Determinants of Non-Interest Income: The Case of Vietnamese Commercial Banks

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Abstract

This study examines the factors affecting non-interest income (NII) of commercial banks in Vietnam in the period from 2010 to 2017, paying special attention to the relationship between competition and NII. The study levers on a sample of 216 observations and 4 estimation methods, including the least square method (OLS), the fixed effect model (FE), the random effect model (RE), and System GMM. Our study differs from other studies in utilizing the sample comprising 27 Vietnamese commercial banks and the use of GMM method to identify factors affecting non-interest income. Albeit the employment of different approaches, the research yields consistent findings: competition has a significant impact on the non-interest income of Vietnamese commercial banks.

Key words: banks, non-interest income, competition, GMM, Vietnam

Introduction

In the context of Vietnam, there has been limited empirical evidence showing the impact of competition on non-interest income, while in the current reality, competition among commercial banks is becoming fiercer. In Vietnam, the period of 2010 - 2017 is the period of the economic transformation of the country, in which renovation process with the main theme being economic restructuring was maintained, improving the efficiency of competitiveness in the direction of enhancing quality and attaching importance to stable development factors. Therefore, for commercial banks, apart from increasing the income from lending activities in the traditional way, maintaining a stable revenue source from non-interest income is an indispensable approach. This has forced commercial banks to adapt and introduce richer variety of products and services, applying advances in information technology to meet the increasingly diverse needs of customers. Commercial banks have two main sources of income for banks: (i) loans are always the main source of income but this source of income is naturally associated with high risk and (ii) the non-interest income from other services such as entrusted services, service charges, and other incomes ... can provide a more reliable and less risky income stream. Therefore, non-interest income has increasingly accounted for a significant proportion of the total sales of most commercial banks, and it plays a sizable role in order to uphold and increase profitability in the context of increasing competition among banks.

So far, the studies on the impact of competition on non-interest income of the bank are limited, mainly comprising the studies on the factors affecting non-interest income of commercial banks, which were conducted in different facets. The factors in focus can be divided into three main groups: micro-level factors, macro-level factors and competition factor. These factors have different influences on non-interest income because of differences in research scale, data sources, and research methods. More specifically, most studies concluded that non-interest income is affected by micro and macro factors such as ROA, bank size, deposits / total assets, NIM, total equity / total assets, loans / total assets, loan loss provision / total assets, costs / income, GDP, inflation and interest rates as in Davis and Tuori (2000a), DeYoung and Rice (2004), Shahimi, Ismail, Ghafar and Ahmad (2006), Al-Horani (2010), Chortareas, Garza-García and Girardone (2012), J. Nguyen (2012), Damankah, Anku-Tsede and Amankwaa (2014), Aslam, Mehmood and Ali (2015), Meng, Cavoli and Deng (2018), Hamdi, Hakimi and Zaghdoudi (2017).

In Vietnamese context, Nguyen Minh Sang and Nguyen Thi Hanh Hoa (2013) study the factors affecting non-interest income of Vietnamese commercial banks in the period of 2006-2012, highlighting the positive impact of specific bank factors such as net income to total assets, the ratio of equity to total assets, and deposits to total assets on bank's non-interest income. Nguyen Thi Diem Hien and Nguyen Hong Hat (2016) show that bank characteristics and market conditions are closely related to the size of non-interest income of commercial banks. The study documents a positive relationship between bank size growth and non-interest income.

Tran Huy Hoang and Nguyen Huu Huan (2016) study the factors affecting the performance of Vietnam's commercial banking system in the integration period from 2005-2011, suggesting that the performance of commercial banks is affected by market share, liquidity risk, foreign ownership, and bank size. Factors that assert a positive impact on the performance of commercial banks include: foreign ownership, bank size and market share. Nguyen Manh Hung (2018) uses the WGI-Worldwide Governance Indicator, a set of national governance indicators, to study the importance of national governance and suggestions for the process of reforming market economy institutions in Vietnam. The study shows that over the past decade, there has been an argument in Vietnam: economic institutional reform is playing an increasingly important role in the innovation process. When resources, such as natural ones, cheap labor and capital, have reached their limits, institutional reform becomes indispensable for the economy.

Doan Anh Tuan (2018) studies the impact of political uncertainty on the effectiveness of commercial banks in emerging economies. The study used macro-control variables such as financial liberalization, REG, GOV, GDP, and inflation. GOV and REG are indicators of government performance and national institutional quality of WGI-Worldwide Governance Indicators, respectively (Kaufmann, Kraay and Mastruzzi, 2003). The research results show that GDP per capita and consumer price index have a negative impact on the efficiency of banks, although these factors are not statistically significant.

From the literature review, we find that no research in Vietnam has studied the impact of competition on non-interest income. Therefore, we conduct this study to to test the impact of competition on non-interest income of joint stock commercial banks in Vietnam in the period from 2010-2017 period. The study consists of part 2 discussing theoretical basis, part 3 presenting data and research methods, part 4 detailing empirical evidence, and the final part concluding the paper.

Theoretical basis

Market power theory: Based on the market structure hypothesis (SCP), the SCP model refers to the relationship between market structure reflected by the degree of market concentration and performance in every activity of entities, with the view that the more power focuses on a few market players, the more monopoly-derived benefits increase (Short, 1979). This hypothesis assumes greater profits as a result of collusion between companies in the industry. According to Berger and Hannan (1998), there are four possible reasons to explain the effect of market power (measured by market structure) on performance: (i) if banks compete in a market with stronger concentration, they can set prices higher than marginal costs and managers do not have to work hard to keep costs under control; (ii) market power allows managers to pursue goals other than profit maximization or business value maximization; (iii) in the absence of competition, managers who spend resources to maintain or win market share will increase costs and reduce efficiency unnecessarily; (iv) if banks benefit from market power, poor managers can survive without trying to work more effectively.

Theory of competition: According to Porter and Advantage (1985), the nature of competition is to seek profit, which is higher than the average profit that businesses have. Porter and Advantage (1985) argue that competition is fundamental to the success or failure of an enterprise. Competition strategy is the search for favorable competitive position in the industry, in order to create an advantageous and sustainable competitive position under

the pressures to determine competition in the industry. The basic foundation for businesses to achieve above-average returns in the long-term is a sustainable competitive advantage. Although businesses have varied strengths and weaknesses in comparison with other competitors, but in general, there are two types of competitive advantages that businesses can own: low cost or differentiation. These two types of basic competitive advantages combined with the scope of activities of a pursuing enterprise will allow the creation of three general competitive strategies to achieve efficiency above the industry average, namely low cost strategy, differentiation strategy and centralization strategy (Porter and Advantage, 1985). Kurt Christensen (2010) states that "Competitive advantage is any value that a business provides to motivate customers to buy their products or services rather than products or services of competitors, and create barriers to potential and current rivals. "

Financial theory and income diversification: The financial theory implies that banks offering more products and services will create more demand and will earn more income. Baele, De Jonghe and Vander Vennet (2007) suggest that, through diversification of operations, banks can gather more information, thus facilitating cross-selling and performing other activities. Besides sharing information, banks can also share inputs such as labor and technology at the same time acrossmany different activities, so it creates the economy of scale, lowering operating costsand taking advantage of fixed costs in the bank (Kevin J Stiroh, 2004).

Institutional Theory and Non-Interest Income: According to the institutionalism represented by Tilman (1997), institution is the normality of acts or regulations that define behavior in specific situations. It is basically accepted by members of the social group and compliance with the rules is by either self-control or outside control. Institutional theory states that institutional differences are the cause of development or poverty. The hypothesis directed by institutionalism is: some types of institutions can bring about development, but some other types of institutions can have detrimental consequences for prosperity, freedom and values (Kasper, Wolfgang and Manfred E. Streit, 1999). The World Bank (1989) argued that development problems of underdeveloped economies were deeply rooted in the 'governance' crisis. Because the root of the institutional problem is the allocation of resources, a country that wants to become rich should start with reforms to ensure people's rights to access or monitor the management ofsocial resources (Acemoglu, Johnson and Robinson, 2001). Therefore, as a whole, institutions have an impact on development. In the general context, institutions exert

impact on economic development (Nguyen Manh Hung, 2018). In a narrower perspective of the banking industry, the institutions contribute to the adjustment of credit relationships in a positive way, through legal documents, political stability, healthy competition and free of corruption, contributing to business stability as well as information transparency in the banking market. It is these things that contribute to increasing the income of the bank in general and non-interest income in particular.

Competition and non-interest income: In the banking sector, the main source of income comes from the bank's loan interest, accounting for the highest portion of the total revenue of the bank (Nguyen Thi Lien Hoa and Nguyen Thi Kim Oanh, 2018). Non-interest income includes revenues other than those earned from lending activities and securities, referred to as specific non-interest revenues: fee collection from the provision of deposit-taking services, payment services which do not use cash and other bank services. Brunnermeier, Dong and Palia (2012) argue that non-interest income includes activities such as income from securities trading, investment and advisory fees, brokerage commissions and entrusted services. These activities are different from receiving deposits and making loans — the traditional functions of banks. Upon performing their functions, banks are competing with other capital market intermediaries such as investment funds, mutual funds, investment banks, insurance companies and private equity funds.

According to Potter (1980), competition is a fundamental to the success or failure of a business. Competition strategy is the search for favorable competitive position in the industry, the main arena of competition, in order to create an advantageous and sustainably competitive position under the pressures to determine competition in the industry. The basic foundation for businesses to achieve above-average returns in the long-term is a sustainable competitive advantage. Although businesses have many strengths and weaknesses before other competitors, but in general, there are two types of competitive advantages that businesses can own: low cost or differentiation.

According to the market power theory, the measurement of the market power level is a major topic in banking research, mainly due to conflicting opinions about the impact of competition between banks on the stability of the financial system. On the one hand, the "competition-fragility" view argues that, because competition reduces the market power and profitability of banks, it encourages risk-taking behavior of banks, thus undermining the stability of the financial market in general. Therefore, a certain degree of market power of banks will be beneficial. On the other hand, the "competition – stability" view opines that high

market power makes it easier for banks to set higher interest rates, making it harder for customers to repay loans, which raises the issue of adverse choices and dangerous ethical issues. As a consequence, ensuring greater competition is expected to benefit everyone. In the studies of Maudos and Solís (2009) and Vo Xuan Vinh and Duong Thi Anh Tien (2017), Lerner index is used as a measure of competition, and the Lerner index will shrink (toward 0) as competition increases, while it increases (to the theoretical limit of one) when the market power of the firm becomes larger. It can be seen that market competition can have a positive and opposite relationship with risks of banks. Meanwhile, there are also studies showing a two-way relationship of risk with income diversification (non-interest income).

Hypothesis 1: There exists a negative correlation between competition (LMC) and non-interest income.

Diversifying income in the banking sector often entails an increase in costs as well as non-interest income in the operating income structure of a bank. As a result, income diversification results in a change in the performance of the bank in terms of profitability. According to competition theory, diversification of income can limit risks and improve the efficiency of banking operations. However, some empirical studies conclude that income diversification may increase the risk of bankruptcy and reduce the profitability of banks. According to Nguyen Thi Lien Hoa and Nguyen Thi Kim Oanh (2018), income diversification of commercial banks is the diversification of types of products and services of banks in order to improve and create additional sources of income for banks. Banks diversify income through the process of developing,

modifying, changing, and creating many types of products and services from existing traditional products and services, and at the same time transforming a variety of new products and services as one of the basic strategies to improve their competitiveness (Chortareas et al. (2012), Ho Thi Hong Minh and Nguyen Thi Canh (2014), Vo Xuan Vinh and Dang Buu Kiem (2016)).

Hypothesis H2: There exists a positive correlation between income diversification (HHI) and non-interest income.

Based on the market power hypothesis, increased lending can increase interest rate margins, thereby increasing the efficiency of commercial banks. However, as discussed, a bank's income comes from two main sources: income from interest and non-interest ones; Smith, Staikouras and Wood (2003) suggest that there is an inverse relationship between these two sources of income. In the studies of Rogers and Sinkey Jr (1999), Hahm (2008), Hakimi, Hamdi and Djelassi (2012), M. Nguyen, Skully and Perera (2012), Nguyen Thi Diem Hien and Nguyen Hong Hat (2016) similar results are provided: the interest income from traditional credit activities is inversely related to the amount of non-interest generated from other activities. The negative relationship between lending and performance has been found in the research of Pham Minh Dien, Duong Thi Kim Hoang and Duong Quynh Nga (2016).

Hypothesis H3: There exists a negative correlation between the market share of lending (ML) and non-interest income.

HHI variable is calculated by the following formula:

$$HHI_{it} = 1 - \left[\left(\frac{INT_{it}}{TOR_{it}} \right)^2 + \left(\frac{COM_{it}}{TOR_{it}} \right)^2 + \left(\frac{TRA_{it}}{TOR_{it}} \right)^2 + \left(\frac{OTH_{it}}{TOR_{it}} \right)^2 \right]$$

Where, HHIit is the income diversification index of bank i in year t; INTit: is the net income from interests and similar incomes of bank i in year t; COMit: is the net income from service activities of bank i in year t; TRAit: is the net income from operations and investment of bank i in year t; OTHit: is the net income from other activities of bank i in year t; TORit: is the total value of income from activities of bank i in year t.

Data and research methods

Data

Research data were collected in the period 2010-2017, as this is the time when the data set from banks becomes more

adequate, after eliminating banks with merger and consolidation processes such as SHB (2012), HD (2013), BIDV (2015), MSB (2015) and STB (2015), and banks that do not disclose information or incomplete information. The outcomeis a final sample of 27 commercial banks over a period of 8 years, totalling 216 observations.

With regard to data sources, information of the banks in the sample is collected from the audited financial statements of commercial banks, downloaded mainly from the website https://vietstock.vn/; Macro variables were collected from the General Statistics Office, State Bank, World Bank websites such as https://www.gso.gov.vn/, https://www.sbv.gov.vn/, https : //www.worldbank.org/

and Thomson Reuter database.

Empirical model

In order to test the relationship between competition and non-interest income of Vietnamese commercial banks, the present research adopts the models of DeYoung and Roland (2001), Stiroh (2002), Brunnermeier et al. (2012), Hakimi et al. (2012), and Damankah et al. (2014). These studies have been studied in developing countries and have quite similar characters with those obtained from the data collected in Vietnam. The current study also refers to Nguyen Minh Sang and Nguyen Thi Hanh Hoa (2013), Nguyen Thi Diem Hien and Nguyen Hong Hat (2016), Pham Minh Dien et al. (2016), and Vo Xuan Vinh and Duong Thi Anh Tien (2017) when drawing on factors affecting non-interest income and competition in banking industry.

The research model is as follows: $NII_{i,t} = \alpha + \beta CT_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}$

In which: $NII_{i,t}$ is the non-interest income of bank i year t;

$CT_{i,t}$: is a proxy representing Competition, measured by Lerner Index (LMC); HHI is the Diversification of income and ML is the loan market share obtained by bank i in year t (ML).

$X_{i,t}$ is a vector of control variables, including Bank size (SIZE); The ratio of Deposit to Total assets (DEP); Net interest margin (NIM); Equity / Total assets ratio (EQUITY); Loans / Total assets ratio (LOAN); Loan loss provisions / Total assets Ratio (RES); Cost / Income Ratio (COST); Profit after tax / Total assets (ROA); GDP growth rate (GDP); Inflation (INF); Interest rate (IR) and WGI National Governance Index (WGI).

Due to the economic nature of the variables in the model, there may be endogeneity issue; as a result, in this study the authors resort to the GMM method. Variables such as Deposit / Total assets (DEP); Net interest margin (NIM); Equity / Total assets ratio (EQUITY); Loans / Total assets ratio (LOAN); Loan loss provisions / Total assets (RES); and Profit after tax / Total assets (ROA) are highly likely to be endogenous variables. The endogeneity can occur because the reverse relationship between dependent variable and independent variables or independent variables can be explained through other variables not included in the model. The technique under GMM approach in the paper is based on combining lagged values of variables as GMM-type instrumental variables for the first-differenced equation, while lagged differences of variables used as GMM-type instruments for the levels equation. Besides, by using the asymptotic standard error, GMM estimation could overcome the heteroskedasticy issue.

Table 1: Summary of research variables

	Variable	Source	Measure
Dependent variable			
1.	NII	Audited financial statements of commercial banks	TNNL/Total assets TNNL = Total income − Income from interest (DeYoung and Rice, 2004; Huang and Chen, 2006; M. Nguyen et al., 2012)
Independent variables			
2.	SIZE	Audited financial statements of commercial banks	Ln (Total asset) (Aslam et al., 2015; Damankah et al., 2014; Hakimi et al., 2012; Hamdi et al., 2017; Meng et al., 2018; M. Nguyen et al., 2012)
3.	DEP		Deposit / Total assets ratio (Aslam et al., 2015; Nguyễn Minh Sáng and Nguyễn Thể Hểnh Hoa, 2013)
4.	NIM		(Income from interest − Costfrom interest)/ Total assets (Davis and Tuori, 2000b; Hahm, 2008; M. Nguyen et al., 2012; Phễm Hoàng Ân and Nguyễn ThểNgễc Huong, 2013)
5.	EQUITY		Equity / Total assets ratio (Chiorazzo, Milani and Salvini, 2008; Lepetit, Nys, Rous and Tarazi, 2008; M. Nguyen et al., 2012; Pennathur, Subrahmanyam and Vishwasrao, 2012; Shahimi et al., 2006)

6.	LOAN		Lending/Total assets (Avramov and Chordia, 2006; Jegadeesh and Titman, 1993; Nguyễn ThếDiễm Hiền and Nguyễn Hễng Hết, 2016)
7.	RES		Loan loss provisions / Total assets (DeYoung and Rice, 2004; Hahm, 2008; Rogers and Sinkey Jr, 1999)
8.	COST		Cost/Income (DeYoung and Roland, 2001; Lepetit et al., 2008)
9.	ROA		Profit after tax / Total assets (Aslam et al., 2015; Davis and Tuori, 2000b; Hamdi et al., 2017; Lepetit et al., 2008)
10.	GDP	The General Statistics Office	GDP growth rate (Atellu, 2016; Nguyễn ThếDiễm Hiền and Nguyễn Hễng Hết, 2016)
11.	INF	Thomson Reuter	Inflation (Atellu, 2016; DeYoung and Rice, 2004)
12.	IR	State Bank	Interest rate
13.	WGI	World Bank	Country-level WGI indicator set (Damankah et al., 2014; Kaufmann et al., 2003)
14.	LMC		$(P_{it} - MC_{it})/ MC_{it}$ (M. Nguyen et al., 2012; Võ Xuân Vinh and Duong Thế Ánh Tiên, 2017; Võ Xuân Vinh and Đễng Bễu Kiễm, 2016)
15.	HHI	Audited financial statements of commercial banks	$$HHI_{it} = 1 - \left[\left(\frac{INT_{it}}{TOR_{it}}\right)^2 + \left(\frac{COM_{it}}{TOR_{it}}\right)^2 + \left(\frac{TRA_{it}}{TOR_{it}}\right)^2 + \left(\frac{OTH_{it}}{TOR_{it}}\right)^2\right]$$ (Carbo-Valverde, Rodriguez-Fernandez and Udell, 2009; Hễ ThếHễng Minh and Nguyễn ThếCành, 2014; Nguyễn ThếLiên Hoa and Nguyễn ThếKim Oanh, 2018)
16.	ML		Lending of each bank / Total Lending of all commercial banks (Koetter, Kolari and Spierdijk, 2012; Phễm Minh Điễn et al., 2016)

Empirical evidence

Descriptive statistics

Table 2 presents descriptive statistics of the data collected, including variable names, number of observations, minimum values, maximum values, means, and standard deviations. The average value measures the degree of concentration, while the distance between the maximum value and the minimum value, and the standard deviation indicates the degree of dispersion of the variables in the dataset. Standard deviation measures the dispersion of a variable around its mean (Nguyen Dinh Tho, 2011).

The statistical figures in Table 2 show that: the non-interest income of commercial banks in Vietnam is quite low, with an average of only 0.0054 (0.54%). As the standard deviation of non-interest income is only 0.0052 (0.52%), the variation in non-interest income is not high; INF variable ranges from 0.006 to 0.187 and has a standard deviation of 0.0532 (5.32%), suggesting that the variation in inflation during the research period is rather small; The min-max range of the IR variable is from 0.0192 to 0.0323 and with a standard deviation of up to 0.46%, which is also quite small.

For Competition factor, the average value of LMC variable is 0.3357, and the standard deviation of 0.1201 (12.01%) and the range of value from -0.1155 to 0.5911 manifest

small variations of this variable. The standard deviation of ML is low at only 5%, but HHI's min-max ranges from -0.7304 to 0.499, yielding a standard deviation of up to 0.2103 (21.03%), suggesting large variations in the factor of income diversification.

Table 2: Descriptive statistics of variables

ID	Variables	Obs	Means	Std.Dev	Min	Max
1	NII	216	0.00546	0.00523	-0.00587	0.03796
2	SIZE	216	32.1417	1.08787	29.8647	34.723
3	DEP	216	0.62826	0.13308	0.25084	0.89371
4	NIM	216	0.02563	0.01186	-0.00641	0.07421
5	EQUITY	216	0.09636	0.04248	0.03461	0.25538
6	LOAN	216	0.52589	0.12837	0.14725	0.73125
7	RES	216	0.00568	0.00460	-0.00484	0.02880
8	COST	216	0.93906	5.83713	0.00057	86.3024
9	ROA	216	0.00712	0.00722	-0.05510	0.04728
10	INF	216	0.06816	0.05326	0.006	0.187
11	GDP	216	0.06126	0.00521	0.0525	0.0681
12	IR	216	0.02615	0.00462	0.01925	0.03234
13	WGI	216	-1.41189	0.04459	-1.49698	-1.35879
14	LMC	216	0.33571	0.12015	-0.11559	0.59116
15	HHI	216	0.22692	0.21034	-0.73042	0.49999
16	ML	216	0.03757	0.05007	0.00239	0.19726

Source: Author's calculation using Stata 14.0

Correlation matrix analysis

The results in Table 3 show that the absolute value of the correlation coefficients between the independent variables are less than 0.8. Therefore, it can be concluded that there is no multicollinearity of the variables in the model (Gujarati and Porter (2004).

The study also conducted multi-collinearity test, whose test result also showed that the Variance Inflation Factor is less than 10. According to Gujarati and Porter (2004), it is possible to conclude that multicollinearity is not a concern in the research model.

Table 3: Correlation matrix table between variables in the research model

	NII	SIZE	DEP	NIM	EQUITY	LOAN	RES	COST	ROA	INF	GDP	IR	WGI	LMC	HHI	ML
NII	1															
SIZE	0.17	1														
DEP	0.02	0.30	1													
NIM	-0.04	-0.10	0.05	1												
EQUITY	0.10	-0.74	-0.16	0.37	1											

LOAN	0.03	0.22	0.54	0.38	0.03	1										
RES	0.28	0.17	0.25	0.57	0.10	0.39	1									
COST	0.01	-0.08	-0.18	-0.19	-0.04	-0.20	-0.03	1								
ROA	0.28	-0.01	-0.10	0.60	0.29	0.20	0.13	-0.60	1							
INF	-0.07	-0.22	-0.59	0.17	0.22	-0.30	-0.20	0.14	0.22	1						
GDP	0.05	0.13	0.03	-0.08	-0.20	0.17	0.06	0.01	0.00	-0.24	1					
IR	-0.07	-0.04	-0.04	0.08	0.09	-0.14	-0.02	0.05	-0.06	0.34	-0.59	1				
WGI	-0.05	0.24	0.52	-0.08	-0.25	0.29	0.23	-0.05	-0.26	-0.48	-0.22	-0.24	1			
LMC	0.07	0.19	0.25	0.70	0.05	0.46	0.56	-0.26	0.48	-0.29	0.21	-0.22	0.12	1		
HHI	0.59	0.24	0.11	-0.10	-0.03	0.06	0.13	-0.31	0.26	-0.13	0.06	-0.14	-0.04	0.14	1	
ML	0.17	0.77	0.15	0.04	-0.40	0.39	0.19	-0.05	0.10	0.00	-0.00	0.00	-0.00	0.20	0.21	1

Source: Author's calculation using Stata 14.0

Regression results

First, the study conducts OLS regression to analyze the relationship between competition and non-interest income. Statistical values fi fi are shown in parentheses under each coefficient. OLS regression results show that competition has an important impact on non-interest income (Table 4). However, the robustness and efficiency in the estimation of the coefficients using the least squares method may be questionable because the OLS model does not take into account individual effects or banks' other uncollectible factors. However, the problem of individual effects is one of the most frequent phenomena in empirical studies (Baltagi, 2001). To address this problem, the fixed effects model (FE) and the random effect model (RE) are used in this study.

Table 4 shows the estimate results of the FE and RE models. The results from FE and RE models suggest that the impacts of the competition variables group (LMC and HHI) are statistically significant. However, the FE model also shows that the ML- calculated by the ratio of each bank's loan to the total loan of the banks is statistically significant.

The study conducts F test to select the model between FE and OLS, and the result of the F test suggests FE model is better than OLS model. The study continues to conduct Hausman test to choose between FE and RE, and Prob> Chi2 = 0.001 shows that RE model can provide biased estimates. Therefore, FE model should yield better results than OLS model and the RE model (Table 4).

The results of the estimated coefficients in the FE model suggest that competition has effects on non-interest income. To increase the effectiveness of the FE model, the authors continue to test whether the heteroskedasticity and autocorrelation exist for the FE model. The results of Wald test in Table 4 indicate that heteroskedasticity exists, and the outcome of Wooldridge test indicates the presence of the autocorrelation. Therefore, the study uses FE-robust method to overcome these disadvantages. Although the FE regression model is used in combination with robust standard errors, according to Wintoki et al. (2012), the endogeneity can still exist in the model. In order to solve the endogeneity problem between independent variables and non-interest income, the study uses system GMM method. The estimation by different methods aids in making the statistical inferences more reliable.

Table 4: Influence of competition on non-interest income

	OLS (1)	RE(2)	FE(3)	FE-robust(4)	GMM(5)
NII$_{t-1}$					.03939 (0.198)
SIZE	0.00032 (0.514)	0.000264 (0.644)	0.0000925 (0.903)	0.000325 (0.565)	.0024443** (0.022)
DEP	0.00204 (0.358)	0.000980 (0.676)	-0.002193 (0.395)	0.0020 (0.253)	.0086058 (0.111)
NIM	-0.34619*** (0)	-0.42248*** (0)	-0.439841*** (0)	-0.3461*** (0)	-0.50149*** (0)
EQUITY	0.016930** (0.049)	0.01428 (0.115)	0.003544 (0.661)	0.01693 (0.088)	0.272746 (0.252)
LOAN	-0.0005798 (0.806)	0.00335 (0.207)	0.009591** (0.003)	-0.000578 (0.755)	-0.01556*** (0.004)
RES	-0.44997 (0.678)	-0.19686*** (0.839)	0.00312*** (0.742)	-0.00449 (0.620)	0.79651*** (0)
COST	0.00056*** (0)	0.00059*** (0)	0.00060*** (0)	0.00056*** (0)	0.00060*** (0)
ROA	0.77009*** (0)	0.85188*** (0)	0.92511*** (0)	0.77009*** (0)	0.92698*** (0)
INF	-0.020629 (0.026)	-0.017053 (0.041)	-0.01851 (0.025)	-0.02062 (0.011)	-0.012504 (0.091)
GDP	-0.176371 (0.734)	-0.046766 (0.293)	-0.06671 (0.138)	-0.01637 (0.674)	-0.12692** (0.003)
IR	0.12598 (0.142)	0.11846 (0.115)	0.09330 (0.195)	0.12598 (0.090)	-0.184596 (0.170)
WGI	0.70552*** (0)	0.77382*** (0)	0.80784*** (0)	0.70552*** (0)	0.018105* (0.033)
LMC	-0.007827** (0.015)	-0.00702** (0.044)	-0.01264*** (0.003)	-0.00782* (0.05)	-0.003093* (0.0409)
HHI	0.00881*** (0)	0.00751*** (0)	0.006544*** (0)	0.00881*** (0.005)	0.00727** (0.007)
ML	-0.002473 (0.780)	-0.009056 (0.384)	-0.135420*** (0)	-0.151257 (0.833)	-0.013254 (0.107)
_cons	-0.015125 (0.531)	-0.03368 (0.394)	-0.00485 (0.899)	-0.01512 (0.546)	-0.43254 (0.107)
Observations	216	216	216		216
Adj R-squared	0.7567	0.7541	0.7793		
F test that all β=0 Prob >F	41.46 0	559.52 0	40.00 0		
Wald (chi 2) Prob>Chibar2		597.94 0			2136.12 0
Breusch and Pagan test Prob > Chibar2			1326.03 0.000		
F test that all u_i = 0 Prob >F			4.50 0.000		

Hausman test	47.6		
Prob>Chi2	0.0001		
Wald test for heteroskedasticity			
Chi2	469.21		
Prob> Chi2	0.0000		
	10.306		
Wooldridge test for autocorrelation	0.0005		
AR (1)			0.000
AR (2)			0.216
Sargan test			0.361
Hansen test			0.388

***, **, * statistical significant at 1%, 5%, 10%

Source: Author's calculation using Stata 14.0

Column 5 shows that the results of the GMM model on competition affecting non-interest income are also similar to those found using OLS, FE, RE and FE-robust models, and only differ in the statistical significance. One notable point in Table 4 is that both the Hansen test results on the validity of the model and the Arellano Bond test of the second-order autocorrelation (AR (2)) have p-values greater than 0.1, suggesting that there is no second-order autocorrelation and the instruments used are valid. Therefore, the results using GMM are valid for inferences.

Thus, the factors affecting non-interest income similar in all 4 methods are NIM, COST, ROA, WGI, LMC, HHI. In addition, there are also differences on other factors affecting non-interest income in each method. However, as mentioned, this study pays special attention to the link between competition factors and non-interest income, the results in column 5 show that the competition variable is measured by the difference between the output price and the marginal cost compared to the output price (LMC) has a negative effect (-0.0030933) and is 10% significant. The competition variable measured by the income diversification index (HII) has a positive impact (0.007273) and has a 1% significance level. With the GMM model results, the study finds no significant impact of competition variables measured by market share, calculated by the ratio of each bank's loans to the loans of all the banks in each year. The estimated coefficient of the LMC variable is negative and statistically significant at 5%, indicating the existence of the impact of competition on non-interest income of Vietnamese commercial banks. The estimated coefficient of HHI variable is positive and statistically significant at 1%, showing that income diversification has a positive impact on non-interest income.

Conclusion

The present study is based on the limitations in the evidence of industry related to the impact of competition on non-interest income in Vietnamese commercial banks. After using the OLS regression to test the relationship between competition and non-interest income, the FE model is used to address the problems of unobservable individual effects. Further, in order to deal with heteroskedasticity and autocorrelation problems, the FE-robust model is utilized. More importantly, to address the endogeneity problem in the research model, the authors resort to the GMM model. GMM model has the advantage of solving problems related to short time series data.

However, despite the employment of different methods, the results of the models show that competition has impacts on non-interest income of Vietnamese commercial banks in the period of 2010-2017. Therefore, in order to competitiveness and improve efficiency, so that commercial banks must control interest expenses and related expenses, and improve the amount of interest income from service activities (LMC). Reality has shown that the reputation of banks belongs to intangible resources, but it has great importance in creating competitiveness for commercial banks. Research results show that competition factor (LMC) has a negative effect on non-interest income; as a result, reducing competition will promote services to cater to customers more, thus increasing utility provided to users. Therefore, the Central Bank needs to take measures to manage the competition of commercial banks in the direction of transparency and publicity. Therefore, the Central Bank needs to have regulations to promote cooperation with foreign banks to learn from their experiences, management strategies and applications used in management. This will help the Central Bank to control

transactions safely, contributing to stability and improving the competitiveness of Vietnam's commercial banking system.

In addition, to increase non-interest income, Vietnamese commercial banks need to diversify the types of services to diversify income sources in the context of strict control of costs in the area of fi fi cost efficiency, and avoid wasting, such as:

Firstly, it is essential to apply informatics technology and automation in the whole process of providing banking services in a broad sense, including modifying the modalities of the whole process of providing services, creating new processes, automating stages where possible, connecting via intranets with customers, ...

Secondly, attention should be paid to the management and administration of the bank: most of the successful banks have done well in raising awareness, raising the professional qualifications of bank officials and employees. Bank should strengthen risk management, strictly control the ceiling of bad debts, and be determined in resolving bad debts. That is the problem that administrators of Vietnamese commercial banks should pay attention to.

Thirdly, maintain the brand and strengthen the reputation: Practice has shown that the reputation and prestige of a bank belong to intangible resources but have great value in building up competitiveness for the commercial banks.

Fourthly, have the right strategy for enlarging market share and developing networks: In an increasingly competitive environment, commercial banks are trying to protect their existing market share, while trying to expand domestic and international market shares through a variety of solutions such as diversifying services provided, creating more utilities for customers, opening more transaction points in new urban residential areas and industrial parks, focusing on marketing strategies, etc.

Fifthly, it is necessary to strengthen cooperation with foreign banks: In the context of increasingly deeper economic integration, Vietnamese commercial banks need to step up and cooperate with foreign banks to learn from their expertise, management experiences, technology-driven applications and softwares. This will help commercial banks to conduct operations safely and stably.

References

Al-Horani, A. (2010). Testing the relationship between abnormal returns and non-interest earnings: The case of Jordanian commercial banks. International Research Journal of Finance and Economics, 55(1), 108-117.

Aslam, F., Mehmood, B., & Ali, S. (2015). Diversification in Banking: Is Noninterest Income the Answer for Pakistan's Case. Science International (Lahore), 27(3), 2791-2794.

Atellu, A. R. (2016). Determinants of non-interest income in Kenya's commercial banks. Ghanaian Journal of Economics, 4(1), 98-115.

Avramov, D., & Chordia, T. (2006). Asset pricing models and financial market anomalies. The Review of Financial Studies, 19(3), 1001-1040.

Bain, J. S. (1956). Barriers to new competition: their character and consequences in manufacturing industries (Vol. 329): Harvard University Press Cambridge, MA.

Baltagi, B. H. (2001). A companion to theoretical econometrics: Wiley Online Library.

Berger, A. N., & Hannan, T. H. (1998). The efficiency cost of market power in the banking industry: A test of the "quiet life" and related hypotheses. Review of Economics and Statistics, 80(3), 454-465.

Brunnermeier, M. K., Dong, G. N., & Palia, D. (2012). Banks' non-interest income and systemic risk. Paper presented at the AFA 2012 Chicago Meetings Paper.

Carbo-Valverde, S., Rodriguez-Fernandez, F., & Udell, G. F. (2009). Bank market power and SME financing constraints. Review of Finance, 13(2), 309-340.

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.

Chortareas, G. E., Garza-García, J. G., & Girardone, C. (2012). Competition, efficiency and interest rate margins in Latin American banking. International Review of Financial Analysis, 24, 93-103.

Damankah, B. S., Anku-Tsede, O., & Amankwaa, A. (2014). Analysis of non-interest income of commercial banks in Ghana. International Journal of Academic Research in Accounting, Finance and Management Sciences, 4(4), 263-271.

Davis, E. P., & Tuori, K. (2000a). The changing structure of banks' income-an empirical investigation.

Davis, E. P., & Tuori, K. (2000b). The changing structure of banks' income-an empirical investigation. Brunel University, Department of Economics and finance. Working Paper, 16-10.

DeYoung, R., & Rice, T. (2004). Noninterest income and financial performance at US commercial banks. Financial Review, 39(1), 101-127.

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.

Đoàn Anh Tufin. (2018). Tác đfing cfia bfit đfnh chính trfidfin hifiu qufic cfia ngân hàng thương mfii tfii các nfin kinh tfi mfii nfii. Tfip chí khoa hfic đfii hfic Đà Lfit, Tfip 8, Sfi 1S, 103–117.

Gujarati, D., & Porter, D. C. (2004). Basic Econometrics, 2004. Editura McGraw-Hill, 858.

Hahm, J.-H. (2008). Determinants and consequences of non-interest income diversification of commercial banks in OECD countries. East Asian Economic Review, 12(1), 3-31.

Hakimi, A., Hamdi, H., & Djelassi, M. (2012). Modelling non-interest income at Tunisian banks.

Hamdi, H., Hakimi, A., & Zaghdoudi, K. (2017). Diversification, bank performance and risk: have Tunisian banks adopted the new business modelfi Financial innovation, 3(1), 22.

Hfi ThfiHfing Minh, & Nguyfin ThfiCành. (2014). Đa dfing hóa thu nhfip and các yfiu tfi tác đfing đfin khfinăng sinh lfii cfia các ngân hàng thương mfii Vifit Nam. Tfip chí Công nghfiNgân hàng(106+ 107), 13-24.

Huang, L.-W., & Chen, Y.-K. (2006). Does bank performance benefit from non-traditional activitiesfiA case of non-interest incomes in Taiwan Commercial Banks. Asian journal of management and humanity sciences, 1(3), 359-378.

Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. The Journal of finance, 48(1), 65-91.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2003). Governance matters III: Governance indicators for 1996–2002: The World Bank.

Koetter, M., Kolari, J. W., & Spierdijk, L. (2012). Enjoying the quiet life under deregulationfi Evidence from adjusted Lerner indices for US banks. Review of Economics and Statistics, 94(2), 462-480.

Kurt Christensen, H. (2010). Defining customer value as the driver of competitive advantage. Strategy & Leadership, 38(5), 20-25.

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.

Lerner, A. P. (1934). Economic theory and socialist economy. The Review of Economic Studies, 2(1), 51-61.

Maudos, J., & Solís, L. (2009). The determinants of net interest income in the Mexican banking system: An integrated model. Journal of Banking & Finance, 33(10), 1920-1931.

Meng, X., Cavoli, T., & Deng, X. (2018). Determinants of income diversification: evidence from Chinese banks. Applied Economics, 50(17), 1934-1951.

Nguyen, J. (2012). The relationship between net interest margin and noninterest income using a system estimation approach. Journal of Banking & Finance, 36(9), 2429-2437.

Nguyen, M., Skully, M., & Perera, S. (2012). Market power, revenue diversification and bank stability: Evidence from selected South Asian countries. Journal of International Financial Markets, Institutions and Money, 22(4), 897-912.

Nguyfin Đình Thfi. (2011). Phương pháp nghiên cfiu khoa hfic trong kinh doanh: Thifit kfi and thfic hifin. In: Lao đfing-Xã hfii.

Nguyfin Mfinh Hùng. (2018). Qufin trfiqufic gia and nhfing gfii mfi cho tifin trình cfii cách thfichfikinh tfithfitrrufing fi Vifit Nam. Tfip chí Khoa hfic ĐHQGHN: Kinh tfiand Kinh doanh, 34, 24-31.

Nguyfin Minh Sáng, & Nguyfin Thfi Hfinh Hoa. (2013). Phân tích thfic nghifim các nhân tfi tác đfing đfin thu nhfip ngoài lãi cfia hfithfing ngân hàng thương mfii Vifit Nam. Tfip chí ngân hàng, 22 (11/2013), 27-34.

Nguyfin ThfiCành, & Hfi ThfiHfing Minh. (2014). Đa dfing hóa thu nhfip and các yfiu tfi tác đfing đfin khfinăng sinh lfii cfia các ngân hàng thương mfii Vifit Nam. Tfip chí Công nghfiNgân hàng, 106+107 (tháng 01+02/2015),, 13-24.

Nguyfin ThfiDifim Hifin, & Nguyfin Hfing Hfit. (2016). Thu nhfip ngoài lãi and hifiu qufitài chính tfii các ngân hàng thương mfii Vifit Nam. Tfip chí công nghfi ngân hàng, sfi, 127, 57-63.

Nguyfin ThfiLiên Hoa, & Nguyfin ThfiKim Oanh. (2018). Đa dfing hóa thu nhfip and rfii ro cfia hfi thfing ngân hàng thương mfii – bfing chfing thfic nghifim tfii Vifit Nam. Kfi yfiu hfii thfio khoa hfic An ninh tài chính cfia

Vifit Nam trong hfii nhfip qufic tfi, 213-229.

Pennathur, A. K., Subrahmanyam, V., & Vishwasrao, S. (2012). Income diversification and risk: Does ownership matterfi An empirical examination of Indian banks. Journal of Banking & Finance, 36(8), 2203-2215.

Porter, M. E., & Advantage, C. (1985). Creating and sustaining superior performance. Competitive advantage, 167.

Potter, M. E. (1980). Competitive strategy: Techniques for analyzing industries and competitors. In: The Free Press, New York.

Phfim Hoàng Ân, & Nguyfin ThfiNgfic Hương. (2013). Tác đfing cfia lofii hình sfi hfiu đfin thu nhfip lãi cfin biên cfia ngân hàng thương mfii Vifit Nam. Tfip chí khoa hfic Đfii hfic An Giang, 01(2013), 31-37.

Phfim Minh Đifin, Dương Thfi Kim Hoàng, & Dương Qufinh Nga. (2016). fi nh hufing cfia chfisfi Lerner, chfi sfi HHI và chi phí cơ hfii cfia dfi trfi đfin tfi lfi thu nhfip lãi cfin biên cfia ngân hàng thương mfii. Tfip chí khoa hfic đfii hfic Mfi thành phfi Hfi Chí Minh, 58(1), 3-15.

Rogers, K., & Sinkey Jr, J. F. (1999). An analysis of nontraditional activities at US commercial banks. Review of Financial Economics, 8(1), 25-39.

Shahimi, S., Ismail, A., Ghafar, B., & Ahmad, S. B. (2006). A panel data analysis of fee income activities in Islamic banks. Journal of King Abdulaziz University: Islamic Economics, 19(2).

Short, B. K. (1979). The relation between commercial bank profit rates and banking concentration in Canada, Western Europe, and Japan. Journal of Banking & Finance, 3(3), 209-219.

Smith, R., Staikouras, C., & Wood, G. (2003). Non-interest income and total income stability.

Stiroh, K. J. (2002). Diversification in Banking: Is Noninterest Income the Answerfi Federal Reserve Bank of New York Research Paper Series, No. 154, 1-40.

Trfin Huy Hoàng, & Nguyfin Hfiu Huân. (2016). Phân tích các yfiu tfi tác đfing đfin hifiu qufi hofit đfing cfia hfi thfing ngân hàng thương mfii Vifit Nam trong thfii kfi hfii nhfip tài chính qufic tfi. Tfip chí phát trifin khoa hfic and công nghfi, 19, sfi q1 – 2016, 88-101.

Võ Xuân Vinh, & Dương ThfiÁnh Tiên. (2017). Các yfiu tfi finh hufing đfin sfic cfinh tranh cfia các ngân hàng thương mfii Vifit Nam. Tfip chí Khoa hfic ĐHQGHN: Kinh tfi and Kinh doanh, 33, 1 (2017), 12-22.

Võ Xuân Vinh, & Đfing Bfiu Kifim. (2016). fi nh hufing cfia rfii ro và năng lfic cfinh tranh đfin khfi năng sinh lfii cfia các ngân hàng Vifit Nam. Tfip chí Kinh tfi and Phát trifin, 233, 96-105