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Impact of Women Borrowers Culture on the Financial Efficiency of Microfinance Institutions in ASEAN-4 Countries

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Abstract: This paper examines the impact of women borrowers' culture on the financial efficiency of microfinance institutions (MFIs) between the years 2011 to 2019. The sample data consisted of 90 MFIs from ASEAN-4 countries. As the first stage analysis, data envelopment analysis (DEA) was employed to determine the score of financial efficiency for the MFIs. In the second stage, Multivariate Panel Regression Analysis were used to examine the impact of women borrower on the level of financial efficiency of the MFIs. The findings reveal that Cambodia has the highest financial efficiency score in ASEAN 4. This indicates that the MFIs in Cambodia are sustainable in providing financial services to the poor in the long run. Moreover, the findings also found a positive relationship between women borrowers culture and the efficiency of the MFIs, which implies that women borrowers reduce the risk of default, thus confirming that women have better loan repayment rates than male borrowers. The outputs from this study provide new insights for the stakeholder of the MFIs as well as policymakers to develop a strategy in order to promote the continuous development of the MFIs.

Keywords: Microfinance Institutions, Women Borrower Culture, Financial Efficiency, ASEAN-4 Countries

1. Introduction

Poverty can be described as an inadequacy of well-being that can be measured by household income, nutrition, education, health, properties, accommodation, and the right to speech in society. In 1976, a professor of economics from Bangladesh, Professor Muhammed Yunus, succinctly initiated microfinance institutions (MFIs). His main mission was to provide financial services to low-income households. At an early stage, the MFIs have been identified as microcredits that generally provide the poor with a credit delivery system. Wagner and Winkler (2013) reported that microfinance began to operate as a subsidy-reliance institution, where the appealing funds were structured by particular donors and governments. Throughout the years, microfinance was no longer subsidy recipients and went commercialised from the subsidy system to full-scale banking products in the 1990s. Eventually, it was extended to a great variety of financial products, including money transfers, insurance, savings, and many more.

The MFIs had a dual approach as they were originally established for their social purpose. Today, the demand is also to be financially stable as a means to provide ongoing financial services to disadvantaged people ultimately. The microfinance industry demonstrates phenomenal growth with a significant increase in the number of MFIs. Statistics from Asian Development Bank Annual Report 2004 reported that over 90% of MFIs in Southeast Asia countries went commercial to increase outreach to the poor. As one of the succeeding MFIs in the world, the Grameen Bank which mainly offers microcredit has managed to eradicate the critical poverty of over one-half of borrowers in Bangladesh, which is approaching 50 million borrowers (Sarkar, 2008). Witnessing this great potential in the microfinance sector, the year 2006 itself was announced as the International Year of Microcredit by the United Nations General Assembly to acknowledge the participation and significance of microfinance in alleviating poverty.

With the global recognition of microfinance as a social movement, the microfinance sector has recently begun to address the issue of MFIs' financial sustainability (Zeller 1998). On the idea that there is a trade-off between the

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sustainability of an MFI and its outreach to women and the poor, there is concern that emphasises a negative impact on the industry's fundamental objective of alleviating poverty. Nevertheless, Morduch (2000) contends that the notion of focusing on women borrowers and the poor will result in poverty reduction and better loan repayment, hence assuring the self-sustainability of MFIs. Moreover, there is also empirical evidence of a positive association between financial performance and the depth of outreach of MFIs (Quayes, 2015).

Generally, the majority of the borrower are women, and MFIs have constant pleasure with high repayment rates that lead to better financial performance. However, in recent years, there has been an increase in the number of male borrowers; therefore, it would be prudent to examine how women's participation affects the financial performance of the MFIs. Hermes and Lensink (2011) also provide an argument on women borrowers had a greater repayment rate than male clients. Thus, this study intends to investigate the impact of MFIs that own a large number of women borrowers pose a higher loan repayment rate than those with a lower number of female borrowers.

The remaining sections are organised as follows. Section II reviews the pertinent literature on the significance of women borrowers and outreach in relation to the financial efficiency of the MFIs; Section III describes the data and methodology used in this study; Section IV provides details of the empirical results of the impact of women borrower and firm-level variables on financial performance; and lastly, Section V discuss conclusions and the policy implications of from the study.

2. Literature Review

Over the last few years, there has been an increasing number of literature that have been covered the aspect of the financial efficiency of the MFIs. They highlight the importance of MFIs to be financially established. Unlike banking institutions, the term financial sustainability is not entirely fixed to profitability; however, it signifies the potential of the MFIs to produce their own income and no longer place reliance on subsidies to run the business (Zainal, 2019).

Hussain et al. (2021), examined the firm characteristics and macroeconomic determinants that can affect the efficiency of MFIs. The findings demonstrated that MFIs' financial efficiency was much higher than their social efficiency each year and in each country. As a result, the findings imply that there are criteria, rather than social efficiency, that contribute to the higher financial efficiency of MFIs in those countries during the study period.

Nourani, Malim and Mia (2021), used a Network Data Envelopment Analysis (NDEA) to assess the efficiency of 90 MFIs between 2013 and 2018. MFIs perform better in converting inputs to intermediates, which are required for the operation of subsequent divisions. Further research revealed that inefficiencies of MFIs are primarily caused by an excess of input values, such as personnel and operating expenses, as well as a shortage of intermediate and output values, such as total borrowing, net income, gross loan portfolio, and the number of active borrowers. Tahir and Tahrim (2015), examine the efficiency and productivity of Cambodian MFIs. The study's findings revealed that changes in efficiency and production were primarily due to scale efficiency and technical advancement.

MFIs focus on women borrowers as they have discovered that due to the high loan repayment rate, their financial performance may be enhanced (Hulme and Mosley 1996). Additionally, the goal of focusing on women is consistent with MFIs' overall goal of serving the poorest strata of society and broadening their reach. If MFIs place more emphasis on financial success, having a high loan repayment rate is crucial for both their financial performance and survival.

The majority of studies argue that women borrowers perform better repayment rates than male borrowers. Armendariz and Morduch (2005), explain Grameen Bank enjoy excellent loan repayment as a result of the decision to limit female borrowers after experiencing an issue of repayment by male borrowers in the early phase. Following Hossain (1988), While 81 percent of women had no repayment issues, only 74 percent of males experienced the same. In Bangladesh, women are targeted based on their 97 percent recovery rate compared to men's 89 percent recovery rate. (Khandker, Khalily, and Kahn 1995). Sharma and Zeller (1997), state In Bangladesh, credit groups with a greater proportion of women had much higher repayment rates. In Malwai, according to Hulme (1991), 92% of female borrowers had no repayment issues, compared to 83% of male borrowers. Gibbons and Kasim (1991) reveal that in Malaysia, 95 percent of women returned their loans, compared to 72 percent of men. According to a study conducted in Guatemala by Kevan and Wydick (2001), female credit groups had better loan repayment records than male credit groups. Meanwhile, D'Espallier, Guerin, and Mersland (2011) conducted a global study to demonstrate that a greater proportion of female clients in MFIs is associated with a higher payback rate.

In contrast, according to Armendariz and Morduch (2005), Bank Rakayat in Indonesia has achieved a near-perfect repayment rate over a few years despite not focusing specifically on women. Enhanced non-financial services in Bangladesh (Godquin, 2004) and group programmes in Ethiopia (Brehanu and Fufa, 2008) reveal that enhanced non-financial services in Bangladesh are associated with women borrowers that contributed to higher loan repayment rates. In terms of the risk associated with loan use, Todd (1996), and Agier and Szafarz (2013), believe that women are more conservative and seek out investing options with a lower rate of return. Women have fewer credit opportunities than men and must repay their loans to maintain continuous access to credit (Armendariz and Morduch 2005).

Women with direct wage workers are more likely to repay their loans, hence reducing the likelihood of default. However, keeping a regular job and managing a micro-business may increase a woman's work pressure,

resulting in less time for her family and children. A superior repayment rate for profit-making MFIs may cost women in terms of increased workloads and higher social pressure to ensure loan repayment, leaving them financially vulnerable unless funds are invested in lucrative income-earning activities (Garikipati, 2008).

Based on the above elaboration, the argument over whether MFIs can remain profitable while focusing on women borrowers is amplified by two literary strands. Some claim that the financial viability of MFIs and their focus on women are completely compatible, while others claim that focusing on women and requiring a high payback rate may put additional strain on women and households. However, these arguments support focusing on women borrowers, which leads to the conclusion that women are more disciplined to repay the loan and more inclined to work with MFIs to provide information, which lowers the danger of moral hazard and information asymmetry (Hartmann et al., 2009).

3. Methodology

The MFIs data has been made available on the portal of the World Bank, an online database consisting of financial information on global MFIs (Widiarto & Emrouznejad, 2015). Meanwhile, data on macroeconomic variables were retrieved from the World Development Indicators (WDI), where the data was published in the World Bank database. According to Vanroose and D'Espallier (2013), the World Bank has the largest database available for MFIs and is frequently utilised for microfinance analysis.

ASEAN-4 countries have been selected as a sample study which, includes Vietnam, Cambodia, Philippines and Indonesia. The primary reason to include these countries is that they possess the biggest number of MFIs among ASEAN nations. The majority of them are developing nations with considerable numbers of poor people who are served by MFIs and therefore included in the data analysis. According to Hassan et al. (2012), over 4000 MFIs from nine regions worldwide were published in the World Bank database. Thus, the samples in this analysis include 90 MFIs from ASEAN 4 countries between 2011- 2019 be composed of in the data analysis. Additionally, the analysis consists of 810 data observations.

3.1 First Stage: Data Envelopment Analysis (DEA)

In 1978, Charnes, Cooper, and Rhodes introduced the DEA with a simplified approach based on their names as a CCR model, in accordance with Farrell's (1957), recommendation in the generalisation of efficiency. The CCR model was accurately approximated using constant returns to scale (CRS). Using the CRS, when overall technical efficiency (OTE) is reached, the CCR model implies that there is no substantial relationship between operational scale and efficiency. CRS is only justifiable if all DMUs are operating at optimal levels. However, enterprises and DMUs may experience economies or diseconomies of scale in practice (Zainal, 2019). Therefore, if one considers that CRS does not work at the ideal scale, the computed OTE measurements will be biased by the degree of inefficiency (SIE). This assumption proved invalid in marketplaces with imperfect competition.

Banker, Charnes, and Cooper (1984), subsequently modified the CCR model in order to minimise the CRS assumption. The extension drawn from their names produced the BCC model, which examined the DMU's efficiency with a variable return on the scale (VRS). The VRS assumptions include technical efficiency (TE), which is subdivided into pure technical efficiency (PTE) and scale efficiency (SE). Accordingly, Zainal et al. (2020), noted that the PTE evaluates the DMU from the perspective of managerial efficiency, with no scale contamination. In the meanwhile, the SE is the optimal size for the DMU to operate in terms of financial efficiency. Consequently, in addition to CRS, VRS results may provide reliable information on DMU performance (Jubilee et al., 2020). In this analysis, the TE is utilised to compute the financial efficiency of the MFIs, which corresponds to the total efficiency score.

Coelli et al. (1998), demonstrate that if there are inconsistencies in the TE scores for a given DMU utilising CRS and VRS assumptions, the DMU carries a Scale of Inefficiency (SIE). In other words, SIE is calculated based on differences between the VRS PTE and CRS TE scores. Performing further DEA issues and the non-increasing returns to scale (NIRS) reveals the existence of SIE under VRS, partially due to rising returns to scale (IRS) or decreasing returns to scale (DRS) (Kamarudin, Sufian, Md. Nassir, & Mohamad Anwar, 2015).

Charnes et al. (1978), advocated that the DEA choose units capable of accurately identifying inputs or outputs. In order to maximise each DMU's efficiency, the DEA permits the selection of its own particular weights. In order to maximise the efficiency of unit j, the efficiency of all other units must be less than or equal to 1 in order for unit j's efficiency to be maximised. The following actions are possible:

$$\text{Maximise efficiency of unit } j = \sum_{r=1}^{s} u_r y_{rj}$$

$$\text{Subject to } \sum_{i=1}^{m} v_i x_{ij} = 1$$

$$\sum_{i=1}^{m} v_i x_{ij} - \sum_{r=1}^{s} u_r y_{rj} \le 1 \qquad j = 1, 2, \ldots, n$$

$$u_r \ge \varepsilon \qquad r = 1, 2, \ldots, s$$

$$v_i \ge \varepsilon \qquad i = 1, 2, \ldots, m$$

As mentioned, financial revenue is the proxy used to determine financial efficiency. The variables that measure financial efficiency are represented in Table 1:

Table 1: Input and Output Variables for Financial Efficiency

Variables	Mean	Min	Max	SD	No. of DMU
Inputs of MFIs					
Personnel expense (million USD)	13.621	6.813	18.114	2.143	90
Operating expense (million USD)	13.814	8.112	19.890	2.219	90
Total assets (million USD)	16.023	9.776	23.424	2.311	90
Output of MFIs					
Financial revenue (million USD)	14.662	6.278	21.776	2.446	90

Source: World Bank database (www.data.worldbank.org)

In fact, Cooper et al. (2007) 's rule of thumb applies to the number of input and output variables in this study. Since the number of MFIs equal to 162 is greater than the number of input and output variables of financial efficiency, the selection of variables is fair as they satisfy the conditions of m and s inputs and n DMUs, $m \times s \leq n$, where 15(3×2), and 15(3×1) (Boussofiane et al., 1991). This validates the study's choice of factors for measuring the efficiency of DMUs.

3.2 Second Stage: Multivariate Panel Regression Approach (MPRA)

In the second stage, this research applies a multivariate panel regression technique consisting of the pooled Ordinary Least Square (OLS), the Fixed Effect Model (FEM), and the Random Effect Model (REM) (REM). White (1980) transformation is the foundation for regression models, according to McDonald (2009).

The panel data exhibited a variety of estimate and inference issues, as shown by Gujarati (2004). Since these data comprise cross-sectional and time series, difficulties such as heteroskedasticity and autocorrelation must be fully acknowledged. Then, multiple approaches for computing these problems are applied to solve them. FEM and REM are the two most significant tests. The test statistics provided by Hausman include the asymptotic distribution of Chi-Square. If the null hypothesis is rejected (at significance levels between 1% and 5%), FEM is more suited than REM. Nevertheless, if a null hypothesis cannot be rejected or is significant at 10 percent, REM is the choice.

Consistent with Quayes (2015), the present study includes women borrowers, financial leverage, age and size of the MFIs to be used in the estimation model as a proxy to the firm characteristics. Details of the firm variables that affect the financial efficiency of the MFIs are depicted in Table 2.

Table 2: Details on the Variables of Firm Characteristics of Microfinance Institutions

Variables	Descriptions
Dependent	
Financial Efficiency (*lfe*)	Financial efficiency score in DEA
Independent	
Women borrower (*lwb*)	Percentage of women borrower
Size of operation (*lta*)	Net assets consist of loan loss reserve and accumulated depreciation
Age of operation (*lage*)	Number of years since the establishment
Financial leverage (*lder*)	Weightage of equity financing over debt financing in MFIs

Source: World Development Indicator (WDI), World Bank database (www.data.worldbank.org)

Therefore, the following equation expresses the estimation model of the study:

$$Financial\ efficiency_{i,t} = \beta_{i,t}\left(\sum Firm\ Characteristics_{i,t}\right) + \varepsilon_{i,t} \quad (2)$$

$$fe_{i,t} = \beta_0 + \beta_1 \mathrm{lwb} + \beta_2 lta + \beta_3 age_{i,t} + \beta_4 der_{i,t} + \beta_4 gdp_t + \varepsilon_{i,t} \quad (3)$$

4. Discussion

4.1 Financial Efficiency Score on Specific Countries In ASEAN-4

The findings begin with the presents of financial efficiency scores in ASEAN-4 countries produced from the DEA analysis. The analysis is then evaluated parametrically and non-parametrically prior to the panel regression analysis.

Table 3 reveals the score of financial efficiency of the MFIs in ASEAN 4 countries for the period of 2011 until 2019. Based on Table 3, for Indonesia, the score of efficiency shows the highest at 90.30% in the year 2016 and the lowest at 77.22% in the year 2012. The highest score of financial efficiency in 2016 mainly attributes to the MFIs operating at an appropriate efficiency level even though they were not managerially efficient in completely using their resources (since PTIE = 5.96% > SIE = 4.14%). Meanwhile, the lowest financial efficiency score in 2012 is mainly due to the firm not operating at the right scale, even when the management is efficient in utilising their resources (since PTIE = 13.59% < SIE = 14.23%).

As for the Philippines, the maximum score hit 86.58% in the year 2011, and the minimum score is at 75.94% in the year 2016. The maximum and minimum score of financial efficiency in the Philippines is due to

the MFIs operating at an optimum level even though they were not managerially efficient to fully utilise use their resources (since PTIE = 11.58% > SIE = 2.01% in 2011 and PTIE = 13.36% > SIE = 11.86% in 2016).

In Cambodia, the financial efficiency score recorded the highest at 90.97% in the year 2016 and the lowest at 84.45% in the year 2013. The highest score of financial efficiency in 2016 was mainly due to the MFIs operating at an appropriate scale even though they were not managerial efficient to use their resources (since PTIE = 5.81% > SIE = 3.31%). Meanwhile, the lowest financial efficiency score in 2013 is due to the firm is not operate at the optimum scale, even when the management is efficient in utilising their resources (since PTIE = 6.29% < SIE = 9.74%).

Lastly, for Vietnam, the maximum and minimum score is at 82.50% in the year 2015 and 71.95% in the year 2012, accordingly. The maximum score of financial efficiency in 2015 mainly came from the MFIs operated at the right scale even though they were not managerially efficient in managing their resources (since PTIE = 10.58% > SIE = 7.76%). In addition, the minimum financial efficiency score in 2012 is due to the firm is not operate at the appropriate scale, even when the management is efficient to fully utilise their resources (since PTIE = 14.39% < SIE = 16.45%).

In conclusion, Cambodia appears to be the most financially efficient than other countries, with the highest (88.06%) score of mean TE as the score of financial efficiency. A study by Liv (2013) found that in Cambodia, microfinance sectors have expanded progressively during the last ten years from the study. The study claims that MFIs in Cambodia have efficiently been one of the leading ASEAN microfinance institutions. The latest World Bank – The World and Income by Region report also disclosed Cambodia's growth prospects for the next few years were strong. These explain the MFIs in Cambodia are financially efficient and able to maintain the operation in the long run (Wagner & Winkler, 2013).

Table 3: Financial Efficiency Score of Microfinance Institutions for Specific Countries in ASEAN – 4

Country	Indonesia	Philippines	Cambodia	Vietnam
No. of Observation	9	30	22	29
	Panel J: 2011	Panel J: 2011	Panel J: 2011	Panel J: 2011
Technical Efficiency	0.8150	0.8658	0.8857	0.7956
Pure Technical Efficiency	0.9444	0.8842	0.9286	0.8707
Scale Efficiency	0.8680	0.9799	0.9559	0.9131
	Panel K: 2012	Panel K: 2012	Panel K: 2012	Panel K: 2012
Technical Efficiency	0.7722	0.8475	0.8687	0.7195
Pure Technical Efficiency	0.8641	0.8611	0.9346	0.8561
Scale Efficiency	0.8577	0.9845	0.9307	0.8355
	Panel L: 2013	Panel L: 2013	Panel L: 2013	Panel L: 2013
Technical Efficiency	0.8579	0.8100	0.8445	0.7879
Pure Technical Efficiency	0.8911	0.8501	0.9371	0.8527
Scale Efficiency	0.9649	0.9556	0.9026	0.9287
	Panel M: 2014	Panel M: 2014	Panel M: 2014	Panel M: 2014
Technical Efficiency	0.7863	0.7953	0.8791	0.8128
Pure Technical Efficiency	0.8409	0.8162	0.9337	0.8833
Scale Efficiency	0.9397	0.9766	0.9427	0.9204
	Panel N: 2015	Panel N: 2015	Panel N: 2015	Panel N: 2015
Technical Efficiency	0.8628	0.8217	0.8785	0.8250
Pure Technical Efficiency	0.9299	0.8738	0.9306	0.8942
Scale Efficiency	0.9312	0.9434	0.9457	0.9224
	Panel O: 2016	Panel O: 2016	Panel O: 2016	Panel O: 2016
Technical Efficiency	0.9030	0.7594	0.9097	0.7594
Pure Technical Efficiency	0.9404	0.8664	0.9419	0.8664
Scale Efficiency	0.9586	0.8814	0.9669	0.8814
	Panel P: 2017	Panel P: 2017	Panel P: 2017	Panel P: 2017
Technical Efficiency	0.9110	0.8516	0.8780	0.8216
Pure Technical Efficiency	0.9730	0.8762	0.9206	0.8922
Scale Efficiency	0.9372	0.9737	0.9561	0.9202
	Panel Q: 2018	Panel Q: 2018	Panel Q: 2018	Panel Q: 2018
Technical Efficiency	0.9251	0.8492	0.9003	0.8180
Pure Technical Efficiency	0.9871	0.8787	0.9423	0.8958
Scale Efficiency	0.9370	0.9684	0.9576	0.9130
	Panel R: 2019	Panel R: 2019	Panel R: 2019	Panel R: 2019
Technical Efficiency	0.9125	0.8455	0.9010	0.8177
Pure Technical Efficiency	0.9321	0.8651	0.9411	0.8287
Scale Efficiency	0.9665	0.9748	0.9428	0.9124
	Panel S: All Years	Panel S: All Years	Panel S: All Years	Panel S: All Years
Technical Efficiency	0.8542	0.8251	0.8806	0.7925

Pure Technical Efficiency	0.9214	0.8633	0.9337	0.8764
Scale Efficiency	0.9243	0.9579	0.9448	0.9043

Source: Data Envelopment Analysis Software by Joe Zhu. Data from World Bank Database.

4.2 Financial Efficiency Score on Specific Countries In ASEAN-4

Table 4 depicts the findings on the impact of women borrowers and other firm characteristics variables on the financial efficiency of the MFIs in ASEAN 4 countries. All findings are based on the FEM estimator since the model is significant to reject the null hypothesis in the Hausman test.

From table 4, it reveals the percentage of women borrowers is positively significant in influencing the financial efficiency of the MFIs. This indicates higher participation of women borrowers has resulted in the improved financial condition of the MFIs, and the coefficient is statistically significant at the 1% level. Furthermore, this infers that women borrower has a better repayment rate even though they take loans at the higher interest rate. The findings also imply that women borrower utilised loan products to support their economic activities, thus able to generate stable income that later will be used to fulfil the loan repayment. In addition, this finding also considerate that women have fewer credit opportunities than men, and they must repay their loans to maintain continuous access to credit. The result is consistent with the study from Abdullah and Quayes (2016), which find women borrower has a positive impact on the financial performance of the MFIs.

Next, Table 4 illustrates a positive association between the size (lta), which describes larger (smaller) MFIs with a tendency to have greater (lower) financial efficiency levels. This is due to the fact that as MFIs became commercialised, their size has increased, enabling them to expand their line of banking products, which is to include investments, money transfers, insurance, and deposits in addition to the microcredits they had previously offered. In short, because MFIs operate on a greater scale, their operations serve primarily to support their financial results. In addition, large MFIs use the most recent technology, such as mobile and internet banking, to run more efficiently than smaller MFIs that use traditional and time-consuming methods. The findings are in line with the past studies by Singh et al. (2013) and Wijesiri et al. (2015).

In addition, at the 1% significance level, there is also a positive association between the age of operation (lage) and the financial efficiency of the MFIs. This clearly demonstrates that the financial efficiency score of older (younger) MFIs is greater (lower) than that of their younger (older) counterparts. It may also be attributed to their business acumen that they are able to increase their likelihood of reaching financial sustainability, given that established MFIs take their time to penetrate the market. These findings are consistent with previous research by Wijesiri et al. (2015).

In Table 4, however, the leverage (lder) coefficient is insufficient to explain any changes in the MFI's financial efficiency. It describes the crucial relationship that cannot be presented by the debt-to-equity ratio to influence the financial efficiency of an MFI. This result is consistent with the findings of Quayes (2015), who concluded that there is no significant association between MFIs and leverage.

Table 4: Result of Panel Static Regression Analysis on Financial Efficiency of Microfinance Institutions in ASEAN 4 Countries

Variables	**Model 1**		
	OLS	**REM**	**FEM**
Constant	-2.120***	-3.060***	-4.470***
	(0.320)	(0.316)	(0.353)
Firm Characteristic Variables			
Women Borrower (lwb)	2.260***	2.820***	3.670***
	(0.009)	(0.007)	(0.012)
Total Asset (lta)	4.870***	2.670***	3.230***
	(0.004)	(0.006)	(0.017)
Age of Operation (lage)	-0.500	1.630**	3.660***
	(0.011)	(0.019)	(0.028)
Financial Leverage (lder)	-0.110	0.026	0.050
	(0.046)	(0.034)	(0.054)
Adjusted R^2	0.021	0.025	0.018
BP & LM x^2		260.500***	
Hausman x^2		25.240***	
Mean VIF	1.310		
No. of Obs.	810	810	810
Notes: *** indicates significance at the 1% level. Figures in parentheses ( ) are standard errors.			

Source: Result Obtained from STATA Regression Software. Data from World Bank Database.

5. Conclusion

This study analyses the impact of women borrowers on the financial efficiency of the MFIs in ASEAN 4 countries. The analysis begins with determining the level of financial efficiency for a specific country in ASEAN 4. Later, the study proceeds with the regression analysis to examine the impact of women borrowers and other firm characteristics on the financial efficiency of the MFIs. For this purpose, the Fixed Effect Model (FEM) has been chosen as the model estimator.

First, the findings from the DEA approach reveal that Cambodia owns the highest score of financial efficiency of the MFIs among ASEAN 4 countries. The findings describe the majority of the MFIs in Cambodia are financially independent and able to free up from the donor and subsidy assistance from the government. Besides, the results also indicate that the MFIs in Cambodia are sustainable in providing financial services to the poor in the long run. The higher score of financial efficiency indirectly shows the MFIs in Cambodia have become a leading microfinance in the Southeast Asia region.

Next, the result from Multivariate Panel Regression Analysis suggests that women borrower has a positively significant to enhance the financial efficiency score of the MFIs in ASEAN 4 countries. This translates to women borrowers possessing a higher repayment rate, thus leading to the better financial performance of the MFIs. Moreover, it describes the higher proportion of women borrowers has reduced the risk of default, thus confirming women have better loan repayment rates than male borrowers. According to Abdullah and Quayes (2016), various incentives have been given to women borrowers to motivate them to repay the loan on time compared to men borrowers.

Besides, the results also found size and age of the MFIs appear to be positive and significant in improving the financial efficiency of the MFIs in ASEAN 4 countries. This implies that mature MFIs with the larger asset are the two significant factors contributing to the higher financial efficiency score. However, there is no significant evidence to show that financial leverage affects the score of financial efficiency of the MFIs.

The findings from this study have identified that more rigorous future research is needed to examine the relationship between women borrowers and the financial performance between conventional and Islamic Microfinance Institutions.

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References

Abdullah, S., & Quayes, S. (2016). Do Women Borrowers Augment Financial Performance of MFIs? *Applied Economics*, *48*(57), 5593–5604. https://doi.org/10.1080/00036846.2016.1181831

Agier, I., and Szafarz, A. (2013). Microfinance and Gender: Is There a Glass Ceiling on Loan Size? *World Development*, *42*(1), 165–181. https://doi.org/10.1016/j.worlddev.2012.06.016.

Armendariz, B. A. D., and Morduch, J. (2005). *The Economics of Microfinance*. Cambridge, MA: MIT Press.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, *30*(9), 1078–1092. https://doi.org/10.1287/mnsc.30.9.1078

Boussofiane, A., Dyson, R. G., & Thanassoulis, E. (1991). Applied data envelopment analysis. European Journal of Operational Research, 52(1), 1–15. https://doi.org/10.1016/0377- 2217(91)90331-O

Brehanu, A., and Fufa, B. (2008). Repayment Rate of Loans from Semiformal Financial Institutions among Small-Scale Farmers in Ethiopia: Two-Limit Tobit Analysis. *The Journal of Socio-Economics 37*(6) 2221–2230. https://doi.org/10.1016/j.socec.2008.02.003.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision-making units. E*uropean Journal of Operational Research*, *2*(6), 429–444. https://doi.org/10.1016/0377-2217(78)90138-8

Coelli, T., Prasada Rao, D. S., & Battese, G. (1998). *An Introduction to Efficiency and Productivity Analysis*, *3*(2). Kluwer Academic Publishers. https://doi.org/10.1007/978-1-4615-5493-6

Cooper, W. W., Seiford, L. M., & Tone, K. (2007). *Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software* (2nd edi). Springer US. https://doi.org/10.1007/978-0-387-45283-8

D'Espallier, B., I. Guerin, and Mersland, R. (2011). Women and Repayment in Microfinance: A Global Analysis. *World Development*, *39*(5), 758–772. https://doi.org/10.1016/j. worlddev.2010.10.008

Farrell, M. J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society. Series A (General)*, *120*(3), 253–290. https://doi.org/10.2307/2343100

Garikipati, S. (2008). The Impact of Lending to Women on Household Vulnerability and Women's Empowerment: Evidence from India. *World Development*, *36*(12), 2620–2642. https://doi.org/10.1016/j.worlddev.2007.11.008

Gibbons, D., and Kasim, S. (1991). *Banking on the Rural Poor Center for Policy Research.* Malaysia: University Sains.

Godquin, M. (2004). Microfinance Repayment Performance in Bangladesh: How to Improve the Allocation of Loans by Mfis. *World Development*, *32*(11), 1909–1926. https://doi.org/10.1016/j.worlddev.2004.05.011

Gujarati, D. N. (2004). *Basic Econometric*, Fourth Edition. In The McGraw-Hill Companies. The McGraw-Hill Companies.

Hartmann-Wendels, T. (2009). Determinants of Banks' Risk Exposure to New Account Fraud–evidence from Germany. *Journal of Banking &Amp; Finance*, *33*(2), 347–357. https://doi.org/10.1016/j.jbankfin.2008.08.005

Hassan, M. K., Sanchez, B., & Ngene, G. (2012). Scales and technical efficiencies in Middle East and North African (MENA) micro-financial institutions. *International Journal of Islamic and Middle Eastern Finance and Management*, *5*(2), 157–170. https://doi.org/10.1108/mf.2008.00934jaa.001

Hermes, N., Lensink, R., & Meesters, A. (2011). Outreach and Efficiency of Microfinance Institutions. *World Development*, *39*(6), 938–948. https://doi.org/10.1016/j.worlddev.2009.10.018

Hossain, M. (1988). *Credit for Alleviation of Rural Poverty: The Grameen Bank of Bangladesh* (Vol. 65). Institute Research Report. Washington, DC: International Food Policy Research.

Hulme, D. (1991). The Malawi Mudzi Fund: Daughter of Grameen. *Journal of International Development*, *3*(3), 427–431. https://doi.org/10.1002/jid.4010030315

Hulme, D., and Mosley, P. (1996). *Finance against Poverty*. London; New York: Routledge.

Hussain, H. I., Kot, S., Kamarudin, F., & Yee, L. H. (2021). Impact of Rule of Law and Government Size to the Microfinance Efficiency. *Economic Research-Ekonomska Istrazivanja* , *34*(1), 1870–1895. https://doi.org/10.1080/1331677X.2020.1858921

Jubilee, R. V. W., Kamarudin, F., Hussain, H. I., Latiff, A. R. A., & Zainal, N. (2020). Analysis of total factor productivity changes in islamic and conventional banks: Empirical evidence from three regions. *International Journal of Management and Sustainability*, *9*(3), 161–180. https://doi.org/10.18488/journal.11.2020.93.161.180

Kamarudin, F., Sufian, F., Md. Nassir, A., & Mohamad Anwar, N. A. (2015). Technical Efficiency and Returns to Scale on Banking Sector: Empirical Evidence from GCC Countries. *Pertanika Journal of Social Sciences and Humanities*, *23*(9), 219–236.

Kevane, M., and Wydick, B. (2001). Microenterprise Lending to Female Entrepreneurs: Sacrificing Economic Growth for Poverty Alleviation?. *World Development*, *29*(7), 1225–1236. https://doi.org/10.1016/S0305-750X(01)00032-8

Khandker, S. R., B. Khalily, and Kahn, Z. (1995). *Grameen Bank: Performance and sustainability*. World Bank Discussion Paper 306. Washington, DC: World Bank Publications.

Liv, D. (2013). *Study on the drivers of over-indebtedness of microfinance borrowers in Cambodia: An in-depth investigation of saturated areas*. Cambodia Institute of Development Study, Final Report, 1–83. http://www.blueorchard.com/wp-content/uploads/2013/05/OID-Final-Report.pdf

McDonald, J. (2009). Using least squares and tobit in second stage DEA efficiency analyses. *European Journal of Operational Research*, *197*(2), 792–798. https://doi.org/10.1016/j.ejor.2008.07.039

Morduch, J. (2000). The Microfinance Schism. *World Development*, *28*(4), 617–629. https://doi.org/10.1016/S0305-750X(99)00151-5

Nourani, M., Malim, N. A. K., & Mia, M. A. (2021). Revisiting efficiency of microfinance institutions (MFIs): an application of network data envelopment analysis. *Economic Research-Ekonomska Istrazivanja*, *34*(1), 1146–1169. https://doi.org/10.1080/1331677X.2020.1819853

Quayes, S. (2015). Outreach and performance of microfinance institutions: a panel analysis. *Applied Economics*, *47*(18), 1909–1925. https://doi.org/10.1080/00036846.2014.1002891

Sarkar, D. (2008). Indian Microfinance Crisis. *Economic and Political Weekly*, *43*(1), 18–20. https://doi.org/10.5334/opt.111111

Sharma, M., and Zeller, M. (1997). Repayment Performance in Group-Based Credit Programs in Bangladesh: An Empirical Analysis. *World Development*, *25*(10), 1731–1742. https://doi.org/10.1016/S0305-750X(97)00063-6

Singh, S., Goyal, S. K., & Sharma, S. K. (2013). Technical efficiency and its determinants in microfinance institutions in India: a firm-level analysis. *Journal of Innovation Economics*, *11*(1), 15. https://doi.org/10.3917/jie.011.0015

Tahir, I., & Tahrim, S. (2015). Efficiency and Productivity Analysis of Microfinance Institutions in Cambodia: A DEA Approach. *International Review of Business Research Papers*, *11*(1), 25–42. https://doi.org/10.21102/irbrp.2015.03.111.03

Todd, H. (1996). *Women at the Center: Grameen Bank Borrowers after One Decade*. Dhaka: Dhaka University Press.

Vanroose, A., & D'Espallier, B. (2013). Do microfinance institutions accomplish their mission? Evidence from the relationship between traditional financial sector development and microfinance institutions' outreach and performance. *Applied Economics*, *45*(15), 1965–1982. https://doi.org/10.1080/00036846.2011.641932

Wagner, C., & Winkler, A. (2013). The Vulnerability of Microfinance to Financial Turmoil - Evidence from the Global Financial Crisis. *World Development*, *51*, 71–90. https://doi.org/10.1016/j.worlddev.2013.05.008

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*, *48*(4), 817–838. https://doi.org/10.2307/1912934

Widiarto, I., & Emrouznejad, A. (2015). Social and financial efficiency of Islamic microfinance institutions: A Data Envelopment Analysis application. *Socio-Economic Planning Sciences*, *50*, 1-17. https://doi.org/10.1016/j.seps.2014.12.001

Wijesiri, M., Yaron, J., & Meoli, M. (2015). *Performance of microfinance institutions in achieving the poverty outreach and financial sustainability: When age and size matter*? Munich Personal RePEc Archive, 69821. https://doi.org/10.5897/JAERD12.088

Zainal, N. B. (2019). Impact of Firm Characteristics, Macroeconomic Conditions, Bank Regulation and Supervision on Social and Financial Efficiency of Microfinance Institutions. In *Universiti Putra Malaysia* (Issue 1). Universiti Putra Malaysia.

Zainal, N., Nassir, A. M., Kamarudin, F., & Law, S. H. (2020). Does bank regulation and supervision impedes the efficiency of microfinance institutions to eradicate poverty? Evidence from ASEAN-5 countries. *Studies in Economics and Finance*, *38*(2), 272–302. https://doi.org/10.1108/SEF-10-2019-0414

Zeller, M. (1998). Determinants of Repayment Performance in Credit Groups: The Role of Program Design, Intragroup Risk Pooling, and Social Cohesion. *Economic Development and Cultural Change*, *46*(3), 599–620. https://doi.org/10.1086/452360