Attribute of Revenue Diversification to Commercial Banks' Profitability: Empirical Evidence in Vietnam

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Abstract
This study conducts a quantitative study on the impact of revenue diversification on the profitability of 25 commercial banks currently operating in the Vietnamese market. The quantitative research results with the support of panel regression models such as pooled OLS, random effect model, fixed effect model and robustness enhancing techniques have revealed the negative impact of revenue diversification on the profitability of commercial banks. Interestingly, the impact varies across the banks' ownership structure with the state-owned commercial banks experience leveraged influence. These research results provide a reliable empirical basis for proposing a number of solutions to enhance the profitability of Vietnamese commercial banks in future tailored to different bank types.
Keywords: Revenue, Revenue Diversification, Commercial Banks, Profitability

Introduction

Commercial banks (CBs) are one of the key entities in the economy, acting as financial intermediaries, providing capital for the economy, and offering financial services to individuals and businesses. Profit is one of the most important indicators reflecting the operational efficiency of CBs. In the context of increasingly deep international integration and intense competition among CBs, revenue diversification is one of the critical strategies for banks to increase profits and enhance competitiveness.

Globally, CBs tend to diversify their operations due to competitive pressures or the allure of profits from financial investment activities (DeYoung & Roland, 2001). In Vietnam, competition among CBs is also fierce, with a growing presence of foreign branch banks. Additionally, the digital economy is rapidly developing, and digital banking services are becoming increasingly diverse, leading banks to compete in the race to develop digital banking.

However, the global economy is currently recovering from the pandemic while facing numerous challenges from global economic and political instability, which significantly

impacts Vietnam's economy in general and the commercial banking system in particular. Production is stagnant, the real estate market is frozen, and the rate of bad debts in banks is rising, while borrowing levels are declining. Despite reduced lending rates and various incentives, attracting businesses to borrow remains a challenge. This situation severely affects the ability of CBs to generate profits and maintain sustainable operations and call for solutions to enhance business efficiency and competitiveness of CBs is increasingly essential. In this regard, diversification of revenue sources could be one of potential solution to facilitate banks in expanding their market penetration, improving their profitability and driving up their competitive advantages. Yet, this potential solution has held controversal discussion over years, which requires additional and reliable emprical evidence.

There have been a number of studies investigating the impact of diversification on bank profits and providing inconsistent results. Meanwhile, Vietnam, the scale of relevant studies is limited and most studies are conducted before the COVID-19 pandemic and have not comprehensively assessed the degree and effectiveness of diversification activities for banks during the recovery phase post-pandemic.

Tapping on those research gaps, our study aims to bring additional and valuable contributions to the research field of banks' profitability and their income diversification. In particular, your study's novel contributions concentrate on: First, our paper enriches the theoretical background on the banking performance with the attribute of the revenue diversification; Second, our research findings add empirical evidence and value to the research area of banks' performance; Third, our study pursue a more conservative approach with the inclusion of Covid-19 pandeminc into the assessment process of the linkage bewteen the revenue diversification and the profitability of banks, and this enables to draw effective and feasible recommendations towards improving banks' operational performance; Fourth, the aformentioned linkage is further tested for the potential of inconsistency accross banks' size and ownership structure (state-owned banks and private commercial banks); Last, the research findings benefit the commercial banks by providing reliable empirical evidence for proposing several solutions to enhance the profit efficiency of Vietnamese CBs in the near future.

The rest of the paper is structured with literature review section follows the introduction, which enables the authors to detect the reasearch gap as well as highlight the contributions of the study and designing the research methodology introduced in section 3. The research results are presented and discussed in section 4 to lay a firm foundation for proposing solutions in section 5.

Literature Review

It is evident that although many studies have been conducted globally regarding the effect of diversification on bank profitability, the findings are inconsistent. Some studies suggest that revenue diversification helps banks improve profitability and enhance competitiveness (Elas et al., 2010; Lee et al., 2014; Hughes et al., 2001; Tuan et al., 2018; Moudud-Ul-Huq et al., 2018; Quynh et al., 2019). Elsas et al (2010), uses data from 9 developed countries (Australia, Canada, France, Germany, Italy, the United Kingdom, the United States, Spain and Switzerland) over the period 1996–2008 to analyze the impact of diversification on bank value. The results show that diversification helps banks increase

profits by expanding income sources and reducing risks. In addition, diversification also contributes to the financial stability of banks, helping them better withstand economic fluctuations.

Diversification can improve the performance of banks by taking advantage of economies of scale (Hughes et al., 2001). Through activities such as cross-selling different financial products, reusing input resources across different services, and sharing supervisory functions across different banking operations, banks can operate more efficiently. In addition, by implementing unified promotional strategies across multiple products, banks can reduce costs while expanding their customer reach (Hughes et al., 2001). This approach not only cuts operating costs but also maximizes resource utilization, ultimately leading to improved overall performance and competitiveness in the financial market.

Diversified banks have higher performance and lower risk. Moudud-Ul-Huq et al. (2018) used banking data from Indonesia, Malaysia, the Philippines, Thailand, and Vietnam for the period 2011–2015 to assess the effect of diversification on commercial banks. The results show that banks generally benefit from diversification; that is,. However, diversification activities bring heterogeneous benefits to banks. While revenue diversification has a strong positive impact on bank performance and stability, the impact of asset diversification varies across countries. Similarly, Quynh et al (2019), studied the relationship between revenue diversification and asset portfolio diversification on the performance of 32 commercial banks in Vietnam from 2000 to 2017 and found that revenue diversification has a positive impact on the performance of commercial banks.

Interestingly, income diversification can improve efficiency, but is limited by unstable non-interest activities (Tuan et al., 2018). Furthermore, Tuan et al (2018), analyzed the relationship between income diversification and bank efficiency in 83 countries during the period 2003–2012, also found that s tate-owned banks are less efficient due to fewer sources of unstable income, while foreign banks in developing countries benefited from diversification after the financial crisis. This emphasizes the role of diversification and bank ownership on performance.

Research on the relationship between revenue diversification and profitability in banks reveals a complex and often contradictory landscape. In addition to the positive impacts of income diversification strategies on the business performance of banks, there are also numerous studies that highlight the negative effects of such activities on specific aspects or the overall effectiveness of banks.

Studies conducted on American and European banks, such as those by DeYoung and Roland (2001), and Chiorazzo et al (2008), indicate that diversification may adversely affect bank profitability. Similarly, Acharya et al (2006), analyzed a sample of 105 Italian banks from 1993 to 1999, concluding that diversification does not enhance operational efficiency or minimize risk. Their findings suggest that for high-risk banks, diversification can lead to reduced profitability and an increase in risky loans, while low-risk banks may achieve a balance between profit and risk through diversification.

Some empirical studies assert that revenue diversification diminishes profitability for commercial banks. Delpachitra and Lester (2013), found that, in their examination of Australian banks from 2000 to 2009, revenue diversification not only decreased profitability but also failed to improve default risk.

Köhler (2014), observing German banks during the period from 2002 to 2012 to examine the impact of non-interest income on bank risk, indicated that non-interest income sources can both reduce and increase risk, depending on the bank's business model. Specifically, banks that focus on retail operations, lending, and accepting savings deposits tend to become more stable when they increase their non-interest income. However, for investment banks, such an increase can significantly heighten bank risk, as diversifying revenue may constrain their investment portfolios.

DeYoung and Rice (2004), examined the impact of non-interest income on the financial performance of commercial banks in the United States, utilizing a sample comprising 37,175 observations from 4,712 banks over the period from 1989 to 2001. The findings indicated that service diversification does not confer benefits to banks. In a preceding study, DeYoung et al. (2001), analyzed 472 U.S. commercial banks during the period from 1988 to 1995. This research posited that income diversification may exacerbate risk and lead to diminished solvency. As banks expand their non-interest income activities, they encounter elevated fixed costs, which result in increased operational leverage and heightened overall risk. Moreover, income sources derived from non-traditional activities exhibit correlations with interest rate volatility, thereby rendering diversification efforts less effective and introducing potential risks for banking instability.

Vo and Tran (2015), studied 37 Viet Nam commercial banks during the period from 2006 to 2013, utilizing the Generalized Method of Moments (GMM) estimation technique. This research asserted that, from a risk perspective, income diversification leads to an increase in risk and a reduction in risk-adjusted profitability for banks. The results further indicated that income diversification does not yield substantive benefits for commercial banks in Vietnam. Lin and Huang (2012), analyzed data from 95 countries and found that while higher levels of diversification generally correlate with lower risk, significant increases in non-interest income could also elevate risk levels, particularly in countries with medium to low income.

Throughout our dicussion on prior relevant literature, it could be seen that empirical evidence on the nexus between the banks' income diversity and their performance bring about different and contrasting findings, which calls for additional, comprehensive and insightful studies. Further, the prevelance and potential impact of Covid-19 has not been incorporated in the research. Those research gaps will be filled in our study.

Data and Research Methodology
Data
According to statistics from the State Bank of Vietnam (SBV), as of December 31, 2022, the system of commercial banks (CBs) consisted of 31 joint-stock commercial banks and 4 state-owned commercial banks. However, as some banks did not fully disclose their annual data, to ensure the balanced nature of the data, the research team utilized data from 25 commercial banks that provided complete annual disclosures. These 25 banks include:

ABBank, ACB, BacABank, BIDV, BanViet Bank, Vietinbank, Eximbank, HDBank, KienLongBank, MB Bank, MSB, NamA Bank, NCB, OCB, PG Bank, SaiGon Bank, SHB, SeABank, Sacombank, Techcombank, TPBank, VietA Bank, Vietcombank, VIB, and VPBank.

The study employs panel data collected from the annual reports and consolidated financial statements of listed Vietnamese commercial banks over the period 2012–2022. Additionally, the research team utilized the S&P Capital IQ Pro database and the financial and securities online information portal Vietstock (http://finance.vietstock.vn). The research team used Stata 17 software for regression analysis and quantitative analysis to assess the impact of revenue diversification on the profitability of Vietnamese commercial banks, categorized by the SBV classification of state-owned and private banks, bank size, and the effects of COVID-19.

Research Methodology

For panel data, the research team applied regression methods such as pooled OLS, fixed effects regression, and random effects regression with the following specific regression process:

The steps include: (1) Descriptive statistics of variables: identifying the dependent variables, independent variables, control variables, and the research model; (2) Analysis of the correlation matrix between variables in the model; (3) Checking for multicollinearity; (3) Regression analysis using common estimation methods in panel data: OLS estimation method, fixed effects estimation method, and random effects estimation method; (4) Using the F-test and Hausman test to select the optimal model; (5) Testing for model defects such as heteroskedasticity and autocorrelation; (6) In the presence of model defects, applying the FGLS (Feasible Generalized Least Squares) method and the GMM (Generalized Method of Moments) method to address these issues.

Similar to the study by Sanya & Wolfe (2011), the research team developed a model to examine the impact of income diversification on commercial banks based on specific portfolios, as follows:

$$ROA_{it} = \beta_0 + \beta_1\,HHI_{rev\_it} + \beta_2 NPL_{it} + \beta_3\,SIZE_{it} + \beta_4 EAR_{it} + \beta_5\,LDR_{it} + \beta_6\,LG_{it} + \beta_7\,CIR_{it} + \beta_8\,COVID_{it} + \beta_9\,HHI_{rev\_it} * QMNH_{it} + \beta_8\,HHI_{rev\_it} * SH_{it} + \beta_8\,HHI_{rev\_it} * COVID_{it} + u_i + \varepsilon_{it}$$

Where: i denotes the i-th bank in the research sample, t represents the time period, and the detailed descriptions of the variables in the research model are presented in Tables 1 and 2 below.

Table 1
Statistical Description of the Variables in the Research Model

$ROA_{i,t}$	The return on assets of bank i at time t
HHI_{rev_it}	Service diversification index of bank i at time t
NPL_{it}	The non-performing loan ratio of bank i at time t
$SIZE_{it}$	The total asset size of bank i at time t
EAR_{it}	The equity-to-assets ratio of bank i at time t
LDR_{it}	The loan-to-deposit ratio of bank i at time t
LG_{it}	The loan growth rate of bank i at time t
CIR_{it}	The cost-to-income ratio of bank i at time t
COVID	A dummy variable that takes the value of 1 in the years 2020, 2021, and 2022, and takes the value of 0 in all other years.
QMNH	A dummy variable representing bank size, taking the value of 1 if it is a large bank and 0 if it is a small bank.
SH	A dummy variable representing bank classification, taking the value of 1 if it is a state-owned commercial bank and 0 if it is a private bank.
ε_{it}	The unobserved residual of bank *i* at time *t*

Table 2
Description of the Variables in the Research Model

Variable name	Acronym	Measurement
Dependent variable		
Return on Assets	ROA	$ROA = \dfrac{Net\ Income}{Total\ Asset} \times 100\%$
Independent variable		
Đa dạng hóa doanh thu	HHI	$HHI_{(rev)} = \left(\dfrac{NON}{NETOP}\right)^2 + \left(\dfrac{NET}{NETOP}\right)^2$
The total asset	SIZE	$SIZE = log\ (Total\ Assets)$
Equity-to-assets ratio	EAR	$EAR = \dfrac{Total\ Equity}{Total\ Asset}$
Loan-to-deposit ratio	LDR	$LDR\ (\%) = \dfrac{Total\ Loans}{Total\ Deposits} \times 100\%$
COVID	COVID	A dummy variable that takes the value of 1 in the years 2020, 2021, and 2022, and takes the value of 0 in all other years.
Size-based assessment	HHI_QMNH	= HHI * QMNH
Ownership classification	HHI_SH	= HHI *SH
Assessment of diversification performance during the COVID-19 perioad	HHI_COVID	= HHI*COVID

Among them, the two main variables in the research model—namely, the level of revenue diversification (independent variable) and the profitability of commercial banks (dependent variable)—are described in detail below. *Level of Revenue Diversification:* The research team employs the HHI (rev) index to measure the level of income diversification of banks based on the relationship between interest income, non-interest income, and total income, using the calculation formula from the study by Sanya & Wolfe (2011):

$$HHI_{(rev)} = \left(\frac{NON}{NETOP}\right)^2 + \left(\frac{NET}{NETOP}\right)^2$$

where: $NETOP = NON + NET$

NON (Non-interest income) is non-interest income. NET (Net interest income) is net interest income, and NETOP (Net operating revenue) is the total operating revenue of the bank.
The profitability of commercial banks: Bank profit is the income earned by the bank after deducting all expenses, and it is a crucial factor in assessing the bank's operational efficiency. In this research paper, the authors use the return on assets (ROA) ratio to measure profitability.

$$ROA = \frac{Net\ Income}{Total\ Assets}\ x\ 100\%$$

Data and Research methodology
Table 3
Descriptive Statistics of Variables

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	275	.8598363	.6703652	8.90e-06	3.237989
HHI	275	.7003364	.979166	.5000093	12.7988
SIZE	275	5.139623	.5047514	4.166866	6.326461
NPL	275	137.64	79.08877	1	270
EAP	275	9.102887	3.58126	4.06177	23.83814
LDR	275	87.70494	16.62888	36.32857	142.8194
LG	275	19.15415	16.12146	-24.59425	106.8167
CIR	275	53.42562	15.14885	22.9814	100.0831
COVID	275	.2727273	.4461737	0	1

Source: Authors' estimates

Table 4
Correlation Coefficient Matrix

	ROA	HHI	SIZE	NPL	EAR	LDR	LG	CIR	COVID	HHI _QMNH	HHI _SH	HHI _COD
ROA	1											
HHI	-0.11	1										
SIZE	0.41	-0.11	1									
NPL	-0.27	0.13	-0.41	1								
EAR	0.29	0.02	-0.49	0.26	1							
LDR	0.52	-0.01	0.27	-0.16	0.12	1						
LG	0.08	-0.07	-0.05	-0.08	-0.09	0.00	1					
CIR	-0.70	0.11	-0.52	0.27	-0.04	-0.52	0.01	1				
COVID	0.36	-0.09	0.30	-0.23	-0.03	0.31	-0.16	-0.34	1			
HHI_QMNH	0.39	-0.09	0.78	-0.27	-0.18	0.33	-0.08	-0.41	0.23	1		
HHI-SH	0.01	-0.06	0.62	-0.26	-0.28	0.17	-0.08	-0.27	-0.01	0.581	1	
HHI_COVID	0.32	-0.08	0.27	-0.22	-0.05	0.27	-0.17	-0.28	0.98	0.214	-0.022	1

Table 5
VIF Test Results

Variables	VIF-1st attempt	VIF-2nd attempt
SIZE	5.70	5.66
HHI_QMNH	3.20	3.18
CIR	2.11	2.05
EAR	1.93	1.90
HHI_SH	1.84	1.84
LDR	1.52	1.49
COVID	29.26	
NPL	1.27	1.27
LG	1.09	1.09
HHI	1.04	1.04
Mean VIF	6.98	2.08

Source: Authors' statistics

The statistical results from the correlation coefficient matrix show that no pair of variables has a correlation level exceeding 0.8, indicating that there is little possibility of multicollinearity between independent variables in the research model. To provide a more reliable assessment of the existence of multicollinearity, the research team used the VIF test and the results are presented in Table 5 below. If the estimated VIF value is less than 10, according to Gujarati (2011), this proves that the model is not significantly affected by multicollinearity.

The first result showed that the VIF value of the COVID variable exceeded the allowable threshold of 10, so the research team removed COVID from the research model and re-tested. The VIF results reported in Table 5 show that the selected independent variables, except COVID, no longer have multicollinearity, suitable for conducting the next quantitative regression steps. The inclusion of COVID into the model will be in the form of the interaction terms presented below.

After conducting regression of the research equations based on the methods of (1) pooled least squares regression model (Pooled OLS), (2) fixed effect model (Fixed Effect

Model - FEM), and (3) random effect model (Random Effect Model - REM), combined with tests such as Breusch and Pagan Lagrangian tests, Hausman test.

Table 6
Selection of Model Specifications

Dependent variable: ROA	Test results	Conclusion of suitable model
Breusch and Pagan Lagrangian multiplier Test	Prob > chibar2 = 0.0000	Panel regression models (Fixed or random effects models) are more suitable than conventional OLS regression models
Hausman Test	Prob > chi2 = 0.4670	Random effects model is more suitable than fixed effects model

Source: Authors' Estimates

The results of the Breusch Pagan Lagrangian multiplier test in Table 6, providing evidence to test the existence of random effects in the research model, show that the probability value of the test is 0.000 (less than 0.05), indicating that the model exists random effects, and therefore the models used for panel data (Fixed Effect (FE) model and Random Effect (RE) model) are suitable compared to the ordinary least squares regression model (Pooled OLS). Next, comparing the FE and RE models, the Hausman test results show that the random effect (RE) model is recommended for use.

Thus, the most suitable research model for the research sample and research questions is the random effects (RE) model. In order to enhance the robustness of the estimates from the random effects regression model as well as eliminate the risk of existing defects of the quantitative model such as autocorrelation and heteroscedasticity, as recommended by Nichols & Schaffer (2007), the research team re-regressed the random effects (RE) model with the condition robust option - vce cluster by ID. The final estimation results are presented in Table 7 below

Table 7
Robusted Estimates of the Chosen Random Effect Model

	Regression coefficient	Standard error
HHI	-0.018*	-0.011
NPL	-0.001*	0
SIZE	0.806***	0
EAR	0.092***	-0.015
LDR	0.007***	-0.002
LG	0.003	-0.002
CIR	-0.015***	-0.003
HHI _ QMNH	0.031	-0.233
HHI _SH	-1.326***	-0.332
HHI_COVID	0.031	-0.086
Hằng số	-3.799***	-1.107

Note: (*), (**) and (***) represent significance levels of 10%, 5% and 1% respectively.
Source: Authors' estimates

From the results of the table above, our study shares a similar finding with prior studies (DeYoung and Rice, 2004; Lin and Huang, 2012; Delpachitra and Lester, 2013; Köhler, 2014; Vo and Tran, 2015), which indicates that diversification has a negative impact on bank profits with a coefficient of 0.019, statistical significance at the 10% level (the variable HHI has a negative impact on the variable ROA). When diversifying revenue sources, banks need to invest in new management systems and personnel, leading to increased management costs and operating costs; this may be the cause of reduced bank profits in the early stages of transformation. In particular, when studying in detail the impact of revenue diversification on the profit efficiency of private commercial banks compared to state-owned commercial banks (HHI_SH), it can be seen that the negative impact of diversification on the profits of private commercial banks is less than that of state-owned commercial banks. This also implies that revenue diversification at state-owned commercial banks needs to be reconsidered to avoid adverse impacts on the profitability of commercial banks in this group.

With the control variables, the results show that the higher the bad debt ratio (NPL) is, the lower the bank's profit would be. With the condition that other factors remain unchanged, when NPL increases by 1 percentage point, the ROA of bank i in year t will decrease by an average of 0.001 percentage point. When debts become bad debts, banks cannot collect interest from these loans, leading to a decrease in revenue; in addition, the cost of handling bad debts increases, so the bank's profit declines.

On the contrary, total asset size - SIZE, equity ratio to total assets EAR, loan to total deposit ratio - LDR have a positive impact on bank ROA with a significance level of 1%. Because banks with large asset size are often able to diversify risks, take advantage of investment opportunities better, and make better profits. High ratio of equity to total assets and high ratio of loans to total deposits show that the bank has good capital mobilization ability, solid financial foundation and effective use of deposits to generate profit from lending interest.

The research results show that the loan growth rate has a positive impact on bank profits, but this result is not statistically significant. The cost-to-income ratio - CIR has a negative impact on ROA, with a statistical significance of 1%. This is consistent with the reality when a high CIR ratio shows that the bank is spending more money than the income it generates; high costs while income does not increase, leading to a decrease in profits.

During the period affected by the Covid-19 epidemic; banks increased the diversification of non-lending service activities to minimize risks, maintain and increase profits. This is reflected in the statistical results of the positive impact of the variable HHI_COVID on profits (estimated coefficient is 0.031). However, this result is not statistically significant.

Limitations
The research findings confirm the negative impact of commercial banks' income diversification on their profitability. The impacting magnitude has been observed to be leveraged for state-owned CBs compared to that observed in private CBs. This implies that CBs need to carefully consider their revenue diversification choices, especially in the context of relatively limited credit growth following the pandemic, as well as the competitive pressure

that service sectors of CBs face from new financial service organizations in the market, such as financial technology companies (FinTech) and digital platforms offering similar traditional products and services. This reality encourages CBs to seek alternative solutions to enhance their competitiveness and profit generation capabilities, ensuring sustainable business operations in the future.

Although certain research results have been achieved, this study still has several limitations and shortcomings that can be addressed in future research. The main limitations of this study are: (i) The number of observations is relatively limited, so the research findings may not be comprehensive. Subsequent studies could expand the scope and sample across the region and explore additional factors, including other macroeconomic and microeconomic variables, to gain a more comprehensive understanding of the impact of income diversification on the profitability of CBs; (ii) The study has not differentiated between the various sources of non-interest income due to the authors' limited access to data; (iii) The research has not identified the optimal scale threshold or the ideal ratio of income diversification for Vietnamese commercial banks. In the future, the authors will continue to conduct expanded research to assess the differences in factors affecting bank profitability by bank group, in order to provide specific recommendations for managers based on bank categories.

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Conflict of interest

The authors declare no conflict of interest.

References

Acharya, V. V., Hasan, I., & Saunders, A. (2006). Should banks be diversified? Evidence from individual bank loan portfolios. The Journal of Business, 79(3), 1355-1412.

Balasundaram, N. (2009). Profitability of Listed Pharmaceutical Companies in Bangladesh: An Inter & Intra Comparison AMBEE & IBN SINA Companies Ltd. Analele of University Bucharest, Economic and Administrative Sciences, 139-148.

Chiorazzo, V., Milani, C., & Salvini, F. (2008). Income diversification and bank performance: Evidence from Italian banks. Journal of financial services research, 33(3), 181-203.

Delpachitra, S., & Lester, L. (2013). Non-interest income: Are Australian banks moving away from their traditional businesses?. Economic Papers: A journal of applied economics and policy, 32(2), 190-199.

Demirgüç-Kunt, A., & Huizinga, H. (2010). Bank activity and funding strategies: The impact on risk and returns. Journal of Financial economics, 98(3), 626-650.

DeYoung, R., & Roland, K. P. (2001). Product mix and earnings volatility at commercial banks: Evidence from a degree of total leverage model. Journal of Financial Intermediation, 10(1), 54-84.

Elsas, R., Hackethal, A., & Holzhäuser, M. (2010). The anatomy of bank diversification. Journal of Banking & Finance, 34(6), 1274-1287.

Hidayat, W. Y., Kakinaka, M., & Miyamoto, H. (2012). Bank risk and non-interest income activities in the Indonesian banking industry. Journal of Asian Economics, 23(4), 335-343.

Köhler, M. (2014). Does non-interest income make banks more risky? Retail-versus investment-oriented banks. Review of financial economics, 23(4), 182-193.

Lee, C. C., Yang, S. J., & Chang, C. H. (2014). Non-interest income, profitability, and risk in banking industry: A cross-country analysis. The North American Journal of Economics and Finance, 27, 48-67.

Lei, A. C., & Song, Z. (2013). Liquidity creation and bank capital structure in China. *Global Finance Journal*, *24*(3), 188-202.

Lepetit, L., Nys, E., Rous, P., & Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks. *Journal of banking & finance*, *32*(8), 1452-1467.

Li, L., & Zhang, Y. (2013). Are there diversification benefits of increasing noninterest income in the Chinese banking industry?. Journal of Empirical Finance, 24, 151-165.

Lin, K. L., & Huang, Y. L. (2014). Is the Diversification of Bank Income the Bright Side or Dark Side? A Global Perspective. Management Review, 33(3), 23-51.

Mercieca, S., Schaeck, K., & Wolfe, S. (2007). Small European banks: Benefits from diversification?. *Journal of Banking & Finance*, *31*(7), 1975-1998.

Sáng, N. M. (2017). The impact of income diversification on the performance of commercial banks in Vietnam. Journal of Economics and Development, 241, 40-49.

Nichols, A., Schaffer, M. (2007). The Cluster-Robust Variance-Covariance Estimator: A (Stata) Practitioner's Guide. Access from: http://fmwww.bc.edu/repec/usug2007/crse04.pdf

Sanya, S., & Wolfe, S. (2011). Can banks in emerging economies benefit from revenue diversification?. *Journal of financial services research*, *40*, 79-101.

Stiroh, K. J., & Rumble, A. (2006). The dark side of diversification: The case of US financial holding companies. *Journal of banking & finance*, *30*(8), 2131-2161.

Tú, T. V. T. (2019). The impact of income diversification on the profitability of Vietnamese commercial banks, Lac Hong Science Journal, 6, 132-136

Vo, X. V, Tran, T. P. M. (2015). Profits and risks from income diversification of Vietnamese commercial banks. Tạp chí Phát triển kinh tế, 26(8), 54-70