Sustainability of Microfinance Institutions in Thailand

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ABSTRACT

Microfinance programs play a vital role in poverty alleviation in developing countries; however, most microfinance institutions (MFIs) face the challenge of maintaining financial sustainability. While several studies have investigated factors affecting MFI financial sustainability, only a few focus on MFIs in Thailand. This paper uses the random effect model to study the determinants of Thai MFIs' financial sustainability. Results show that sustainability is affected by the efficiency of Thai MFI staff members in managing borrowers and the MFIs' ability to use their short-term assets to generate cash or revenue. Moreover, Thai MFIs do not benefit from economies of scale and do not reach the very poor households. This study recommends that MFIs should ensure that their social and financial goals are adequately balanced. It proposes that MFIs use a mixed approach: follow profit maximization principles and embrace technology to minimize operational costs.

Keywords: financial sustainability, microfinance institutions, financial performance, panel data estimation

JEL codes: G19, G21, G29

INTRODUCTION

Microfinance programs may assist in reducing income inequality. They provide small loans to individuals who typically do not have access to formal financial institutions. Individuals or households can use these loans to invest in productive or income-generating activities. Although microfinance programs play an important role in improving borrowers' well-being, they cannot help borrowers if their own financial performance is poor.

Many studies examining microfinance institutions (MFIs) in different countries have expressed concerns about their sustainability. Schreiner (2000) asserts that for MFIs to have any effect on poverty alleviation, they must be sustainable. He suggests that although MFIs might currently help poor people, they may not be able to help them in the future if their current performance

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does not ensure financial sustainability. Mahapatra and Dutta (2016) note that sustainability is a primary criterion in evaluating the performance of MFIs. Sustainability indicates that an MFI is financially viable or that it can survive without support from the government and/or donors (Shaoyan and Duwal 2012). This means that an MFI should generate sufficient profits to cover its expenses while eliminating all subsidies. Indeed, Kinde (2012) argues that financial sustainability is the main condition for sustainability. Achieving financial sustainability not only ensures an MFI's continued existence, but also guarantees that the poor will have sustained access to financial services. Dissanayake (2012) underscores that MFIs must be well designed to ensure profitability and, ultimately, alleviate poverty.

In Thailand, some MFIs are government funded, such as Village Funds (VFs), which do not focus on profit-making (Hermes and Lensink 2011). Many clients of these government-funded MFIs believe these programs will always be publicly supported; hence, they do not actively commit themselves to paying back their loans (Armendariz de Aghion and Morduch 2004). This lack of commitment has resulted in moral hazard behavior and damages to the MFIs' long-term sustainability.

Unlike in other countries, many of Thailand's MFIs were voluntarily established by groups of individuals (often living in the same community or village). These include Savings Groups for Production (SGPs) and Sajja Savings groups. These MFIs are funded and managed by community leaders. Some MFIs appear highly dependent on their leaders (Meagher 2013). Thus, if the leaders cannot maintain their position in the community or are no longer involved in the MFIs, the MFIs may not survive (TDRI 2004). Moreover, in the absence of institutionalization, leaders could take the MFIs in the wrong direction, engage in self-dealing, or be replaced with less capable ones.

Chikalipah (2017) echoes Kinde (2012) in that financial sustainability is a necessary condition for MFIs' institutional sustainability. The study shows that many MFIs in sub-Saharan Africa underperform and struggle to survive. For Bayai and Ikhide (2018), financial sustainability means that an MFI can exist indefinitely and serve the poor. Such MFI can contribute to the ongoing battle against poverty. Chikalipah (2017) argues that unsustainable MFIs cannot help the poor because they will not be around in the future. Achieving financial sustainability is thus crucial for MFIs. It assures not only the continued existence of an MFI, but also its provision of microfinance programs to the poor.

Studies have shown that most low income and poor people in Thailand can access financial services from community-based MFIs such as VFs, cooperatives, and SGPs. Microfinance Services Ltd. (2013) reports that over 50 percent of VF borrowers and 40 percent of SGPs borrowers have average incomes of less than THB 6,000[1] per month. Therefore, these Thai MFIs are important in encouraging the poor to avail themselves of the financial services, which can ultimately help them escape poverty. This study focuses on VFs and SGPs.

There are very few studies that evaluate MFI performance and sustainability in Thailand. Eur-U-Sa (2011) investigates the performance and outreach of the Bank of Agricultural and Agricultural Cooperatives (BAAC), exploring the relationship between outreach and financial performance using secondary data from BAAC's annual reports in 2004–9. The study finds that the breadth of outreach indicators is associated with financial performance and financial sustainability. Hemtanon and Gan's (2020) evaluation of the financial performance of VFs and SGPs in Thailand shows that these MFIs are profitable and financially sustainable. These previous studies notwithstanding, there is limited research on factors affecting the sustainability of Thai MFIs.

Since MFIs must be profitable to ensure healthy operations and attain their long-term goal of alleviating poverty, this paper investigates the determinants of Thai MFIs' sustainability.

[1] About USD 187.56 at a 2021 average exchange rate of USD 1 = THB 31.99

The rest of the paper is organized as follows: Section 2 reviews the relevant literature. Section 3 describes the methodology and data. Section 4 summarizes and discusses the results. Section 5 presents the study's conclusions.

LITERATURE REVIEW

Sustainability of MFIs refers to their ability to operate continuously in the future. Over the past two decades, many MFIs have performed poorly or have collapsed (Chikalipah 2017). MFIs that are not financially sustainable will not be able to help the poor because soon they will no longer exist (Schreiner 2000). They must be financially sustainable to ensure continued loan-access assistance to the poor (Kinde 2012).

Financial sustainability is defined in several ways. According to Henock (2019), financial sustainability refers to the smooth operation of financial institutions, which must make a profit and have adequate liquidity to overcome any challenges associated with potential bankruptcy. For MFIs, it means long-term regular provision of financial services to clients while recovering all costs (Shaoyan and Duwal 2012). Dunford (2003) and Kinde (2012) define financial sustainability as an MFI's ability to achieve its objectives without donor support. Harelimana (2017) considers an MFI sustainable when it is financially self-sufficient—that is, it can operate without subsidies, adding that MFIs must be profitable so they can attract private capital. This is vital because subsidies or donor funds may dry up, hampering an MFI's operations in the future. Likewise, Ngo (2012) contends that MFIs need to be economically viable to be sustainable in the long run. These studies underscore the need for MFIs to generate sufficient profit to cover all their costs (transactional, operational, and financial), while eliminating all subsidies.

There are two levels of financial sustainability (Meyer 2002). The first level is operational self-sufficiency (OSS), which means that an MFI's operating income is sufficient to cover its operating costs, such as salaries and wages, supplies, loan losses, and other administrative costs, without relying on donor support. The second level is financial self-sufficiency (FSS), which means that an MFI can cover both its operating and financing costs and other forms of subsidies, valued at market prices, from its generated income (Daher and Le Saout 2015). Thus, to be financially sustainable, an MFI must maximize its profits to meet its expenses, without relying on subsidies (Mahmood and Rauf 2012; Tucker and Miles 2004). OSS and FSS are widely accepted methods to measure financial sustainability (Yenesew 2014), and the Microfinance Financial Reporting Standards recommends their use in measuring MFIs' sustainability (Harelimana 2017; Muriu 2011).

OSS, FSS, and return on assets (ROA) can capture the complexity of financial performance and thus are used to evaluate it (Nasrin et al. 2018; Shkodra 2019). ROA is used to analyze financial performance or profitability of financial institutions, while OSS and FSS have been widely used in microfinance research (Shkodra 2019).

Some studies have explored the determinants of MFI sustainability. Woldeyes (2012) employs yield on gross loan portfolio, portfolio at risk (PAR), liquidity ratio (current ratio), number of borrowers per staff member, cost per borrower, operating expense ratio, average disbursed loan size (depth of outreach), MFI size, debt-to-equity ratio, and MFI age to study MFI sustainability in Ethiopia. Using a panel regression model and six years of data (2005–10) from a mix-market database for 12 selected MFIs in Ethiopia, Woldeyes (2012) identifies four factors that significantly affect MFI operational sustainability. These are average loan balance per borrower, MFI size, cost per borrower, and yield on gross loan portfolio. On the other hand, MFI financial sustainability is significantly affected by cost per borrower, number of active borrowers, and yield on gross loan portfolio. The study concludes that MFIs in Ethiopia are sustainable.

Using multiple regression and independent variables from Woldeyes (2012) in their study of MFIs in Bangladesh, Rahman and Mazlan (2014) report that MFI size, MFI age, and operating expense ratio affect the FSS. They suggest that

MFIs should reduce both donor funds and their operation costs to generate financial revenue and increase profit.

Khan, Butt and, Khan (2017) find that MFI size, loan portfolio to total assets, PAR, breadth of outreach, management inefficiency, and operating cost ratio impact the FSS of MFIs in Pakistan, India, and Bangladesh. Moreover, the higher the portfolio at risk value, the lower the repayment rates and, thus, the MFI's financial sustainability. The study recommends that MFIs increase their borrowers' repayment rates to become financially sustainable. Also, MFIs should be more efficient in disbursing loans and collecting repayments and should reduce their transactions and administrative expenses.

Thapa (2006), examining MFI sustainability using experiences and lessons from Southeast Asia, finds that MFIs in the region perform well: they earn positive returns on their assets and equity. These MFIs earn more from their loan portfolios so they can cover much higher cost levels. To achieve financial sustainability, however, these MFIs need to reduce their operational costs and charge market interest rates. Similarly, Duong (2019) finds that capital adequacy ratio, deposit growth, and income have positive relationships with the OSS of the people's credit funds (PCFs) in Vietnam's Mekong Delta region, but credit growth and non-performing loan ratio have negative relationships.

Revindo and Gan (2016), who surveyed the three main government-funded MFIs in Malaysia, conclude that these subsidized programs may lead to higher levels of non-performing loans since the MFIs are not concerned about their borrowers' low repayment rates. The Malaysian government's support for these microcredit programs is expected to continue because these programs are seen as a form of social responsibility. It must be pointed out, however, that if the MFIs do not accumulate high enough levels of capital, then they are less likely to be sustainable and their effectiveness in reaching the poor will likely be curtailed.

In the case of Thailand, the investigation of Eur-U-Sa (2011) of the relationship between BAAC's outreach and its financial performance using data from the bank's annual reports for the period 2004–9 shows that the breadth of outreach indicators is associated with financial performance and financial sustainability. That is, there is a trade-off between depth of outreach and financial sustainability, implying that BAAC does not rightly reach the poor farmers. The author suggests that the bank should expand its depth of outreach by designing a wider variety of financial products, such as insurance products, more joint liability group lending, and cash flow-based lending. Meagher (2013) notes that many MFIs in Thailand expanded rapidly with little or no supervision, thus increasing their risk of failure. The author observes that Thai MFIs are less cost-effective and sustainable than other MFIs elsewhere in the world. Financial sustainability is a big concern for MFIs in Thailand.

The relationships between the factors affecting microfinance financial sustainability (e.g., yield on gross loan portfolio, MFI size, personnel productivity ratio, debt-to-equity ratio, cost per borrower, average loan balance per borrower, and operating expense ratio) have been explored in the literature. Yield on gross loan portfolio, which shows an MFI's efficiency in generating cash revenue from its outstanding portfolio, is positively related to the FSS (Woldeyes 2012). Cull, Demirguc-Kunt, and Morduch (2007), assessing patterns of profitability, loan repayments and cost reductions in 124 micro-banks in 49 countries, also find that yield on gross loan portfolio is positive and significantly associated with the FSS for individual lenders. However, the result does not hold for village banks and solidarity group lenders, for which negative and insignificant relationships were obtained. Similarly, Nyamsogoro (2010) reports a positive relationship between yield on gross loan portfolio and the FSS of MFIs in Tanzania. These results provide evidence that an MFI's ability to generate revenue positively affects its financial sustainability.

MFI size, which can be measured using the value of an MFI's assets, is hypothesized to positively influence the FSS. Indeed, Cull, Demirguc-Kunt, and Morduch (2007) and Woldeyes (2012) find that an MFI's size significantly and positively affects its FSS; moreover, an increase in size also causes a

positive change in the OSS. Cull, Demirguc-Kunt, and Morduch (2007) conclude that MFI size is significant and positively related to three financial performance indicators: FSS, OSS, and ROA. Likewise, Mersland and Strom (2009) find that size is associated with the FSS of MFIs, concluding that because larger MFIs have more capital, they can reach more people than smaller MFIs.

The personnel productivity ratio is hypothesized to positively influence the FSS of MFIs. This is measured by dividing the number of active borrowers by the number of loan officers (CGAP 2003). However, since loan officers have some duties that overlap with those of the other microfinance staff, productivity can be measured by dividing the number of active borrowers by the number of officers (Kinde 2012). A higher personnel productivity ratio means the MFI is more efficient is using its staff. Nyamsogoro (2010) shows a negative and strong, statistically significant relationship between number of borrowers per staff member and financial sustainability of MFIs in rural Tanzania. This indicates that the Tanzanian MFIs' staff were inefficient because they failed to manage the growing number of borrowers.

The debt-to-equity ratio, which reflects an MFI's capital structure, is hypothesized to negatively influence the FSS. A high ratio implies that an MFI is leveraged rather than financed through equity capital (Kinde 2012). Kinde (2012), investigating the factors affecting the FSS of Ethiopian MFIs, concludes that the more MFIs are debt-financed, the less sustainable they are. In the case of MFIs in Rwanda, Harelimana (2017) finds that when the debt-to-equity ratio increases by 1 percent, all other things being equal, the FSS of MFIs decreases by 7.074 percent. Nyamsogoro (2010) shows that capital structure, which represents the percentage of equity to total long-term capital, is positively correlated with MFI sustainability. This implies that the more MFIs are equity financed (as opposed to other sources of finance), the greater the improvement in their sustainability. This result may be due to the fact that owners, especially for the member-based MFIs, benefit not from debt, but from the loans given to them. This makes equity a cheaper source of finance, which can be used to improve an MFI's financial sustainability.

Cost per borrower measures the efficiency of MFI management and operation. Chikalipah (2017), evaluating the financial sustainability of MFIs in sub-Saharan Africa, finds a negative relationship between cost per borrower and financial sustainability. That is, an increase in cost per borrower reduces an MFI's financial sustainability. Bayai and Ikhide (2018) also report a negative and statistically significant correlation between cost per borrower and MFI sustainability in southern Africa. These results imply that cost reductions can improve financial sustainability.

The average loan balance per borrower is measured using depth of outreach (Ledgerwood 1998). Bhanot and Bapat (2015) posit that average loan size is a proxy for a client's poverty level. Smaller loans reflect poorer clients (Cull, Demirguc-Kunt, and Morduch 2007; Mersland and Strom 2009). Similarly, Adongo and Stork (2005) find that profitability is related to bigger loans among Namibian MFIs. Nyamsogoro (2010) also finds a positive and statistically significant correlation between borrowers' average loan balance and MFI sustainability in Tanzania. These results imply that larger loans are related to greater cost efficiency and, therefore, greater profitability.

The operating expense ratio is hypothesized to negatively affect MFI sustainability. Nyamsogoro (2010) finds that the operating expense ratio is negatively related to the sustainability of Tanzanian MFIs. This means that by reducing operating costs and being more efficient, MFIs will more likely be financial sustainable. Dissanayake (2012) likewise shows a negative and statistically significant correlation between operating expense ratio and sustainability among MFIs in Sri Lanka. Thus, as a statistically significant predictor in evaluating the OSS of Sri Lankan MFIs, this variable provides an overall measure of MFI efficiency. Efficiency in management practices enables MFIs to reach more clients and attain higher profits.

Table 1 presents the explanatory variables used in the current study. These variables have been found to affect MFI sustainability.

Table 1. Key factors affecting microfinance institutions sustainability

Variable	Hypothesis	Authors
Yield on gross loan portfolio	+	Woldeyes (2012); Cull, Demirguc-Kunt, and Morduch (2007); Nyamsogoro (2010)
Total assets	+	Cull, Demirguc-Kunt, and Morduch (2007); Woldeyes (2012); Mersland and Strom (2009)
Personnel productivity ratio	+	Kinde (2012); Nyamsogoro (2010)
Debt-to-equity ratio	–	Kinde (2012); Harelimana (2017); Nyamsogoro (2010)
Operating expense ratio	–	Chikalipah (2017); Bayai and Ikhide (2018); Nyamsogoro (2010); Dissanayake (2012)
Average loan balance per borrower	+	Adongo and Stork (2005); Nyamsogoro (2010)

Note: +/- indicates a positive or negative effect on the dependent variable

METHODOLOGY AND DATA

Data from the annual reports of both VFs and SGPs, from 2014 to 2016, were used to evaluate MFI sustainability. These annual reports were collected by the Government Savings Bank (GSB) via a competition of MFIs in Thailand in 2017. Ninety VFs and 70 SGPs joined the competition. We were unable to use the most recent data because the government and GSB do not currently have a database that contains the most recent data.

This study uses a panel regression model to identify the determinants of MFI financial self-sufficiency and ROA. We chose this model because of its advantages over cross-section and time-series data methods (Kinde 2012). Panel data involve the pooling of observations on a cross-section of units over several time periods. This method can increase the degrees of freedom and, therefore, the power of the test (Kinde 2012).

Before estimating the regression model, we test for normality. From the visual plot, it is evident that the distribution of some variables is not normal; some variables (FSS ratio, ROA, total assets, personnel productivity ratio, average loan balance per borrower, and ratio of operating expenses) are skewed. Non-normally distributed variables can distort relationships and significance tests (Osborne and Waters 2002). To resolve this non-normal distribution problem, we transform the variables into their natural log, as suggested by Cameron and Trivedi (2009); Verbeek (2008); and Wooldridge (2009). The panel regression model for the FSS and ROA of MFIs are provided in equations (1) and (2):

$$LN\,(FSS_{it}) = \alpha_i + \beta_1 LN\,(YIE_{it}) + \beta_2 LN\,(SIZ_{it}) + \beta_3 LN\,(PP_{it}) + \beta_4 DE_{it} + \beta_5 LN\,(ALBPB_{it}) + \beta_6 LN\,(OER_{it}) + \in_{it} \quad (1)$$

$$LN\,(ROA_{it}) = \alpha_i + \beta_1 LN\,(YIE_{it}) + \beta_2 LN\,(SIZ_{it}) + \beta_3 LN\,(PP_{it}) + \beta_4 DE_{it} + \beta_5 LN\,(ALBPB_{it}) + \beta_6 LN\,(OER_{it}) + \in_{it} \quad (2)$$

where:

$LN\,(FSS_{it})$ is the natural log of the financial self-sufficiency ratio of MFI i at time t;

$LN\,(ROA_{it})$ is the natural log of the return on assets of MFI i at time t;

α_i is a constant;

$LN\,(YIE_{it})$ is the natural log of yield on gross loan portfolio of MFI i at time t;

$LN\,(SIZ_{it})$ is the natural log of total assets of MFI i at time t;

$LN\,(PP_{it})$ is the natural log of personnel productivity ratio of MFI i at time t;

DE_{it} is the debt-to-equity ratio of MFI i at time t;

$LN\,(ALBPB_{it})$ is the natural log of average loan balance per borrower of MFI i at time t;

$LN\,(OER_{it})$ is the natural log of the ratio of operating expense of MFI i at time t; and

$\in$ is the error term.

Equations (1) and (2) estimate the impact of each of the explanatory variables in the FSS ratio and ROA. These variables, derived using the panel regression model, may be subject to omitted variables bias, however. This occurs when some variables are not included in the model (Kinde 2012; Wooldridge 2009). Omitted variables bias can be divided into constant or changing over time and constant or changing over cases—known as time specific and individual specific effects of unobservable or omitted variables (Kinde 2012). Hsiao (2007) notes that there are two methods commonly used to deal with omitted variables: the fixed effect model and the random effect model.

To decide between fixed effect and random effect models, we use the Hausman test to compare the coefficients of the fixed and random effect estimators. Table 2 shows that the random effect model provides more consistent estimates than the fixed effect model in equation (1). Table 3 shows that the fixed effect model provides more consistent estimates than the random effect model in equation (2). The test results show that the Hausman test statistics are not significant in equation (1) and significant in equation (2). In short, the random effect model provides more consistent results in equation (1) and the fixed effect model provides more consistent results in equation (2).

Equation (1) also investigates the suitability of using the random effect model as opposed to pooled Ordinary Least Square (OLS), based on the Breusch and Pagan Lagrange Multiplier (LM) Test. The null hypothesis of the LM test is that the variances across the entities equal zero. Table 4 shows that the LM test is statistically significant, indicating the existence of random effects. The results suggest that pooled OLS regression is not appropriate. Thus, this study uses the random effect model.

Table 2. Results of the Hausman fixed effect and random effect test (equation [1])

Variable	Coefficients with fixed effects model (1)	Coefficients with random effects model (2)	Difference (1) –(2)	SE
LN (average loan balance per borrower)	0.575763	0.473304	0.102460	0.052646
LN (number of borrowers per staff member)	0.436709	0.404330	0.032379	0.221424
LN (total assets)	–0.467909	–0.359926	–0.107983	0.061798
Debt-to-equity ratio	–0.004183	–0.005702	0.001519	0.002029
LN (operating expense ratio)	–0.820712	–0.840295	0.019583	0.025184
LN (yield on gross loan portfolio)	0.826166	0.810042	0.016124	0.021043

Source: Author's calculations
Note: $\chi 2 = 5.03$; probability > $\chi 2 = 0.5397$

Table 3. Results of the Hausman fixed effect and random effect tests (equation [2])

Variable	Coefficients with fixed effects model (1)	Coefficients with random effects model (2)	Difference (1) -(2)	SE
LN (average loan balance per borrower)	0.988939	0.762586	0.226353	0.039565
LN (number of borrowers per staff member)	0.776612	0.715402	0.061210	0.199477
LN (total assets)	–0.951026	–0.703973	–0.247053	0.048516
Debt-to-equity ratio	0.000698	–0.002979	0.003677	0.001447
LN (operating expense ratio)	0.072731	0.098138	–0.025406	0.019396
LN (yield on gross loan portfolio)	0.891512	0.855655	0.035857	0.008531

Source: Author's calculations
Note: $\chi 2 = 26.75$; probability > $\chi 2 = 0.0002$

Table 4. Results of the Breusch-Pagan Lagrange Multiplier Test (LM test)

Variable	Var	Sqrt (Var)
LN (financial self-sufficiency ratio)	1.229805	1.108966
E	0.019459	0.139496
U	0.138233	0.371797

Source: Author's calculations
Note: Test: Var(*u*) = 0; chibar2(01) = 44.34; prob > chibar2 = 0.0000

Next, we test for heteroskedasticity across the explanatory variables using the Breusch-Pagan test in equation 2. The null hypothesis is that there is no heteroskedasticity. Since the p-value of the test statistic in equation (2) is statistically significant, indicating the presence of heteroscedasticity, we reject the null hypothesis. To resolve the heteroscedasticity problem, we use the option of robust standard error to obtain heteroscedasticity-robust standard error.

The fixed effect model explains the impact of the determinants on an MFI's ROA. We estimate the model using heteroskedastic standard errors, as suggested by Cameron and Trivedi (2009); Verbeek (2008); and Wooldridge (2009). The next section presents the descriptive statistics for the panel regression model variables.

Descriptive Statistics

Table 5 presents the descriptive statistics of equation (1) variables. The average loan balance per borrower variable shows an MFI's efficiency in selling loans, their primary product (Woldeyes 2012). Assuming all things are equal, if an MFI sells more loans, it will have greater profitability and operational sustainability. Table 5 shows that the mean of this variable is THB 29,254.03,[2] indicating that on average, MFIs provide a loan of THB 29,254.03 to each borrower. The maximum value is THB 166,666.70 (about USD 5,209.96 at a 2021 average exchange rate of USD 1 = THB 31.99) and the minimum is 0. The minimum value is zero because some MFIs do not provide loans; they are savings-only institutions.

In terms of number of borrowers per staff member, a higher ratio reflects an MFI's ability to efficiently use its staff. Table 5 shows that the mean number of borrowers per staff member is 8.92; that is, one staff member monitors approximately nine borrowers. The minimum and maximum values are 0 and 45 borrowers. The minimum value is 0 because some MFIs do not have any borrowers as they do not provide loans.

Total assets measures whether MFIs are large enough to be operationally and financially sustainable (Woldeyes 2012). Bogan (2012) shows that assets and capital structure affect MFI performance: asset size is positive and significantly influences sustainability. Cull, Demirguc-Kunt, and Morduch (2007) and Woldeyes (2012) find that MFI size is significant and positively affects the FSS. The mean value of total assets is THB 3,869,404, with maximum and minimum values of THB 39.2 million and THB 11,240.98, respectively (Table 5). The standard deviation is THB 5,391,584, indicating that the MFIs in our study differ in asset size. Larger MFIs can benefit from economies of scale by reducing operating expenses and, therefore, achieving greater financial performance (Meyer 2019). Our results suggest that some MFIs benefit from economies of scale.

The average debt-to-equity ratio is 1.46 (Table 5), indicating that for every baht owned by the shareholders, Thai MFIs owe 1.46 baht to creditors. This implies that some Thai MFIs are leveraged rather than financed through equity capital. Interestingly, the minimum debt-to-equity ratio is -21.20, suggesting that some MFIs are incurring losses and have more liabilities than assets. The maximum value is 64.88, indicating that debt financing is considerably higher than equity capital. Some MFIs in Thailand are savings-based organizations, and their debt-to-equity ratios are much higher than the other MFIs. Mobilizing voluntary deposit, which is an inexpensive, sustainable source of loan funds, can help MFIs achieve independence from investors and donors (Muriu 2011). Hence, if MFIs employ more debt in their capital structure, they might increase their profit.

[2] About USD 914.47 at a 2021 average exchange rate of USD 1 = THB 31.99

Table 5. Descriptive statistics for the model variables (equations [1] and [2])

Variable	Mean	SD	Minimum	Maximum	P-value
Financial self-sufficiency ratio	5.41	18.36	0.002	188.03	0.0002***
Return on assets	0.06	0.06	0	0.68	0.0000***
Yield on gross loan portfolio	0.14	1.08	0	22.7	0.0085***
Total assets	3,958,338.00	5,391,584.00	11,240.98	39,200,000.00	0.0000***
Debt-to-equity ratio	1.46	6.33	-21.20	64.88	0.0000***
Average loan balance per borrower	29,254.03	22,668.73	0	166,666.70	0.0000***
Operating expense ratio	0.02	0.05	0	0.61	0.0000***
Number of borrowers per staff member	8.92	8.29	0	44.44	0.0000***

Source: Author's calculations.
Note: *** significant at 1% level.

The average operating expense ratio is 0.02 (Table 5), indicating that, on average, Thai MFIs absorb two satang in operating expenses for each baht in the gross loan portfolio. Shaoyan and Duwal (2012) explain that the operating expense ratio can be used to compare administrative and personnel expenses with MFIs' yields on loan portfolios. MFIs with lower operating expense ratios are considered more efficient. Interestingly, some MFIs in Thailand do not incur operating expenses because their staff members are volunteers and are not paid wages; thus, the minimum operating expense ratio is zero. This is the case of the VFs, which are administered at the national and village levels (Meagher 2013). The national level works with volunteers (VF members from each village). These volunteers deal directly with the funds.

The yield on gross loan portfolio ratio indicates MFI efficiency in terms of generating cash revenue from its outstanding portfolios (Woldeyes 2012). The mean yield on gross loan portfolio is 0.14 (Table 5), suggesting that, on average, Thai MFIs generate 14 satang for every baht in their outstanding loan portfolios. The minimum and maximum values are 0 and 22.7, respectively, which indicates that some MFIs do not generate revenue from loans, whereas more efficient MFIs can generate up to THB 22.7. As Lewis et al. (2013) note, some savings groups in Thailand are community-run organizations that encourage people to save. Some of these groups also provide their members with welfare services, such as hospital and funeral coverage and educational and community development programs.

The FSS variable indicates that an MFI can cover all its operating and capital costs without depending on any subsidy (Kinde 2012). Kinde (2012) argues that financial sustainability is the key to MFI sustainability. Woldeyes (2012) posits that if the value of FSS is below 1, then an MFI has not broken even, financially speaking. Table 5 shows that the mean value of FSS is 5.41, suggesting the Thai MFIs are financially self-sustainable.

The ROA reflects an MFI's ability to profitably deploy its assets. Nyamsogoro (2010) reports that Tanzanian MFIs had a negative ROAs between 2001 and 2002 because these institutions started their businesses in a new environment. Rahman and Mazlan (2014), using the ROA to compare the financial performance of five Bangladeshi MFIs, conclude that Bangladeshi MFIs are financially sustainable since their ROAs are positive. Agarwal and Sinha (2010), also using the ROA in their evaluation, find that MFIs in India are financially sustainable. Table 5 shows that the mean ROA is 0.06, indicating that the Thai MFIs can profitably deploy their assets.

RESULTS AND DISCUSSION

Results of equation (1) show that the overall Wald statistic is significant at the 1 percent level (Table 6). These indicate that the conditions for the null hypothesis—that all coefficients are equal to zero—have not been met. The R-squared values indicate high explanatory power within an MFI; that is, approximately 93 percent of the variations

in the dependent variable are explained by the independent variables in the model. In terms of panel data, Cameron, and Trivedi (2009) and Hsiao (2007) note that R-squared values above 0.2 are large enough to draw reliable conclusions. The empirical results identify six determinants that are statistically significant and affect financial sustainability of MFIs. These are average loan balance per borrower, number of borrowers per staff member, MFI size, debt-to-equity ratio, operating expense ratio, and yield on gross loan portfolio (Table 6).

Results of equation (2) show that the overall Wald statistic is significant at the 1 percent level (Table 7). The R-squared values indicate high explanatory power within an MFI; that is, approximately 90.67 percent of the variations in the dependent variable are explained by the independent variables in the model. The empirical results identify four determinants that are statistically significant and affect the MFIs' ROA. These are average loan balance per borrower, number of borrowers per staff member, MFI size, and yield on gross loan portfolio (see Table 7).

There is a positive relationship between average loan balance per borrower and financial sustainability, which is significant at the 1 percent level. This result is similar to that of Adongo and Stork (2005), who report that profitability is related to bigger loans among Namibian MFIs. Nyamsogoro (2010) likewise finds a positive and statistically significant correlation between average loan balance per borrower and MFI sustainability. These results imply that larger loans are more cost efficient and, therefore, more profitable. The average loan balance per borrower is typically used as a proxy measure for depth of outreach (Adongo and Stork 2005; Cull, Demirguc-Kunt, and Morduch 2007; Nyamsogoro 2010). Smaller loans indicate poorer borrowers (Adongo and Stork 2005; Cull, Demirguc-Kunt, and Morduch 2007; Nyamsogoro 2010). Our results suggest that Thai MFIs do not lend money to the very poor. Fongthong and Suriya (2014) and Menkhoff and Rungruxsirivorn (2011) report that Thai MFIs reach near-poor households and lower-income households (with income above the poverty line), but not the very poor.

The number of borrowers per staff member is also a significant positive factor, at the 1 percent level, affecting MFI sustainability (see Tables 6 and 7). This result is similar to that of Crombrugghe, Tenikue, and Sureda (2008), who show that an increase in the number of borrowers per staff member increases MFI sustainability in India. Hossain and Khan (2016) also report a positive relationship between number of borrowers per staff member and financial sustainability of MFIs in Bangladesh. Nyamsogoro (2010) points out that the number of borrowers per staff member shows an MFI's efficiency level. The results of our study imply that Thai MFI staff members become more efficient at managing borrowers as the latter's number increases. This leads to MFI sustainability.

Table 6. Determinants of financial self-sustainability

Variable	Coefficient	Robust SD	P-Value
LN (average loan balance per borrower)	0.4733037	0.1215087	0.000***
LN (number of borrowers per staff member)	0.4043298	0.0875826	0.000***
LN (total assets)	–0.3599262	0.1088793	0.001***
Debt-to-equity ratio	–0.005702	0.0031276	0.068*
LN (operating expense ratio)	–0.8402949	0.0491394	0.000***
LN (yield on gross loan portfolio)	0.8100421	0.0801113	0.000***
Constant	–0.3067263	0.6793407	0.652
R-sq	Within = 0.9307, Between = 0.8856, Overall = 0.8912		

Source: Author's calculations
Note: *, *** significant at 10% and 1% levels, respectively

Table 7. Determinants of return on assets

Variable	Coefficient	Robust SD	P–Value
LN (average loan balance per borrower)	0.9889388	0.088207	0.000***
LN (number of borrowers per staff member)	0.7766119	0.2030917	0.000***
LN (total assets)	–0.9510259	0.0937869	0.000***
Debt-to-equity ratio	0.000698	0.001133	0.540
LN (operating expense ratio)	0.0727313	0.0607343	0.236
LN (yield on gross loan portfolio)	0.8915122	0.0673007	0.000***
Constant	2.419006	1.106815	0.033**
R-sq	Within =0.9067, Between =0.5166, Overall = 0.6117		

Source: Author's calculations
Note: *, *** significant at 10% and 1% levels, respectively

A significant negative relationship at the 1 percent level between MFI size and MFI sustainability suggests that larger MFIs are less likely to be sustainable (see Tables 6 and 7). Our result is similar to that of Yenesew (2014), who shows a negative relationship between size and financial performance of MFIs in Ethiopia. According to the author, large MFIs do not benefit from economies of scale and diseconomies of scale may occur due to bureaucratic bottlenecks and/or inefficiency associated with asset management. Sima (2013), examining factors affecting Ethiopian MFIs profitability, observes that MFIs have become too complex to manage; diseconomies of scale occur when MFIs are too large. The author finds that Ethiopian MFIs do not benefit from economies of scale.

Our findings are contrary to those of Cull, Demirguc-Kunt, and Morduch (2007) and Woldeyes (2012), who report that MFI size is significant and positively affects financial sustainability. Our study suggests that larger MFIs are less likely to be sustainable because they do not benefit from economies of scale.

The debt-to-equity ratio is negative and significant at the 10 percent level in equation (1) (see Table 6). This result suggests that a higher debt-to-equity ratio is less likely to lead to MFI sustainability. As some MFIs in Thailand are government-funded, profit-making is not their priority (Hermes and Lensink 2011). In addition, government funding is a relatively cheap source of funding. Tehulu (2013) uses unbalanced panel data from 23 MFIs between 2004 and 2009 in investigating the determinants of MFI financial sustainability in East Africa. The study finds that debt-to-equity ratio has a negative and statistically significant impact on the FSS. This result implies that a combination of various sources of capital does not improve an MFI's FSS. The negative relationship between debt-to-equity ratio and MFI sustainability suggests that the more MFIs are debt-financed (compared with other sources of finance), the less sustainable they are. Tehulu (2013) explains that MFIs, especially those in Ethiopia, do not pay dividends, and this makes equity a relatively cheaper source of finance than debt financing. Nyamsogoro (2010) likewise says that equity is a relatively cheap source of funding and can improve MFI sustainability. Nyamsogoro's study shows that capital structure is positively correlated with MFI sustainability.

At the 1 percent level, operating expense ratio has a significant but negative relationship with MFI sustainability (see Table 6). This result indicates that the higher the operating expense ratio is, the less sustainable an MFI is likely to be. A lower operating expense ratio indicates greater efficiency. Efficient management practices enable MFIs to reach more clients and attain higher profit.

The yield on gross loan portfolio variable is positive and significant at the 1 percent level in

terms of MFI sustainability (see Tables 6 and 7). This result suggests that an increase in yield on gross loan portfolios increases MFI sustainability in Thailand. The yield on gross loan portfolio indicates an MFI's ability and efficiency in using its short-term assets, including its outstanding portfolio, to generate cash or revenue (Woldeyes 2012). Cull, Demirguc-Kunt, and Morduch (2007) and Nyamsogoro (2010) find a positive relationship between gross loan portfolio yields and the FSS.

CONCLUSIONS

Our study shows that, in terms of size and financial structure, large Thai MFIs do not benefit from economies of scale. Diseconomies of scale might occur due to bureaucratic bottlenecks and/or inefficient asset management (Yenesew 2014). They lead to increases in unit costs because MFIs grow too large or expand too quickly (Ngo 2012). Inefficiency of MFIs in delivering financial services is a big problem because, as the results suggest, Thai MFIs do not lend money to the very poor. Thus, they are not meeting their aim of helping the poor (Meyer 2002). On the other hand, our study reveals that the Thai MFI staff members become more efficient at managing borrowers as their number increases, and this leads to greater MFI sustainability.

We find that a combination of capital sources does not improve an MFI's FSS. For instance, some MFIs in Thailand are government-funded, which is a relatively cheap source of funds. On the other hand, Thai MFIs are efficient in generating cash revenue from their outstanding portfolios. An increase in the yield on gross loan portfolio increases MFI sustainability. Moreover, the operating costs of Thai MFIs are low. Staff in some Thai MFIs are volunteers and are not paid wages. Furthermore, as the staff and members live in the same village and know each other well, the staff can more effectively screen and monitor members.

To achieve sustainability, MFIs should ensure that their social and financial goals are adequately balanced. We recommend that MFIs follow the principles of profit maximization and that the government and donors support this approach by creating a robust financial infrastructure. This will require the participation of information intermediaries to assist MFIs in reducing their costs—for example, credit rating, credit bureaus, or credit scoring agencies (Hao 2005).

Further, the Thai MFIs should embrace technology to minimize their transaction costs. They can use management information software and other innovative banking technologies—such as internet banking, mobile phone banking, smart card operation, and credit scoring tools—to reduce transaction costs. These tools can decrease administrative costs, increase staff productivity, and improve the reliability of financial accounts (Muriu 2011).

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