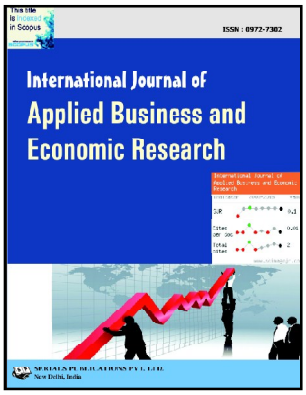

International Journal of Applied Business and Economic Research

ISSN : 0972-7302

available at http: www.serialsjournal.com

Volume 15 • Number 15 • 2017

The Impact of Income Diversification on Profitability and Risk of Commercial Banks: Cases of Vietnam

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Abstract: Traditional income sources of commercial banks (CBs) are mainly from lending and fund raising activities. Currently, due to the increasingly fierce competition, banks tend to diversify revenue sources and look for income from non-traditional activities. This study considers the issue of income diversification through the analysis of profitability and risk of commercial banks in Vietnam. The authors used the regression method of estimation for panel data with a sample of 23 banks in Vietnam during the period from 1995 to 2015. The study results show that the more increasingly banks have diversified their operations, the higher profitability they have achieved. However, the analysis of risk factors shows that the higher level at which banks have diversified their income, the lower risk-adjusted profitability has been. The empirical evidences indicate that the diversification of income is not benefitial for commercial banks in Vietnam.

Keywords: Income diversification, commercial banks, profitability, risk.

1. INTRODUCTION

The experimental studies have been conducted for banks in the countries of the European region. In recent years, some authors have done researches in Asian countries and their findings show that the issue of income diversification has been increasingly considered in these areas. In Vietnam, there have been studies related to yielding and the impact of income diversification on banks' profitability. However, there have been not many studies mentioning the risk that banks may face when implementing the diversification of income–the mentioned risk is the volatility level of profitability or the uncertainty compared to the expected returns. The consideration of the impact of the income diversification on the both sides of profitability and risk is measured by the volatility of profitability. This will help commercial banks to have a more comprehensive perspective in considering benefits and costs of diversifying bank income.

2. THEORY BASIS AND PRACTICAL STUDIES (LITERATURE REVIEW)

2.1. Theory Basis

Profitability represents the efficiency level of business operations for a predetermined period, which is expressed through the level of profitability and losses (La Porta *et. al.*, 2002). To measure the profitability, researchers often use the ratios such as ROA and ROE (Taha, 2013).

The term "risk" is understood as the "uncertainty", which describes the variation in yields, related to a stock or a particular asset (Tran Ngoc Tho and Co., 2005). Risk of commericial banks implies the instability of banks in one or more aspects. In this study, the risk of commercial banks is understood as the instability in banks' income and is calculated by the standard deviation of profitability (Lee *et. al.* 2014).

Diversification is the idea that investors allocate money to different types of investment (Markowitz, 1952). Banks can diversify their income by offering more products and services. The diversification of products and services will stimulate customer demand, thereby increasing bank profitability. Baele, De Jonghe and Vander Vennet (2007) suggested that when commercial banks offer more products and services, they can obtain more customer information, and facilitate the cross selling of products and perform other bank activities. In addition to sharing information, banks can also share inputs such as labour and technology through various activites; therefore, they participate in areas of the economy with low operational costs and take advantage of banks' fixed costs (Stiroh, 2004a).

Whether or not a diversified bank can have access to funding sources with lower costs depends on the judgments of the market. The income diversification will reduce banks' risk, causing the increase in banks' share prices, while the costs of debt will also be lower (Baele *et. al.*, 2007; Deng, Elyasiani and Mao, 2007). However, the diversification can cause the increase in representation costsas well as the increase in conflicts of interests between clients and the fields of banking activities, thus increasing the risk of affecting the bank reputation and probably resulting in the share price reduction yet the increase in the costs of borrowings (Laeven and Levine, 2007; Schmid and Walter, 2009).

There have been endless debates on the benefits and costs of income diversification in studies of the banking sector. In the perspective of profitability, many studies show that banks pursuing the income diversificaton strategy have increased profitability. Smith *et. al.* (2003) pointed out that the banking activities which generatenon-interest income will contribute to stabilizing the bank profitability. Chiorazzo *et. al.* (2008) stated that the banks which diversify their sources of non-interest income will increase profitability. This result is supported by many studies using data in different countries (Baele *et. al.*, 2007; Carlson, 2004; Elsas *et. al.*, 2010; Gurbuz *et. al.*, 2013; Landskroner *et. al.*, 2005).However, there are also many studies refuting the benefits in the aspect of profitability which banks get from income diversification (DeYoung and Roland, 2001; Stiroh, 2004a, 2006a; Stiroh and Rumble, 2006). In the risk perspective, the revenues from non-interest operations such as service charges are usually more stable than from interest income; therefore, bank risk will be reduced (DeYoung and Roland, 2001). Chiorazzo *et. al.* (2008) and Lee *et. al.* (2014) suggested that the bank risk can be reduced through the diversification of income. However, some researches also imply that income diversification will also increase risk, because when banks expand activities generating non-interest income, it means they accept the increase in fixed costs, leading to the increase in their operating leverage and leading to higher risk (DeYoung and Roland, 2001; Lepetit *et. al.*, 2008; Baele *et. al.*, 2007).

2.2. Practical Studies

In the research: "Income Diversification and Bank Performance: Evidence from Italian Banks", Chiorazzo *et. al.* (2008) used annual data of Italian banks in the period from 1993 to 2003 to study the relationship between income diversification and profitability. The research shows that the banks shifting to diversifying their sources of income would create non-interest income which increases bank profitability. In addition, the research results show that when small banks which have little non-interest income increase their non-interest income, they will increase profitability.

Lepetit *et. al.* (2008) with the research "Bank income structure and risk: An empirical analysis of European banks", studied the relationship between bank risk and income structure of 734 banks in Europe during the period from 1996 to 2002. The authors made estimations to assess the impacts on risk when the bank structure is changed from the traditional intermediary activities to the activities generating non-interest income. The study analyzed the link between bank risk and the level of income diversification based on non-interest income, income from fees and commissions, income from trade. The research firstly shows that the banks which expand their non-interest income generating activities have the higher bankruptcy risk compared to the banks which have the main activity of lending. Furthermore, the risk increase is strongly correlated with the income from fees and commissions rather than the income from trade. Meanwhile, the results also show that small banks with the total assets of less than 1 billion euros will increase bank risk when diversifying income from fees and commissions.

Meslier *et. al.* (2010) in the research "Bank diversification, Risk and Profitability in an Emerging Economy with Regulatory Assets Structure Constraints: Evidence from the Philippines" used panel data of 39 banks in Phillipines during the period from 1999 to 2005 to examine the impact of income diversification on profitability and risk of these banks. With the use of the ratio of return after tax over total assets (ROA) and the ratio of ROA over the standard deviation, which represent profitability and risk respectively, the authors found the evidences proving that the banks' income diversification through the diversification of nontraditional business activities will help to increase both of bank profitability and risk. Moreover, the authors also found that the banks focusing on security trading will be able to achieve more profitability compared to other activities.

Trujillo-Ponce (2013) in the research "What determines the profitability of banks? Evidence from Spain" studied the impact of income diversification on profitability of banks in Spain. By using the GMM estimation method for the system of 89 commercial banks in Spain during the period 1999-2009, the authors found empirical evidences proving that with the profitability measurement by using the ratio of return after tax over total assets (ROA) and return after tax over owners' equity (ROE), income diversification has impact in the same direction on bank profitability. However, this impact is not statistically significant.

Lee *et. al.* (2014) in the research "Non-interest income, profitability, and risk in banking industry: A cross country analysis" used the GMM estimation method to test the influence of non-interest income on profitability and risk of 967 different banks in 22 Asian countries including Vietnam. The study results show that the activities generating non-interest income of banks in Asia minimize risk but do not increase the profitability of the sampling population. Especially, due to the consideration of the specialization areas of banks and the national income level, the results become more complex. The activities generating non-interest income help to increase not only profitability but also risk of the savings banks.This is totally

different from the impact on commercial banks, cooperation-joint ventures as well as investment banks because the impact is to increase profitability or reduce risk. On the other hand, non-interest income generating activities increase risk in high-income countries, while inmedium or low income countries, they increase profitability or reduce risk. Finally, the research results of the authors show that the existence of risk is significantly influenced by the expertise areas of banks and the national income, while risk exists from year to year. The authors also found that different types of banking activity areas have important implications for the effectiveness of income diversification.

Bian *et al.* (2015) in the research "Non-interest income, profit and risk efficiencies: Evidence from Commercial Banks in China" considered the impact of non-traditional business activities on profitability and risk of commcercial banks in China. By using the sample of 107 Chinese commercial banks duringthe period from 2007 to 2012 withthe GMM estimation method, the authors found evidences proving that the banks having more revenues from service operations will be able to minimize bank risk, while revenues from security trading activities and investment activitites will minimize bank profitability.

3. METHODOLOGY AND DATA

3.1. Data

In order to examine the impact of income diversification on profitability and risk of commercial banks in Vietnam, the article used the data collected from the financial statements of banks operating in Vietnam during the period 1995-2015 according to the synthesis of the General Statistics Office. In particular, the article excluded banks having no available data for 5 consecutive years and merged banks in the recent period. Therefore, the final research sample of this article includes 23 banks operating in Vietnam during the period 1995-2015.

3.2. Methodology

According to the previous studies about the decision of income diversification of banks such as the studies of Acharya *et. al.* (2006), Baele *et. al.* (2007) and Stiroh and Rumble (2006), the endogeneity problem needs to be tested in the researches of the income diversification decision of banks because banks can diversify strategies based on the opportunities of using econometric models such as Fixed Effects Model, Random Effects Model and Pooled OLS model. Such can be biased, leading to the research results which will be inappropriate and inaccurate. However, if the use of the GMM estimation method (Generalized method of moments) for the regression models has the endogenous phenomenon, it can overcome the endogenous phenomenon, autocorrelation and Heteroscedasticity.

Therefore, the article used the GMM estimation method as suggested by Lee *et. al.* (2014), however, the article used the GMM system instead of using the GMM difference as the authors have used. As shown by Arellano and Bover as (1995) and Blundell and Bond (1998), when the explanatory variables are sustainable over time (which may be constant variables over time), the lag of the original sequence is the weak instrumental variable for the first difference sequence. Therefore, Arellano and Bover (1995) and Blundell and Bond (1998) proposed the GMM estimation system to reduce potential errors and inaccuracies related to the estimated difference. At the same time, the authors argued that the GMM estimation system provides better estimation results compared to the GMM difference because the instrumental variables in the original

level form of the model retain the best measures for the model's endogenous variables, even when the sequences in the model are sustainable.

4. MODELS AND HYPOTHESES

Based on previous studies, we examine the impact of income diversification on profitability and risk of commercial banks in Vietnam based on the approach of Laeven and Levine (2007), Lepetit *et. al.* (2008) and Lee *et. al.* (2014). This relationship is presented as the following equation:

$$\text{prof}_{it} = \propto * \text{prof}_{it-1} + \beta_1 * HHI_{it} + \beta_2 * \text{Size}_{it} + \beta_3 * \text{Growth}_{it} + \beta_4 * \text{Loans}_{it} + \beta_5 * \text{Deposits}_{it} + \beta_6 * \text{Equity}_{it} + \beta_7 * LLP_{it} + \varepsilon_{it}$$

$$\text{risk}_{it} = \propto * \text{risk}_{it-1} + \beta_1 * HHI_{it} + \beta_2 * \text{Size}_{it} + \beta_3 * \text{Growth}_{it} + \beta_4 * \text{Loans}_{it} + \beta_5 * \text{Deposits}_{it} + \beta_6 * \text{Equity}_{it} + \beta_7 * LLP_{it} + \varepsilon_{it}$$

In particular, prof_{it} is the bank profitability, represented by the two profit measuring criteria which have been commonly used in previous studies: ROA, return after tax over total assets, and ROE, return after tax over owners' equity. risk_{it} is the bank risk. According to Lee *et. al.* (2014), identified bank risk is calculated by the standard deviation of ROA (SdROA) and standard deviation of ROE (SdROE).

HHI_{it} is the indicator of bank income diversification. According to previous researches on the issue of income diversification, there are 2 main measurement methods. In specific:

$HHIREV_{it}$ is the indicator that measures the changes in the bank income (Elsas *et. al.*, 2010; Gurbuz *et. al.*, 2013; Sanya and Wolfe, 2011; Trujillo-Ponce, 2013) . The indicator measuring the income diversification level of banks is determined as follows:

$$HHIREV_{it} = \left(\frac{Non_{it}}{NetOp_{it}}\right)^2 + \left(\frac{Net_{it}}{NetOp_{it}}\right)^2$$

In particular, Non_{it} is the non-interest income, calculated as the sum of income from fees, commissions or payments from service activities, foreign exchange and gold trading, security trading business, buying and selling of investment securities and other activities. Net_{it} is the interest income, measured by interest income. And $\text{NetOp}_{it} = \text{Non}_{it} + \text{Net}_{it}$. varies from 0.5 to 1:00; reaching 0.5 indicates that the diversification is perfect for a bank, while being equal to 1:00 shows the lowest level of diversification (non-diversified income) of the bank. Therefore, it can be seen that that an increase in *HHIREV* means the bank income diversification is less than when there is no increase in *HHIREV*.

$HHIRD_{it}$ is measured by the coefficient calculation method Herfindahl–Hirschman with the adjustment similar to the formula used by Elsas *et. al.* (2010), Stiroh and Rumble (2006). This new variable (the coefficient of income diversification *HHI*) is calculated as follows:

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

Trongǧó;

INT_{it} is the gross interest income.

COM_{it} is the return from foreign exchange trading

$TRAD_{it}$ is the return from foreign exchange trading

OTH_{it} is the gross income from other business activities

TOT_{it} is total operating revenues/total value INT_{it}, COM_{it}, $TRAD_{it}$ and OTH_{it}.

According to the definition, the $HHIRD_{it}$ value can be from 0 (with no appearance of diversification) and 0.75 (the banks have the balance level of diversification regarding the above four areas). In comparison with the income diversification indicator calculated by *HHIREV*, the case of *HHIRD* is somewhat contradictory. In other words, the higher the income diversification indicator calculated by *HHIRD* is, the more the bank diversifies their income. According to previous studies (DeYoung and Roland, 2001; Stiroh and Rumble, 2006; Trujillo - Ponce, 2013), whether the impact of income diversification on profitability and risk of banks is positive or negative is not really clear.The authors expect that the diversification of banks will increase revenues, thereby improving the bank profitability. However, the costs to implement the diversification of revenues is quite high, so banks need to consider the costs and revenues to decide whether or not they should proceed with the diversification, especially when the income diversification can lead to risk–the higher volatility of profitability for banks.

Hypothesis H1a: Bank diversification has the relationship in the same direction with bank profitability.

Hypothesis H1b: Bank diversification has the relationship in the same direction with bank risk.

Besides, the authors used the controlled variables used in the previous studies about profitability and risk of banksin the research model. Specifically:

$Size_{it}$ is the bank size calculated by natural logarithm of the bank total assets. Based on the analysis presented in Chapter 2, the authors expect there is a relationship in the same direction between bank size and bank profitability and there is a inverse relationship between bank size and bank risk.

Hypothesis H2a: Bank size has the relationship in the same direction with bank profitability

Hypothesis H2b: Bank size has the inverse relationship with bank risk

$Growth_{it}$ represents the growth rate of bank total assets, measured by the percentages of change in the total assets in year t and year $t-1$. Based on the analysis presented in Chapter 2, the authors expect thatthere are the relationship in the same direction between growth rate and profitabilityand the inverse relationship between growth rate and bank risk.

$Lones_{it}$ represents the bank loans, calculated by outstanding loan balanceover total assets. Based on the analysis presented in Chapter 2, the authors expect there is the relationship in the same direction between outstanding loan balance and bank profitability/risk.

Hypothesis H4a: Bank's outstanding loan balance has the relationship in the same direction with bank profitability.

Hypothesis H4b: Bank's outstanding loan balance has the relationship in the same direction with bank risk.

Deposits$_{it}$ represents the bank's deposit ratio, calculated by the ratio of deposits over total assets. Based on the analysis presented in Chapter 2, the authors expect there isthe relationship in the same direction between customer deposits and bank profitability.

Hypothesis H5a: Bank's deposits have the relationship in the same direction with bank profitability

Hypothesis H5b: Bank's deposits have the relationship in the same direction with bank risk

Equity$_{it}$ is the ratio of owners'equity over total assets. Based on the analysis presented in Chapter 2, the authors expect there is the relationship in the same direction between owners' equity and bank profitability, and expect that banks will have higher risk when banks increasingly raise capital from investors.

Hypothesis H6a: Bank's equity has the relationship in the same direction with bank profitability.

Hypothesis H6b: Bank's equity has the relationship in the same direction with bank risk.

LLP$_{it}$ represents the quality of bank assets, calculated by the ratio of calculated credit risk provisions over total assets. The higher this ratio is, the more the quality of bank assets decreases. In this research, we expectthat credit risk provisions have the inverse relationship with bank profitability and have the relationship in the same direction with bank risk.

Hypothesis H7a: Bank's credit risk provisions have the inverse relationship with bank profitability.

Hypothesis H7b: Bank's credit risk provisions have the relationship in the same direction with bank risk.

Table 1
Detailed descriptions and expectations of variables in the model

Variables	*Descriptions*	*Expectations*	*Previous studies*
Dependent variables: Bank profitability are calculated following the 2 indicators: ROE and ROA			
Independent variables:			
Hhi	Indicator of bank income diversification	+	DeYoung and Roland (2001) and Stiroh and Rumble (2006)
Size	Natural Logarithof total assets	+	Stiroh and Rumble (2006), Altunbas *et al.* (2007), Haw *et. al.* (2010) and Mercieca *et al.* (2007)
Growth	Growth rate of total assets	+	Merciecaet al. (2007), Stirohand Rumble (2006), Lepetit *et al.* (2008)
Loans	Outstanding loan balance over total assets	+	Merciecaet al. (2007), Stiroh and Rumble (2006)
Deposits	Deposits over total assets	+	Haw *et. al.* (2010)
Equity	Owners' equity over total assets	+	Mercieca *et al.* (2007), Stiroh and Rumble (2006)
Llp	Credit risk provisions over total assets	–	Berger *et. al.* (2010)
Dependent variables: bankrisk are calculated following the 02 indicators: standard deviation of ROE (SdROE) and standard deviation of ROA (SdROA)			
Independent variables:			
Hhi	Indicator of bank income diversification	+	DeYoung and Roland (2001) and Stiroh (2004, 2006), Laven and Levine (2007), Lepetit *et. al.* (2008)

Table 1 contd.

Variables	*Descriptions*	*Expectations*	*Previous studies*
Dependent variables: Bank profitability are calculated following the 2 indicators: ROE and ROA			
Independent variables:			
Size	Natural Logarithof total assets	–	Stiroh and Rumble (2006), Altunbas *et al.* (2007), Haw *et. al.* (2010) and Mercieca *et al.* (2007)
Growth	Growth rate of total assets	+	Mercieca *et al.* (2007), Stirohand Rumble (2006), Lepetit *et al.* (2008)
Loans	Outstanding loan balance over total assets	+	Mercieca *et al.* (2007), Stiroh and Rumble (2006)
Deposits	Deposits over total assets	+	Shiers (2002)
Equity	Owners' equity over total assets	+	Mercieca *et al.* (2007), Stiroh and Rumble (2006)
Llp	Credit risk provisions over total assets	+	Berger *et. al.* (2010)

Source: Compiled by the authors.

5. RESULT

5.1. Descriptive Statistics

Before the authors conducted the model estimation to examine the impact of income diversification on bank profitability and bank risk, the authors generated the descriptive statistics of variables in the article to generalize research variables through the mean, standard deviation, minimum value, median and maximum value.Table 2 presents descriptive statistics of variables in the article. The ROA indicator has the average value of 1% with the standard deviation of 0.9%, while the ROE indicator has the average value of 10.3% with the standard deviation of 11.1%. This shows that the profitability of banks has greater volatility when ROE is used as the representative.

Table 2
Descriptive statistics of variables in the model

Variables	*Mean*	*Standard deviation*	*Minimum value*	*Median*	*Maximum value*	*Observations*
ROA	0.010	0.009	–0.055	0.009	0.060	296
ROE	0.103	0.111	–0.820	0.095	1.140	296
SdROA	0.003	0.005	0.000	0.002	0.044	269
SdROE	0.033	0.066	0.000	0.018	0.616	269
Hhirev	0.700	0.133	0.500	0.683	1.000	296
Hhird	0.322	0.161	0.000	0.334	0.662	296
Size	17.704	1.476	12.656	17.903	20.562	296
Growth	0.265	0.357	–1.529	0.200	2.615	269
Loans	0.513	0.159	0.000	0.516	0.845	296
Deposits	0.608	0.167	0.005	0.635	0.927	296
Equity	0.118	0.117	0.008	0.088	0.943	296
Llp	0.005	0.005	0.000	0.003	0.020	296

Similar to bank profitability, the bank risk in the research sample also has more volatility with the ROE's standard deviation representative (the standard deviation value of 6.6%). In addition, two income diversification representatives of banks are Hhirev and Hhird, showing that the banks in the research sample are in the process of income diversification.

4.2. Correlation Analysis

Results are presented in table 3 and 4, showing that the absolute value of the correlation coefficient between variables and bank profitability and bank risk is quite difficult (less than 0.8). Therefore, according to the suggestion of Frank (2010), we can conclude that the multi collinearity phenomenon does not exist in the authors' research model.

On the other hand, based on the sign of the correlation coefficient between the two representatives of bank income diversification and bank profitability and bank risk, it can be seen that bank income diversification has the correlation in the same direction with bank profitability and bank risk.

Table 3
Matrix of the correlation between the variables in the model and bank profitability

	ROA	*ROE*	*Hhirev*	*Hhird*	*Size*	*Growth*	*Loans*	*Deposits*	*Equity*	*Llp*
ROA	1.000									
ROE	0.533	1.000								
Hhirev	–0.244	–0.176	1.000							
Hhird	0.239	0.179	–0.975	1.000						
Size	–0.277	0.099	0.010	–0.012	1.000					
Growth	0.197	0.181	–0.180	0.205	–0.266	1.000				
Loans	–0.052	0.147	0.073	–0.067	0.170	–0.189	1.000			
Deposits	–0.080	0.150	–0.189	0.229	0.301	–0.347	0.406	1.000		
Equity	0.320	–0.186	0.087	–0.091	–0.523	0.043	–0.373	–0.445	1.000	
Llp	–0.240	0.023	0.109	–0.122	0.350	–0.313	0.414	0.215	–0.173	1.000

Table 4
Matrix of the correlation between the variables in the model and bank risk

	SdROA	*SdROE*	*Hhirev*	*Hhird*	*Size*	*Growth*	*Loans*	*Deposits*	*Equity*	*Llp*
SdROA	1.000									
SdROE	0.652	1.000								
Hhirev	–0.155	–0.146	1.000							
Hhird	0.150	0.149	–0.975	1.000						
Size	–0.343	–0.049	0.010	–0.012	1.000					
Growth	0.011	–0.066	–0.180	0.205	–0.266	1.000				
Loans	–0.242	–0.034	0.073	–0.067	0.170	–0.189	1.000			
Deposits	–0.263	–0.036	–0.189	0.229	0.301	–0.347	0.406	1.000		
Equity	0.438	–0.022	0.087	–0.091	–0.523	0.043	–0.373	–0.445	1.000	
Llp	–0.082	0.058	0.109	–0.122	0.350	–0.313	0.414	0.215	–0.173	1.000

Impact of diversification on bank profitability

Table 5 shows the results of the impact of income diversification on bank profitability. Refer to Table 5, it shows that the bank profitability in the previous period will have a positive impact on the current bank profitability at the significance level of 1% with the ROA and ROE representatives. This implies that the effective operations of banks in the previous period will lead to the higher profitability of banks in the current period.

In addition, Hhirev shows the inverse relationship with bank profitability, represented by ROA and ROE at the significance level of 1%, indicating that when Hhirev increases, it leads to the reduction in bank profitability. In other words, the more increasingly banks diversify their income, the more they increase the bank profitability. With the representative variable Hhird, which shows the bank income diversification level, it can be seen that Hhird has the relationship in the same direction with bank profitability at the significance level of 1%. This indicates that the higher Hhird is, the more the bank is diversified and the higher the bank profitability is. In summary, through the two representatives of income diversification, the higher profitability is caused. This finding is consistent with the authors' expectations at the beginning and similar to the previous empirical edidences of DeYoung and Roland (2001), Stiroh and Rumble (2006).

Besides, the controlled variables that the authors put in the research model also have a siginificant impact on the bank profitability. In particular, the growth rate of total assets has a positive impact on the bank profitability at the significance level of 5% (with the representative of bank profitability as ROE). This suggests that the higher growth rate of total assets banks have, the higher their bank profitability is. These results are similar to the previous findings of Mercieca *et al.* (2007), Stiroh and Rumble (2006), Lepetit *et. al.* (2008) and Lee *et. al.* (2014).

The bank outstanding loan balance also has a positive influence on the bank profitability at the significane level of 10%. This result shows that the more increasingly banks offer credit to individuals, economic organization the higher the bank profitability will be due to achieving the higher level of interest income. This evidence is consistent with the conclusions of previous studies of Mercieca *et. al.* (2007), Stiroh and Rumble (2006).

It is seen that the owners' equity has the relationship in the same direction with the bank profitability at the significance level of 1%. This indicates that the higher equity banks have, the higher the bank profitability is. In the context in which theeconomy of Vietnam significantly has fluctuated in the recent years, the higher owner equity banks have, the more the banks are able to take advantage of the cost of capital because the cost of capital is quite lower than the cost of other funding sources. Consequently, these banks may have higher profits compared to other banks. This finding is similar to the evidences found by Mercieca *et. al.* (2007), Stiroh and Rumble (2006) and Lee *et. al.* (2014).

In contrast, the credit risk provisions have a inverse impact on the bank profits at the significance level of 1%. This suggests that the lower asset quality banks have, the lower their profitability is compared to other banks. The reason is that the fact that banks have low asset quality means that banks are holding too many overdue debts (bad debts). These debtsdonot increase interest income; they force banks to allocate an income amount from business activities as the provision for the debts, thereby reducing profits after tax of banks

Thetests of AR (2) and Hansen suggest that the second autocorrelation phenomenon does not exist and the instrumental variablesused by the authors are all valuable or not correlated with the balance.

Table 5
Results of the estimation of the impact of income diversification on profitability

		Dependent variable: ROA		*Dependent variable: ROE*	
Independent variable	*Expectations*	*Coefficient/ (z)*	*Coefficient/ (z)*	*Coefficient/ (z)*	*Coefficient/ (z)*
ROA (–1)	+	0.4216***(7.48)	0.4094***(7.97)		
ROE (–1)	+			0.3392***(5.42)	0.3519***(5.01)
Hhirev	–	–0.0047***(–2.96)		–0.0863***(–3.01)	
Hhird	+		0.0028**(2.33)		0.0652*(1.81)
Size	+	–0.0001(–0.2)	–0.0001(–0.22)	0.0104(1.46)	0.0085(1.19)
Growth	+	0.0006(0.55)	0.0013(1.07)	0.0385**(2.22)	0.0347*(1.89)
Loans	+	0.0081*(1.66)	0.0069(1.35)	0.1160**(2.35)	0.1068*(1.88)
Deposits	+	–0.0022(–0.53)	0.0005(0.12)	–0.0083(–0.15)	–0.0087(–0.12)
Equity	+	0.0508***(3.33)	0.0578***(3.85)	0.0780(0.38)	–0.0811(–0.27)
Llp	–	–0.2193***(–2.7)	–0.2426***(–3.18)	–1.4638***(–2.64)	–1.5655***(–2.86)
–cosn		0.0031(0.29)	–0.0025(–0.23)	–0.1254(–0.86)	–0.1518(–0.98)
Ar(1)	–1.68*	–1.51	–1.57	–1.11	
Ar(2)	1.17	1.4	1.5	1.07	
Hansen	20.33	13.38	13.62	18.61	

Note: *, ** and *** respectively represent the significance level of 10%, 5% and 1%.

The impact of diversification on bank risk

Table 6 shows the results of the impact of income diversification on bank risk. Specifically, the bank risk in the previous period has a positive impact on the current bank risk at the significance level of 1% with the two representatives of SDRoe and SDRoa. This implies that the higher the bank risk was in the previous period, the higher the bank risk in the current period would be.

In addition, Hhirev shows the inverse relationship with the bank risk represented by SdROA and SdROE at the significance level of 1%, indicating that when Hhirev increases, it will reduce the bank risk. In other words, the more diversified a bank is, the more the bank risk will increase. With Hhird as the representative variable showing the bank income diversification level, it can be seen the Hhird variable has the relationship in the same direction with the bank risk at the significance level of 1%. This implies that higher the Hhird indicator is, the more diversified the bank is, thus the higher the bank risk will be. In summary, through the two representatives of bank income diversification, the authors can conclude that higher level of diversification banks have, the higher the bank risk is. This finding is consistent with the authors' expectations at the beginning and similar to the empirical evidences of DeYoung and Roland (2001), Stiroh (2004, 2006), Laven and Levine (2007), Lepetit *et. al.* (2008) and Lee *et. al.* (2014).

Besides, the controlled variables that the authors put in the research model also have a significant impact on the bank risk. In particular, the growth rate of total assets has an inverse impact on the bank riskat the 5% significance level with both of the two representatives of bank risk. This shows that the higher growth rate of total assets banks have, the lower the bank risk would be.

Banks' outstanding loan balance also has an inverse impact on bank risk at the significance level of 1%, which indicates that the more the banks foster lending, the lower the bank risk would be. This result is somewhat in contrast to the expectations of the authors in the research model. This contrast can be explained by the reason that when banks offer more credit to customers with the strict credit procedures in compliance with the policies of the Central bank, it can result in more interest income and consequently reduce the risk banks have to face.

The deposits of customers show an inverse impact on the bank risk at the significance level of 1%. This means that the more deposits banks receive, the lower risk the banks have to face. This result is contrary to the authors' expectations in the research model. However, this can be explained that banks attract deposits from customers and use them quite effectively due to the compliance with the policies of the use of Central bank's capital; therefore, bank risk will be reduced. Moreover, the higher deposits from customers also mean the higher bank liquidity, thus reducing the possibility of banks' bankruptcy or reducing the risk that banks have to face. This result is consistent with the result of Lee *et. al.* (2014).

It can be seen that equity has the relationship in the same direction with the bank risk at the significance level of 1%. This result shows that the more capital the banks have, the higher bank risk they face. This is consistent with the empirical evidences of Mercieca *et. al.* (2007), Stiroh and Rumble (2006), Lepeit *et. al.* (2014).

The tests of AR (2) and Hansen show that the second correlation phenomenon does not exist, and the instrumental variables used by the authors are all valuable or not correlated with the balance.

Table 6
The estimation results of the impact of income diversification on risk

		Dependent variable: ROA		*Dependent variable: ROE*	
Independent variable	*Expectations*	*Coefficient/ (z)*	*Coefficient/ (z)*	*Coefficient/ (z)*	*Coefficient/ (z)*
SdROA(–1)	+	0.0573(0.85)	0.3094***(2.76)		
SdROE(–1)	+			0.3083***(8.74)	0.2959***(5.00)
Hhirev	–	–0.009***(–2.75)		–0.0707***(–1.79)	
Hhird	+		0.0058***(1.98)		0.0708***(2.91)
Size	–	0.0004(0.89)	–0.0003(–1.19)	–0.0025(–0.89)	–0.0013(–0.55)
Growth	+	–0.002**(–2.27)	–0.0027**(–2.11)	–0.0437**(–3.46)	–0.0565**(–6.00)
Loans	+	–0.012***(–3.25)	–0.0044(–1.21)	–0.0588(–1.57)	0.0093(0.27)
Deposits	+	–0.004(–1.48)	–0.0057***(–2.13)	–0.0496(–1.5)	–0.0961***(–3.24)
Equity	+	0.0148(1.26)	0.0185(1.21)	0.1843***(1.9)	0.2770***(1.97)
Llp	+	–0.08(–1.15)	0.0662(0.4)	0.7320(0.93)	1.0663(1.02)
–cosn		0.0099(1.34)	0.0087(1.52)	0.1649**(2.21)	0.0571(1.00)
Ar(1)	–2.47**	–1.87*	–2.12**	–2.06**	
Ar(2)	–0.92	–1.08	–0.88	–0.97	
Hansen	22.09	13.25	18.58	14.3	

Note: *, ** and *** respectively represent the significance level of 10%, 5% and 1%.

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

The diversification of banking activities is one of the issues attracting the attention of many parties, from bank managers to policy makers-government management agencies in the banking sector. This research examines the influence of income diversification on profitability andrisk of commercial banks in Vietnam. By using the GMM estimation method for the sample of 23 commercial banks in Vietnam during the period from 1995 to 2015, the authors studied the impact of income diversification on bank profitability and bank risk. The results show that the diversification of income has the impact in the same direction on bank profitability. However, when commercial banks conduct more income diversification, the bank risk consequently increases, meaning the commercial banks' profitability is more volatile. The study result shows that commercial banks need to have prudent policies of diversifying products and services based on the consideration of benefits, costs, foundations of human resources, technology, capital and other factors.

The study results show that the growth rate of total assets, outstanding loan balance and owners' equity have the relationship in the same direction with profitability. However, the credit risk provisions have the inverse relationship with profitability. Therefore, the advantages of scale, growth rate and credit growth will be a double-edged sword if the credit quality is not high. In such case, the provisions will lead to profit erosion.

The study results also show that the growth rate of total assets, outstanding loan balance and deposits have the inverse relationship with risk, whereas the owners' equity has the relationship in the same direction with bank risk. This means that the banks having high growth rate, high outstanding loan balance and high deposits would have the profitability which is less volatile. Banks with large authorized capital will have more possibility of profitability volatility.

5.2. Recommendations

First, it is needed to diversify income by developing more products and services or, in other words, promote non-interest income activities.

Second, managers need to consider and be cautious in implementing the polices which foster non-traditional business activities. Such must be based on the market analysis, the potentials of the bank and the consideration of resource waste prevention.

Third, managers need to plan for growth of total assets and additional equity, take advantages of scale, operate healthy credit system with the strict internal control system and risk control system. Especially, they need to pay attention to credit quality, collateral quality and minizing the provisons which would lead to profit erosion.

Fourth, it is necessary to focus on the growth of total asset size, capital mobilization and credit activities, because these are the factors that can reduce the volatility of profitability.

Fifth, in order to diversify income, banks need to invest in developing technology associated with the increased security of bank information and need to provide the diverse range of services and packages that are time-saving and convenient for customers. This would help to satisfy the needs of customers.

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