# THE EFFICIENCY OF MICROFINANCE IN VIETNAM: EVIDENCE FROM NGO SCHEMES IN THE NORTH AND THE CENTRAL REGIONS

Hong Son Nghiem

Tim Coelli

Prasada Rao

Centre for Efficiency and Productivity Analysis

School of Economics, University of Queensland

#### Abstract

A large amount of donor money and government money is spent on microfinance programs in developing countries around the world. However, there is very little quantitative research available on the relative efficiency of these programs. This research investigates the efficiency of the microfinance industry in Vietnam through a survey of 46 schemes in the north and the central regions. Data Envelopment Analysis (DEA) methods are used to assess the technical efficiency and scale efficiency of the microfinance schemes. Given the lack of previous studies in this industry, we review the various approaches to variable selection used in the financial institutions literature and amend the so-called "production" approach to accommodate the poverty reduction focus of microfinance. The empirical results reveal that the average technical efficiency scores of schemes surveyed is 80%. A second stage regression analysis is used to assess the impact of a variety of environmental variables upon the efficiency of the schemes. The age and the location of the scheme are found to have a significant influence upon efficiency.

## **ABBREVIATIONS**

ADB	Asian Development Bank
AE	Allocative efficiency
CRS	Constant returns to scale
DEA	Data Envelopment Analysis
DRS	Decreasing returns to scale
EE	Economic efficiency
GSO	General Statistics Office
IRS	Increasing returns to scale
MFI	Microfinance Institution
MO	Mass Organisations
NGO	Non-governmental Organisation
OECD	Organisation for Economics Cooperation and Development
PCF	People's Credit Fund
ROSCA	Rotating Credit and Saving Association
RSHB	Rural Shareholding Bank
RSHB SBV	Rural Shareholding Bank State Bank of Vietnam
RSHB SBV SE	Rural Shareholding Bank State Bank of Vietnam Scale efficiency
RSHB SBV SE SFA	Rural Shareholding Bank State Bank of Vietnam Scale efficiency Stochastic Frontier Analysis
RSHB SBV SE SFA TE	Rural Shareholding Bank State Bank of Vietnam Scale efficiency Stochastic Frontier Analysis Technical efficiency
RSHB SBV SE SFA TE UNDP	Rural Shareholding Bank State Bank of Vietnam Scale efficiency Stochastic Frontier Analysis Technical efficiency United Nations Development Program
RSHB SBV SE SFA TE UNDP VBA	Rural Shareholding Bank State Bank of Vietnam Scale efficiency Stochastic Frontier Analysis Technical efficiency United Nations Development Program Vietnam Bank for Agriculture and Rural Development
RSHB SBV SE SFA TE UNDP VBA VBP	Rural Shareholding BankState Bank of VietnamScale efficiencyStochastic Frontier AnalysisTechnical efficiencyUnited Nations Development ProgramVietnam Bank for Agriculture and Rural DevelopmentVietnam Bank for the Poor
RSHB SBV SE SFA TE UNDP VBA VBP VBSP	Rural Shareholding BankState Bank of VietnamScale efficiencyStochastic Frontier AnalysisTechnical efficiencyUnited Nations Development ProgramVietnam Bank for Agriculture and Rural DevelopmentVietnam Bank for the PoorVietnam Bank for Social Policy
RSHB SBV SE SFA TE UNDP VBA VBP VBSP VLSS	Rural Shareholding BankState Bank of VietnamScale efficiencyStochastic Frontier AnalysisTechnical efficiencyUnited Nations Development ProgramVietnam Bank for Agriculture and Rural DevelopmentVietnam Bank for the PoorVietnam Bank for Social PolicyVietnam Living Standard Survey
RSHB SBV SE SFA TE UNDP VBA VBP VBSP VLSS VND	Rural Shareholding BankState Bank of VietnamScale efficiencyStochastic Frontier AnalysisTechnical efficiencyUnited Nations Development ProgramVietnam Bank for Agriculture and Rural DevelopmentVietnam Bank for the PoorVietnam Bank for Social PolicyVietnam Living Standard SurveyVietnamese Dong, currency unit of Vietnam

## **1** INTRODUCTION

During the past ten years, microfinance has been an important component in poverty reduction projects of the Government and development agencies in Vietnam. A number of evaluation reports of microfinance projects and previous research such as UNDP (1996a), Seibel and Kunkel (1997), Hung (1998), Llanto (2000) and McCarty (2001) have provided some evidence that microfinance is an effective tool to help the poor get out of poverty. In addition, the statistical figures from the Vietnam Living Standard Survey (VLSS) showed that the poverty rate in Vietnam dropped from 58 percent in 1993 to 37 percent in 1998 (GSO, 1994; 2000). During this period, the percentage of the rural population having access to credit also increased significantly from 23 percent in 1993 to 40 percent in 1998. Therefore, it is widely believed that microfinance has contributed positively to the poverty reduction process in Vietnam.

However, there is no previous research on the efficiency of microfinance schemes in Vietnam. Thus, the main objective of this study is to examine the efficiency of microfinance schemes in Vietnam. In addition, the research aims to provide some recommendations for managerial and policy making purposes.

This paper includes six sections. An introduction to the research is presented in Section 1, followed by a description of the microfinance system in Vietnam (Section 2). Section 3 reviews some previous efficiency studies. A discussion of the conceptual frame work is presented in Section 4. The methodology, data available and preliminary results of efficiency analysis are presented in Section 5. Concluding remarks are presented in Section 6.

#### 2 MICROFINANCE

According to common definition such as ADB (2000), microfinance is the provision of a broad range of financial services such as credit, saving, insurance and money transfer for low-income individuals or households. The term *low income* used in the definition of

microfinance is a relative concept; it varies from countries to countries or even among different areas within a country.

#### 2.1 Microfinance in Vietnam

In Vietnam, microfinance services are delivered by three types of providers, informal, semi-formal and formal service providers. Each type of service provider is described briefly below.

#### 2.1.1 Informal Service Providers

The informal microfinance providers include moneylenders, relatives and ROSCAs. Until the mid 1990s, the informal sector has been the most important source of credit for Vietnamese households, especially in rural areas. According to the results of the VLSS 1992 survey, 73 percent of rural credit was provided by the informal sector. Although its role in rural credit has been declining owing to the expansion of the formal and semi-formal sectors, informal credit providers still play an important role in the development of rural Vietnam with more than 30 percent of the credit market recorded in VLSS 1998. The main advantage of informal credit suppliers is the simple loan procedure. Loans from the informal sector can also be applied for consumption purposes. Furthermore, the cost of informal credit has been affordable to borrowers although it usually has interest rates up to three times higher than the interest rates of formal banks. Whilst loans from ROSCAs, relatives and friends were interest-free, most private money-lenders charged reasonable rates given the high transaction cost and high risk of providing credit to the poor (UNDP, 1996b).

## 2.1.2 Semi-formal Institutions

The semi-formal players in microfinance include non-bank institutions, which are authorised to provide finance services but are not allowed to mobilise savings from nonmembers. The main service providers in this sector include Mass Organisations (MOs)<sup>1</sup>, Non-Governmental Organisations (NGOs), and the credit component of national programs for poverty alleviation. Apart from capital resources, the NGOs also often brought along international experience on financing to the poor. However, microfinance is not the only objective for many NGOs. Often, microfinance was integrated with other activities or it was just an entry point to implement other activities (UNDP, 1996b). In addition, NGO microfinance programs focus on saving mobilisation. Also, the credit component of NGO programs were often operated in remote areas and focused on providing small short-term loans with regular instalment repayments. Because of their small scale, the contribution of NGOs to the rural credit market has been modest at 4.94 percent of the total loan portfolio (GSO, 2000).

Meanwhile, MOs mainly play the role of executers in programs of NGOs and the government. Apart from the integrated NGOs' programs mentioned above, government programs, in which MOs were involved, were directed towards poverty alleviation. In these programs, MOs assisted the government in disbursing loans to target groups. In addition, MOs acted as brokers for the Vietnam Bank for the Poor (VBP)<sup>2</sup> owing to their extensive network.

#### 2.1.3 Formal Institutions

The involvement of formal players in microfinance began with the establishment of the VBP in 1995. With the advantage of cheap credit subsided by the government, the VBP has rapidly increased its outreach to poor households. For example, VBP provided credit to 0.6 million low-income households in 1998 (Llanto, 2000). Apart from cheap credit, the increasing outreach of the VBP was partly due to its strategy to use the existing

<sup>&</sup>lt;sup>1</sup> MOs include five social organisations (Women's Union, Youth Union, Farmers' Union, Veteran Association, and Elderly Association). MO has a complete network from the central level to village level. <sup>2</sup> Since October 2002, VBP has been reorganised into the Vietnam Bank for Social Policy (VBSP) by the

Decision 131/TTg with the objective of providing preferential credit for the poor and beneficiaries of social policies. However, studied reviewed here still referred to VBP since these studies were conducted during the period where VBP was still in operation.

network of the Vietnam Bank for Agriculture (VBA) branches. Despite the massive outreach, the VBP was criticised by NGOs community and some donors such as Llanto (2000) for ignoring the financial sustainability and distorting the market with its extreme low interest rate. However, Izumida (2003) pointed out an interesting point that NGOs and other microfinance institutions also receive interest-free or subsidised interest funds from donors but are facing no criticism.

People's Credit Funds (PCFs) were reorganised from credit cooperatives established during the central planning period from 1954 to 1986<sup>3</sup>. According to Hung (1998) PCFs were established on the model of the *Caisse Populaire* system in Quebec, Canada, with technical support from the Development International Desjardins (DID). The establishment of PCFs were conducted in a project funded by the Canadian International Development Agency (CIDA) and supervised by the State Bank of Vietnam. In 1998, it was estimated that there were 900 PCFs with an aggregated capital of VND<sup>4</sup> 1,158 billion, providing services to 0.6 million households.

## **3 METHODOLOGY**

According the comprehensive review of financial sector efficiency analyses by Berger and Humphey (1997), efficiency studies can be broadly classified into two approaches, namely parametric and non-parametric. The former takes into account random disturbances in the measurement of efficiency whilst the latter assumes no random error. However, the parametric approach needs to assign a functional form for the estimated frontier whilst the non-parametric approach does not need any assumption on functional form. Different assumptions about the probability distribution of efficiencies further distinguished the parametric approach into various techniques. Likewise, the nonparametric approach may be classified into several techniques with differing

<sup>&</sup>lt;sup>3</sup> More precisely, the central planning period in Vietnam lasted from 1954-1986 in the north and 1976-1986 in the south

<sup>&</sup>lt;sup>4</sup> VND stands for Vietnamese Dong, the currency unit of Vietnam. At present, the exchange rate is about 1\$US=VND15,500.

assumptions on input and output combinations, and the convexity of the frontier. Below is a brief review of the main techniques that have been used in efficiency of financial institutions and other sectors.

## 3.1 Nonparametric

The most commonly used non-parametric technique is Data Envelopment Analysis (DEA). The DEA terminology was first developed by Charnes *et al.* (1978) although the concept originated from the work of Farrell (1957). DEA involves the calculation of efficiency by comparing aggregate input/output ratios of each firm with a piecewise frontier surface (representing fully efficient operation), constructed from the data set by linear programming. Efficiency can be measured by an input-oriented process, which focuses on reducing inputs to produce the same level of outputs, and an output-oriented process, which aims to maximize outputs from a given set of inputs<sup>5</sup>. The DEA method does not require specification of a functional form for the production relationship underlying it nor does it require one to make assumptions regarding the economic behaviour of the firms. Thus, the DEA technique is ideal for analysing the public service sector, where economic behaviour such as profit maximization may not apply. In addition, DEA technique provides information about peers, which is the efficient schemes that have similar input-output structure as some inefficient schemes. Therefore, the peer information is very useful for managerial purpose.

The main drawback of non-parametric techniques such as DEA is the assumption of no random noise. Thus, results may be biased if there is some noise in the data. To remedy this issue, parametric techniques include a random error term in the analysis. In particular, parametric techniques such as stochastic frontier analysis specify an error term with two components: a noise component and an inefficiency component. Information on

<sup>&</sup>lt;sup>5</sup> For more detail descriptions on DEA, see Coelli et al. (1998)

the parametric techniques that have been commonly used in financial sector studies is presented in the next section.

#### 3.2 Parametric

The most common parametric technique have been used for efficiency assessment of financial institutions is Stochastic Frontier Analysis (SFA) (Berger and Humphrey, 1997). SFA specifies a functional form (e.g., cost and production functions) for the technology, and an assumption about the distributional form of the inefficiency error component. The inefficiency error component is often assumed to have a half-normal distribution. However, the main criticism of half normal distribution is that the most efficient schemes are the mode. Other distributional forms such as a truncated normal distribution (Berger and DeYoung, 1997) or a gamma distribution (Yuengert, 1993) have been tried with little but significant improvement compared to normal distribution.

The Distribution-Free Analysis (DFA) technique makes no strong assumptions regarding the distributional forms of the error components. Instead, DFA assumes that the noise error term has a zero mean whilst the inefficiency component is stable over time. With access to panel data (which is required in DFA), the efficiency of each firm is estimated as the difference between its average residual and the average residual of the firm on the frontier. The disadvantage of this approach is that when efficiency is not stable over time then the difference between average residuals of any firm on the frontier may not represent the efficiency of that firm at any one point in time.

The Thick Frontier Analysis (TFA) approach also specifies a functional form (e.g. for cost, profit or production functions) with no distributional assumptions required for the error components. Instead, TFA assumes that the randomness is represented by deviation within the lowest and highest quartiles of the ordinary least squares (OLS) residuals, whilst the inefficiency component is represented by the difference between these quartiles. Under TFA, best-practice firms do not necessarily lie on the frontier but close to the frontier. TFA reduces the effects of extreme data but it is limited in that it only

provides estimates of overall efficiency of the sector instead of point estimates of efficiency for individual firms.

Apart from the above three methods, the corrected ordinary least squares (COLS) and parametric linear programming (PLP) methods have been often used in other sectors (Coelli and Perelman, 1999). The COLS technique differs from ordinary least squares technique (OLS) in that it adds to the intercept term the largest negative OLS residual (output-oriented case) so that the frontier is defined by the best performing firms. Meanwhile, the PLP technique involves specifying a parametric functional form for the production technology then using linear programming to select parameter values so that the frontier provides the "closest" fit over the sample data.

Among the above mentioned technique, TFA and DFA are not suitable for this research because they requires panel data. With only 44 observations in this study, the SFA technique, using the common translog functional form is also difficult to try because of the degree of freedom issue. Also, among the techniques available, only DEA can provide information about peers. Therefore, this study chooses DEA as the main technique for analysis. For consistency comparison, SFA and PLP techniques are also used. To avoid the shortage of degree of freedom in SFA with small number of observations in this study, a modified input distance function translog SFA, which drop the interaction terms among outputs, is used.

## **4** APPROACHES IN MICROFINANCE

The microfinance movement can be roughly divided into two different approaches: financial sustainability oriented and poverty reduction oriented, although both share the same goal of improving the welfare of the poor (Woller *et al.*, 1999; Schreiner, 2002). The financial-sustainability approach focuses on commercialisation of microfinance and increasing the breadth of service (i.e., number of clients). Meanwhile, the poverty reduction approach focuses more on the depth of service (i.e., reaching the very poor and

disadvantaged groups) despite the need for long-term dependency on donors. The debate between the two approaches has not yet been resolved, although the financial sustainability approach has become more popular in microfinance practice in recent years.

The goal of microfinance is to improve the welfare of the poor. Therefore, poverty reduction is a good proxy to measure the fulfilment of that goal. However, because providing financial services for the poor often requires high transaction costs, microfinance practitioners need resources from donors to cover the shortfall between revenue received from clients and the cost of service delivery. Meanwhile, subsidy resources are scarce and the interest of donors in microfinance in the future is uncertain. Therefore, financial sustainability is the key factor that allows the poor, especially the poor of the future, to receive the financial services that they need. Thus, a successful microfinance operation must meet both poverty reduction and financial sustainability requirements. This study, therefore, takes the middle view that both financial sustainability and poverty reduction are important.

This study also hypothesises that the relative priority on financial sustainability and poverty reduction varies according to types and age of MFIs. In particular, special government banks and NGO programs would give more priority to poverty reduction than financial sustainability. In contrast, registered MFIs such as PCFs and some commercial banks operated in rural areas such as the VBA would give more priority to financial sustainable than poverty reduction.

This study postulates that the development of a microfinance institution experiences certain stages such as infancy and maturity. Priorities placed upon the two main objectives of microfinance institutions differ in each stage. For example, in the infant stage registered MFIs need a subsidy from donors to cover establishment and operational costs. However, in the mature stage, it is required that a registered MFI be able to produce some profit (see Figure 1). Therefore, it is expected that the financial efficiency of these MFIs increases as they become more mature. The development process of NGO-MFIs (i.e., an NGO with a microfinance component) starts with a lower level of outreach and sustainability. In addition, since more priority is given to reach the very

poor, the financial aspect of NGO-MFIs may not be very efficient. However, at the end of the infant period, some NGO-MFIs may wish to transform themselves to registered MFIs, and hence, focus more on financial sustainability. Meanwhile, commercial banks that choose to lend to households require financial sustainability even at the 'infant' stage.



Figure 1: The development process of different financial institutions

#### 5 EMPIRICAL ANALYSIS

## 5.1 The Survey and Data

The data in this study include financial and operational information of 44 microfinance schemes operated in the north and the central of Vietnam. The schemes were selected in consultation with the NGOs that provided funds for these schemes. Basically, schemes selected themselves into the survey by answering a questionnaire.

Some descriptive statistics from the institution survey data are presented in Table 1. It can be observed that the operational scale varies greatly among the schemes surveyed. The loan interest and saving interest distribute quite evenly with little variation, showing that the interest rate policy of microfinance schemes surveyed were quite similar. On average, the loan interest rate is 1.3 percent per month, which is higher than the rate charged by VBP. However, compared with the interest rate charged by local

moneylenders, varied from 2 percent per month to 5 percent per month, the interest rates of microfinance schemes are reasonable. The average saving interest rates of microfinance schemes surveyed is 0.6 percent per month, which is much higher than the saving interest of commercial banks.

There were some outliers in the institutional survey data that could not be used for efficiency analysis since this may lead to biased results. For example, the salary of local staff in two schemes was as high as salary of head quarters staff in other schemes.

Variables	Unit	Min	Max	Mean	Std.
Years in operations	Years	1.0	12.0	6.5	3.0
Members	Persons	68.0	9,566.0	1,993.3	2,610.9
Borrowers	Persons	48.0	9,566.0	1,836.4	2,504.6
Savers	Persons	18.0	9,400.0	1,917.3	2,634.0
Loan interest	%/month	0.8	1.7	1.3	0.2
Outstanding loans	VND mill	31000	7533300	1627474	2035718
Saving interest	%/month	0.4	0.9	0.6	0.1
Saving volumes	VND mill	2225.0	2031000.0	304054.3	515672.7
Income	VND mill	5580.0	1116000.0	255638.0	320703.2
Interest cost	VND mill	172.7	182,790.0	23,624.7	41,087.9
Other financial cost	VND mill	382.0	35,000.0	10,306.8	6,524.9
Wages	VND mill	40800.0	379200.0	145385.5	87635.9
Other operation cost	VND mill	130.0	22,846.0	10,528.7	6,408.9
Headquarter staff	Persons	1	9	3	2
Local staff	Persons	2	107	16	22

Table 1.Descriptive Statistics of Key Variables of the Institution Survey

Missing data and zero value data are also problems in some institutions. For example, one institution provided no data on number of staff but the data on salary and other information were available. In this case, the problem was solved by calculating an implicit measure of the number of staff by dividing the wage cost for that institution by the average wage rate of the sample. Various other small data problems have been treated in a similar manner.

## 5.2 Empirical Results

#### 5.2.1 Input-output Choice

According to the review of Berger and Humphrey (1997), there are two common approaches used in efficiency analysis of financial institutions: the production approach and the intermediation approach. The choice of inputs and outputs varies with the approach applied in each study. The production approach considers financial institutions as a production unit, using standard inputs to make transactions and to process financial documents. Therefore, popular input choices under this approach are labour, capital and materials whilst the popular output choice is number of borrowers and number of savers. Meanwhile, the intermediation approach considers financial institutions as intermediating between savers and borrowers. Thus, their inputs choice usually includes loanable funds, financial costs, labour, capital and materials, whilst their outputs include loan volume and saving volume.

In this paper we follow the production approach because crucial financial inputs such as funds received from donors and bad debt were not recorded properly in some schemes. Also, the consideration of deposit as an input in the intermediation approach is still an on-going debate. Thus, the input choice of this paper includes labour cost and non-labour costs. We choose labour cost instead of number of labour as an input because it can integrate the quality of labour into account.

Three outputs selected in this research include number of savers, number of borrowers and number of groups. While the number of savers and number of borrowers can represent both objectives, the number of groups stands for the social objective of microfinance. In particular, the number of groups is a proxy for geographical conditions of the operation site. In remote areas, where the population is often more sparse and the terrains are tough, it would be difficult for microfinance members who live further distance from other households in a group to travel for regular group meetings. Therefore, in remote areas, more groups are needed than that in areas of higher population density.

## 5.2.2 Results and discussions

In this section some results estimated by DEA, PLP and SFA techniques (input-oriented<sup>6</sup>) are presented. The results in Table 2 show that the average technical efficiency score estimated by DEA and PLP are very close, at 0.76 and 0.78, respectively. Meanwhile, the average efficiency score estimated by the SFA technique is a little lower at 0.69. This means that compared to schemes on the frontier, on average microfinance schemes surveyed can save from 22 per cent to 31 per cent of inputs while maintaining the same level of output produced. All three techniques estimate that majority of schemes were technically efficient. However, because of taking into account a random error term, the SFA technique estimates that most of schemes have the technical efficiency score in the 80%-90% range. Meanwhile, the DEA and PLP techniques suggest most of schemes have the technical efficiency score in the 90%-100% range (Figure 2).

Methods	Mean	Std.	Min	Max	
DEA	0.76	0.23	0.30	1.00	
PLP	0.78	0.23	0.24	1.00	
SFA	0.69	0.20	0.25	0.92	

Table 2.Some Results



Figure 2: Histogram of Technical Efficiency Score under Different Estimates

<sup>&</sup>lt;sup>6</sup> In the context of Vietnamese microfinance, most schemes have a fixed amount of funds available for loans in the short run (i.e., in the short run microfinance schemes depend on the matching fund from donors since the saving amount mobilised has not been significant), and hence, their output levels are fairly fixed, relative to their use of input resources, over which they have more discretion. Therefore, the input-oriented approach is more practical to use in this study.

The second stage Tobit<sup>7</sup> regression on the determinants of efficiency show that the sign of the number of years in operation variable does not tend to support the notion that there is a synergy between efficiency and maturity (see Table 3). In general, the magnitude of coefficient for the period of more than five years is less than those for the period 2-5 years. In addition, none of the coefficient in the period of more than five years is significant. Also the estimated parameters of maturity level are negative except for the period of 2-5 years estimated with DEA and PLP technique. One possible reason for this situation is that some households escaped from poverty as a result of participating in microfinance for more than five years, and hence, they became ineligible to participate (or they decided not to participate further<sup>8</sup>) in microfinance programs. Thus, the outputs (measured mainly by the number of savers and numbers of borrowers) in these schemes reduced, leading to the reduction of the technical efficiency score.

Variables	Exp. Sign -	DEA		PLP		SFA	
v al labies		Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Age 2-5 years	+	0.179	1.380	**0.324	2.070	*-0.172	-1.830
Age >5 years	+	-0.055	-0.570	0.108	0.920	-0.023	-0.330
Poorest area (Y/N)	-	-0.051	-0.670	-0.045	-0.490	0.053	0.950
Electricity (Y/N)	+	0.005	0.050	-0.080	-0.670	-0.046	-0.640
Car accessibility (Y/N)	+	-0.110	-0.880	-0.068	-0.450	**0.242	2.620
Town distance (km)	-	**0.024	2.860	**0.033	3.130	-0.003	-0.510
Northern region (Y/N)	+/-	0.113	1.390	-0.097	-0.980	-0.067	-1.130
Constant	+/-	**0.693	3.540	**0.720	2.990	**0.593	4.090

Table 3.Determinants of Efficiency

Notes:

- Age 2-5 years is a dummy variable, equals one if a scheme has been in operation for 2-5 years equals zero otherwise.
- Age >5 years is a dummy variable, equals one if a scheme has been operated for five years or more, equals zero otherwise.
- Poorest area is a dummy variable, equals one if the project site was located in one of the poorest communes (ranked using national criteria) of the country, equals zero otherwise.

<sup>&</sup>lt;sup>7</sup> The Tobit regression is applied when the dependent variable is censored. For more details about Tobit regression, see, for example, Green (2003), Chapter 22. In the case of this study, technical efficiency scores lie between at zero and one.

<sup>&</sup>lt;sup>8</sup> The design of microfinance programs (small loans with regular instalment repayments) make it suits only the poor.

- Electricity is a dummy variable, equals one if a project site has been able to access to electricity, equals zero otherwise.
- Car accessibility is a dummy variable, equals 1 if cars and trucks can access to a project site, equals zero otherwise.
- Town distance is the distance from the project site to the nearest township.
- Northern region is a dummy variable, equal 1 if the scheme operates in the Northern region, zero otherwise
- Asterisks represent the level of significant: \* is 90% and \*\* is 95%

The results also show that the signs of all infrastructure variables were against expectation. For example, the sign of electricity variable is negative under the PLP estimate, meaning that schemes operate in area without electricity is likely to be more efficient. However, the magnitudes of coefficients under both estimations are negligible. Especially, the sign of the distance to township variable is significant negatively related to efficiency score. One possible explanation is that in remote areas, microfinance schemes may face less fierce competition from more traditional credit suppliers.

In contrast, the poverty variable follows the expected negative sign, meaning that schemes operated in poor regions (ranked with national criteria) are less efficient than those operated in non-poor regions. However, the magnitude of this variable is very small and it is not statistically significant.

Based on the information from the schemes survey, the locality (i.e., north or central regions) have no significant influence on the technical efficiency scores. In addition, the sign of this variable varies among the estimation techniques.

## 6 CONCLUSIONS

This paper has analysed the efficiency of microfinance schemes in the north and the central regions of Vietnam using DEA technique. The study follows the production approach to measure the efficiency of microfinance schemes. The average technical efficiency scores of schemes surveyed is 76%. For the consistency comparison, the study also uses the SFA and PLP techniques. The average technical efficiency scores estimated by SFA and PLP are 69% and 78%, respectively. The rank correlation coefficients also

confirm that three estimation techniques consistently rank the microfinance schemes. Among environmental factors, maturity of schemes and distance to township are significantly influence the efficiency of schemes. However, it is against the expectation that schemes become efficient as they become more mature. In addition, schemes operate in remove area seem to be more efficient than other schemes.

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