Vol 5, No 1, January - June 2020, pp: 69 - 82

Faculty Publications
ISSN: 3008-1017
Title DOI: https://doi.org/10.62458/021024

Commercial Banks' Profitability Determinants in Cambodia: Fixed Effect and Random Effect

Siphat Lim*, Casey Barnett**

ABSTRACT

This study employs fixed effect and random effect models to investigate the effect of commercial banks' characteristics, macroeconomic indicators and financial structure on ROA of commercial banking in Cambodia. Fixed Effect model is selected as refer to the Hausman test. The result indicates that banks' characteristic such as the ratio of non-performing loan to total loan, ratio of operating expense to total asset and ratio of equity to total asset play a crucial role in determine ROA of commercial banks. In contrast, none of macroeconomic indicators explain ROA, but one of financial structure ratio, CSX market capitalization to commercial banks' total asset, is statistically significant in explaining commercial banks' ROA.

***Keywords*:** Commercial Banks, ROA, Fixed Effect model, Random Effect model.

* Siphat Lim, PhD
CamEd Business School
Email: lsiphat@cam-ed.com

** Casey Barnett, FCCA, CFA, MBA
CamEd Business School
Email: president@cam-ed.com

INTRODUCTION

Profitability is a main objective of business. The banking industry, like others, has the objective of earning and growing profits. Profitability of the banking industry, however, involves many internal and external factors. Internal factors, for instance, include the quality of the asset management of the banks, especially the quality of the loan management, credit risk, non-performing loans (NPL) and operating expense management. External factors, on the other hand, include the financial structure and macroeconomic factors such as economic growth, inflation, foreign currency deposits, money supply and market capitalization. In the last two years, the assets of the banking system in Cambodia is seen to have increased moderately from 94,440 billion riels in 2016 to 113,292 billion riels in 2017 which is estimated to be around 20%. At the same time, the return on assets (ROA), in contrast, has declined from 1.8% in 2016 to only 1.57% in 2017. The decline of ROA is instigated by an overall decrease in the net profit of the banking system from 1,687 billion riels in 2016 to 1,680 billion riels in 2017.

Total outstanding loans of the banking system, in fact, has greatly increased from 45,240 billion riels in 2016 to 60,902 billion riels in 2017 which is estimated to be around 34.6%, along with this, the NPL have also increased from 1.9% in 2016 to 2.3% in 2017. It may be suggested that the effectiveness of asset management of the Cambodia banking system is declining, even though Cambodia has relentlessly maintained annual economic growth of around 7% in the last few years.

The main purpose of this study is to determine which indicators: banks' characteristic, macroeconomic indicators, or financial structure have a significant effect on banks' profits in Cambodia by employing fixed effect and random effect models of panel data with the study period covering from 2012 to 2017.

LITERATURE REVIEW

The determination of bank profitability, typically measured by the return on equity (ROE) and return on assets (ROA), is normally expressed as a function of internal and external determinants. Influenced significantly by the bank management, policy and performance, the internal determinants are the variables that determine bank profitability, such as level of liquidity, return on assets, return on equity, loans, non-performing loans, expenses management and size of the bank. The external determinants, however, are the variables that reflect the economics and legal environment of where the banks operate. Those determinants are not related to bank management.

Former studies of bank profitability analysis include Haslem (1968), Bourke (1989), Short (1989), Demirgüç-Kunt & Huizinga (1999), Akhavein, Berger & Humphrey (1997), Boyd & Runkle (1993) and Molyneux & Thornton (1992) which are either single country analyses or cross-country analyses. Similar studies conducted recently including Naceur (2003), Park (2004), Staikouras & Wood (2004), Athanasoglou, Brissimis & Delis (2005), Athanasoglou, Delis & Staikouras (2006) and Béjaoui & Bouzgarrou (2014). Kohlscheen, Murcia, & Contreras (2018), which, though different in scope, take into account both internal and external determinants. The empirical results of each study differ significantly based on the dataset and

environment where the institutions operate. Those studies, nevertheless, consist of some common determinants which allow for further categorization of the determinants.

The internal determinants capture variables, such as, size, shareholder equity ratio, non-performing loan ratio, and operating expense ratio. The size of the bank is introduced to capture the potential of the economy and cope with diseconomy of scale. Haslem (1968) applied Fixed Effect (FE) model on the annual cross-sectional data from 1963 to 1964. Akhavein et al. (1997) adopted frontier profit function which captures the dataset from the period of 1980 to 1990. And Smirlock (1985) applied structure-specific-performance to investigate the relationship in banking from 1973 to 1978. The results from their studies show the positive and significant relationship between bank size and profitability. Demirgüç-Kunt & Huizinga (1999), on the other hand, employed a linear function approach which covered banks in 80 countries from 1988 to 1995, proposing that commercial bank profitability is closely related to the tax policies, deposit insurance regime, financial market conditions and legal and institutional reality. Haslem (1968), additionally suggests that bank profitability is closely linked to the bank's capital adequacy. Short (1979), similarly applied the linear function approach to study the relationship of bank profitability of Canadian, Western European and Japanese banks from 1972 to 1974, giving evidence to support that the greater the concentration, the higher the profit rates due to the fact that relatively large banks tend to raise less expensive capital. Moreover, Haslem (1968), Short (1979), Bourke (1989) and Molyneux & Thornton (1992) connected bank size to capital ratios which implies that better concentration leads to more profitability, especially in the case of small to medium-sized banks. Many researchers, on the other hand, argue that increasing the size of the banks does relatively little to reduce expenses, while very large banks could face scale inefficiency.

Shareholder equity measures how much the bank's assets are funded by equity and shows how much a shareholder would receive in the event of liquidation. Park (2004) reports that the banks with a higher equity ratio, less non-performing loans, and less operating cost per employee or branch were found to have higher profit ratio. Staikouras & Wood (2004), adopted pooled ordinary least square (OLS) and FE analysing a dataset of European banks from 1994 to 1998, suggesting that the equity to assets ratio positively and significantly affects bank profits which means that banks are more profitable when the level of equity is relatively higher.

Operating expenses are also an important determinant of bank profitability which closely related to the notion of efficient management. A number of papers propose the notion that an expenses-related variable ought to be included in the cost part of a standard internal profit function. Bourke (1989) and Molyneux & Thornton (1992), for instance, used the same pooled time series approach but the former focuses on the banks in Europe, North America and Australia from 1972 to 1981 while the latter focuses on the banks in 18 European countries from 1986 to 1989, reporting a positive relationship between better-quality management and bank profitability.

The equally important external determinants of bank profitability can be distinguished into control variables, for example, the GDP growth rate, inflation rate and foreign currency deposits, and the variables that represent the financial structure which captures to stock market capitalization to GDP ratio, deposit bank assets to GDP and stock market capitalization to assets.

The macroeconomics control variables consist of the GDP growth rate, inflation rate and the foreign currency deposits. Bourke (1989), Molyneux & Thornton (1992) and Demirgüç-Kunt & Huizinga (1999) show that the inflation has a positive relationship with bank profitability.

Employing the FE and Random Effect (RE) to study the bank profitability in seven countries in South Eastern Europe from 1998 to 1992, Athanasoglou et al. (2006), for example, suggested that the inflation rate strongly affects bank profitability and the current and future economic growth rates are likely to enhance the effect on bank profitability. Demirgüç-Kunt & Huizinga (1999), moreover, finds that inflation has a positive relationship with bank profitability which implies that inflation rising banks' income rises in greater proportion than costs. The study also suggests that more transactions and generally more widespread branch networks increase bank income offset the higher costs involved with inflation. In contrast, Staikouras & Wood (2004) finds that the GDP growth rate and interest rate have negative effects on bank profitability. Some researchers argue that macroeconomic indicators have no effect on bank profitability. Using the same FE and RE to study the bank profitability of 10 Tunisian banks from 1980 to 2000, Naceur (2003), for instance, finds that inflation and growth rate have no impact on the bank's interest margin and profitability. The last macroeconomic variables representing the financial structure include stock market capitalization to GDP ratio, deposit bank assets to GDP and stock market capitalization to assets. Demirgüç-Kunt & Huizinga (1999) suggest that bank margins are positively related to the stock market capitalization to GDP ratio which implies that debt and equity are complementing each other. The same study, however, shows that a larger ratio is negatively related to bank margins which means that bank finance can be substituted where a stock market is relatively well-developed. Smirlock (1985), likewise, suggests that the bank profitability is positively and significantly related to the stock market even after the controlling for concentration. This study finds that once the market share is included, bank concentration adds nothing to explain bank profit rates. In contrast, many studies claim that the concentration positively impacts bank profit rates. Demirgüç-Kunt & Huizinga (1999) finds that bank profitability is positively influenced by bank concentration ratio and larger banks tend to have higher margins. Athanasoglou et al. (2006) also favors this finding and suggests that bank profitability is positively affected by bank concentration even after the market share is included in the estimated model.

In conclusion, the obtainable literature provides a rather comprehensive view capturing the effects of both internal and external determinants on bank profitability. However, the macroeconomic determinants have not been conclusively deliberated. Also, the time dimension of panels used in the studies has usually been too short to apprehend the effect of macroeconomics determinants. Lastly, sometimes, the variables are overlapping such that they proxy the profitability determinants. The study of bank profitability, therefore, should take in account the above issues and develop a more satisfying study which has the potential to provide better insight into the factors affecting the bank profitability. Last but not least, the existing literature mostly employs pooled OLS, FE and RE to study the bank profitability. However, the majority of the studies produce the result in favor FE, for example, Naceur (2003), Staikouras & Wood (2004) and Athanasoglou, Brissimis & Delis (2005).

METHODOLOGY

Models

Fixed Effect (FE)

$$y_{it} = \alpha_i + \beta' X_{it} + \varepsilon_{it},\ i = 1, \dots, N \text{ and } t = 1, \dots, T \quad (1)$$

where

y_{it} : independent variable, Return on Asset (*ROA*) of bank *i* at time *t*,

$$ROA = \frac{Net\ Profit}{Assets}$$

α_i : constant coefficients of bank *i*,

X_{it} : vector of dependent variables or explanatory variables of bank *i* at time *t* (The specification of independent variables is indicated in Table I),

β : vector of individual slope coefficient.

To check the specific of fixed effect model, the individual intercept coefficients are not the same, a simultaneous test is employed by using the *F*-test. The null and alternative hypotheses of the test are stated below,

$H_0: \alpha_1 = \cdots = \alpha_n = \alpha$

$H_A: Not\ at\ all.$

The *F*-statistic is defined as

$$F_{(n-1,nT-n-k)} = \frac{(R_u^2 - R_r^2)/(n-1)}{(1 - R_u^2)/(nT - n - k)}$$

where

R_u^2 : unrestricted *R*-square,

R_r^2 : restricted *R*-square,

n : number of cross-sections,

T : number of time periods,

k : number of independent variables

Random Effect (RE)

$$y_{it} = \beta' X_{it} + u_{it}, \qquad i = 1, \dots, N \text{ and } t = 1, \dots, T \tag{2}$$

where

y_{it} : independent variable, return on assets (ROA) of bank *i* at time *t*,

$$ROA = \frac{Net\ Profit}{Assets}$$

X_{it} : vector of dependent variables or explanatory variables of bank *I* at time *t* (the specification of independent variables is indicated in Table I),

$u_{it} = \mu_i + v_{it}$ are the error component disturbances which are assumed not to be correlated with the independent variables, X_{it}, which is written as $E(u_{it}|X_{it}) = 0$.

μ_i : individual specific effects which are assumed to be independent and identically distributed (iid), $\mu_i \sim (0, \sigma_\mu^2)$,

v_{it} : residual terms which are assumed to be normally distributed, $v_{it} \sim (0, \sigma_v^2)$,

$Cov(v_{it}, \mu_i) = 0$, $Cov(v_{it}, X_{it}) = 0$ and $Cov(X_{it}, \mu_i) = 0$,

$E(u_{it}) = 0$ and $Var(u_{it}) = \sigma_\mu^2 + \sigma_v^2$.

The *RE* model can be estimated by the feasible generalized least squares (*FGLS*).

Hausman Test

The error component disturbances, u_{it}, consists of individual specific effects, μ_i, and the residual term, v_{it}. In fact, the individual specific effects might be correlated with the independent variables, X_{it}, which is $E(u_{it}|X_{it}) \neq 0$. In this case, the estimated parameters using generalized least squares (GLS), $\hat{\beta}_{GLS}$, becomes biased and inconsistent for β. However, the estimated parameters using the within transformation, $\hat{\beta}_{Within}$, wipes out the individual specific effects which leaves $\hat{\beta}_{Within}$ unbiased and consistent for β. The comparison between $\hat{\beta}_{GLS}$ and $\hat{\beta}_{Within}$ is suggested by Hausman (1978) under the null hypothesis, $H_0: E(u_{it}|X_{it}) = 0$, which is asymptotically distributed as χ_K^2 where K denotes the dimension of slope vector, β. The Hausmen (*H*) test statistic is written as below,

$$H = \left(\hat{\beta}_{GLS} - \hat{\beta}_{Within}\right)' \left(\hat{V}\left(\hat{\beta}_{Within}\right) - \hat{V}\left(\hat{\beta}_{GLS}\right)\right)^{-1} \left(\hat{\beta}_{GLS} - \hat{\beta}_{Within}\right)$$

where

$\hat{V}\left(\hat{\beta}_{Within}\right)$: variance and covariance matrix of $\hat{\beta}_{Within}$,

$\hat{V}\left(\hat{\beta}_{GLS}\right)$: variance and covariance matrix of $\hat{\beta}_{GLS}$.

The rejection of the null hypothesis will bring the adoption of the Fixed Effect model, while the non-rejection of the null hypothesis means the Random Effect model is adopted.

Table I. Independent Variables

Variables	Measure	Expected Sign	Classification
SIZE	Natural logarithm of Assets	+	Bank Characteristic
ET	Equity/Assets or Capital/Assets	+	Bank Characteristic
NPLL	Non-Performing Loans/Loans	-	Bank Characteristic
OEA	Operating Expenses/Assets	-	Bank Characteristic
GDPG	GDP growth rate, %	+	Macroeconomics
CPIG	CPI growth rate, %	+/-	Macroeconomics
FCDM	Foreign Currency Deposits/M2, %	+	Macroeconomics
MCGDP	CSX Market Capitalization/GDP	+/-	Financial Structure
AGDP	Commercial Bank Assets/GDP	-	Financial Structure
MCA	CSX Market Capitalization/ Commercial Bank Assets	+/-	Financial Structure

Data

Balanced panel data is employed in this study and the time period of the study covers 2005 to 2017. Data related to banks' characteristics are collected from the National Bank of Cambodia (NBC) and the macroeconomic indicators are collected mainly from NBC and the Asian Development Bank (ADB), while the stock market capitalization is collected from the Cambodia Securities Exchange (CSX).

Table II. Sources of Data

Variables	Measurement	Sources
Bank Assets	Billions of KHR*	National Bank of Cambodia
Bank Equity	Billions of KHR	National Bank of Cambodia
Bank Non-Performing Loans (NPLs)	Billions of KHR	National Bank of Cambodia
Bank Loans	Billions of KHR	National Bank of Cambodia
Bank Operation Expense	Billions of KHR	National Bank of Cambodia
Foreign Currency Deposits (FCD)	Billions of KHR	National Bank of Cambodia
Broad Money (M2)	Billions of KHR	National Bank of Cambodia
Gross Domestic Products Growth Rate	Percent, %	Asian Development Bank
Consumer Price Index (CPI) Growth Rate	Percent, %	Asian Development Bank
Nominal GDP	Billions of KHR	Asian Development Bank
Cambodia Securities Exchange (CSX) Market Capitalization	Billions of KHR	Cambodia Securities Exchange

*Khmer Riel (KHR)

EMPIRICAL RESULT

The average return on asset of all banks is about 0.99 percent which is rather low, while the operating expenses to total asset is rather high at 2.59 percent. This might be the cause of low return on assets. In addition, whole banking system non-performing loan to total loans is 2.59 percent which is considered low since the value is less than 5 percent. The average of bank equity to total assets is 30 percent which is consistent with the capital requirement set by the central bank in accordance with legislation.

During the period of the study, Cambodia maintained an average annual GDP growth rate of 7.12 percent and an annual CPI growth rate or inflation rate of 2.81 percent. The average level of dollarization measured by the ratio of foreign currency deposit to broad money (M2) is high at 82.84 percent. The level of dollarization has been high for almost three decades and the deposits and lending in the Cambodian banking system have been mostly conducted in foreign currency, mainly the U.S. dollar. At the moment, only five companies are listed on the Cambodian Securities Exchange. Therefore, the ratio of CSX's market capitalization to GDP is still low at approximately 1.05 percent which is far lower than the average of commercial banks' total assets to GDP which is approximately 143 percent.

Table III. Summary Statistics

Variable	N	Mean	Median	Standard Deviation	Maximum	Minimum
ROA	192	0.99	1.23	2.05	4.26	-13.52
SIZE	192	6.98	6.91	1.25	9.95	4.08
NPLL	192	2.59	1.17	5.22	57.82	0.00
OEA	192	2.11	1.76	1.41	9.52	0.34
ET	192	30.07	20.49	23.02	99.14	7.36
GDPG	192	7.12	7.01	0.25	7.58	6.89
CPIG	192	2.81	2.94	0.79	3.87	1.21
FCDM	192	82.84	83.00	0.38	83.24	82.16
MCGDP	192	1.05	1.02	0.15	1.35	0.85
AGDP	192	3.05	1.50	4.22	23.33	0.07
MCA	192	143.77	63.39	232.80	2045.38	4.37

Table IV. Correlation Matrix

Variable	SIZE	NPLL	OEA	ET	GDPG	CPIG	FCDM	MCGDP	AGDP	MCA
SIZE	1									
NPLL	-0.199	1								
OEA	-0.343	0.156	1							
ET	-0.764	0.172	0.261	1						
GDPG	-0.189	-0.082	0.032	0.062	1					
CPIG	-0.041	0.025	0.013	0.031	0.305	1				
FCDM	0.109	0.065	-0.004	0.003	-0.700	-0.257	1			
MCGDP	0.145	0.103	-0.005	-0.015	-0.622	0.118	0.513	1		
AGDP	0.788	-0.058	0.094	0.389	-0.099	-0.023	0.065	0.078	1	
MCA	-0.699	0.567	0.350	0.718	-0.065	0.016	0.072	0.112	-0.340	1

As indicated in Table IV, no perfect multicollinearity is found among the independent variables. The estimated result of the fixed effect model is presented in Table V below.

Table V. Determinants of Cambodia Commercial Banks' ROA: Fixed-Effect Model

	Fixe-Effect	
	Coefficient	t-Statistic
Intercept	13.624	0.550
SIZE	0.310	0.790
NPLL	-0.159***	-5.950
OEA	-0.758***	-4.820
ET	0.022*	1.930
GDPG	-0.161	-0.300
CPIG	-0.024	-0.230
FCDM	-0.133	-0.490
MCGDP	-0.365	-0.500
AGDP	-0.124	-1.370
MCA	-0.003**	-2.170
Number of obs	192	
Number of groups	32	
F(10, 150)	23.210	
Prob > F	0.000	
R-Square:		
Within	0.6074	
Between	0.4752	
Overall	0.5156	
Corr(u_i, Xb)	-0.3445	
F-test that all u_i=0		
F(31, 150)	4.990	
Prob > F	0.000	

*,**, and *** indicate significant level of 10%, 5% and 1%, respectively.

The probability of the calculated F-test that all u_i=0 is rejected which means that an individual specific effect is found between the estimated result generated by pooled ordinary least squares or pooled OLS method and the estimated result generated by the within effect or fixed effect method, the fixed effect method is selected. The interpretation of the fixed effect model is not performed yet since the estimated result of this model has to be compared with the estimated result of the random effect model as indicated in Table VI.

Table VI. Determinants of Cambodia Commercial Banks' ROA: Random-Effect Model

	Random-Effect	
	Coefficient	z-Statistic
Intercept	17.823	0.710
SIZE	0.056	0.180
NPLL	-0.137***	-5.880
OEA	-0.644***	-6.300
ET	0.025***	2.680
GDPG	-0.174	-0.330
CPIG	-0.026	-0.250

FCDM	-0.171	-0.620
MCGDP	-0.410	-0.560
AGDP	0.066	1.070
MCA	-0.004***	-3.380
Number of obs	192	
Number of groups	32	
Wald Chi-Square (10)	274.380	
Prob > Chi-Square	0.000	
R-Square:		
Within	0.593	
Between	0.660	
Overall	0.624	
Corr(u_i, Xb)	0.000	
Theta	0.533	

*,**, and *** indicate significant level of 10%, 5% and 1%, respectively.

To compare between the estimated result of the pooled OLS and the estimated result of the random effect method, the Breusch and Pagan Lagrangian Multiplier (LM) test for random effects is employed and the hull hypothesis of the test is $\sigma_{\mu_i}^2 = 0$. The random effect estimated method is selected when the null hypothesis is rejected.

Table VII. Breusch and Pagan Lagrangian Multiplier (LM) test for Random Effects

ROA[bank,t]=Xb+u[bank]+e[bank,t]
Estimated results:

	Var	sd=sqrt(Var)
ROA	4.204	2.050
e	0.959	0.979
u	0.575	0.758
Test:	Var(u)=0	
chibar2(01)=	54.650	
Prob>chibar2=	0.000	

Since the probability of the calculated chibar2 is less than a 1 percent significant level, the null hypothesis is rejected. Thus, between the pooled OLS and random effect estimated method, the pooled OLS method is rejected. In order to choose between fixed effect and random effect model, the Hausman test is performed and the result of the test is presented below in Table VIII.

Table VIII. Hausman Test

	Coefficient			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
SIZE	0.310	0.056	0.254	0.233
NPLL	-0.159	-0.137	-0.022	0.013
OEA	-0.758	-0.644	-0.114	0.120
ET	0.022	0.025	-0.003	0.007
GDPG	-0.161	-0.174	0.013	0.160

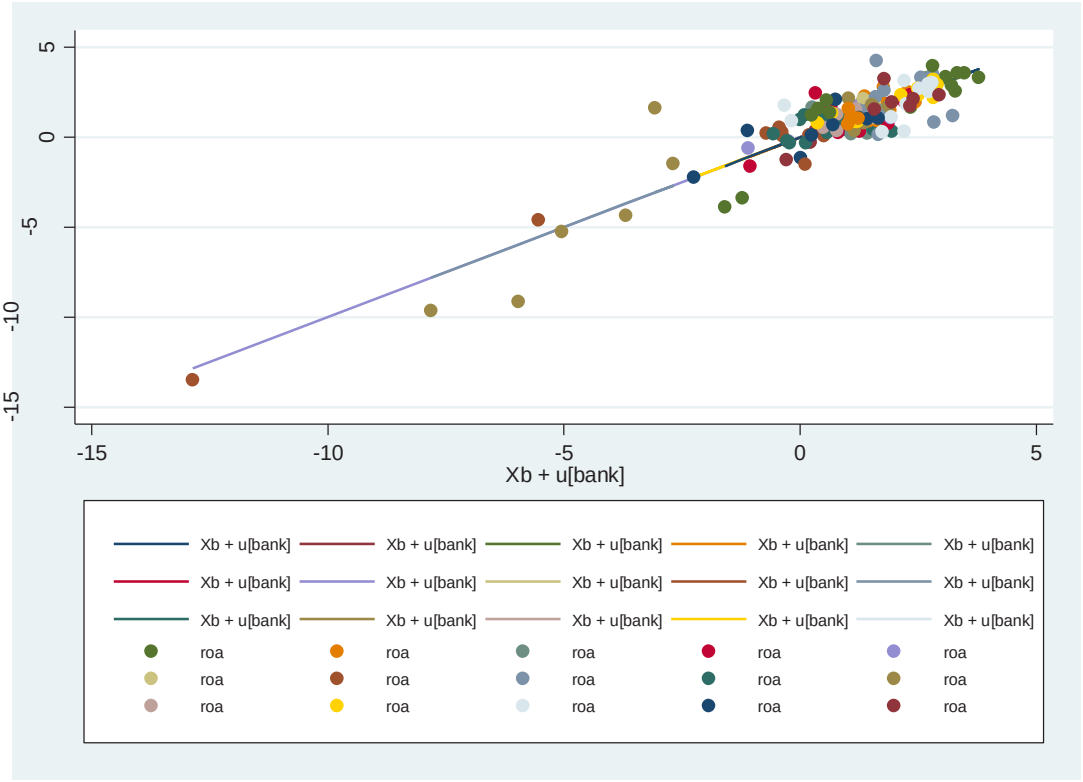
CPIG	-0.024	-0.026	0.002	.
FCDM	-0.133	-0.171	0.038	.
MCGDP	-0.365	-0.410	0.045	0.048
AGDP	-0.124	0.066	-0.190	0.067
MCA	-0.003	-0.004	0.001	0.001

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 35.26
Prob>chi2 = 0.0001
(V_b-V_B is not positive definite)

As stated earlier, the rejection of the null hypothesis will bring the adoption of the fixed effect model, while the non-rejection of the null hypothesis means the random effect model is adopted. The Hausman test result in Table VIII reveals that the calculated chi-square is 35.26 with a probability of 0.0001 which is lower than a 1 percent significant level, hence, the estimated result of the fixed effect model is selected in this research.



Regarding to the estimated result of the fixed effect model in Table V, commercial banks' profit in Cambodia is highly explained by bank characteristics such as the ratio of non-performing loan to total loans, ratio of operating expenses to total assets, and ratio of equities to total assets. There is a negative relationship between the return on assets and non-performing loan since the

slope coefficient is -0.159 and highly significant at a 1 percent significance level. Similarly, the increase in the ratio of operating expense to total assets would harm banks' profits with a 1 percent significant level and the slope coefficient of -0.758. In addition, the ratio of equity to total assets has a positive relationship with ROA, but the result is weakly significant. Surprisingly, the ratio of CSX market capitalization to commercial banks' total assets has a significant effect on commercial banks' profit at a 5 percent level, but the relationship is negative.

CONCLUSION

Among the three models, pooled OLS, fixed effect, and random effect, the fixed effect model is the best model according to the results of this research. Commercial banks' profits are mainly explained by the bank characteristics and only one financial structure indicator. In contrast, no significant relationship between ROA and macroeconomic indicators was found. To increase banks' profits, the non-performing loans must be reduced by banks since non-performing loans reduce the ability of banks to generate interest revenue and therefore reduces the net interest margin. To improve the quality of loans, banks' risk assessment has to be strengthened. More importantly, bank's operating expenses need to be restrained to an appropriate level since ROA declines as the ratio of operating expense to total assets increases. The higher operating expense is, the lower net income and ROA. Investment in the development of high frequency data should be conducted by the government in order to increase the availability of the data sets such as GDP. Moreover, each commercial bank's financial statement should be officially public on the central bank website not just annually, but also monthly or quarterly. The availability of high frequency data would provide more opportunities for researchers to produce more research papers as well as provide more policy recommendations for the government. This may be a reason that this study found no significant effect of macroeconomic variables on commercial bank's profit since the availability of time series data sets applied in this research was limited to only six observations, 2012 to 2017.

REFERENCES

Akhavein, D. J. (1997). The effects of megamergers on efficiency and prices: Evidence from a bank profit function. *Review of Industrial Organization, 12*, 95-139.

Athanasoglou, P. P. (2005). Bank-specific, industry-specific and macroeconomics determinants of bank profitability. *Munich Personal RePEc Archive, 25*, 1-35.

Athanasoglou, P. P. (2006). Determinants of bank profitability in the South Eastern European region. *Munich Personal RePEc Archive*, 1-31.

Béjaoui, R. &. (2014). Determinants of Tunisian bank profitability. *Journal of Banking and Finance, 8*(4), 121-131.

Bourke, P. (1989). Concentration and other determinants of bank profitabilty in Europe, North America and Australia. *Journal of Banking and Finance, 13*, 65-79.

Boyd, H. J. (1993). Size of performance of banking firms: Testing the predictions of theory. *Journal of Monetary Economics, 31*, 47-69.

Demirgüç-Kunt, A. &. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence. *The World Bank Economic Review, 13*(2), 379-408.

Haslem, A. J. (1968). A statistical analysis of the relative profitabilty of commercial banks. *The Journal of Finance, 23*(1), 167-176.

Kohlscheen, E. M. (2018). Determinants of bank profitability in emerging markets. *Bank for International Settlements*, 1-24.

Molyneux, P. &. (1992). Determinants of European bank profitability: A note. *Journal of Banking and Finance, 16*, 1173-1178.

Naceur, B. S. (2003). The determinants of the Tunisian banking industry profitability: Panel evidence.

Park, H. K. (2004). Profitability of Korean banks: Test of market structure vs efficient market. *KMFA Conference*, (pp. 1-39).

Short, M. (1989). The relation between commercial bank profit rates and banking concentration in Canada, Western Europe, and Japan. *Journal of Banking and Finance, 3*, 209-219.

Smirlock, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. *Journal of Money, Credit and Banking, 17*(1), 69-83.

Staikouras, K. C. (2004). The determinants of European bank profitability. *International Business & Economics Research Journal, 3*(6), 57-68.