Productivity and Social Performance of Co-operative Financial Institutions: Evidence from Vietnam

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Abstract

The major intendment of this study was to discover the interactive relationship between productivity and social performance, in which the productivity measured as a ratio of number of active borrowers to number of staff, the social performance is measured through the breadth of outreach and the depth of outreach. This research used the panel data regression method with research data from thirty-six selected CFIs in Vietnam from 2013 to 2018. The study results discovered that the debt-to-equity ratio, equity growth rate, breadth of outreach and return on equity had positive relationships with productivity and that the depth of outreach, loan-to-deposit ratio, non-performing loans ratio and return on assets had negative relationships with productivity. The age of CFIs, debt-to-equity ratio, breadth of outreach had positive relationships with the depth of outreach; the productivity and financial sustainability had negative impacts on the depth of outreach. The depth of outreach, productivity and non-performing loans ratio had positive relationships with the breadth of outreach; the deposit growth ratio had a negative impact on the breadth of outreach. The research had determined the bidirectional interactions and relationship between productivity and social performance. Based on the findings the study offers policy implication and further emphasizes optimal policies to CFIs management that helps the policy makers, CFIs managers and executives in improving the overall productivity and increasing the social performance of CFIs in Vietnam.

Keywords: Breadth of outreach; Co-operative financial institution; Depth of outreach; Social performance.

1. Introduction

Co-operative financial Institution is one of the institutions that provide microfinance services. CFIs arose in response to serve marginal communities, and now operate a widespread in banking markets. They play a crucial role in the socioeconomic transformation by bridging the financial exclusion gap created by the traditional financial system through pooling members' savings together for on-lending to the same members. However, they differ from banks which aim at maximizing shareholders value at the expense of customers. CFIs have a dual objective to improve the social and economic benefits of its members. This enables its members to break the poverty trap caused by lack of economic opportunities and low productivity due to the absence of access to financial services. Since CFIs are owned and operated by members, their objective can be thought of as maximizing services provided to members (John and Ross, 2012).

The CFIs have affirmed its position and role of new model of cooperative economy in monetary, credit sector, and achieved the objective of establishment and development of cooperative economic model in the sector of credit provision. CFIs could contribute significantly in ensuring access to affordable financial services. CFIs place a strong emphasis on building social capital and empowering their members and the local community. This is an important channel of capital mobilization which has actively contributed to the development of agricultural and rural economy in Vietnam. However, many CFIs are faced with various challenges including productivity and social performance which constantly affect their operations. The productivity is very low and tends to decrease; besides, CFIs' social performance has not contributed strongly to their operations over the years, affecting the ability to expand the financial services. There has been some research on CFIs operations in Vietnam but, there has been no research on the interactive between productivity and social performance.

This study's purpose was to discover the interactive between productivity and social performance and to examine the factors that affect CFIs' productivity and social performance. By studying this aspect of Vietnam the research results will contribute to the theoretical and experimental research on the interactive between CFIs' productivity and social performance. The study contributes to the knowledge gap in the literature on CFIs' productivity and social performance. At the same time, the study offers policy implication and further emphasizes optimal policies to CFIs management to change the decision-makers' perception of CFIs, so they can develop an effective suitable CFI management strategy. Therefore, the study of CFIs' productivity and social performance is urgently required to improve the productivity and increase the social performance. In particular, this study is helpful to decision-makers and other stakeholders of CFIs in Vietnam.

2. Literature Review

The CFIs play a key role in assisting financially excluded communities with lower incomes with improved access to finance. The CFIs are the voluntary and democratic institutions, meaning that members are its main

driver. The CFIs model is building on the tradition of self-financing, self-helping and self-sustaining organizations, and the communities stand to gain a lot if they can join forces and form CFIs. The CFIs offer same financial services provided by mainstream banks while providing a safe, convenient environment for members to deposit or save money and obtain loans and other financial services at a low cost. The CFIs serve their members most effectively and work for the sustainable development of communities. The CFIs play the important role in the economy and social development, contributes to strengthening and expanding formal financial systems. To play that role effectively, the CFIs' productivity and social performance have to be strengthened.

2.1. Productivity

The productivity indicators measured as a ratio of number of active borrowers to number of staff show how efficiently the available human resource was utilized (Rauf and Mahmood, 2009). Productivity was typically expressed as an output-input ratio. Productivity measures showed units of output produced per unit of a particular input. Labor productivity was the most common measure of this type (Syverson, 2011). Rashid and Twaha (2013) used numbers of borrowers per staff number as a measure of productivity. This ratio was computed by expressing the total number of borrowers regarding total number of staff members in a given microfinance institution. It was a staff productivity ratio. The higher the ratio, the more productive the institution, and the more effectively it leverages was resources to keep down costs to clients. The total staff referred to the total number of people working full time in a microfinance institution. The total number of borrowers referred to individually identifiable borrowers who had at least one current outstanding loan with the institution (MIX, 2015).

This ratio provides a clue of the number of staff required to produce a given level of output measured by the borrowers. It captures the productivity of the loan officers and the higher the ratio the more productive the institution. It is the appropriate measure of productivity given the fact that in microfinance institutions are characterized by many borrowers accessing very many small loans. Productivity represents one of the major areas reflects the term performance, especially for the CIFs' operations. Productivity measurement has become more important and has been regarded as a prerequisite for development and continuous improvement the CFIs' operations. The productivity is associated with all CFIs' operations and is influenced by many factors, including:

First, depth of outreach: The depth of outreach was measured by the average loan size (Ledgerwood, 1999). According to Quayes (2012), the depth of outreach was defined as access of credit disbursement to borrowers, and they referred to the depth of outreach measured by the average loan size per borrower. The research results of Rashid and Twaha (2013) showed that the average loan size appears to have an inverse relationship with productivity. Abrar (2018) revealed that the depth outreach as depicted by average loan size. Bitok (2019a), found that the study determined the moderating effect of depth of outreach on the relationship between staff productivity. On the contrary, the empirical results of Adhikary and Papachristou (2014) on the connection between the depth of outreach and productivity suggested a positive relation.

Secondly, debt-to-equity ratio: Abdulai and Tewari (2017b) showed that the availability and use of debts by microfinance institutions helped to expand their capital base and also propelled microfinance institutions towards achieving many borrowers. The debt-to-equity ratio was a good indicator in assessing the extent of utilization of commercial funds by microfinance institutions and was included as the capital structure variable. Therefore, the debt-to-equity ratio had a positive impact on the productivity. According to Ha (2019a), the debt-to-equity ratio had a positive relationship with productivity of microfinance institutions. On the contrary, The findings of Towo *et al.* (2019) concluded that an increase in financial leverage results in lower labor productivity, the financial leverage had a negative effect on the labor productivity, which could be due to inefficient operation because of the debt overhang problem, higher financing costs.

Thirdly, equity growth: According to Rauf and Mahmood (2009), the microfinance sector had successfully raised its productivity, for which the sector must rely on intensive utilization of their existing capacity to enhance outreach to many potential borrowers. Hence, as the equity increased microfinance institutions increased their productivity. MicroRate (2014), showed that personnel productivity was one of the ratios that were most uniquely define microfinance institutions. If they were to become financially viable, the microfinance institutions must be able to handle very large numbers of customers with a minimum of administrative effort. Therefore, the equity growth rate had a positive impact on productivity. Microfinance sector was associated with both capital stock and factor productivity growth (Mathurin *et al.,* 2015). Abrar (2018), found that the equity growth played a vital role in the microfinance institutions' credit growth. Since then, the microfinance institutions built a strong clients base which in the future results in greater productivity and as competition increases. Thereby, as the equity increased microfinance institutions promoted the credit growth and increased their productivity.

Fourth, loan-to-deposit ratio: The loan-to-deposit ratio was used to assess a credit institution's liquidity. It helped to show how well a credit institution was attracting and retaining customers. The study of DiSalvo and Johnston (2017) found that the loan-to-deposit ratio was a ratio showing how much credit of these institutions was funded by key stable funding resources, namely deposits. Loan-to-deposit ratio of large credit institutions reached high ratio as their operations expanded rapidly. Thus, it had a positive impact on the credit institutions' productivity. According to Ha (2019b), the loans-to-deposits ratio measured the extent that deposit fund loans and was good analysis of the role of deposits as a funding source. The loan-to-deposit ratio had positive relationships with the credit growth and the number of borrowers. Hence, the loans-to-deposits ratio contributed to increase the microfinance institutions' productivity.

Fifthly, breadth of outreach: It simply involved the number of poor people reached by a microfinance institution and was measured as the total number of active borrowers. It could also be assessed in relation to the increase in

branch network and staff (Rauf and Mahmood, 2009). The breadth of outreach was measured by the number of people a microfinance institution had extended credit to, or the number of borrowers over a specific period (Quayes, 2012). The study of Abrar (2018) pointed out the breadth of outreach was shown by the number of borrower. According to the research results of Rashid and Twaha (2013) showed that numbers of active borrowers positively influenced productivity of microfinance institutions. According to MicroRate (2014), in order for the microfinance institutions to succeed they must learn to maximize productivity by using the least number of resources to process the greatest volume of loans and number of borrower in a way that did not sacrifice portfolio quality or customer service. This critical equilibrium of productivity must be paramount at every level of the microfinance institution, and a key measure of operational management. Thereby, the number of borrower had a positive impact on the microfinance institutions' productivity.

Sixthly, non-performing loan ratio: According to Kiiru (2007), microfinance institutions had high repayment rates, which associated with growing the clients and loan sizes. Thereby, microfinance institutions had low non-performing loans ratio, which associated with growing the productivity. The study of Osotimehin *et al.* (2011) found that microfinance outreach was positively and significantly determined by loan repayment ratio. Thus, the numbers of borrowers was positively and significantly determined by loan repayment ratio. This had led to the numbers of borrowers per staff number was negatively and significantly determined by non-performing loan ratio. (Arhin *et al.*, 2019) showed that non-performing loans ratio disturbs all the operations of the banks and other financial institutions. They concluded that non-performing loan was a challenge for microfinance institutions. The non-performing loan was major problems for microfinance institutions andhad implications on their operations and surviva. Hence, the productivity of the microfinance institutions was negatively affected with increase in non-performing loans ratios.

Seventhly, return on asset: This is a financial ratio that shows the percentage of profit a business institution earns in relation to its overall resources. Return on assets is a profitability ratio that provides how much profit a business institution is able to generate from its assets. The return on assets is a important measurement for profitability of microfinance institution. Kipesha and Zhang (2013), found that the trade-offs between profitability and borrowers per staff. This implied that focusing on profitability results into declining outreach to the poor hence existence of trade-offs. The return on asset had a negative coefficients with percentage of borrowers per staff in both correlation and regression results. On the contrary, Adhikary and Papachristou (2014) revealed that profitability was positively associated with the breadth of outreach. Therefore, the return on assets had a positive impact on the microfinance institutions' productivity. A recent study also concluded that there was a positive bidirectional interactions and causal relationship between profitability and productivity (Ha, 2019a).

Eighth, return on equity: The return on equity is a measure of the financial performance of a business institution in relation to the equity. Return on equity is calculated by dividing net income by average equity for the given period. Nawaz (2010), revealed that the positive relationship between microfinance institutions' financial performance and staff productivity were in line with the theory and also were significant. On the contrary, Rashid and Twaha (2013) found convincing evidence that the efficiency affected the microfinance institutions' productivity negatively.

2.2. Social Performance

According to Abrar (2018), social performance was measured through average loan size and number of credit clients. The breadth of outreach as measured by the number of credit clients, the depth outreach as depicted by average loan size. Quayes (2012), showed that social outreach generally referred to either breadth of outreach or depth of outreach. The breadth of outreach was measured by the number of people a microfinance institution has extended credit to, or the number of borrowers over a specific period. The depth of outreach was defined as access of credit disbursement to borrowers, wherein the borrowers were the greater was the depth of outreach. With the rapid growth of microcredit, breadth of outreach had also increased both at the industry level and also at the individual microfinance institution level. As a result, depth of outreach had received more attention from all quarters who are concerned about the overall social outreach of microfinance,including policy-makers. From the point of providing poor people with access to credit, breadth of outreach could be thought of as measuring the quantity of microcredit while depth of outreach measured the quality of microcredit. Social performance was one of the goals of microfinance institution to increase accessibility of low-income individuals and households, and super small-sized enterprises, which is a goal associated with the development, and operation process of microfinance institutions. Therefore, the breadth and depth of outreach are influenced by many factors, including:

Microfinance institutions are striving to develop to ensure coverage for those living with high relative poverty levels (depth of outreach), the depth of outreach is how deep within the clients a microfinance institution is able to reach. The depth of outreach is influenced by the age of CFIs, productivity, debt-to-equity ratio, financial sustainability, loan-to-deposit ratio and breadth of outreach.

First, the age of CFIs: Coleman (2007) found that the age of microfinance institutions told about the experiences acquired by the institution with operations, resource mobilization as well as market experience. The older microfinance institutions had acquired knowledge and experience about the market, better operational strategies, customer needs. Through this research, it showed that the age of microfinance institutions contributed to increase the depth of outreach. The study of Wijesiri *et al.* (2015) showed that although older microfinance institutions performed better than younger ones regarding achieving financial results, they were relatively inefficient in achieving depth of outreach objectives. Hence, the age of microfinance institutions had a negative impact on their depth of outreach.

Secondly, productivity: Kipesha and Zhang (2013) also showed that the ratio of borrowers to staff measured the staff productivity in microfinance institutions. The outreach objective could only be reached if microfinance institutions had enough funds to cover for the loan demands. The study found that the staff productivity were significantly positive correlated with this outreach measure of microfinance institutions. Abdulai and Tewari (2017b) revealed that borrower per staff member was main institutional determinants of microfinance institutions, and the level of staff productivity negatively affected outreach depth.

Thirdly, debt-to-equity ratio: The study Osotimehin *et al.* (2011) showed that the microfinance outreach was positively and significantly determined by debt-to-equity ratio. According to Quayes (2012), debt-to-equity ratio had a significant positive impact on the depth of outreach. Ha (2019b), also found that debt-to-equity ratio had a positive relationship with the microfinance institutions' depth of outreach.

Fourthly, financial sustainability: Quayes (2012) showed empirical evidence of a positive complementary relationship between financial sustainability and depth of outreach. Ha (2019b), also found that the financial sustainability had a positive relationship with microfinance institutions' depth of outreach.

Fifthly, loan-to deposit ratio: DiSalvo and Johnston (2017) showed that the loan-to-deposit ratio was a key indicator to be monitored to take the gauge of credit institutions' structural liquidity positions. It was a ratio showing how much credit of these institutions was funded by deposits. Loan-to-deposit ratio of large credit institutions reached high ratio, their lending expanded rapidly and effect on the credit institutions' depth of outreach. However, Ha (2019b) found that the loan-to-deposit ratio had a negative relationship with the microfinance institutions' depth of outreach.

Sixthly, breadth of outreach: Abdulai and Tewari (2017b) showed the trade-off relations between the breadth of outreach and the depth of outreach of microfinance institutions. On the contrary, Ha (2019b) found that the breadth of outreach had a positive relationship with the microfinance institutions' depth of outreach.

Microfinance institutions are striving to reach out to many clients (breadth of outreach), the breadth of outreach is related to the actual number of clients reached with financial services. The breadth of outreach is influenced by the age of CFIs, depth of outreach, productivity, deposit-to-loan ratio, deposit growth rate and non-performing loans ratio.

First, the age of CFIs: Coleman (2007) found that the growth of microfinance institutions was also increase with the age of the institutions as results of experience. The age increased the microfinance institutions expanded and reached more poor clients. Javid and Abrar (2015), revealed that the age of a microfinance institution had positive impact on number of active borrowers which was significant for almost all regions, and also collectively indicating mature microfinance institutions had more active clients. The age of a microfinance institution showed positive impact on breadth of outreach dimension captured through number of active borrowers. Rupa (2017), showed that based on age groups, mature of microfinance institutions had shown better performance regarding breadth of outreach.

Secondly, depth of outreach: According to Abdulai and Tewari (2017a), it was established that a trade-off exists between the depth of outreach (access to credit disbursement by the clients) and breadth of outreach (number of clients served). Ha (2019b), found that the depth of outreach had a negative relationship with the microfinance institutions' breadth of outreach.

Thirdly, productivity: The study of Kipesha and Zhang (2013) used the breadth of outreach was the size or scale of microfinance institutions. The focus on outreach to the clients involved increasing the clients base in microfinance institutions. The staff productivity was significantly positive correlated with this outreach measure of microfinance institutions. Abdulai and Tewari (2017b), showed that staff productivity positively drove the breadth of outreach of microfinance institutions. The results showed that using the number of borrowers appeared to be a better predictor of microfinance institutions wider outreach.

Fourthly, deposit growth rate: The deposit growth rate related to the breadth of outreach of microfinance institutions. Because, objective of mobilizing deposits was twofold: (i) to provide relatively secured deposit services that meet the demand of large numbers of poor people on an ongoing basis; and (ii) to provide credit services to the poor by developing a relatively stable meant to finance their portfolios (CGAP, 2005). Hartaska and Nadolnyak (2007), showed that deposit taking institutions attained broader outreach and the results indicated that outreach was affected by the level of deposits, suggesting effect of regulation on outreach. Bayai and Ikhide (2016), revealed that deposits went a long way in spurring outreach depth and breadth. Churchill and Marr (2017), found that the deposit account served as a proxy that captures the level of savings amongst microfinance clients and increase in the number of savings account would help microfinance institutions expanded outreach, especially the breadth of outreach.

Fifthly, deposit-to-loan ratio: According to Fiebig *et al.* (1999), the deposits' mobilization had become a strong driving force for improving operation of microfinance institutions. Many clients can be served more by lending from the mobilization deposits. Thereby, deposit-to-loan ratio had a positive impact on the breadth of outreach. Narayanan (2018), showed that the loan-to-deposit ratios as another measure of the liquidity of the financial institutions. The loan-to-deposit ratio was a useful measure of the risks taken by the financial institutions counting on savings and deposits to finance loan portfolio growth. Therefore, these institutions have produced more breadth of outreach and impact regarding clientele.

Sixthly, non-performing loans ratio: Okumu (2007) noted that the level of loan repayment is an important indicator of a health of a lending institution. The higher the repayment rate, the better the institution performance. In other words, The lower the non-performing loans ratio, the better the institution performance. Thereby, showed that the low non-performing loans ratio contributed to increase social performance and expand the microfinance institutions' breadth of outreach. Osotimehin *et al.* (2011), researched the microfinance institutions' outreach. They

suggested that the microfinance outreach was positively and significantly determined by loan repayment rates. Thereby, it represented that the low non-performing loans ratio contributed to increase the microfinance institutions' breadth of outreach.

3. Research Methodology

The study uses both primary and secondary data. Secondary sources of data are gathered from international journals, books, etc. Primary data is collected from the annual reports and financial reports of thirty six selected CFIs in Vietnam from 2013 to 2018. The analysis model of the relationship between the productivity and social performance of CFIs was established as follows:

$$Y_1 = \alpha_{10} + \alpha_{11}Y_2 + \alpha_{12}Y_3 + \sum_{k=1}^{n} \beta_{1k}X_{1k} + \mu_1 \tag{1}$$

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

$$Y_3 = \alpha_{30} + \alpha_{31}Y_1 + \sum_{\delta=1}^{q} \beta_{3\delta} X_{3\delta} + \mu_3 \tag{3}$$

Where,

Y1 is a variable that measures productivity, determined by numbers of borrowers per staff number. Y2 is a variable that measures depth of outreach, determined the average loan per borrower. Y3 is a variable that measures breadth of outreach, determined by the number of active borrowers. X_{1k}, $X_{2\gamma}$ and $X_{3\delta}$ are the independent variables that can affect productivity and social performance in Equation 1, Equation 2 and Equation 3, 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, indicator 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 and 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 productivity		
Dependent variable		
Productivity: Borrowers per staff ratio (BSR)	Numbers of borrowers / Number of staff	
Independent variables		
Depth of outreach: Average loan per borrower (ALB)	The average loan per borrower	H1.1: +/- (high ALB, high or low BSR)
Debt-to-equity ratio (DER)	Total liabilities / Total equity	H1.2: +/- (high DER, high or low BSR)
Equity growth rate (EGR)	Growth in total equity	H1.3: + (high EGR, high BSR)
Loan-to-deposit ratio (LDR)	Total loans / Total deposits	H1.4: + (high LDR, high BSR)
Breadth of outreach: Number of active borrowers (NAB)	The number of active borrowers	H1.5: + (high NAB, high BSR)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H1.6 - (high NPL, low BSR)
Return on assets (ROA)	(Net operating income - Taxes) / Average assets	H1.7: +/- (high ROA, high or low BSR)
Return on equity (ROE)	(Net operating Income - Taxes) / Average equity	H1.8 +/- (high ROE, high or low BSR)
Factors affecting depth of outreach		
Dependent variable		
Depth of outreach (Average loan per borrower - ALB)	The average loan per borrower	
Independent variable		
The age of CFIs (AGE)	Number of operational years of CFIs	H2.1: +/- (high AGE, high or low ALB)
Productivity: Borrowers per staff ratio (BSR)	Numbers of borrowers / Number of staff	H2.2: +/- (high BRS, high or low ALB)
Debt-to-equity ratio (DER)	Total liabilities / Total equity	H2.3: + (high DER, high ALB)

Financial self - sustainability (FSS)	Operating income / (Operating expenses + financing costs + provision for loan losses + Cost of capital)	H2.4: + (high FSS, high or ALB)
Loan-to-deposit ratio (LDR)	Total loans / Total deposits	H2.5: +/- (high LDR, high or low ALB)
Breadth of outreach: Number of active borrowers (NAB)	The number of active borrowers	H2.6: +/- (High NAB, high or low ALB)
Factors affecting breadth of outreach		
Dependent variable		
Breadth of outreach: Number of active borrowers (NAB)	The number of active borrowers	
Independent variable		
The age of CFIs (AGE)	Number of operational years of CFIs	H3.1: + (high AGE, high NAB)
Depth of outreach (Average loan per borrower - ALB)	The average loan per borrower	H3.2: - (high ALB, low NAB)
Productivity: Borrowers per staff ratio (BSR)	Numbers of borrowers / Number of staff	H3.3: + (high BRS, high NAB)
Deposit growth rate (DGR)	Growth in total deposit	H3.4: + (high DGR, high NAB)
Deposit-to-loan ratio (DLR)	Total deposit / Gross loan	H3.5: + (high DLR, high NAB)
Non-performing loan ratio (NPL)	Non-performing loans / Total loans	H3.6: - (High NPL, low NAB)

The study used the descriptive statistical method to evaluate the fluctuations of variables in the research model, perform 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 productivity, social performance, and the relationships between CFIs' productivity and social performance.

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, BSR, DER, DLR, FSS, LDR, NAB, NPL, ROA, ROE variables had smaller standard deviations than the average. The DGR, EGR variable have fluctuations, due to the large difference in the deposit growth, the equity growth between the CFIs of Vietnam from 2013 to 2018.

Table-2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
AGE	216	21.26	2.012209	16	25
ALB	216	79.26929	38.39889	22.09	293.88
BSR	216	66.96878	26.18049	23.71	137.4
DER	216	11.32849	4.022086	3.35	22.14
DGR	216	.0687174	.1798071	-.37	1.022
DLR	216	.9884028	.1595959	.51	1.45
EGR	216	8.792431	16.37872	-12.15	160.42
FSS	216	110.6	8.160111	68.4606	137.667
LDR	216	1.041459	.1961796	.688	1.969
NAB	216	1375.196	1171.156	241	6215
NPL	216	1.201739	1.189869	0	6.34
ROA	216	1.506669	.9247296	-3.28	4.31
ROE	216	17.24319	9.995376	-24.04	49.65

Source: Authors' calculation from Stata 15.0.

4.2. Correlation Analysis

The analysis results of the correlation between variables in the model indicated a very low degree of correlation among the variables, so the presence of any multicollinearity was neglected in Table 3.

Table-3. Correlation matrix

Correlation matrix for factors affecting productivity								
	BSR	**ALB**	**DER**	**EGR**	**LDR**	**NAB**	**NPL**	**ROA**	**ROE**
BSR	1.0000								
ALB	-0.3018	1.0000							
DER	0.0618	0.2612	1.0000						
EGR	0.0299	-0.0370	-0.0472	1.0000					
LDR	-0.2510	-0.1606	-0.4047	-0.0028	1.0000				
NAB	0.5714	0.1902	0.1966	-0.0400	-0.3169	1.0000			
NPL	-0.2775	0.0882	0.0480	0.2475	-0.0423	-0.0228	1.0000		
ROA	0.3294	-0.3130	-0.3226	-0.1730	0.0890	0.0898	-0.3897	1.0000	
ROE	0.3380	-0.1609	0.2584	-0.0517	-0.2026	0.2076	-0.3623	0.7480	1.0000
Correlation matrix for factors affecting depth of outreach								
	ALB	**AGE**	**BSR**	**DER**	**FSS**	**LDR**	**NAB**		
ALB	1.0000								
AGE	0.2298	1.0000							
BSR	-0.3018	-0.248	1.0000						
DER	0.2612	-0.0738	0.0618	1.0000					
FSS	-0.2407	-0.1347	0.3982	-0.2620	1.0000				
LDR	-0.1606	0.1018	-0.2510	-0.4047	0.0208	1.0000			
NAB	0.1902	-0.1293	0.5714	0.1966	0.1199	-0.3169	1.0000		
Correlation matrix for factors affecting breadth of outreach								
	NAB	**AGE**	**ALB**	**BSR**	**DGR**	**DLR**	**NPL**		
NAB	1.0000								
AGE	-0.1293	1.0000							
ALB	0.1902	0.2298	1.0000						
BSR	0.5714	-0.2485	-0.3018	1.0000					
DGR	-0.0542	-0.4079	-0.0907	0.0998	1.0000				
DLR	0.3269	-0.0950	0.2005	0.2211	0.1751	1.0000			
NPL	-0.0228	0.1084	0.0882	-0.2775	0.0467	0.0414	1.0000		

Source: Authors' calculation from Stata 15.0.

4.3. Regression Results

Regression was carried out using FEM and REM, and compared with OLS between the BSR dependent variable and ALB, DER, EGR, LDR, NAB, NPL, ROA, ROE independent variables.

According to the results of REM and FEM, 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 REM, the variables DER, EGR, NAB and ROA had positive impact on the variable BSR at the significance level of 10%, 5%, 1% and 5%, respectively; the variables ALB, LDR, NPL and ROE had negative impact on the variable BSR at the significance level of 1%, 10%, 1% and 10%, respectively. In FEM, the variables DER, EGR, NAB and ROA had positive impacts on the variable BSR at the significance level of 10%, 10%, 1% and 5%, respectively; the variables ALB, LDR, NPL and ROE had negative impacts on the variable BSR at the significance level of 1%, 10%, 10% and 1%, respectively as can be seen in Table 4.

The Hausman test was performed to select the appropriate model and the Hausman test result obtained a Pvalue of 0.9945, 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 to analyze and test the next steps. The multicollinearity test of the model had a result of Mean VIF = 3.33, VIF of variables from 1.33 to 5.29. This result showed no serious multicollinearity in this model. In the test for variance change of the model, the P-value = 1.0000 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 = 0.6524 was greater than 0.05 so this model did not have serial correlation.

Table-4. Regression results for factors affecting productivity

Independent variables	Dependent variable (BSR)	
	REM	**FEM**
ALB	-0.266***	-0.254***
	(-6.57)	(-5.70)
DER	1.534*	1.402*
	(2.31)	(1.98)
EGR	0.267**	0.227*
	(2.76)	(2.12)
LDR	-20.13*	-18.30*
	(-2.42)	(-2.08)
NAB	0.0131***	0.0129***

	(9.90)	(9.57)
NPL	-5.360***	-5.352***
	(-3.99)	(-3.86)
ROA	12.28**	11.68*
	(2.87)	(2.61)
ROE	-0.895*	-0.853*
	(-2.32)	(-2.16)
_cons	74.70***	74.06***
P-value	0.0000	0.0000

*t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001*
Source: Authors' calculation from Stata 15.0.

Regression was carried out using FEM and REM, and compared with OLS between the ALB dependent variable and AGE, BSR, DER, FSS, LDR, NAB independent variables.

According to the results of REM and FEM, 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 REM, the variables AGR, DER and NAB had positive impact on the variable ALB at the significance level of 10%, 10% and 1%, respectively; the variable BSR had a negative impact on the variable ALB at the significance level of 1; the variables FSS, LDR had negative impact on the variable ALB, but both these last two variables were not statistically significant. In FEM, the variables DER and NAB had positive impact on the variable ALB at the significance level of 5% and 10%, respectively; the variable BSR had a negative impact on the variable ALB at the significance level of 1; the NAB had positive impact on the variable ALB, the variables AGE and LDR had negative impacts on the variable ALB, but these variables were not statistically significant as can be seen in Table 5.

The Hausman test was performed to select the appropriate model and the Hausman test result obtained a Pvalue of 0.0432, smaller than the significance level of 5 %, so the FEM was more suitable than REM. In comparison with the OLS Pooled model, FEM was more suitable than the OLS Pooled model. Therefore, the study used the FEM regression results to analyze and test the next steps. The multicollinearity test of the model had a result of Mean VIF = 1.57, VIF of variables from 1.12 to 2.35. This result showed no serious multicollinearity in this model.

In the test for variance change of the model, the P-value = 0.0189 and was smaller than 0.05, therefore, this model had the variance change phenomenon. When checking the autocorrelation of the model, P-value = 0.0347 was smaller than 0.05 so this model had serial correlation. This study performed to overcome the variance change phenomenon and serial correlation. The results in FEM (xtgls) showed that variables AGR, DER and NAB had positive impacts on the variable ALB at the significance level of 1%, 10% and 10%, respectively; the variable BSR had a negative impact on the variable ALB at the significance level of 1; the variables FSS had negative impact on the variable ALB, the variables LDR had positive impact on the variable ALB, but both these last two variables were not statistically significant as can be seen in Table 5.

Table-5. Regression results for factors affecting depth of outreach

Independent variables	Dependent variable (ALB)		
	REM	FEM	FEM (xtgls)
AGE	3.315*	-3.886	3.655***
	(2.45)	(-1.54)	(4.40)
BSR	-0.822***	-0.759***	-0.568***
	(6.01)	(-5.51)	(-5.61)
DER	1.680*	2.434**	1.092*
	(2.24)	(3.18)	(2.00)
FSS	-0.00863	0.300	-0.0598
	(-0.02)	(0.77)	(-0.30)
LDR	-19.53	-27.31	5.532
	(-1.28)	(-1.77)	(0.68)
NAB	0.0153***	0.0138***	0.00635*
	(5.41)	(4.95)	(2.15)
_cons	45.10	161.3*	14.15
P-value	0.0000	0.0000	0.0000

*t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001*
Source: Authors' calculation from Stata 15.0.

Regression was carried out using FEM and REM, and compared with OLS between the NAB dependent variable and AGE, ALB, BSR, DGR, DLR, NPL independent variables.

According to the results of REM and FEM, 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 REM, the variables ALB, BSR and NPL had positive impacts on the variable NAB at the significance level of 1%, 1% and 10%, respectively; the variables DGR had a negative impact on the variable NAB at the significance level of 10%; the variable DLR had a positive impact on the variable NAB, the variable AGE had a negative impact on the variable NAB, but both these last two variables were not statistically significant. In FEM, the variables ALB, BSR and NPL had positive impacts on the variable NAB at the significance level of 1%, 1% and 10%, respectively; the variables DGR had a negative impact on the variable NAB at the significance level of 10%; the variable DLR had a positive

impact on the variable NAB, the variable AGE had a negative impact on the variable NAB, but both these last two variables were not statistically significant as can be seen in Table 6.

The Hausman test was performed to select the appropriate model and the Hausman test result obtained a Pvalue of 0.9610, greater than the significance level of 5 %, so the EEM 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 to analyze and test the next steps. The multicollinearity test of the model had a result of Mean VIF = 1.57, VIF of variables from 1.16 to 2.34. This result showed no serious multicollinearity in this model.

In the test for variance change of the model, the P-value = 1.0000 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 = 0.0717 was greater than 0.05 so this model did not have serial correlation.

Table-6. Regression results for factors affecting breadth of outreach

Independent variables	Dependent variable (NAB)	
	REM	FEM
AGE	-67.76	-100.9
	(-1.72)	(-1.44)
ALB	11.43***	11.09***
	(5.68)	(5.22)
BSR	30.83***	31.01***
	(10.07)	(9.83)
DGR	-1061.2*	-1133.8*
	(-2.48)	(-2.41)
DLR	811.9	989.3
	(1.71)	(1.94)
NPL	148.7*	166.8*
	(2.43)	(2.59)
_cons	-1063.6	-536.3
P-value	0.0000	0.0000

*t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001*
Source: Authors' calculation from Stata 15.0.

5. Discussions
5.1. Discussions of Factors Affecting Productivity
The results of REM in Table 4 showed that the variable ALB had a negative impact on BSR with coefficient -0.266 with the significance level of 1%, indicating that ALB has a very strong impact on productivity. This result agreed with the analysis results of Rashid and Twaha (2013), Bitok (2019a) and disagreed with the analysis results of Adhikary and Papachristou (2014). The average loan size (proxy for the depth of outreach) had a coefficient -0.266. This suggested that extending loans to the clients reduced the productivity of CFIs by 26.6%. This suggested that many CFIs increased the depth of outreach, the clients were being served and serving the clients required more inputs, which adversely affected the productivity of CFIs. Therefore, the fact that the CFIs had a higher average loan per borrower, the lower productivity over the years.

The variable DER had a positive impact on BSR with coefficient 1.534 with the significance level of 10%, indicating that DER has an impact on productivity. This result agreed with the analysis results of Abdulai and Tewari (2017b), Ha (2019a) and disagreed with the analysis results of Towo et al. (2019). The debt-to-equity ratio had a coefficient 1.534, which implied that increasing the debt-to-equity ratio promoted the productivity of CFIs by 1.534 units per year. A possible explanation for this finding was that CFIs used a lot of resources to service many clients, which implied that increasing resources to serve clients demanding credits, thereby, increasing productivity. This is consistent with the fact that CFIs mainly used the external mobilized funds to increase the financial services and their productivity under the conditions of low equity in the past years.

The variable EGR had a positive impact on BSR with coefficient 0.267 with the significance level of 5%, indicating that EGR has a strong impact on productivity. This result agreed with the expected sign and hypotheses and agreed with the analysis results of Rauf and Mahmood (2009), MicroRate (2014), Mathurin et al. (2015) and Abrar (2018). The equity growth rate had a coefficient 0.267. This suggested that increasing the equity promoted the productivity of CFIs by 26.7%. This implied that increasing the equity to serve clients demanding credits, thereby, increasing productivity. The fact that many CFIs strengthened and increased their financial capacity by increasing their charter capital, attracting new members. The CFIs focus on lending to its members, and the clients for their productivity growth over the years.

The variable LDR had a negative impact on BSR with coefficient -20.13 with the significance level of 10%, indicating that LDR has an impact on productivity. This result disagreed with the analysis results of DiSalvo and Johnston (2017) and Ha (2019a). The loan-to-deposit ratio had a negative and statistically significant effect on the productivity of CFIs. Specifically, the estimated coefficient for the loan-to-deposit ratio indicated that the productivity of CFIs decreased by 20.13 units per year when additional the loan-to-deposit ratio was placed. This meant the CFIs' loan-to-deposit ratio advanced and their productivity decreased, respectively showing the CFIs

increased the loan size and the fact that the CFIs had a higher average loan per borrower, the lower productivity over the years.

The variable NAB had a positive impact on BSR with coefficient 0.0131 with the significance level of 1%, indicating that NAB has a very strong impact on productivity. This result agreed with the expected sign and hypotheses and agreed with the analysis results of Rashid and Twaha (2013) and MicroRate (2014). The total number of active borrowers (proxy of the breadth of outreach) has a coefficient 0.0131, suggesting that an additional client increased the productivity of CFIs at a rate of 1.31%. This could have been possible due to attracting new members and the diversification of clients. The CFIs focus on lending to its members and the clients for their productivity growth over the years.

The variable NPL had a negative impact on BSR with coefficient -5.360 with the significance level of 1%, indicating that NPL has a very strong impact on productivity. This result agreed with the expected sign and hypotheses and agreed with the analysis results of Kiiru (2007), Osotimehin *et al.* (2011) and Arhin *et al.* (2019). The non-performing loans ratio had a coefficient -5.360, which implied that reducing the non-performing loans ratio increased the productivity of CFIs by 5.360 units per year. Most of CFIs had the low non-performing loan ratio and many CFIs increased the productivity due to their non-performing loan ratio decrease in recent years.

The variable ROA had a positive impact on BSR with coefficient 12.28 with the significance level of 5%, indicating that ROA has a strong impact on productivity. This result agreed with the analysis results of Adhikary and Papachristou (2014), Ha (2019a) and disagreed with the analysis results of Kipesha and Zhang (2013). The return on assets had a coefficient 12.28. This suggested that increasing the return on assets promoted the productivity of CFIs by 12.28 units per year. In addition to serving its members goals, profitability contributes to their social performance and increasing CFIs' productivity. The CFIs' return on assets had a positive impact on productivity and this study result showed there was the interactive relationship between return on assets and productivity of CFIs.

The variable ROE had a negative impact on BSR with coefficient -0.895 with the significance level of 10%, indicating that ROE has an impact on productivity. This result agreed with the analysis results of Rashid and Twaha (2013) and disagreed with the analysis results of Nawaz (2010). The return on equity had a coefficient -0.895. This suggested that reducing the return on equity promoted the productivity of CFIs by 89.5%. Many CFIs increased their financial capacity by increasing their charter capital, attracting new members. These makes to decrease the return on equity from increasing their equity, beside the CFIs focus on lending to its members and customer for their productivity growth over the years. The CFIs' return on equity has a negative impact on productivity and this study result showed there was the trade-off between return on equity and productivity of CFIs.

5.2. Discussions of Factors Affecting Social Performance

The results of FEM (xtgls) in Table 5 showed that the variable AGE had a positive impact on ALB with coefficient 3.655 with the significance level of 1%, indicating that AGE has powerful effects on the depth of outreach. This result agreed with the analysis results of Coleman (2007) and disagreed with the analysis results of Wijesiri *et al.* (2015). The estimated coefficient for the age of CFIs suggested that the age of CFIs increased the depth of outreach by 3.655 points. Specifically, the results suggest that the age of CFIs were positively and statistically significantly related to the depth of outreach, implying that the older CFIs had higher the depth of outreach than young ones. The age of CFIs reflects operational experience of CFIs and it was positively and statistically significantly related to the depth of outreach, which implied that for any additional year of existence of the CFIs, the depth of outreach increased over the years. The experience was important in dealing with the clients as it provided chance for lenders and borrowers to understand each other and served each other more efficiently. Many CFIs had the higher the age, the greater the depth of outreach over the years.

The variable BSR had a negative impact on ALB with coefficient -0.568 with the significance level of 1%, indicating that BSR has a strong impact on the depth of outreach. This result agreed with the analysis results of Abdulai and Tewari (2017b) and disagreed with the analysis results of Kipesha and Zhang (2013). The estimated coefficient for the productivity suggested that the productivity reduced the depth of outreach by 56.8%. This implied that the increasing the productivity resulted into fewer the average loan per borrower. The fact that CFIs had lower the productivity that obtained better the depth of outreach and the increasing the average loan per borrower reduced the productivity. Therefore, the trade-off between the CFIs' productivity and depth of outreach over the years.

The variable DER had a positive impact on ALB with coefficient 1.092 with the significance level of 10%, indicating that DER has an impact on the depth of outreach. This result agreed with the expected sign and hypotheses and agreed with the analysis results of Osotimehin *et al.* (2011), Quayes (2012) and Ha (2019b). The debt-to-equity ratio was found to be positively correlated with a significant coefficient with the depth of outreach. The estimated coefficient for the debt-to-equity ratio suggested that the debt-to-equity ratio increased the depth of outreach by 1.092 points. This implied that the increasing use of commercial funds in CFIs resulted in increasing more the depth of outreach. Many CFIs used funding sources for lending, and this CFIs increased the average loan per borrower from liabilities over the years.

The variable NAB had a positive impact on ALB with coefficient 0.00635 with the significance level of 10%, indicating that NAB has an impact on the depth of outreach. This result agreed with the analysis results of Ha (2019b) and disagreed with the analysis results of Abdulai and Tewari (2017b). The estimated coefficient for the breadth of outreach suggested that the breadth of outreach increased the depth of outreach by 0.63%. Specifically, the results suggest that the breadth of outreach were positively and statistically significantly related to the depth of outreach, implying that the breadth of outreach contributed to increase the depth of outreach. This indicated that the

increasing focus on the breadth of outreach moved in the same direction with the depth of outreach of CFIs over the years.

The results of REM in Table 6 showed that the variable ALB had a positive impact on NAB with coefficient 11.43 with the significance level of 1%, indicating that ALB has powerful effects on the breadth of outreach. This result disagreed with the expected sign and hypotheses and disagreed with the analysis results of Abdulai and Tewari (2017b) and Ha (2019b). The estimated coefficient for the depth of outreach suggested that the depth of outreach increased the breadth of outreach by 11.43 points, which implied that the depth of outreach contributed to increase the breadth of outreach. There was no trade-off between the depth of outreach and breadth of outreach. Instead, it was established that the interactive relationship between the CFIs' depth and breadth of outreach in a positive trend over the years.

The variable BSR had a positive impact on NAB with coefficient 30.83 with the significance level of 1%, indicating that BSR has a very strong impact on the breadth of outreach. This result agreed with the expected sign and hypotheses and agreed with the analysis results of Kipesha and Zhang (2013), Abdulai and Tewari (2017a). The estimated coefficient for the productivity suggested that the productivity increased the breadth of outreach by 30.83 units per year This implied that the increasing the productivity resulted into more the number of active borrowers. The fact that CFIs had higher the productivity that obtained better the breadth and there was the interactive relationship between the CFIs' productivity and breadth of outreach in a positive trend over the years.

The variable DGR had a negative impact on NAB with coefficient -1061.2 with the significance level of 10%, indicating that DGR has an impact on the breadth of outreach. This result disagreed with the expected sign and hypotheses and disagreed with the analysis results of CGAP (2005), Hartaska and Nadolnyak (2007), Bayai and Ikhide (2016), Churchill and Marr (2017). This suggested that increasing the deposit decreased the breadth of outreach of CFIs by 1061.2 points. This implied that increasing the depodit to serve clients demanding credits of CFIs had been difficult in the deposit mobilization operations. The fact that many CFIs were reduced their deposit growth ratio over the years.

The variable NPL had a positive impact on NAB with coefficient 148.7 with the significance level of 10%, indicating that NPL has an impact on the breadth of outreach. This result disagreed with the expected sign and hypotheses and disagreed with the analysis results of Okumu (2007), Osotimehin *et al.* (2011). This implied that increasing the non-performing loans ratio promoted the CFIs' breadth of outreach by 148.7 units per year. This indicates that CFIs must take risks achieving the breadth of outreach goal. Most of CFIs had the low non-performing loan ratio and many CFIs decreased the breadth of outreach due to their non-performing loan ratio decrease in recent years.

The results of this research are accurate according to the characteristics of CFIs and the development process of CFIs in Vietnam from 2013 to 2018. On the other hand, this study did not find statistically significant impacts between the FSS, LDR and the depth of outreach, between the AGE, DLR and the breadth of outreach. This was consistent with the fact that CFIs step by step improve their financial capacity by increasing their charter capital, attracting new members over the years.

6. Conclusions

This paper studied the interactive relationships between CFIs' productivity and social performance in Vietnam. Multiple regression analysis was used in this study to find out the potential factors that affect CFIs' productivity and social performance. Based on prior research, three prominent models were identified and these research results were accurate according to the characteristics of CFIs and the development history of CIFs in Vietnam from 2013 to 2018.

The results of the study showed that four factors that had positive relationships with productivity were the debt-to equity ratio, the equity growth rate, the breadth of outreach and the return on assets. The four factors that had negative relationships with productivity were the depth of outreach, the loan-to-deposit ratio, the non-performing loan ratio and the return on equity. The three factors that had positive relationships with the depth of outreach were the age of CFIs, the debt-to-equity ratio and the breadth of outreach. The productivity had a positive relationship with the depth of outreach. The three factors that had positive relationships with breadth of outreach were the depth of outreach, the productivity and the non-performing loan ratio. The deposit growth rate had a negative relationship with the breadth of outreach. The study found relationships between CFIs' productivity and social performance. The study found the interactions relationships between productivity and social performance.

Today, the CFIs' operation accounts for a large share of economic activity in many countries. This has been one of the booms sectors in development cooperation over the past years. The CFIs are becoming a significant investment prospect in many regions of the country. This study will help researchers and managers develop their expertise on key factors of productivity and social performance and the relationship between the two. Based on the research results, the article recommends the following to increase productivity and social performance.

Firstly, this study found the bidirectional causal interactions between productivity and breadth of outreach in a positive trend, so that the immediate policy recommendation is for CFIs to focus more on productivity and breadth of outreach.

Secondly, CFIs should be massive mobilization of clients to boost the number of active borrowers. Beside to ensure productivity and social performance, CFIs should focus on deposit mobilization, creating the capital source to meet the needs of many borrowers.

Thirdly, CFIs need to strict control over credit growth quality and efficiency are necessary to ensure productivity and social performance of CFIs.

Fourthly, CCIs should continue to consolidate and increase their financial capacity by increasing their charter capital, attracting new members.

Fifthly, CFIs should create solutions that they restrict the trade-off between productivity and depth of outreach, the trade-off between productivity and return on equity.

Sixthly, CFIs need to balance sufficient resources to ensure their operational objectives, and create solutions that incorporate the productivity and social performance goals.

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