FACTORS AFFECTING PROFITS OF COMMERCIAL BANKS: EMPIRICAL EVIDENCES IN VIETNAM

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Abstract: This study verifes factors such as the structure of assets (TLTA), quality of assets, equity ratio, funding structure, operational efficiency, bank size, income diversification, rate of economic growth and inflation, which have affected profits of commercial banks in Vietnam. The estimation method is based on typical models of panel data such as Pool OLS, FEM, REM and SGMM. In the research process, the authors conducted variable descriptive statistics, correlation analysis and tests of models such as omitted variable test, multicollinearity test, Heteroscedasticity test, Hausman test, sargan, hansen, AR. After estimating regression models, the authors found the relationships between the structure of assets, asset quality, equity ratio, inflation and ROA. Simultaneously, the study also found the relationship between the structural elements of assets, asset quality, funding structure, bank size, diversification of income, GDP growth rate, inflation and ROE.

Keywords: Micro factors, macrofactors, profits, banks in Vietnam.

1. INTRODUCTION

Commercial banks are important financial institutions in the financial system and play important role in the operations of most of the economies. Therefore, the commercial bank system's efficient operations are significant on the enterprise,national and international levels. Financial soundness indicators of the banking sector are analyzed based on some criteria such as capital adequacy, asset quality, incomes-expenses and profits. The profit potential of the banking sector is likely to contribute to encouraging investments, strengthening the economic movement and the rise of global trends of the sector. In Vietnam, in the recent years, the decline of economic growth has led to the decline of many sectors including commercial banks. Therefore, in the specific context of Vietnam, there should be researches to consider the factors affecting profits of commercial banks in Vietnam. Thereby, based on the comprehensive view of the specific context in Vietnam, several policy suggestions can be given for the increase of profits of commercial banks, which would contribute to economic growth.

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2. LITERATURE REVIEW

There have been many research projects over the world on the issue of commercial bank profit targets. For instance, Ponce (2012) used the dependent variables including ROA and ROE to measure the profitability of banks. Similarly, Almumani (2013), Alper and Anbar (2011), Federick (2014), Adeusui *et al* (2014), Khrawish (2011) and Shaher *et al* (2011) also had the perspective of using ROA and ROE for the study of profitability. This is such a popularly used ratio because it is simple, easy to understand and compare between companies in the same industry with different scales, or between businesses in many different industries, or between many different investments such as savings, real estate, securities, gold, foreign exchange andbusiness projects. Therefore, it can help investors to make funding decisions quickly. The higher the ratio is, the more rational and more efficient the allocation and management of assets would be, and enterprises also have the flexible variations between the property items under the fluctuations of the economy. In this study, we used ROA and ROE to reflect the profit indicators of commercial banks. In addition to the studies of Ponce (2012), Almumani (2013), Alper and Anbar (2011), Federick (2014), Adeusui *et al* (2014), Khrawish (2011), Shaher *et al* (2011), there were also studies of Cekeizi (2015), Trinh Quoc Trung (2013). Although the studies were conducted in different countries and in different periods, the factors affecting ROA and ROE of commercial banks includedcharacteristic elements of banks and external factors.

Characteristic Elements of the Bank

The bank characteristic elements affect the goals and business strategies of a bank. These factors include capital size, scales of customer deposits, the quality of bank assets, the level of diversification, operating costs, the status of information technology.

Structure of Assets (TLTA)

In order to assess the impact of asset structure on profits of commercial banks, the authors used the ratio of loan outstanding balance to total assets. When studying the 89 banks in Spain in the period 1999-2009, Ponce (2013) found the correlation between asset structure and bank profits, in accordance with the findings of Khrawish (2011), Syafri (2012). Syafri (2012) mentioned that commercial banks' expected profitswould increase when the asset portfolio consisting of loans rise against other secured assets.

Equity ratio *(TETA)*

Studies have shown that there is a positive correlation between owner equity and bank profits (Ponce, 2012). The study of Kharawish (2011) had the same perspective. It examined and analyzed the factors that may affect the operational efficiency of commercial banks in Jordan during the period 2000 -2010, which providedadditional evidences of the positive correlation between the capital size and bank profits. Syafri

(2012) provided further evidences proving that the increase in owner equity was the cause for higher profits. The studies of Obamuyi, (2013); Ongore and Kusa, (2013); Frederic (2014) also had similar results.

Funding structure (DEPTLI)

Financing structure reflects the ratio of customer depositsto total debts. Among the funding sources, deposits and loans from credit institutions and customer deposits account for the largest proportion of the total funding. The ratio of customer deposits to the total funding should be the key factor contributing to the bank liquidity funding and the ratio should be greater than 80%, indicating the caution in the management of bank liquidity as well as the bankcredibility in attracting deposits from customers. Customer deposits are considered as the funding source which is stable and cheaper than other funding sources. Thus, the ratio of customer deposits to total high debts will increase bank profits. Ponce (2013), Gul and Zaman (2011) showed that the rate of customer deposits positively affected the profitability of banks.

Asset quality (NPL)

Asset quality affects factors such as profitability, financing and liquidity of banks. Asset quality is measured by the non-performing loan ratio (NPL), a measure of risk in the lending process of commercial banks. According Girardone *et al* (2004), NPL ratio was a sign that banks are not taking full advantages of all the resources as usual to assess credits and monitor the lending processes; additionally, non-performing loans make the whole banking system operate inefficiently. With the same perspective, the studies of Ponce (2013), Adeusui *et al* (2014), Federick (2014) indicated that asset quality had a direct impact on profitability of banks. The increasein bad loans would require banks to set aside a provision, thus reducing profits.

Bank size (SIZE)

Bank size is calculated by the natural logarithm of total assets. The impacts of bank sizeon bank profits are not homogeneous. It can be positive to a certain limit because there is a greater opportunity for diversification but this does not mean that diversification will lead to increases in profits. In other words, the effects of bank size on profits can be nonlinear. Thereare banks having profits which initially increase along with bank size and later gradually decrease due to bureaucracy and other reasons. Previous arguments enable us to build two hypothesises about signs of profitability. Based on the principle, it is expected that big banks will have experiences and advantages in increasing profits thanks to the size advantage. However, above a certain threshold of size, non-economic factors of size may arise, making the bank size affect the bank profits. The researches of Alper and Anbar (2011), Gul and Zaman (2011), Syafri (2012), Obamuyi, (2013); Frederic, (2014) had different research results.

Income Diversification (HHIRD)

In the condition of increasingly severe integration and competition, if banks only maintain the supply of traditional services, theycan notmaintain their positions. In the context of the strong development of science and technology, banks have been putting more efforts inapplying modern technology in activities which create favorable conditions for citizens and investors to access products, advanced banking services and ensure operational efficiency and enhance competitiveness. The studies of Chiorazzo (2008) and Elsas *et al* (2010), Ponce (2013) all concludedthat income diversification would enhance bank profitability from non-interest incomes. The researchesof Sufian and Chong (2008) in the Philippines also showed a positive correlation between non-interest incomes and bank profits.

Operational efficiency (CIR)

Operational efficiency is one of the important factors that affect bank profits. It is represented by various financial ratios such as total asset growth, credit growth and the rate of profit growth. In addition, operational efficiency represents the quality of management and the ability to exploit resources efficiently, maximize revenue, reduce operational costs whichcan be measured by operating expenses on sales from operations. The studies ofSufian and Chong, (2008), Adeisui *et al* (2014), Ponce (2013*)*, Onuonga (2014) agreed that the high operational efficiencypresented by the low ratio of operating expenses tosales from operationsindicated high revenues.

The External Factors

External factors affecting bank profits are factors beyond the control ability of the bank managers, representing the events taking place outside the banks. Most studies have shown that economic growth rate and inflation rate have an impact on commercial bank profits.

Economic growth rate

As the economic, political and social environments are stable, production processes of the economy occur normally, businesses in the economy can ensure the ability to borrow and repay capital and capital repayment, sobank operations are also stab. When the economic growth rate is high and stable, other areas of the economy all have demands of expanding operaions, thus increasing the demands for loans, which makes the banking sector easily expand credit operations. Besides, NPLs of banks also fall because the financial capacity of enterprises in such good economic condition will be enhanced. In contrast, when the economic, political and social environments become unstable, demands for loans decline, the risk of overdue debts increases, higher non-performing loans happenand bank operational efficiencystrongly decreases. The findings of Gul and Zaman (2011), Ponce (2013) provided evidences of a positive correlation between economic growth and bank profits. Meanwhile, the studies of Kharawish (2011), Ongore

(2014), Alper and Anbar (2011), Adeusi (2014) found different results. Ongore (2014), Alper and Anbar (2011) suggested that the growth rate did not affect bank profits, Kharawish (2011), Adeusi (2014) argued that economic growth would make bank profits decline.

Inflation rate

Experimental researches at commercial banks in Jordan during the 2000-2010 of Kharawish(2011) had the finding that there was a negative correlation between inflation rate andbank profits, similar to the research of Adeusi (2014), studying 14 commercial banks in Nigeria from 2000 to 2013. However, on the contrary, Ponce (2013), Gul and Zaman (2011) all agreed that inflation rate had a positive correlation with bank profits. Also, Ongore (2014), Alper and Anbar (2011) all suggested that inflation rate had insignificant impacts or no impacts on bank profits.

3. THE RESEARCH MODEL AND HYPOTHESES

3.1 Research Models

Based on the previous studies with two factor groups of bank characteristics and macroeconomic factors, the research model is proposed as follows:

Model 1:

$ROA_{i,t} = \beta_0 + \beta_1 TLTA_{i,t} + \beta_2 NPLTL_{i,t} + \beta_3 TETA_{i,t} + \beta_4 DEPTLI_{i,t} + \beta_5 CIR_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 HHIRD_{i,t} + \beta_8 GDP_{i,t} + \beta_9 INF_{i,t} + \varepsilon_{i,t}(l)$

Model 2:

$ROE_{i,t} = l_0 + l_1 TLTA_{i,t} + l_2 NPLTL_{i,t} + l_3 TETA_{i,t} + l_4 DEPTLI_{i,t} + l_5 CIR_{i,t} + l_6 SIZE_{i,t} + l_7 HHIRD_{i,t} + l_8 GDP_{i,t} + l_9 INF_{i,t} + \mu_{i,t}(2)$

The represents each commercial bank, the *t* represents year of observations.

$ROA_{i,t}$, $ROE_{i,t}$ represent the *i* bank's profitsin year *t*. $TLTA_{i,t}$, $NPLTL_{i,t}$, $TETA_{i,t}$, $DEPTLI_{i,t}$, $CIR_{i,t}$, $SIZE_{i,t}$, $HHIRD_{i,t}$ respectively represent the characteristic elements of the bank: the structure of assets, asset quality, the ratio of owner equity, funding structure, operational efficiency, bank size, income diversification of the i bank in yeart. *GDP*, *INF* respectively represent macro factors: annual *GDP* growth rate, the rate of inflation over years. $\varepsilon_{i,t}$ is normally distributed errors, varying following *i* and *t*.

3.2. Descriptions of Variables and Hypotheses

Dependent variables

This study used ROA as a dependent variable to reflect the return on total assets and ROE to reflect the return on equity.

Independent variables

The independent variables are the factors affecting bank profits, including:

Structure of assets (TLTA)

This index is determined by loan outstanding balance on total assets. The studies of Ponce (2013), Syafri (2012) all agreed that there was a positive correlation between this index with bank profits.

Hypothesis H1: There is a positive correlation between the ratio of loans to total assets and profits.

Asset quality (NPL)

Asset quality is measured by the non-performing loan ratio (NPL). The low ratio reflects the high quality of assets. There have been researches proving that asset quality has a direct impact on bank profits such as researches ofGirardone *et al* (2004), Ponce (2013), Adeusui *et al* (2014), Federick (2014).

Hypothesis H2: There is a positive correlation between the quality of assets and bank profits, indicating that the lower non-performing loans are, the higher profits would be.

The ratio of equity (TETA)

Equity ratio (TETA) is measured by owner equity divided by total assets in order to assess the relevance of the capital. The studies by Ponce (2013), Gul and Zaman (2011), Kharawish (2012) stated that equity ratio had a positive effect on bank profits.

Hypothesis H3: There is s a positive correlation between equity ratio and profitability.

Funding structure (DEPTLI)

This index is measured by the ratio of customer deposits to total liabilities. The high ratio will increase thebank profitability. Ponce (2013), Gul and Zaman (2011) pointed out that the ratio of customer deposits positively affectedbank profits.

Hypothesis H4: There is a positive correlation between financing structure and profitability.

Operational efficiency (CIR)

This index is measured by the ratio of operating expenses to income from operations, used to evaluate bank operations. Ponce (2013), Almumani (2013) presented that thebetter the operational efficiency presented by the ratio of operating expenses to income was, the higher profits would be.

Hypothesis H5: There is a positive correlation between operational efficiency and profitability.

Bank size (SIZE)

This study used bank size variable, which was measured by taking the natural logarithm of total assets (SIZE). The studies of Ponce (2013), Alper and Anbar (2011), Almumani (2013) showed an inconsistent result about the correlation between bank size and bank profits. Therefore, SIZE variable in this study could have a positive or negative correlation with the profitability of banks. However, for the emerging economy relying on size in Vietnam, industries seek for profits by expanding size.

Hypothesis H6: There is a correlation between size and profitability.

Diversification of income (HHIRD)

The study usedthe adjustment indexHerfindahl - Hirschman (HHI), which is similarto the study of Elsas(2010). HHI revenue diversification is calculated as below:

$$HHIRD = 1 - \left[\left(\frac{INT}{TOR} \right)^2 + \left(\frac{COM}{TOR} \right)^2 + \left(\frac{TRAD}{TOR} \right)^2 + \left(\frac{OTH}{TOR} \right)^2 \right]$$

In such:

INT : gross interest income;

COM : commission, fee revenue;

$TRAD$: trading revenue;

OTH : other gross operating income;

TOR : total operating revenue.

$HHIRD$ = 0 when the total income is generated from the only one source of bank activity (100% of the bank's income from credit operations or interest income, for example) and $HHIRD$ = 0.75 according to the above formula when the income from each source is equal (income from credit operations and other business activities). Therefore the higherthe $HHIRD$ is, the higher the level ofincome diversification of banks would be.

Hypothesis H7: There is a positive correlation between income diversification and profitability.

Economic growth (GDP)

The annual growth rate of real GDP is used to find the correlation between the economic situation and profitability. The poor economic situation can reduce the quality of loan portfolio, increasecredit risk provisions and reducebank profits. In contrast, the good economic situation will improve bank profits.

Hypothesis H8: There is a positive correlation between economic growth and profits.

Inflation (INF)

Inflation is measured by the annual rate of inflation based on CPI. Revell (1979) discussed the relationship between inflation and profits, given that the impact of inflation on profits depended onthe impact of inflation on salaries and other operating expenses of the banks. If bank managers couldaccurately predict the rate of inflation, the banks may adjust the inflation rate appropriately to increase profits. The researchesPonce (2013) andKhrawish (2011) confirmed a negative correlation between inflation and profits.

Hypothesis H9: There is a negative correlation between inflation and profits.

Table 1
Descriptions of the variables used in the model

No.	Variable	Formula	Expectation Sign	Researches
I.	Group of banks' characteristic elements			
	1. TLTA–Asset structure	Loan outstanding balance/ Total assets	+	Ponce (2013); Syafri (2012); Gul *et al* (2011)
	2. NPL–Asset quality	Non performing loans/ Total outstanding loans	–	Ponce (2013); Adeusui (2014); Federick (2014)
	3. TETA–Ratio of owner equity	Capital and funds/Total assets	+	Ponce (2013); Gul *et al* (2011); Kharawish (2012); Syafri (2012); Obamuyi (2013); Ongore and Kusa (2013); Frederic (2014)
	4. DEPTLI –Funding structure	The rate of customer deposits/total liabilities	+	Ponce (2013); Gul *et al* (2011)
	5. CIR–Operational efficiency	Operational expenses / Operational income	–	Almumani (2013) ; Sufian and Chong (2008); Adeisui *et al* (2014); Ponce (2013); Onuonga (2014)
	6. SIZE–Total asset size	Log (Total assets)	+	Khrawish (2011); Ponce (2013)
	7. HHIRD –Income diversification	$HHIRD = 1 - [(INT/TOR)^2 + (COM/TOR)^2 + (TRAD/TOR)^2 + (OTH/TOR)^2]$		Chiorazzo (2008); Elsas *et al* (2010); Ponce (2013); Sufianand Chong (2008)
II.	Group of macrofactors			
	8. GDP–Annual growth rate of GDP	(GDP yearn/GDP year $(n - l)) - l$	+	Bouke (1989); Gul *et al* (2011); Ponce (2013)
	9. INF–Inflation rate	Annual CPI	–	Khrawish (2011); Adeusi (2014)

4.   DATA AND METHODOLOGY

4.1. Data

The study used secondary data of 27 banks in Vietnam based on the criteria of total assets, owner equity, market share with a total of 189 observations for the panel data of 7 years from 2008 to 2014. The study used secondary data, including financial statements, annual reports of commercial banks to calculate the ratios such as the ratio of non-performing loans, bank size, the ratio of owner equity to total assets, the ratio of loans to total mobilized capital, net profit on equity, credit growth, short-term lending rate. Meanwhile, the macro-indicators such as GDP and inflation rate are collected from the General Statistics Office of Vietnam.

4.2. Methodology

The research used statistical data from the financial statements of commercial banks in Vietnam, the General Statistics Office. Besides, panel regression techniques were used to build panel regression model and test the given hypotheses to examine the impact of factors and the level of impact on profits of commercial banks in Vietnam. The used studies were Ordinary Least Square Pooled; Fixed Effect Model-FEM; andRandom Effect Model - REM. To choose between OLS and REM, LM test (Breusch-Pagan Lagrange Multiplier) was used; to choose between REM and FEM, Hausman test was used. However, to handle the endogenous phenomenon in the model, we used Difference Generalized Method of Moments - GMM. At the same time, to test the relevance of GMM, Sargan test or Hansen test of determining excessive limits and Arellano- Bond test about autocorrelation phenomena.

5.   RESULTS AND DISCUSSIONS

5.1. Descriptive Statistics

Descriptive statistical results of research variables presented in Table 2 show that the average profits of the banks were 0.96% (ROA) and 9.2% (ROE), varying from 0.01% to 3.95% (ROA) and varying from 0.075% to 28.46% (ROE). It can be seen thatindicated profits in this periodwere quite low and there was a large difference between banks. This reflects the difficult business situations of commercial banks in Vietnam.

The asset structure (TLTA) with the average value of 70% indicatesthat the operation level and the ability to use the bank capital for lending were relatively good. The asset quality demonstrated by the low average NPL ratio of 2.41% showed the guaranteedasset quality. The ratio of equity to total assets (TETA) of the banks was relatively low (the average figure of 12%), indicating that the banks' self-financing capability was not high. The financing structure (DEPTLI) reached 64.5% averagely, accounting for a considerable proportion of the mobilized funds of commercial banks.

Table 2
Descriptive Statistics of variables

Variable	Observations	Average	Median	Max value	Min value	Standard Deviation	Skewness	Kurtosis
ROA	189	0.0096	0.0093	0.0395	0.0001	0.0063	1.2601	6.9371
ROE	189	0.0929	0.0821	0.2846	0.0008	0.0608	0.6731	3.0124
TLTA	189	0.7003	0.7142	0.9527	0.3734	0.0977	−0.3021	2.8498
NPL	189	0.0241	0.0226	0.1246	0.0034	0.0149	2.8582	16.3477
TETA	189	0.1213	0.0929	0.6141	0.0291	0.0843	2.8725	13.6100
DEPTLI	189	0.6450	0.6687	0.9659	0.0000	0.1543	−0.5426	4.0050
CIR	189	1.4632	0.9335	12.7702	0.2109	1.5959	3.8527	22.1167
SIZE	189	7.7244	7.7363	8.8203	6.3100	0.5357	−0.1128	2.5095
HHIRD	189	0.3315	0.3342	0.6660	0.0008	0.1517	−0.1386	2.3065
INF	189	0.1014	0.0681	0.1989	0.0184	0.0624	0.4237	1.7528
GDP	189	0.0582	0.0589	0.0678	0.0503	0.0057	0.2706	1.9437
ROA	189	0.0096	0.0093	0.0395	0.0001	0.0063	1.2601	6.9371
ROE	189	0.0929	0.0821	0.2846	0.0008	0.0608	0.6731	3.0124
TLTA	189	0.7003	0.7142	0.9527	0.3734	0.0977	−0.3021	2.8498
NPL	189	0.0241	0.0226	0.1246	0.0034	0.0149	2.8582	16.3477
TETA	189	0.1213	0.0929	0.6141	0.0291	0.0843	2.8725	13.6100
DEPTLI	189	0.6450	0.6687	0.9659	0.0000	0.1543	−0.5426	4.0050
CIR	189	1.4632	0.9335	12.7702	0.2109	1.5959	3.8527	22.1167
SIZE	189	7.7244	7.7363	8.8203	6.3100	0.5357	−0.1128	2.5095
HHIRD	189	0.3315	0.3342	0.6660	0.0008	0.1517	−0.1386	2.3065
INF	189	0.1014	0.0681	0.1989	0.0184	0.0624	0.4237	1.7528
GDP	189	0.0582	0.0589	0.0678	0.0503	0.0057	0.2706	1.9437

Source: Authors' calculations

The average operational efficiency (CIR) was relatively high at 1.46. The average bank size (SIZE) was 7.7. The average income diversification (HHIRD) was 0.33, meaning that the overall average level of diversification was low. GDP, INF, ROE, ROA, NPL, TETA, CER all had positive skewness and kurtosis, demonstrating the right-skewed distribution of all the variables. TLTA, DEPTLI, CIR, HHIRD had left-skewed distribution.

5.2. Research Results

Table 3 presents the estimated results from the regression model 1 and model 2 with Pooled OLS regression method, in which ROA and ROE were the dependent variables. The regression results showed that the model hadstatistical significance and explained 51.8% (ROA) and 30.6% (ROE). The majority of the variables were statistically significant. However, the variable DEPTLI and SIZE had no statistical significance when ROA was used as the dependent variable ROA; the variable NPL, CIRhad no statistical significancewhen ROE was used as the dependent variable .

However, after testing, the authors realized thatamong 189 observations, there were a few observations having big deviations from the average, giving rise to

Table 3
Pooled OLS regression results

Variable	ROA		ROE	
	Regression coefficients	*Standard error*	*Regression coefficients*	*Standard error*
TLTA	0.0093***	0.0035	−0.0824***	0.0402
NPL	−0.0589***	0.0226	−0.1669	0.2623
TETA	0.0253***	0.0054	0.2127***	0.0627
DEPTLI	0.0031	0.0023	0.0462*	0.0270
CIR	−0.0018***	0.0002	0.0014	0.0025
SIZE	0.0002	0.0009	0.0734***	0.0100
HHIRD	−0.0062***	0.0024	0.0304	0.0281
GDP	−0.1184*	0.0649	−1.795***	0.7551
INF	0.0225***	0.0063	0.1643***	0.0732
R^2	0.5414	0.3398		
Corrected R^2	0.5184	0.3067		
F-statictis	23.48	10.24		
P-value (*F*-statictis)	0.0000		0.0000	

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

Heteroscedasticity. To overcome the above phenonmenon, the authors conducted the examinations of typical regression models providing panel data by Fixed-effect and random-effects with the results shown in Table 4.

Table 4
Regression results by Fixed Effect and Random Effect

Variable	ROA		ROE	
	REM	*FEM*	*REM*	*FEM*
TLTA	0.0094***	0.0057	−0.0576	−0.0338
NPL	−0.052***	−0.0196	−0.1128	−0.0939
TETA	0.0226***	−0.0003	0.2112***	0.2108***
DEPTLI	0.0021	−0.0017	0.0273	0.02
CIR	−0.0018***	−0.0016***	0.0043*	0.0059*
SIZE	−0.0000286	−0.0032	0.0807***	0.0917***
HHIRD	−0.006***	−0.003	0.0207	0.0114
GDP	−0.1165*	−0.1118*	−1.735***	714***
INF	0.0216***	0.0178***	0.1603***	0.1704***
Hausman Test	chi2(9) = 98.83		chi2(9) = 4.21	
	Prob > chi2 = 0.0000		Prob > chi2 = 0.8967	
Model selection	Fixed Effect		Random Effect	

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

The results showed that the model had statistical significance. The variable CIR, GDP, INF had statistical significance to ROA as the dependent variable. The variable TETA, CIR, SIZE, GDP, INF had statistical significance to ROE as the dependent variable.

With the aim of solving the endogenous problem and testing the sustainability of the theory, the authors conducted a regression with the GMM system model. The research used Sargan-Hensen test because the estimation of dynamic panel data was based on the method of instrumental variables. At the same time, the AR test was also used to consider the autocorrelation of residuals.

Table 5
SGMM regression results

	ROA		ROE	
Variable	*Regression coefficients*	*Standard error*	*Regression coefficients*	*Standard error*
$Yi.t - \tilde{e}$	−0.008	0.1801	0.8862***	0.1653
TLTA	0.1533*	0.0076	−0.1032	0.0712
NPL	−0.1485***	0.0549	−0.6042***	0.2537
TETA	0.0365***	0.0046	0.0801***	0.03563
DEPTLI	0.0007	0.0044	0.0418***	0.0149
CIR	−0.0012*	0.0008	0.0021	0.0022
SIZE	0.00039	0.0066	0.0038	0.0113
HHIRD	−0.0023	0.0025	0.0443*	0.0236
GDP	−0.1023	0.0631	−0.407	0.7622
INF	0.0343***	0.0085	0499***	0.1145
Prob > F	0,0000	0,0000		
Sargan	chi2(8) = 13*18		chi2(15) − 9.34	
	Prob > chi2 = 0.106		Prob > chi2 = 0.859	
Hensen	chi2(8) = 12.35		chi2(15) = 13.70	
	Prob > chi2 = 0.136		Prob > chi2 = 0.549	
AR(1)	Z = −2.79 Pr > z = 0.005		z = −2.52 Pr > z = 0.012	
AR(2)	z = −0.25 Pr > z = 0.805		z = 0.31 Pr > z = 0.758	

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

The results given in Table 5 show that the changes in the asset structure, equity ratio, operational efficiency, bank size and inflation had statistical significance with the dependent variable as ROA and other variables as asset quality, funding structure, income diversification, inflation hadstatistical significance with the dependent variable as ROE. The results of Sargan-Hensentest in SGMM 's estimation, the chi-squared test of the validity of instrumental variables indicated that the usedinstrumental variableswere valid. The results of AR test aboutthe autocorrelation in residual AR (1) and AR (2) did not show theautocorrelation in the model.

In addition, in order to eliminate unnecessary variables from the model, we used Wald test. The results showed that the *p*-value of Wald test in the model was less than 0.05, indicating that the variables used in the regression model were meaningful.

To detect multicollinearity problems, the inspection rule is that when the correlation coefficient between independent variables is less than 0.8 or the VIF, variance - inflating factor, is higher than 10, the level of multicollinearity is considerably high. The

correlation coefficient described in Table 6 indicates that the correlation coefficient between the explanatory variables were not high, so the phenomenon of multicollinearitywas less likely to occur when the regression model was conducted.

Table 6
Matrix of the correlation between variables

	ROA	*ROE*	*TLTA*	*NPL*	*TETA*	*DEPTLI*	*CIR*	*SIZE*	*HHIRD*	*GDP*	*INF*
ROA	1										
ROE	−0.051	1									
TLTA	0.313	−0.214	1								
NPL	−0.216	0.011	−0.131	1							
TETÀ	0.393	−0.197	0.122	0.060	1						
DEPTL1	−0.061	0.163	0.094	0.100	−0.156	1					
CIR	−0.523	−0.048	−0.143	0.209	0.027	−0.042	1				
SIZE	−0.252	0.498	−0.205	−0.034	−0.680	0.187	−0.140	1			
HHIRD	−0.304	0.229	−0.121	−0.020	−0.408	0.280	−0.008	0.363	1		
GDP	0.079	−0.175	0.016	−0.167	−0.009	−0.164	−0.109	−0.085	0.143	1	
INF	0.285	−0.097	0.108	−0.048	0.077	−0.348	−0.136	−0.208	0.210	0.47	1

Simultaneously, the results between the explanatory variables shown in Table 7 show that the correlation coefficients between the explanatory variables were all lower than 0.8 and the variance inflation factors (VIF) of the variables in the model were all smaller than 10. Therefore, there is no phenomenon of multicollinearity between the explanatory variables in the models.

Table 7
The VIF coefficient between variables

Biến	*VIF*	*1/VIF*
SIZE	2.12	0.4715
TETA	2.05	0.4872
INF	1.54	0.6491
GDP	1.35	0.7418
HHIRD	1.32	0.7559
DEPTLI	1.28	0.7841
CIR	1.15	0.8733
TLTA	1.14	0.8763
NPL	l.12	0.8961

5.4. Finding Discussion

Asset structure (TLTA)

The regression coefficients ofthe dependent variable ROA had significance at the level of 10% when SGMM was used, but there was no significance when the dependent variable was the ROE. From the regression results,there was a positive correlation between TLTA and ROA, indicating that the after-tax profitson total assets ratio were

influenced by the ratio of loan outstanding balance to total assets. The higher this ratio was, the higher the profits were. This result is consistent with the authors' expectationsigns and similar to many other studies about the direct relationship between the ratio of loan outstanding balance to total assets and profits, such as the studies of Ponce (2013), Syafri (2012); Gul *et al* (2011).

Asset quality (NPL)

The study results showed a positive correlation between the quality of assets and bank profits at the high significance level with ROA and ROE. This means the high NPL ratio indicated the serious decline of bank profits. The research results were consistent with the studies Adeusui (2014); Federick (2014), Ponce (2013).

The ratio of equity (TETA)

The results showed that the higher the ratio of equity to total assets was, the higher the profits would be. This result is consistent with the expectation signs of the authors and consistent with the research findings of Ponce (2013), Gul *et al* (2011), Kharawish (2012), Syafri (2012), Obamuyi (2013), Ongore and Kusa (2013), Frederic (2014).

Funding structure (DEPTLI)

From the research results,the funding structure measured by the ratio of customer deposits to total liabilities had a positive correlation with the profitability of commercial banks when ROE was used as the representative variable and there was no statistical significance to ROA. The research results matched the expectation signs of the authors and the findings were consistent with the studies of Ponce (2013), Gul *et al* (2011).

Operational efficiency (CIR)

The research results showed that the higher the operational efficiency measured by the ratio of operating expenses to operational income was, the lower the profits would be, which means the ratio of operating expenses on operating income was correlated with bank profits with the significance to ROA and no significance to ROE. Thus, the improvedoperational efficiencyindicates the increase in bank profits, meaning in order to increase profits, banks need to control operating expenses, especially the expenses related to staff as this expense item accounted for the highest proportion. The research results matched the expectationsigns of the authors, consistent with the findings of Almumani (2013), Sufian and Chong (2008), Adeisui *et al* (2014), Ponce (2013), Onuonga (2014).

Bank size (SIZE)

From the research results, bank size did not have impact in the same direction on bank profits, meaningthere were no economic advantages of size. This result was contrary

to the study of Khrawish (2011). Large size indicates the advantages in terms of capital, people, the number of branches but due to the expansion in size with the failure to meet the requirements of service quality, management quality and labour efficiency, it would lead to the increase in expenses with low effiency.

Diversification of income (HHIRD)

The study results showed that the diversification of income increasedthe commercial banks' profit, indicating the statistical significance to ROE and no statistical significance to ROA. This means after-tax profits on equity will increase as the level of income diversification increases. A commercial bank with diverse operations will be dispersed, reduce risk and improve profitability. This result was consistent with the research hypothesis and simultaneously consistent with the research results of Chiorazzo (2008), Elsas *et al* (2010), Ponce (2013), Sufian and Chong (2008).

Economic growth (GDP)

The research results showed that economic growth had no correlation withbank profits. This result was inconsistent with the hypothesis of the study and inconsistent with the study results of Ponce (2013). However, these results supported the findings of Kharawish (2011), Adeusi (2014). The annual growth rate of GDP affects profitability. The poor economic situation can reduce the quality of loan portfolio, increase credit risk provisions and reduce the profitability of banks. In contrast, the economic growth situation improves the profitability of banks. However, in the period 2008-2014, when the economy started to recover, the internal problems of banks had not really been solved. The high NPLs could lead to the reduced profitability of banks.

The rate of inflation (INF)

The study results showed that inflation had a positive impact on the profitability of banks and had a high level of significance to ROA and ROE. These results were contrary to the expectations but in line with the studies of Ponce (2013) and Gul *et al* (2011). Theoretically when there is high inflation, Central bank will manage policies in the way tightening monetary to control the inflation, which directly affects credit operations of commercial banks. The increase in inflation makes interest rates increase, which makes it hard for enterprises to access bank capital sources due to high interest expenses. Besides, the prices of materials, goods and costs of business inputs are pushed up, which reduces the business efficiency of capital-borrowing enterprises, and directly affects the enterprises' ability of loan repayment for the banks, giving rise to the non-performing loans. Additionally, the increase in inflation leads to an increase in non-performing loans, and banks have to prepare provisions forloans which pulls up the business expenses of banks and reduces bank profits. However, the research results can be explained by the fact that bank managers have predicted the expected inflation and adjusted interest rates appropriatelyto achieve higher profits.

6. SUMMARY AND CONCLUSION

6.1. Conclusion

The study considered the factors affecting the profitability of commercial banks in Vietnam in the period from 2008 to 2014. With the balanced panel data consisting of 27 commercial banks in Vietnam, the authors used characteristic regression models of panel datasuch as: Pool OLS, REM, FEM, SGMM to find out the correlation between the factors andthe profits of commercial banks in Vietnam. The profits of commercial banks were measured by ROA and ROE as the indicators reflecting the profit margin of banks in financial statements. The study results showed a difference between the regression models and Sargan- Hensen test, AR (2), indicatingthat the estimation model GMM was the bestfor analyzing the factors affecting the profits of commercial banks in Vietnam. Accordingly, the variables such as the structure of assets, equity ratio, operational efficiency, bank size, inflation hadstatistical significance to the profitability of commercial banks whenROA was used as the dependent variable; the variables including asset quality, funding structure, bank size, income diversification, growth, inflation hadstatistical significanceto the profitability of commercial banks when ROE was used as the dependent variable.

6.2. Policy Implications

Firstly, increase the ratio of loan outstanding balance to total assets, because whenthe ratio of loan outstanding balance to total assets increases, bank profits will increase and vice versa. To achieve this, we suggest some policies such as raising the quality of credit operations in order to reduce the NPL ratio. Specifically, commercial banks should focus on the compliance of the lending process and simultaneously supervise the lending process closely. In addition, they need to actively handle problematic loans and NPLs.

Secondly, increase the equity. According to research results, the ratio of owner equity to total assets is the factor having impact in the same direction on the profitability of commercial banks in Vietnam. Therefore, the goal of this solution is to increase the ratio of equity to total assets for commercial banks in Vietnam. Specifically, banks can increase the equity by restructuring, mergers and acquisitions, issuance of additional shares, requesting foreign investments and actively seeking strategic shareholders.

Thirdly, improve the efficiency of bankoperations. According to the research results, the ratio of operating expensestoincome from operations is the factor which negatively impacts the profitability of commercial banks. Therefore, the goal of this solution is to reduce the ratio of operational expenses to income from operations of commercial banks in Vietnam. Specifically, it is necessary to increase thecapital mobilization by various methods and applications of modern services, and simultaneously improve the management competence through restructuring the operations of commercial banks and the management mechanisms in accordance with international standards.

Fourthly, diversify income and continually convert models to be customer oriented models. In order to accomplish this goal, commercial banks need to accelerate the applications of modern technology and improve service quality.

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