, managers are likely to expose the bank's loan portfolio to more risks, ultimately escalating NPLs (Berger & DeYoung, 1997). Another critical determinant of the loan portfolio's quality is cost efficiency, referred to as the 'skimping' hypothesis. In the case where banks deliberately fail to allocate sufficient resources in screening and monitoring borrowers, they would appear as efficient in the short run; however, the NPLs would increase in the long-run (Abid, Ouertani, & Zouari-Ghorbel, 2014), implying that a high level of cost efficiency deteriorates the quality of loan portfolio (Salas & Saurina, 20002). Highly profitable banks have fewer incentives to engage in high-risk activities (Ghosh, 2015). A positive relationship between bank performance and NPLs shows leniency in credit management. Managers allocate fewer resources to monitoring, appraisal, and screening borrowers to report higher earnings to boost investors' confidence. Thus, bank performance has a significant influence on NPLs.

Studies also show that credit growth affects the loan portfolio's quality (Salas & Saurina, 2002). An increase in the supply of loans is likely to be accompanied by a reduction in the interest rate and lower minimum credit standards. However, lowering credit standards increases loan defaults by borrowers, excessive lending (Klein, 2013). The bank's size is used to test the 'too big to fail hypothesis,' which assumes that large banks take excessive risks by increasing their leverage too much, extending loans to lower-quality borrowers, and therefore having more NPL (Beccalli, Anolli, & Borello, 2014). Conversely, low efficiency shows bad management, where the manager is reluctant to follow the set standard practices of loan monitoring, controlling. Besides, large banks have more incentives to engage in income diversification. The definition and proxies for all the variables are shown in Table A of the appendices. For this purpose, the study estimates the empirical relationship as below.

3. Research methodology

3.1. Research model

This study examines the impact of revenue diversification on the quality of loan portfolio. The causal relationship is between the explanatory variable (revenue diversification) and the dependent variable (quality of loan portfolio). Several banking sector variables (credit growth, cost inefficiency, size, performance, and capitalisation) are incorporated as control variables as shown by the model below.

$$QLP_{it} = \alpha_0 + \beta_1 RD_{it} + \beta_2 CE_{it} + \beta_3 BC_{it} + \beta_4 BS_{it} + \beta_5 CG_{it} + \beta_5 BP_{it} + \varepsilon_{it}$$

where:

QLP_{it} – the quality of loan portfolio quality in period t for the cross-sectional unit i.

RD_{it} – the revenue diversification in period t for the cross-sectional unit i.

CIE_{it} – the banking sector cost inefficiency in period t for the cross-sectional unit i.

BC_{it} – the banking sector capitalisation in period t for the cross-sectional unit i.

BS_{it} – the banking sector size in period t for the cross-sectional unit i.

CG_{it} – the credit growth in period t for the cross-sectional unit i.

BP_{it} – the banking sector performance in period t for the cross-sectional unit i.

ε_{it} – the error term.

α_0 – the intercept.

$\beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 – the beta-coefficients.

i – the cross-section units (67 countries).

t – the period (2016Q1 to 2018Q4).

3.2. Measurement of variables and data

The study has three sets of variables; the dependent variable, independent variable, and control variables, whose measurements and definitions are indicated in Table B of the appendices.

The study considers a sample of 67 countries and quarterly banking sector financial reports for 2016Q1–2018Q4. The data was obtained from the IMF's Financial Soundness Indicators (FSI) database (2007-2017). In total, the study used 804 observations.

4. Research findings

The descriptive statistics, for the raw data, of the research variables are presented in Table 1.

Table 1. Summary statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Quality of Loan Portfolio	804	0.08	0.09	0.00	0.58
Revenue Diversification	804	0.45	0.06	0.16	0.50
Cost inefficiency	804	0.59	0.12	0.29	0.96
Size	804	6.02	1.22	3.12	8.90
Capitalisation	804	0.12	0.05	0.03	0.48
Performance	804	0.13	0.07	-0.23	0.29
Credit Growth	804	0.63	0.16	0.13	1.05

Before applying panel data estimation equations, it is a standard practice to transform the data through log transformation, first difference, or any other method to normalise the data and remove heteroskedasticity. Although, Lütkepohl & Xu (2009) contend that log transformation is accurate, log transformation can produce a downward bias during estimation. Therefore, to remedy this shortcoming, all the variables were first converted into first differences and expressed as a percentage change.

Before establishing the empirical relationship between variables there is a need to conduct several diagnostic tests, particularly for panel data. Unit root was tested through Levin-Lin-Chu, Breitung, Fisher-AD, and Im-Pesaran-Shin. As shown in Table A (Appendices), the results ruled out the presence of unit root. Multicollinearity exists if the VIF factor is greater than 10. As illustrated in Table D (Appendices), the variance inflation factors range between 1.16 and 1.06, suggesting a low probability of multicollinearity in econometric analysis.

Additionally, the study tested for autocorrelation between the models' error terms using the Wooldridge test for autocorrelation, as shown in Table C (Appendices). The test results negated the presence of autocorrelation.

Given that the study uses panel data, the data is analysed using panel data analysis techniques. The study's hypothesis is tested using the fixed effect regression results as supported by the results of the Hausman test (results shown in Table E, Appendices). However, for presentation purposes, the results for three estimation models, fixed effect regression, random effect model, and the ordinary least square, are presented in Table 2. Based on the findings, revenue diversification has a positive and significant effect on the quality of loan portfolio ($\beta = 0.041$, $\rho < 0.05$), implying that revenue diversification lowers the banking sector's quality of loan portfolio. The results contradict those of Hu, Li, & Chiu (2004) and the theoretical propositions of modern portfolio theory; that banks can reduce credit risks by broadening their revenue streams. However, the findings are supported by Stiroh's (2004) hypothesis 'dark side of revenue diversification,' which suggests that bank managers may lack the requisite knowledge and experience to handle non-lending activities that expose a bank to higher risks. Moreover, revenue diversification can lead to over-optimism, loss of focus, and overload on senior management leading to poor loan appraisals and monitoring, which eventually increases the level of nonperforming loans. Thus, a low level of revenue diversification improves the quality of loan portfolio by allowing banks to specialise in lending activities.

Table 2. Results of regression analysis

Loan Portfolio Quality	Fixed Effect	Random Effect	OLS
Income diversification	0.041**	0.041**	0.041**
	(2.28)	(2.30)	(2.30)
Capitalisation	0.493**	0.520**	0.521**
	(17.71)	(19.20)	(19.22)
Size	−0.033	−0.005	−0.005
	(−1.30)	(−0.20)	(−0.23)
Cost inefficiency	0.017**	0.019**	0.020**
	(1.97)	(1.87)	(2.18)
Credit growth	−0.096**	−0.086**	−0.087**
	(−5.61)	(5.28)	(5.27)
Performance	−0.030**	−0.029**	−0.029**
	(−2.67)	(−2.64)	(−2.64)
Constant	0.001**	−.001**	−.001**
	(−1.90)	(−2.33)	(−2.37)
R-squared	0.4083	0. 4098	0.4098
Number of obs	804	804	804
Number of countries	67	67	67

Banking sector size has no significant effect on the quality of loan portfolio. These results contradict the argument that large banks have advanced technologies and skilled employees to appraise and monitor loans, hence higher loan portfolio quality (Hu, Li, & Chiu, 2004; Salas & Saurina, 2002). However, the findings are supported by Foos, Norden, & Weber (2014). Cost efficiency has a positive effect on loan portfolio quality. The results are supported by previous studies (Abid et al., 2014; Berger & DeYoung, 1997). Generally, improved cost efficiency precedes increases in nonperforming loans, which implies that banks purposely trade short-run expense reductions for long-run loan quality reductions. The cost-efficient results indicate that banks with higher cost-efficiency have lower loan portfolio quality.

Additionally, the effect of capitalisation on the quality of loan portfolio is significant and positive, which supports the skimming and flawed management hypothesis, as postulated by Berger & DeYoung (1997). The decreases in capital ratios generally precede increases in nonperforming loans for banks with low capital ratios, implying that low capitalised banks respond to moral hazard incentives by taking increased portfolio risks. Further, the findings emphasise the need for banks to increase their capital to strengthen their monitoring incentives; which will ultimately improve their quality of loan portfolio. The effect of bank performance on the quality of loan portfolio is significant and negative. Higher profitability (ROE) contributes to lower NPLs, meaning that well-managed banks have, on average, higher quality of loan portfolios. Credit growth's negative beta coefficient implies that excessive /growth in lending does not necessarily worsen loan portfolio quality through increased NPLs if the lending standards are strictly adhered to. These findings contrast to Foos et al., (2014) who found that excessive lending lowered loan portfolio quality.

5. Conclusions

The quality of loan portfolio is an indicator of the financial health of the banking sector. Therefore, with the increased importance on non-traditional banking activities, this paper sought to examine whether revenue diversification affects the quality of loan portfolios. The hypothesis was tested using the quarterly aggregate banking sector annual final data of 67 countries over 2016 and 2018.

The empirical results revealed that revenue diversification lowers the loan portfolio's quality, which is inconsistent with the prepositions of the modern portfolio theory (MPT). However, there are many uncontrollable factors, such as

irrational managerial and market inefficiencies, that impede validation of the theory in practice. Several factors can explain these findings. First, lack of managerial expertise and experience in managing complex non-lending activities and probable loss of focus by diversified banks. Second, the risks and losses associated with non-lending activities are likely to deteriorate the loan portfolio's quality and ultimately expose the bank to credit risks. Third, to leverage on informational economies of scope, managers may opt to engage in cross-selling and loosen their loan monitoring and appraisal policies, leading to higher default and worsen the loan portfolio's quality. Therefore, the study recommends that bank managers and regulators focus on improving lending activities through innovative appraisal and monitoring tools and techniques instead of engaging in non-traditional activities that are likely to jeopardize the loan portfolio. Finally, this study used the aggregate banking sector data; hence future studies can consider bank-level data, which might shed more light on the quality of loan portfolio.

Appendices

Table A. Unit root test

Variable	Levin-Lin-Chu	Breitung	Fisher-ADF	Im-Pesaran-Shin
Quality of loan portfolio	−12.79 (0.00)	−9.45(0.00)	30.05 (0.00)	−2.1256 (0.00)
Income diversification	−10.50(0.01)	−7.92(0.00)	61.71 (0.00)	−2.34 (0.00)
Bank capitalisation	− 15.06 (0.00)	−13.30(0.00)	40.09 (0.00)	−2.27 (0.0)
Bank size	−13.62 (0.000)	−10.28 (0.00)	31.01 0.00)	−2.14 (0.00)
Cost inefficiency	−16.32 (0.00)	−10.35(0.00)	53.33 (0.00)	−2.41 (0.00)
Bank liquidity	−14.67 (0.00)	−11.52(0.00)	40.54 (0.01)	−2.25(0.00)
Bank performance	−16.85 (0.00)	−9.93(0.00)	53.79 (0.00)	−2.39 (0.00)

Table B. Variables description

Variable	Measurement	Previous Studies
Loan portfolio Quality	Ratio of nonperforming loans to total loans	Anastasiou, Louri, & Tsionas (2019); Berger & DeYoung (1997)
Cost inefficiency	Total non-interest expense divided by total operating revenue	Berger & DeYoung (1997); Koju, Koju, & Wang, 2018; Louzis et al. (2012)
Bank capitalisation	Equity capital to asset ratio	Louzis et al. (2012), Berger & DeYoung (1997)
Bank size	Logarithm of bank assets	Koju et al. (2018)
Credit growth	Loan to asset ratio	Koju et al. (2018)
Bank performance	Return to Equity (ROE)	Louzis et al. (2012)

| Income diversification | Hirschman–Herfindahl index (HHI) Diversification = $$\left[1 - \left\{ \left(\frac{INT}{TOR}\right)^2 + \left(\frac{NINT}{TOR}\right)^2 \right\} \right]$$ Where: INT – Amount of net interest income NIN – Amount of non-interest income TOR – Total operating revenue | |

Table C. Wooldridge test for autocorrelation

Wooldridge test for autocorrelation in panel data			
Ho: no first-order autocorrelation			
F(1, 66) = 0.557 Prob > F = 0.4580			

Table D. Variance inflation factor

Variable	VIF	1/VIF
Credit growth	1.16	0.864490
Bank size	1.15	0.871161
Income diversification	1.13	0.886715
Bank capitalisation	1.12	0.890864
Bank performance	1.08	0.926437
Cost inefficiency	1.08	0.927078
Mean VIF	1.12	–

Table E. Hausman Test

	---- Coefficients ----			
	(b)	**(B)**	**(b-B)**	**sqrt(diag(V_b-V_B))**
	Fe	**Re**	**Difference**	**S.E.**
Income diversification	.0406966	.0407945	−.0000978	.0018176
Bank performance	−.0296565	−.0292971	−.0003593	.0004675
Bank size	−.0329656	−.0057734	−.0271922	.011237
Cost inefficiency	.01771	.0194889	−.0017789	.0008013
Bank capitalization	.4928073	.520094	−.0272867	.0063993
Credit growth	−.0962272	−.0869397	−.0092874	.0047957
b = consistent under Ho and Ha; obtained from xtreg B = inconsistent under Ha, efficient under Ho; obtained from xtreg Test: Ho: difference in coefficients not systematic chi2(6) = (b − B)'[(V_b − V_B)^(−1)](b − B) = 28.95 Prob>chi2 = 0.0001 (V_b − V_B is not positive definite)				

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