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The interactive relationship between credit growth and profitability of people's credit funds in Vietnam

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C H R O N I C L E

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A B S T R A C T

This study purposes to discover the interactive relationship between credit growth and profitability and to examine factors that affect the credit growth and profitability of people's credit funds (PCFs). After regression analysis on a set of panel data from 2013 to 2018 on 24 selected PCFs, it appeared that deposit growth and loan-to-deposit ratio had positive relationships with credit growth, and capital adequacy ratio and profitability had negative relationships with credit growth of PCFs. The age of PCFs has a positive relationship with profitability, while the credit growth, debt-to-equity ratio, non-performing loan ratio, economic growth and inflation have negative relationships with profitability of PCFs. The study found the credit growth and profitability have relationships with each other in a contrary trend. Based on the findings the study proposes policy measures that could be implemented by the managers to increase PCFs' credit growth rate and profitability.

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1. Introduction

People's credit fund is one of the institutions that provide microfinance services. Increasing the ability to provide financial services is one of the important goals targeted by many people's credit funds (PCFs). With this orientation, PCFs in Vietnam expand the scale of the credit growth and need to ensure a balance of the profitability goals. However, the credit growth is very low and tends to decrease; besides, the profitability of many PCFs has fluctuated over the years, affecting the ability to expand financial service provision. There have been some studies on PCFs operations in Vietnam but, there has been no research on the interactive relationships between credit growth and profitability.

The purpose of this study was to discover the interaction and causal relationships between credit growth and profitability and to examine the factors that affect PCFs' credit growth and profitability. By studying this aspect of Vietnam, the research results will contribute to the theoretical and experimental research on the interaction and causal relationship between PCFs' credit growth and profitability. The study contributes to the knowledge gap in the literature on PCFs' credit growth and profitability. At the same time, the study is expected to change the decision-makers' perception of PCFs, so they can develop an effective suitable PCF management strategy. Therefore, the study of PCFs' credit growth and profitability is urgently required to increase their credit growth rate and profitability. In particular, this study is helpful for decision-makers and other stakeholders of PCFs in Vietnam.

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2. Literature Review

PCF is a credit institution established voluntarily by legal entities, individuals and households as a cooperative to conduct some banking operations under the Law on Credit Institutions and the Law on Cooperatives for the main purpose of mutual assistance in production and business development and life (National Assembly, 2010). Therefore, PCF is a legal entity that provides microfinance services with the main purpose of mutual assistance in production and business development and life. PCF attracts capital from savings mobilization to serve the needs of investment, production, and exchange of goods, thereby contributing to poverty reduction and income improvement for members and customers. PCF plays an important role in the economy and social development, contributes to strengthening and expanding the formal financial systems. To play this important role, PCFs must increase their credit growth rate and profitability.

2.1. Factors affecting credit growth of PCF

With the main operation of PCFs attracts capital from savings mobilization to serve the needs of members and customers loan. Thus, the credit growth has always been the top concern of PCFs. Because reasonable and high-quality credit growth will create stable and safe profitability for PCFs. The credit growth is an increase in credit supply of PCFs, which is an operation associated with the development process of PCFs and is influenced by many factors, including:

Firstly, capital adequacy ratio: The capital adequacy ratio is a measurement of a PCF and refers to the level of capital in an organization that is available to cover its risk. Generally, a credit institution with a high capital adequacy ratio is considered safe and likely to meet its financial obligations. The reason minimum capital adequacy ratios are critical is to make sure that credit institutions have enough cushion to absorb a reasonable amount of losses before they become insolvent and consequently lose depositors' funds. This means that in the event of asset loss, the organization would have sufficient funds of its own to cover the loss (Ledgerwood, 1999). According to Berrospide and Edge (2010), there are effects of capital on loan growth and the capital changes on loan growth of credit institutions. When capital requirements of Basel II are between 1 - 2%, the credit institutions lend more, which allows them to accumulate retained earnings through increased revenues. The quantitative impact of an increase in required capital is a sizable increase in lending (Phi et al., 2019).

H1.1: There is a positive relationship between the capital adequacy ratio and the credit growth of PCFs.

Secondly, deposit growth: The deposit growth is defined as the change of total deposits scaled by total assets in a year. Credit institutions have more funding availability will be able to perform their financial intermediation function better and credit institutions which have higher deposit growth tended to expand credit more rapidly (Barajas et al., 2010). Besides, the deposit expansion contributes positively to credit growth of credit institutions (Tan, 2012). Similarly, there is a positive relationship between the growth rate of the deposits and credit growth, since the deposits sources are the basis for performing credit nomination (Alihodžić & Ekşi, 2018).

H1.2: There is a positive relationship between the deposit growth and the credit growth of PCFs.

Thirdly, equity growth: According to Oliver et al. (2012), there is a long-run relationship between equity capital and demand for bank credit. The results of Alnahedh and Bhagat (2017) indicate that the increase in equity ratio is associated with the increase in new loan lending. There have been new interests in the effects of equity capital on bank credit, studies have provided estimations of the effect of a marginal change in equity ratio on the growth rate of loans. On the one hand, credit institutions with low capital cannot generate new loans instantly and have to compete for deposits or raise equity capital first before being able to generate new loans. On the other hand, well-capitalized credit institutions, who have equity capital exceeds capital requirements, possess a greater capacity to generate loans given their excessive equity capital.

H1.3: There is a positive relationship between the equity growth and the credit growth of PCFs.

Fourthly, loan-to-deposit ratio: The loan-to-deposit ratio is used to assess a bank's liquidity by comparing a credit institution's total loans to its total deposits for the same period. Loan-to-deposit ratio is used as a proxy for relative loan activity (Barkley et al., 1984). According to DiSalvo and Johnston (2017), loan-to-deposit ratio is a key indicator to be monitored to take the gauge of credit institutions' structural liquidity positions. It is a ratio showing how much credit of these institutions is funded by key stable funding resources, namely deposits. Loan-to-deposit ratio of large credit institutions reached high ratio as their lending expanded rapidly.

H1.4: There is a positive relationship between the loan-to-deposit ratio and the credit growth of PCFs.

Fifthly, non-performing loan ratio: A non-performing loan is a loan that is in default or close to being in default. The ratio of non-performing loans has a negative and significant impact on credit operations (Rabab'ah, 2015). Besides, the study of Alihodžić and Ekşi (2018) show that there is a reverse relationship between the rate of non-performing loans and credit growth rate for all the observed countries.

H1.5: There is a negative relationship between the non-performing loan ratio and the credit growth of PCFs.

Sixth, return on assets: The return on assets was used a measure of profitability. Bank profitability could be a motive for banks to expand their loans a larger bank may have higher ability to expand lending (Awdeh, 2017). According to Alihodžić and Ekşi (2018), there is a positive correlation between bank profitability and credit. Thus, there is a positive relationship in terms of the profitability and credit growth.

H1.6: There is a positive relationship between PCFs' profitability and credit growth.

Seventh, economic growth: Gross domestic product is the monetary value of all finished goods and services made within a country during a specific period. According to Growe et al. (2014), economic growth represents the gross domestic product annual growth. The higher economic growth is, the higher credit growth is (Barajas et al., 2010), and the stronger economic growth leads to higher credit growth (Guo & Stepanyan, 2011). The basic results of the analysis also showed a positive relationship between economic growth and the credit growth (Alihodžić & Ekşi, 2018). However, according to Wachukwu et al. (2018), some studies have shown that credit growth is significantly related to economic growth, but economic growth has a negative influence.

H1.7: There is a positive or negative relationship between the economic growth and the credit growth of PCFs.

Eighth, inflation: The inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling. The inflation is determined by the changing of consumer price index annually (Growe et al., 2014). The research of Bakker and Gulde (2010) point out credit grows when there is a high inflation and according to Guo and Stepanyan (2011), while high inflation increases nominal credit.

H1.8: There is a positive relationship between the inflation and the credit growth of PCFs.

2.2. Factors affecting profitability of PCFs

The definition of profitability usually depends on the objective of the analysis. The profitability theory focuses on how well the microfinance institutions use their assets to generate returns. The return on assets measures profitability regardless of the institution's underlying funding structure; it does not discriminate against microfinance institutions that are funded primarily through equity and the return on assets is a good measurement for profitability of microfinance institutions (Bruett et al., 2005). Therefore, return on assets is a good measurement for profitability of PCFs, the profitability is associated with all PCFs operations and is influenced by many factors, including:

Firstly, the age of PCFs: The study of Kipesha (2013) pointed that the age of microfinance institutions reflects the operational experience of microfinance institutions and affects profitability of microfinance institutions. According to Vanroose and D'Espallier (2013), the age of microfinance institutions was also found to have a positive and significant impact on the financial performance. However, the study of Narwal and Yadav (2014) found that a negative impact of age on profitability of microfinance institutions.

H2.1: There is a positive or negative relationship between the age of PCFs and the profitability of PCFs.

Secondly, depth of outreach: These findings of Bassem (2012) agree with those of the other research that also attest the existence of a trade-off between profitability and depth of outreach of microfinance institutions. Amin et al. (2017) indicate compatible relation of depth of outreach with profitability. These results may be very helpful for policy development which may deliver treasured understandings to verbalize the future policy concerning to the revolutionary progression of microfinance institutions.

H2.2: There is a positive or negative relationship between the depth of outreach and the profitability of PCFs.

Thirdly, credit growth: Banks with higher rates of loan growth are more profitable, suggesting that the credit cycle is key for bank profitability (Kohlscheen et al., 2018). Beside Rossi et al. (2019) shows that credit growth improves bank profitability, given the need for higher or at least stable credit standards.

H2.3: There is a positive relationship between PCFs' credit growth and profitability.

Fourthly, debt-to-equity ratio: The debt-to-equity ratio is a measure of capital adequacy as this ratio measures the overall leverage of microfinance institutions. The debt-to-equity ratio indicates the microfinance institutions' level of operational safety. If the debt-to-equity ratio increases rapidly, it will affect the level of safety in microfinance institutions operations and the rapid increase in debt financing will put pressure on profitability (MicroRate, 2014). On the other hand, Abdulai and Tewari (2017) show that the debt-to-equity ratio is a good indicator in assessing the extent of utilization of commercial funds by microfinance institutions. The availability and use of debts by microfinance institutions help to expand their capital base, outreach and debts also propel microfinance institutions towards achieving efficiency and profitability.

H2.4: There is a positive or negative relationship between the debt-to-equity ratio and the profitability of PCFs.

Fifthly, loan-to-deposit ratio: According to Monyi (2017), this ratio is used to assess the liquidity of microfinance institutions, and there is a correlation between the loan-to-deposit ratio and net income. Besides, according to Adusei (2015), liquid assets usually have lower rates of return; therefore, lower loan-to-deposit ratio would signal lower profitability and vice versa.

H2.5: There is a positive relationship between the loan-to-deposit ratio and the profitability of PCFs.

Sixth, non-performing loans: The study of Baasi (2018) revealed that non-performing loans negatively affect profitability of banks. According to Kingu et al. (2018), the findings of the study have both theoretical and managerial implications for practitioners and policy-makers in financial institutions when the study found that occurrence of non-performing loans is negatively associated with the level of profitability.

H2.6: There is a negative relationship between the non-performing loans and the profitability of PCFs.

Seventh, economic growth: According to Yong and Christos (2012a), there is a negative relationship between the economic growth and bank profitability. The result of Yüksel et al. (2018) is that economic growth positively influences bank profitability. This result allows the study to conclude that higher gross domestic product comes with higher bank profitability.

H2.7: There is a positive or negative relationship between the economic growth and the profitability of PCFs.

Eighth, inflation: According to Yong and Christos (2012b), the positive relationship found between the inflation and profitability in the banking sector reflects the fact that the inflation can be fully anticipated and the interest rates are adjusted accordingly. Ishfaq and Khan (2015) also point out there is a positive relationship between the inflation and profitability banks and the inflation is fully anticipated and interest rates should be adjusted according to their profitability. However, the evidence from the analysis is the inflation adversely affected commercial banks' profitability, marked by the downward trends in return on asset of most of the banks within the period (Scott & Ovuefeyen, 2014). On the other side, the study has been observed that inflation has an adverse effect on banking sector performance, and its spillover effect is detrimental to the overall economy. Inflation acts as a drag on performance as banks are usually compelled to shift their resources from more productive activities simply to focus on profit and losses from currency inflation (Umar et al., 2014).

H2.8: There is a positive or negative relationship between the inflation and the profitability of PCFs.

3. Research Methodology

The study used both primary and secondary data. Secondary sources of data were gathered from international journals, books, etc. Primary data is collected from financial reports of 24 selected PCFs in Vietnam from 2013 to 2018. This research has analyzed and synthesized the theoretical basis relating to the credit growth and profitability of PCFs. Based on the synthesized and analyzed theories, the paper defines the factors affecting the credit growth and profitability, the analysis model of the interactive and causal relationships between the credit growth and profitability of PCFs is established as follows:

$$Y_1 = \alpha_{10} + \alpha_{11}Y_2 + \sum_{k=1}^{n} \beta_{1k}X_{1k} + \mu_1 \quad (1)$$

$$Y_2 = \alpha_{20} + \alpha_{21}Y_1 + \sum_{\gamma=1}^{m} \beta_{2\gamma}X_{2\gamma} + \mu_2 \quad (2)$$

where,

Y_1 is the variable that measures credit growth, determined by the rate of the increase in credit sizes and Y_2 is a variable that measures profitability, determined by return on assets. X_{1k} and $X_{2\gamma}$ are the independent variables that can affect credit growth and profitability in Eq. (1) and Eq. (2), respectively.

The coefficient α and coefficient β are the correlation coefficients of the independent variables with the dependent variables, which are the error terms of the model. For simplicity, *i*ndicator i represents the number of observations and indicator t represents the number observed year. This study used Stata 15.0 software with the variables described briefly, the definitions of the variables and their expected signs are presented in Table 1.

Table 1
Summary of the research model variables

Variables and symbols	Definition	Expected sign and hypotheses
Factors affecting credit growth		
Dependent variable		
Credit growth rate (CGR)	Growth in loan outstanding	
Independent variables		
Capital Adequacy Ratio (CAR)	Total Capital / Risk Weighted Assets	H1.1: + (high CAR, high CGR)
Deposit growth rate (DGR)	Growth rate of customer deposits	H1.2: + (high DGR, high CGR)
Equity growth rate (EGR)	Growth rate of equity	H1.3: + (high EGR, high CGR)
Loan-to-deposit ratio (LDR)	Total loans / Total deposits	H1.4: + (high LDR, high CGR)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H1.5: - low (NPL, high CGR)
Return on assets (ROA)	(Net Operating Income -Taxes) / Average Assets	H1.6: + (high ROA, high CGR)
Gross domestic product (GDP)	Growth rate of gross domestic product	H1.7: + / - (high GDP, high or low CGR)
Inflation (INF)	Change of the consumer price index annually	H1.8: + (high INF, high CGR)
Factors affecting profitability		
Dependent variable		
Return on assets (ROA)	(Net Operating Income -Taxes) / Average Assets	
Independent variables		
The age of PCFs (AGE)	Number of operational years of PCFs	H2.1: + / - (high AGE, high or low ROA)
Depth of outreach (ALB)	The average loan per borrower	H2.2: + / - (high ALB, high or low ROA)
Credit growth rate (CGR)	Growth in loan outstanding	H2.3: + (high CGR, high ROA)
Debt-to-equity ratio (DER)	Total liabilities / Total equity	H2.4: + / - (high DER, high or low ROA)
Loan-to-deposit ratio (LDR)	Gross loan / Total deposit	H2.5: + (high LDR, high ROA)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H2.6: - (Low NPL, high ROA)
Gross domestic product (GDP)	Total loans / Total deposits	H2.7: + / - (High GDP, high or low ROA)
Inflation (INF)	Change of the consumer price index annually	H2.8: + / - (High INF, high or low ROA)

The study used the descriptive statistical method to evaluate the fluctuations of variables in the research model, performed the correlation analysis to assess the degree of multicollinearity and performed the regression according to the fixed effects model (FEM), random effects model (REM) and compared them with the pooled ordinary least square model (OLS) to determine the influencing factors for each model. Through the results of the regression steps, this study found the factors affecting credit growth, profitability and the interactive relationships between PCFs' credit growth and profitability.

4. Research Results

4.1 Descriptive statistics

Descriptive statistics of both dependent and independent variables are presented in Table 2. The results found that the AGE, ALB, CAR, DER, LDR, NPL, ROA, GDP, INF variables had smaller standard deviations than the average. The CGR, DGR and EGR variables have fluctuations, due to the large difference in the credit growth, equity, equity growth rate, deposits and deposit growth rate between the PCFs from 2013 to 2018.

Table 2
Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
AGE	144	21.25	2.012201	16	25
ALB	144	79.26924	38.39884	22.09	293.88
CAR	144	18.04	6.779657	8.02	41.15
CGR	144	.0669514	.1466846	-.214	1.087
DER	144	11.32847	4.022083	3.35	22.14
DGR	144	.0687174	.1798071	-.37	1.022
EGR	144	8.792431	16.37872	-12.15	160.42
LDR	144	1.041451	.1961791	.688	1.969
NPL	144	1.201736	1.189866	0	6.34
ROA	144	1.506667	.9247287	-3.28	4.31
GDP	144	6.363333	.5607787	5.42	7.08
INF	144	3.508333	1.781145	.63	6.6

Source: Own calculations

4.2. Correlation analysis

The analysis results of correlation between variables in the model indicated a very low degree of correlation among the variables,

so the presence of any multicollinearity was neglected Table3.

Table 3
Correlation matrix

Correlation matrix for factors affecting credit growth									
	CGR	CAR	DGR	EGR	LDR	NPL	ROA	GDP	INF
CGR	1.0000								
CAR	-0.1833	1.0000							
DGR	0.5501	-0.0822	1.0000						
EGR	0.2097	0.0067	0.1837	1.0000					
LDR	0.1257	0.2640	-0.1966	-0.0028	1.0000				
NPL	0.0506	0.0204	0.0467	0.2475	-0.0423	1.0000			
ROA	-0.2543	0.2633	-0.0584	-0.1730	0.0890	-0.3897	1.0000		
GDP	-0.1967	0.1185	-0.4153	-0.1509	0.1366	-0.0028	-0.1682	1.0000	
INF	0.1691	-0.0948	0.2693	0.0830	0.1129	-0.0524	0.0459	-0.6534	1.0000
Correlation matrix for factors affecting profitability									
	ROA	AGE	ALB	CGR	DER	LDR	NPL	GDP	INF
ROA	1.0000								
AGE	-0.1065	1.0000							
ALB	-0.3130	0.2298	1.0000						
CGR	-0.2543	-0.1721	-0.0534	1.0000					
DER	-0.3226	-0.0738	0.2612	0.2035	1.0000				
LDR	0.0890	0.1018	-0.1606	0.1257	-0.4047	1.0000			
NPL	-0.3897	0.1084	0.0882	0.0506	0.0480	-0.0423	1.0000		
GDP	-0.1682	0.7675	0.2577	-0.1967	-0.1603	0.1366	-0.0028	1.0000	
INF	0.0459	-0.3500	-0.0849	0.1691	0.0315	0.1129	-0.0524	-0.6534	1.0000

Source: Own calculations

4.3. Regression results

Regression was carried out using FEM and REM, and compared with OLS between the CGR dependent variable and CAR, DGR, EGR, LDR, NPL, ROA, GDP, INF independent variables.

According to the results of FEM and REM, both P-values were less than the significance level of 5% (P-value = 0.000), so the regression models were statistically significant at the significance level of 5 %. In both FEM and REM, the variables CAR and ROA had negative impacts on the variable CGR at the significance level of 10% and 5%; the variables DGR and LDR had positive impacts on the variable CGR at the significance level of 1% and 1%. The variable NPL had a negative impact on the variable CGR, and the variable EGR had a positive impact on the variable CGR but was not statistically significant. The variables GDP and INF had negative impacts on the variable CGR but was not statistically significant in the REM and these variables had no effect on the CGR in the FEM as can be seen in Table 4.

Table 4
Regression results for factors affecting credit growth

Independent variables	Dependent variable (CGR)	
	REM	FEM
CAR	-0.00343* (-2.26)	-0.00340* (-2.22)
DGR	0.464*** (7.89)	0.459*** (7.16)
EGR	0.000743 (1.23)	0.000743 (1.16)
LDR	0.234*** (4.44)	0.233*** (4.37)
NPL	-0.00895 (-1.01)	-0.00905 (-1.00)
ROA	-0.0361** (-2.98)	-0.0365** (-2.97)
GDP	-0.0150 (-0.60)	0 (.)
INF	-0.00595 (-0.81)	0 (.)
_cons	0.0285	-0.0869
P-value	0.0000	0.0000
N	144	144

t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001
Source: Own calculations

The Hausman test was performed to select the appropriate model and the Hausman test result obtained a P-value of 1.000, greater than the significance level of 5 %, so the REM was more suitable than FEM. In comparison with the OLS Pooled model, REM was more suitable than the OLS Pooled model. Therefore, the study used the REM regression results in order to analyze and test next steps. The multicollinearity test of the model had a result of Mean VIF = 1.61; VIF of all variables CGR, CAR, DGR, EGR, LDR, NPL, ROA, INF are all less than 2 and VIF of variable GDP was 2.27. This result showed no serious multicollinearity in this model. In the test for variance change of the model, the P-value = 1.000 and was greater than 0.05,

therefore, this model did not have the variance change phenomenon. When checking the autocorrelation of the model, P-value = 0.1000 was greater than 0.05 so this model did not have serial correlation. Regression in the study was carried out using FEM and REM, and compared with OLS between the ROA dependent variable and the AGE, ALB, CGR, DER, LDR, NPL, GDP, INF independent variables. According to the estimation results of FEM and REM, the values of P-value of both models were less than the significance level of 5% (P-value = 0.000), so the regression models were statistically significant at the significance level of 5 %. In both FEM and REM, the variable AGE had a positive impact on the ROA at 10% and 1%, the variable CGR had a negative impact on the ROA variable at the significance level of 5% and 1%, the variables DER and NPL had negative impacts on the ROA variable at the significance level of 1% and 1%. The variable ALB had a negative impact on ROA, the variable LDR has a positive impact on ROA, but these variables were not statistically significant. The variable GDP has a negative impact on the variable ROA at the significance level of 1%, the variable INF had a negative impact on the variable ROA at the significance level of 10% in the REM, but these variables had no effect on ROA in the FEM as can be seen in Table 5. The study performed the Hausman test to select the appropriate model and the Hausman test result had P-value = 0.1915, which was greater than the significance level of 5 %, so the REM was more suitable than FEM, compared with the OLS Pooled model, REM was more suitable than the OLS Pooled model. Therefore, the study used the REM regression results in order to analyze and test the next steps. Multicollinearity test of the model gives the results was Mean VIF = 2.16; VIF of all the variables ROA, ALB, CGR, DER, LDR, NPL are all less than 2, VIF of the variables INF, AGE and GDP are 2.33, 3.02 and 5.61, respectively. The result showed no multicollinearity phenomenon in this model. In the test for variance change of the model, P-value = 1.000 was greater than 0.05 so this model did not have the variance change phenomenon. When checking the autocorrelation of the model, the P-value = 0.3365 was greater than 0.05 so this model did not have serial correlation.

Table 5
Regression results for factors affecting profitability

Independent variables	Dependent variable (ROA)	
	REM	FEM
AGE	0.129* (2.50)	0.232*** (3.84)
ALB	-0.00344 (-1.92)	-0.00212 (-1.17)
CGR	-1.400** (-3.11)	-1.581*** (-3.52)
DER	-0.0619*** (-3.41)	-0.0718*** (-3.99)
LDR	0.227 (0.62)	0.335 (0.92)
NPL	-0.307*** (-5.78)	-0.330*** (-6.27)
GDP	-0.986*** (-4.03)	0 (.)
INF	-0.124* (-2.41)	0 (.)
_cons	6.665***	-2.297
P-value	0.0000	0.0000
N	144	144

t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001
Source: Own calculations

5. Discussions

5.1. Discussions of the model of factors affecting credit growth

The results of REM in Table 4 showed that the variable CAR had a negative impact on CGR with coefficient -0.00343 with the significance level of 10%, indicating that CAR has an impact on CGR. This result contrasted with the expected sign and hypotheses, and disagreed with the analysis results of Ledgerwood (1999), Berrospide and Edge (2010), Phi et al. (2019). Many PCFs maintained a high capital adequacy ratio of over 20% due to their limitations in loans providing ability and risk concerns in the recent period. Therefore, capital adequacy ratio had a negative impact on credit growth of PCFs the past years. The variable DGR had a positive impact on CGR with coefficient 0.464 with the significance level of 1%, indicating that DGR has a very strong impact on CGR. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Barajas et al. (2010), Tan (2012) and Alihodžić and Ekşi (2018). The credit institutions that had higher deposit growth tend to expand the credit more rapidly, and the deposit expansion contributed positively to the credit growth of credit institutions. The PCFs were institutions that provide loans mainly from mobilized capital, so in past few years, the PCFs had always increased the capital mobilization to meet the needs of credit growth. Therefore, high rate of the deposit growth promoted the credit growth of PCFs. The variable LDR had a positive impact on CGR with a coefficient of 0.234 with the significance level of 1%, indicating that LDR has a very strong impact on CGR. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Barkley et al. (1984), DiSalvo and Johnston (2017). In the past period, the loan-to-deposit ratio of the PCFs reached a high value as their lending expanded rapidly. Therefore, a high rate of the loan-to-deposit ratio promoted the credit growth of PCFs. The variable ROA had a negative impact on CGR with a coefficient of -0.0361 with the significance level of 5%, indicating that CAR has a strong impact on CGR. This result contrasted with the expected sign and hypotheses, and disagreed with the analysis results of Awdeh (2017), Alihodžić and Ekşi (2018). The PCFs always aimed at the profitability, at the same time, they ensured the credit growth. However, to ensure the profitability, PCFs needed to ensure their income and reduced the costs, while the extra their income was not commensurate with the rising costs over the years. Therefore, there was

a trade-off between PCFs' credit growth and profitability in the past years. These research results were accurate according to the characteristics of PCFs and the development history of selected PCFs in Vietnam from 2013 to 2018. On one hand, the PCFs improved the deposit mobilization to promote the credit growth and to improve the loan-to-deposits ratio step by step, etc. On the other hand, this study did not find a statistically significant impact between the variables EGR, NPL, GDP and INF on the variable CGR. This was consistent with the fact that the PCFs mainly used the external mobilized funds to provide financial services and loans under the conditions of low equity in these years. In particular, the credit growth was low and the non-performing loan ratio was concerned by many PCFs and most of the PCFs had low the non-performing loan ratio.

5.2. Discussions of the model of factors affecting profitability

The results of REM in Table 5 showed that the variable AGE had a positive influence on ROA with a coefficient of 0.129 with the significance level of 10%, indicating that CAR has an impact on ROA. This result agreed with the analysis results of Kipesha (2013), Vanroose and D'Espallier (2013), but contrasted with the analysis results of Narwal and Yadav (2014). The age of PCFs reflected operational experience of PCFs and had contributed to increase the PCF's profits over the years. The variable CGR had a negative impact on ROA with a coefficient of -1.400 with the significance level of 5%, indicating that CGR has a strong impact on ROA. This result contrasted with the expected sign and hypotheses, and contrasted with the analysis results of Kohlscheen et al. (2018) and Rossi et al. (2019). The PCFs always aimed at profitability, at the same time, they ensured the credit growth. However, the credit growth of many PCFs leaded to an increase in the costs more than their income. The extra income was not commensurate with the rising the costs over the years. Therefore, there was a trade-off between PCFs' profitability and credit growth in the past years. The variable DER had a negative impact on ROA with a coefficient of -0.0619 with the significance level of 1%, indicating that DER had a very strong impact on ROA. This result agreed with the analysis results of MicroRate (2014), but contrasted with the analysis results of Abdulai and Tewari (2017). The debt-to-equity ratio increased rapidly, it affected the level of safety in operations, and the rapid increase in debt financing put pressure on the profitability of many PCFs over the years. The variable NPL had a negative impact on ROA with a coefficient of -0.307 with the significance level of 1%, indicating that NPL had a very strong impact on ROA. This result agreed with the expected sign and hypotheses, and agreed with the analysis results of Baasi (2018) and Kingu et al. (2018). The financial inefficiencies in the PCFs arises due to high non-performing loan rate. Most of the PCFs had a low the non-performing loan rate, which helped the PCFs to ensure their operations were safety and profitability in the past years. Therefore, the increase in the non-performing loan ratio would be the risk in operational of the PCFs and the occurrence of non-performing loans was negatively associated with the level of profitability. The variable GDP had a negative impact on ROA with a coefficient of -0.986 with the significance level of 1%, indicating that GDP had a very strong impact on ROA. This result agreed with the analysis results of Yong and Christos (2012a), but contrasted with the analysis results of Yüksel et al. (2018). This relationship was explained by the low competitiveness of the PCFs in Vietnam. As the economy grows, incomes of the people were higher, capital demand, and banking services supply also increase. Meanwhile, the PCFs did not have enough financial and human resources to develop their services. The products, and services of the PCFs were not diversified, mainly loans in the period from 2013 to 2018. The variable INF had a negative impact on ROA with a coefficient of -0.124 with the significance level of 10%, indicating that GDP had an impact on ROA. This result is consistent with the analysis results of Scott and Ovuefeyen (2014) and Umar et al. (2014), but contrasted with the analysis results of Yong and Christos (2012b), Ishfaq and Khan (2015). Even though, the PCFs could be able to withstand the effects of inflation at its initial stages, since the PCFs system mostly operated with their lending. However, when the rate of inflation became stronger, the PCFs system could not absorb the shock. Therefore, that inflation had an adverse effect on PCFs' profitability and its spillover effect was detrimental to the overall operations of PCFs. The results of this research were accurate according to the characteristics of PCFs and the development process of selected PCFs in Vietnam from 2013 to 2018. At the same time, this study did not find a statistically significant impact between the variables ALB and LDR. This was consistent with the fact that the PCFs mainly used the external the mobilized funds to provide loans under the conditions of low equity and the average loan per borrower was low in the past years.

6. Conclusions

This paper has studied the interactive relationship between the credit growth and profitability of the selected PCFs in Vietnam. Multiple regression analysis was used in this study to find out the potential factors that affect PCFs' credit growth and profitability. Based on prior research, two prominent models were identified and these research results were accurate according to the characteristics, and the development history PCFs in Vietnam from 2013 to 2018. The results of the study have shown that the two factors that had positive relationships with the credit growth were the deposit growth and the loan-to-deposit ratio. The capital adequacy ratio and the profitability had negative relationship with PCFs' credit growth. On the other hand, the factors that had the highest impact were the deposit growth and loan-to-deposit ratio. This study also has shown that the one factors that had a positive relationship with profitability was the age of PCFs. The credit growth, debt-to-equity ratio, non-performing loan ratio, economic growth and inflation had negative relationships with PCFs' profitability. On the other hand, the factors that had the highest impact were the debt-to-equity ratio, non-performing loan ratio, economic growth. The multiple

regression analysis results of the two models for factors affecting credit growth and factors affecting profitability of selected PCFs in Vietnam, this study can conclude that two dependence variables of the two models were statistically significant, and there was relationship between the credit growth and profitability. Particularly, this study has found bidirectional interactions between the credit growth and profitability of the selected PCFs in Vietnam in a contrary trend. Nowadays, the PCFs are having a significant investment prospects in many regions of the country. This study helps the researchers, and managers develop their expertise in the key determinants of the credit growth, profitability and the interactive relationships between PCFs' credit growth and profitability. Base on the research results, the article recommends the following to improve PCFs' profitability and credit growth rate in Vietnam.

Firstly, PCFs are credit institutions that are allowed to mobilize the deposit to lend to its members. Therefore, to ensure the credit growth and profitability, the PCFs must follow the general principle of ensuring safety for banking operations.

Secondly, PCFs focus on lending to its members and the poor for the credit growth, therefore, strict control over the credit growth quality and efficiency are necessary to ensure PCFs' profitability.

Thirdly, PCFs enhance the deposit mobilization to create the large capital for the credit growth. At the same time, PCFs should focus more on maintain and restrict non-performance loan ratio that contribute to promote the credit growth.

Fourthly, PCFs enhance competitiveness and have enough financial and human resources to develop the diversified products and services. Thereby, the PCFs take advantage of economic growth to develop operations and increase PCFs' profitability.

Fifthly, PCFs need to balance sufficient resources to ensure their operational objectives. At the same time, strengthen solutions to limit the trade-off between PCFs' credit growth and profitability.

Sixthly, State bank of Vietnam should ensure a stable monetary policy in the economy. State bank of Vietnam should try to curtail and maintain the long run inflation rate at the low ebb which is one of the channels through which inflation volatility affect PCFs' profitability.

This study assesses the interaction relationships between the credit growth and profitability of selected PCFs in Vietnam. Subsequent researches can be extended to the credit institutions in Vietnam to investigate further other factors including macro and micro factors to achieve more comprehensive results on the interaction relationships between the credit growth and profitability.

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