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Article

Efficiencies of Faith and Secular Microfinance Institutions in Regions of Asia, Africa, and Latin America: A Two-Stage Dual Efficiency Bootstrap DEA Approach

Adithya Kiran Kolloju ^{1,*} and Michele Meoli ² 

¹ Department of Management, Information and Production Engineering, University of Bergamo, 24100 Bergamo, Italy

² Department of Management, Information and Production Engineering, CCSE-Cisalpine Institute for Comparative Studies in Europe, University of Bergamo, 24100 Bergamo, Italy; michele.meoli@unibg.it

* Correspondence: adithya.kolloju@unibg.it; Tel.: +39-339-240-6828

Abstract: Purpose: the objective is to measure the financial and social performance of 127 microfinance institutions (MFIs) and observe the effects with explanatory factors such as “type”, “geography region”, and “secular and faith” variables. Design/methodology/approach: The time-series performance analysis of microfinance institutions is determined in two stages. In the first stage, both the social and financial efficiencies are measured with Data Envelopment Analysis (DEA) approach. The two explanatory factors along with faith and secular variables show the effect on these determined efficiencies by the second stage of the Tobit regression Random effect Model. Findings: Financial performance is greater than the social performance from the first stage analysis. When considering the explanatory variables, the social performances are not significant with religious factors. When the regression is performed in a group, the financial score is more significant with religious and other explanatory variables. Faith-based and secular-based microfinance institutions are strongly significant if the performances (efficiencies) are highly maintained. Originality/Value: faith and secular variables are identified based on the background/history information of each microfinance institution (MFI).

Keywords: DEA-approach; non-parametric; Tobit; random-effect; religion; conventional; time-series; efficiency performance; microfinance; region



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1. Introduction

Financial services for an individual ameliorate inclusion and performing business activities for obtaining a smooth economy (Li et al. 2019). Organizational performance promotes good outcomes irrespective of size, type, or faith, but is achieved by good loan repayment rates. The self-employed destitute have strong capabilities and commitments to structure their living and the microfinance institutions (MFIs) extend the frontiers with small credits and other financial services such as insurance, policies, mutual funds, etc. (Alimukhamedova 2013), while the access to traditional banks for the same destitute has been difficult for financial advancement activities. MFI finances with low-security risks and has a critical role in the progress of the economic system in emerging countries by showing their significant financial services (such as group lending, self-monitoring, short-repayment methods, etc.) to millions of poor households globally (Daley-Harris 2009; Hadi and Kamaluddin 2015) in addition with the digitalized services (Agrawal and Sen 2017). It is observed that MFIs emerged from traditional banks to calculate and function their administration based on the profit efficiency, operating costs, and returning capital constraints which leads to economical profit being more important than social outreach (Kar 2012). Although one or group of efficiency (financial, social, and technological) is important in the functioning of a financial organizations to sustain bankruptcy or shutting down. At a

certain point, the financial, social, and technological efficiencies are interconnected. Few dimensions of MFIs (NBFC¹, credit unions, micro-credits, rural banks, NGOs²) were taken into consideration for the influence of their services and functionalities. Few operate with the spirit of capitalism (private ownership) but always abide by the reserve bank guidelines.

The capital structuring for an MFI (faith or secular) is obtained from sources such as government subsidiaries, public-private investments (shareholders), debt capital, profits, and third-party donations (Tchuigoua 2015). Apart from the public and the commercial funders, both provide funds as a charity for certain types of microfinance organizations for global development (Cobb et al. 2016). The level of profits, revenues, ROA³, and ROE⁴ ratios from operating costs, loan size, cost per borrower, etc., describes the performance of an MFIs. For better sustainability of MFI, it is important to maintain the average returns from the clients on timely basis agreements. It is also important to merge the economic and social gaps for proper and smooth functionality (Liñares-Zegarra and Wilson 2018). The profit-based institutions extend links with capital markets to ensure maintaining profitability and high-rate efficiency. The traditional MFIs are profit-based because the drawn-out monetary usefulness is a higher priority than the social effort (Leite et al. 2019; Liñares-Zegarra and Wilson 2018; Schwarz et al. 2015).

We drew the financial data from the World Bank catalog with the Mix-market collaboration and the data were extracted from 25 countries with 127 microfinance institutions and similar data were used in several studies (Aggarwal et al. 2015; Leite et al. 2019; Navajas and Tejerina 2006; Sainz-Fernandez et al. 2018; Wijesiri et al. 2015, 2017). The dual efficiency is a technique to understand the organization's performances and may estimate by diverse variables while we considered financial and social variables that reflect the performance factors of each microfinance institution. The data envelopment analysis (DEA) (Charnes et al. 1978), is a non-parametric approach bootstrap method that analyses the sensitivity of measured efficiency score by decision-making units (DMUs) (Simar and Wilson 2007). The DMUs have non-specified measurable properties and are neither classified in categories nor groups of faith and secular but the assumption is made for all MFIs in the analysis.

It is necessary to explore the marginal changes and impact of environmental indicators on the dual efficiencies. Several studies (Lebovic 2004; Wijesiri et al. 2015) used a censored model to investigate the determinants of efficiency estimates. The Tobit regression truncated random effect method is preferred as the correlation exists with an error term for both input and output variables (Amemiya 1984), the censored regression is used to analyze the impact of indicators such as type, religion, and region on efficiency performances. It is believed that an indirect relationship exists between the social/economical factors with the organizational principles (type, region, and religion). The religion and region indicators are organized by faith, secular institutions by the life cycle of MFIs, and they were identified and represented by three regions (Asia, Africa, and Latin America). The straightforward time-series Tobit censored linear regression model is assumed with a minimum of two autonomous variables/indicators individually for dual efficiencies. The second stage regression exhibits the indicators over efficiencies, and it is significantly seen that faith-adopted MFIs show better social outreach than traditional institutions.

The study is organized in sections and the following literature (Section 2) describes the important classification that is concentrated to determine the efficiencies, the effect of efficiencies over the observatory variable on women in microfinance, religious performance, effectiveness. Section 3 has empirical literature followed with the data and Section 4 has the methodology, Section 5 has the results of the performances and impaction with the regression model. Section 6 has the discussion and conclusions.

2. Literature Review

Microfinance institutions serve the development of society assisting the poor with turning out to be little business visionaries by micro-credits/grants without accepting interest rates (faith-operated) or little interest rates (traditionally operated). The clustered faith-based institutions are differentiated with the functionalities. To strike the difference

between outreach and poverty alleviation, the institutional performance varies on the technical operations, attractiveness, strategies, methodologies, etc., and these categories have importance depending on the secular-based microfinance institutions (SB-MFIs) or the faith-based microfinance institutions (FB-MFIs). The cross-country MFIs are some laid out privately but are regulated under government policies with suitable regulatory acts, credit information companies, Reserve/Central bank, and Microfinance Regulatory Authority. Loan portfolios, recovering activities, are managed by financial managers and legal teams, apart from tradition/religion, MFIs raise funds with savings mobilizations (Wijesiri et al. 2015), donations (with the risk of liquidity management, this is considered as the minimal investment), deposits, and other cumulative surpluses. Partially, few MFIs are controlled and managed by women with profiting terms and policies, this is considered as a business activity or entrepreneurial establishment. We further discuss the role of gender (women) in microfinance.

2.1. Microfinance and Women

Business with opportunity-driven strategies in low-income countries satisfies basic needs and enhance the welfare of the poor (Schwarz et al. 2015). Gender orientation contrasts in microfinance are particularly critical because women have a crucial impact on money-related progressions, especially in the turn of advancements. Women are granted lower importance than men because of their educational levels, discrimination, etc. Women in microfinance promote and strengthen the International Labor Organizations (ILOs) which has a decent work agenda. MFIs are established in urban/rural areas, where the women borrowing rate is increasing in annual periods (from the cross-country data). In the rural areas, the increase in small enterprises by women allows to mitigate patriarchal practices and make women empowerment grow in significant proportions. Trust is the main concern that the financial institution believes, and MFIs assist with entrepreneurial training skills to women in some regions and provide confidence in the establishment of small-scale industries in rural areas with low-interest rates (Hadi and Kamaluddin 2015). There is a 54.6% increase in active women borrowers since 2009, which increased the financial inclusion in microfinance. The combination of microfinance and social assert, brings norms, trust, and networks to connect people and coordinate with their actions. The average borrowing rate of female borrowers and only 16 countries have at least 50% and 9 countries have 70% access in rural areas, the average rate is much increased from the year 2008. MFIs grant capital with low-interest rates for entrepreneurial enterprises, especially female borrowers are better with loan repayment, and analytically the financial outreach is significantly high (Aggarwal et al. 2015; Belwal et al. 2012; Ul-Hameed et al. 2018). Indeed, we chose “women borrower” as a significant indicator for determining the social efficiency for regions in Asia, Africa, Latin America, and the Caribbean, where women’s participation plays a decisive role in the analysis. From the religious point of view women are playing a more valuable role than in traditional institutions.

2.2. Religion Performance and Effectiveness

Religion rehearses impact and changes the human mind despite literacy (Barro and McCleary 2003). Non-profit and regional MFIs primarily focus on developments in poverty alleviation. On the other hand, faith MFIs follow the community and religiously implemented principles and the results are more explored from the conviction-based institutions. In Islamic law, there is a prohibition to apply interest rates on loans (Imam and Kpodar 2016) and there are more potential in attaining social performance with counterparts with conventional organizations, and fundings are made with profits (Fersi and Boujelbéne 2016). Catholic microfinance institutions are better with financial performance in developing efforts (Mersland et al. 2013). It is empirically analyzed that women are more concerned with religious practices and ethics (Gyapong et al. 2021). The religious institutions are risk aversion and have low stock returns. In an Islamic country such as Bangladesh, social efficiency is 22% more than financial efficiency (Khan and Sulaiman 2015; Mia and Govindaraju 2016).

We took the religion factor (irrespective of belief) as a dependent variable to differentiate the efficiencies socially and financially with profit/non-profit microfinance organizations.

The faith-based institutions follow the principles imposed by their religion and run administration to reach social and financial objectives. In countries such as Pakistan, Afghanistan, Bangladesh, and Middle Eastern countries, religion (Islam) is very important and treated in almost every activity. [Mansori et al. \(2020\)](#) collected questionnaires from each Muslim and the gender classification (majority men have favor towards religion) showed importance. Spotted the difference in the risks between FB-MFIs and conventional Islamic MFIs cross-sectionally from the period 1998–2014 from the MIX database, the results show financial stability with SB-MFIs with low risk, evidence from OSS regression. The DEA-CRS⁵ analysis on 72 MFIs (NGOs and NBFIs) in MENA regions where MFI performances in Islamic nations are significant socially and financially, and these efficiencies are concerning to age (Mature, Young, and New) ([Ben Abdelkader and Mansouri 2019](#)). It is feasible to identify institutions and Table 1 shows the institution type with the religious status of each country. The background and historical analysis are perfectly performed to explore the religious status of the microfinance institution itself, it is observed many MFIs are integrated with Vision fund in Latin American regions (Catholic), and East Asian countries.

Table 1. Microfinance country, type, and religious status.

Country	Institution Type	Religion Status
Afghanistan	NGOs	Secular
Azerbaijan	Credit corporative, Bank, and NBFC	Secular, Faith
Bolivia	Bank, and Credit corporative	Secular, Faith
Brazil	Bank, and Credit corporative	Secular, Faith
Bangladesh	NGO, Bank	Secular, Faith
Costa Rica	NGO, Bank, and Credit corporative	Secular, Faith
Colombia	Microcredit	Secular
Cambodia	NGO, and Bank	Secular, Faith
El Salvador	NGO	Secular, Faith
Egypt	NGO	Secular, Faith
Ecuador	Bank, Credit corporative, Microcredit, and NGO	Secular
Guatemala	Bank, NGO, Credit, NBFI corporative, and Microcredit	Secular, Faith
Ghana	Bank	Secular
India	NGO, Credit corporative, NBFI, and Bank	Secular, Faith
Kosovo	NGO	Secular
Kazakhstan	Credit corporative	Secular
Jordan	Bank	Secular, Faith
Mexico	NBFI, and Bank	Secular, Faith
Morocco	Bank, and Credit corporative	Secular, Faith
Nicaragua	NBFI, and Credit corporative	Secular, Faith
Peru	Bank, Credit corporative, NGO, and NBFI	Secular, Faith
Pakistan	NBFI, and Bank	Secular, Faith
Palestine	Credit corporative	Faith
Tanzania	Bank	Secular
Tajikistan	Bank, and NGOs	Secular

Source: Mix Market, Background Historical status of MFIs.

3. Research Design

3.1. Research Questions

The research questions are developed in two parts:

1. To determine the social and financial efficiency of 129 cluster MFIs (faith and secular) with a frontier non-parametric methodology ([Simar and Wilson 2007](#); [Seiford and Zhu 2014](#); [Wijesiri et al. 2015](#)). This helps to identify the microfinance status in established countries;

- To determine the effect of external variables on these efficiency variables through both cluster⁶ and two-model⁷ groups, the time series as the Tobit regression model (Wijesiri et al. 2015). This helps to explore which variable can affect the MFI performance.

3.2. Data Selection

The performance and the selection of variables were inspired by the contributions in the microfinance industry (Gutiérrez-Nieto et al. 2009; Gyapong et al. 2021; Mersland et al. 2013; Schwarz et al. 2015; Wijesiri et al. 2015; Wijesiri and Meoli 2015), etc. The sample of 127 MFIs was selected from the World Bank financial database (Mix market) with annual periods 2008–2018. The specific variable “Female borrowers” is inspiring with the increase in clients annually in many countries. Table 2 discusses the MFIs list and the percentage of borrowers, investments, and equity in each type of MFIs.

Table 2. Financial funding of different microfinance institutions.

	NBFI	NGO	Bank	Credit Union	Rural Bank
Borrowings	36	30	21	8	10
Deposits/investments	43	28	58	79	69
Equity	21	42	20	13	21

Source: Mix market 2019, World Bank’s data catalog (%).

3.3. Variable Selection

Table 3 describes the explanation of dependent and independent variables for efficiency measurement with definitions. The selection of indicators is influenced by the previous works published in the articles where cross-country data have importance. The analysis is not based on specific country performance instead, it is cross-country productivity impactation.

Table 3. Selection and description of input/output variables for the first stage of analysis.

Variables	Indicators	Term Definitions	Data Explanation
Input variables	Loan Officers	Dealing with authorizing loans to the clients, monitoring interest and security, responsible for outgoing credits and outstanding loans.	The database consists of 127 well-performing microfinance institutions. A total of 30 MFIs are identified as faith-based organizations and 97 MFIs are secularly operating microfinance institutions. The 30 Faith institutions are related to Catholic- and Islamic-based MFIs. These are identified by the establishment and collaborations and merging with dominating microfinance institutions. All the data are drawn from Mix.org merged with World Bank Data in the year 2019.
	Total Assets	The absolute estimation of assets is constrained by the financial organization because of past occasions and from which future monetary advantages are relied upon to stream to the MFI.	
	Cost per borrower	It is the cost imposed on a borrower from loan application to the total loan repayment.	
Output variables	Financial Revenue (Financial efficiency)	Revenues generated from loans, assets, other financial accumulations.	
	Female borrowers (Social efficiency)	The percentage of women borrowers is consistently increasing periodically. The social outreach is well enough.	

The financial revenue is an output variable to determine the financial performance of MFIs. The financial performance tends to raise if there are more dependents and good repayment rates irrespective in rural or urban regions, for this purpose the variable borrowers are used to determine the social outreach performance of MFI. (*Microfinance-Barometer-2019_web-1*, n.d.) report specifies there is an incremental increase with women entrepreneurs annually for a decade so, women/female borrowers help to determine the social efficiency. The following Table 4 has numerical statistics of input and output variables along with the correlations between the variables are in Table 5.

Table 4. Mean and standard deviation of input/output variables.

Variable	Mean	Std. Dev.
Total Assets (USD MM *)	19.71	270.50
Personal (Count)	208	2190
Cost per Borrower (USD)	137	1065
Financial Revenue (USD MM *)	4.60	51.2
Female borrowers (Count)	15.709	681,944

* USD MM represents value Million USD.

Table 5. Correlations of input/output variables.

Correlations	Assets	Financial Revenue	Personal (s)	Female Borrower(s)	Cost per Borrower(s)
Assets	1.00				
Financial revenue	0.73	1.00			
Personal(s)	0.27	0.49	1.00		
Female borrower(s)	0.22	0.39	0.64	1.00	
Cost per borrower(s)	0.023	0.024	−0.02	0.64	1.00

3.4. Borrowing Rate

Women workers in developing countries all through the world contribute their development in financial turn and microfinance helps to empower them and helps with making their commitment (Somavia 2007). According to the data, women clients are up to 73% on average. The average female borrowing rate is classified in Table 6, from the countries which are considered in the analysis. Ghana and Pakistan which have faith-based MFIs are dominating in the second position and Azerbaijan, Tanzania takes the last position in the female borrowing rate.

Table 6. Percentage of female borrowers in 25 countries.

Country	Avg Female Borrower (%)
Afganisthan	52
Azerbaijan	29
Bolivia	40
Brazil	46
Bangladesh	96
Costa Rica	43
Colombia	58
Comodia	68
El Salvador	70
Egypt	100
Ecuador	46
Guatemala	75
Ghana	75
India	100
Kosovo	22
Kazakhstan	64
Jordon	84
Mexico	93
Morocco	57
Nicaragua	59
Peru	43
Pakistan	95
Palestine	100
Tanzania	32
Tajikistan	34

Source: Mix Market 2019.

4. Methodology

Data envelopment analysis (DEA) is a non-parametric bootstrap approach that requires simple time-series data (with no financial gaps) to analyze the competence scores without any complex assumptions in any industry. Charnes et al. 1978 first developed the efficiency measuring model, later applied to identify the organizational performances in the banking sector (Wijesiri et al. 2015, 2017). Bootstrapping has the simple notion of repeated data generating process (DGP) and applying the original simulant to each outcome model (Wijesiri et al. 2015). The selection of appropriate input and output variables depends on the input-oriented and output-oriented methods. In this analysis, we restricted the non-parametric, output-orientated, and constant return to scale DEA approach to determine the production performances. The MFI identities are disclosed and are represented by the normal series from 1, 2, 3 . . . , 127 which act as the decision-making units to produce efficiency scores (Simar and Wilson 2010). We assume for the development of efficiencies from the decision-making units “p” (DMUs), it is necessary to select “m” different inputs and “n” output/s from the available dataset. Each DMU (“p”) has one positive input and one positive output.

We assume:

$$x_{ij} \geq 0 \text{ for } i \text{ input} \quad (1)$$

$$y_{kj} \geq 0 \text{ for } k \text{ output} \quad (2)$$

The virtual output to the virtual input to maximize the efficiency of each DMU (p) is formulated and should be less than or equal to zero.

$$\text{i.e., } \max h_o(u, v) = \frac{\sum_r u_r y_{ro}}{\sum_i v_i x_{io}} \leq 1 \quad (3)$$

where $j = 1, \dots, n$; $u_r v_i \geq 0$ for all i and r .

The censored Tobit truncated random effect regression (as we have time-series data) was discussed to exhibit the relation between the measured dual efficiency scores (act as dependent variables) in the first stage of DEA analysis on the explanatory factors. Tobit model aids in determining the marginal changes on dependent variables by concerning lower and upper impediments. It represents the effect of an independent variable over the conditional variable. The regression provides the validation by considering the dual efficiencies and the overall empirical performance of the microfinance industry is obtained and controls different parameters. The linear regression is followed:

$$\theta_{(i,j,p)*} = \beta_0 + \beta_1 var1 + \beta_2 var2 + \varepsilon; i, j = 1, \dots, p \quad (4)$$

$$\theta_{(i,j,p)*} = \beta_0 + \beta_1 var1 + \varepsilon; i, j = 1, \dots, p \quad (5)$$

$$\theta_{(i,j,p)*} = \beta_0 + \beta_1 var2 + \varepsilon; i, j = 1, \dots, p \quad (6)$$

where i represents the social efficiency score, j represents the financial efficiency score, the $\beta_0, \beta_1, \beta_2$ are the coefficients for the explanatory variables and ε is the statistical error term, where p represents the DMSs/MFIs (127). Equation (3) represents the social efficiency depending on all the three explanatory indicators. Whereas Equations (4)–(6) represent two explanatory indicators. The indicators imply the religious status, geographic region, and type of financial organization. The religious status, geographic position, and type of the institutions are imported as dummy variables and represent binary numbers. For instance, if religion is a faith, I considered it as 1 otherwise 0. The same with the location and type. We tabulate the results from the analysis in Table 6.

5. Results

5.1. First Stage Non-Parametric Constant Rail Scale DEA Approach

Table 7 reports the efficiency scores of 127 MFIs globally. The aggregate efficiency score of MFI in 10 years and the individual scores are calculated separately. It is observed that financial outreach is dominating with social outreach.

Table 7. The DEA social and financial efficiencies.

MFI (p)	Social		Financial		MFI	Social		Financial	
	θ	θ_a	θ	θ_a		θ	θ_a	θ	θ_a
1	0.45	0.43	0.86	0.83	65	0.72	0.71	0.90	0.57
2	0.92	0.67	0.22	0.62	66	0.56	0.50	0.65	0.32
3	0.93	0.73	0.36	0.45	67	0.38	0.43	0.69	0.54
4	0.13	0.14	0.21	0.30	68	0.02	0.02	0.96	0.86
5	0.01	0.39	0.19	0.64	69	0.02	0.52	0.34	0.34
6	0.01	0.47	0.73	0.57	70	0.22	0.51	0.59	0.33
7	0.00	0.49	1.00	0.58	71	0.36	0.50	0.43	0.57
8	1.00	0.45	0.48	0.44	72	0.37	0.73	0.06	0.45
9	0.80	0.60	0.51	0.51	73	0.89	0.59	0.67	0.48
10	0.61	0.44	0.90	0.37	74	1.00	0.61	1.00	0.44
11	0.31	0.52	0.22	0.42	75	0.98	0.64	0.56	0.72
12	0.48	0.33	0.76	0.75	76	0.52	0.53	0.37	0.67
13	0.48	0.57	0.67	0.43	77	0.08	0.46	0.79	0.65
14	0.88	0.21	0.00	0.37	78	0.17	0.54	0.86	0.41
15	0.02	0.57	0.05	0.46	79	0.88	0.59	0.17	0.41
16	0.19	0.27	0.12	0.14	80	0.11	0.62	0.42	0.41
17	0.00	0.62	0.00	0.30	81	0.87	0.94	0.19	0.27
18	0.28	0.61	0.00	0.60	82	0.59	0.42	0.23	0.50
19	0.58	0.51	0.94	0.31	83	0.76	0.57	0.07	0.36
20	1.00	0.86	0.94	0.43	84	0.02	0.59	0.81	0.49
21	0.83	0.56	0.75	0.64	85	0.54	0.51	0.63	0.59
22	0.00	0.45	0.19	0.59	86	0.30	0.51	0.09	0.55
23	0.94	0.57	0.20	0.38	87	0.00	0.52	0.89	0.59
24	1.00	0.84	0.90	0.71	88	0.11	0.43	1.00	0.55
25	0.01	0.19	0.21	0.29	89	0.46	0.45	0.56	0.46
26	0.14	0.07	0.70	0.53	90	0.44	0.58	0.49	0.47
27	0.62	0.22	1.00	0.52	91	0.29	0.65	0.83	0.51
28	1.00	0.21	1.00	0.62	92	0.94	0.64	0.41	0.27
29	0.01	0.01	0.26	0.33	93	0.70	0.90	0.10	0.75
30	0.43	0.14	0.89	0.61	94	0.00	0.18	0.35	0.57
31	0.77	0.61	0.42	0.37	95	0.00	0.41	0.50	0.61
32	0.31	0.48	0.59	0.50	96	0.00	0.41	0.00	0.37
33	0.49	0.47	0.08	0.32	97	0.79	0.73	0.99	0.68
34	0.01	0.29	0.00	0.16	98	1.00	0.87	1.00	0.87
35	0.00	0.27	0.31	0.36	99	0.93	0.63	0.69	0.55
36	0.35	0.51	0.03	0.50	100	0.98	0.63	0.20	0.47
37	0.22	0.18	0.55	0.46	101	0.85	0.43	0.71	0.59
38	0.57	0.62	0.71	0.61	102	0.07	0.49	0.63	0.57
39	0.69	0.59	0.93	0.71	103	0.62	0.46	3.63	0.90
40	0.19	0.11	0.39	0.31	104	0.11	0.57	0.21	0.44
41	0.41	0.50	0.87	0.70	105	1.00	0.67	0.04	0.32
42	0.57	0.53	1.00	0.58	106	0.12	0.20	0.50	0.44
43	0.27	0.61	0.69	0.51	107	0.26	0.46	0.63	0.47
44	0.38	0.40	0.42	0.52	108	0.22	0.17	0.83	0.68
45	0.80	0.47	0.99	0.79	109	0.73	0.65	0.36	0.40
46	0.02	0.49	0.03	0.30	110	0.81	0.44	0.43	0.56
47	0.33	0.52	0.01	0.40	111	0.38	0.58	0.45	0.47
48	0.49	0.63	0.32	0.53	112	0.10	0.49	0.74	0.46

Table 7. Cont.

MFI (p)	Social		Financial		MFI	Social		Financial	
	θ	θ_a	θ	θ_a		θ	θ_a	θ	θ_a
49	0.13	0.61	0.47	0.27	113	0.28	0.56	0.68	0.35
50	0.26	0.36	0.98	0.56	114	0.84	0.48	0.92	0.48
51	0.59	0.51	0.98	0.62	115	0.62	0.39	0.76	0.56
52	0.13	0.53	0.54	0.54	116	0.06	0.36	0.89	0.60
53	0.61	0.51	0.50	0.53	117	0.21	0.05	0.70	0.38
54	0.16	0.46	0.33	0.46	118	0.00	1.00	0.00	1.00
55	0.05	0.47	0.38	0.38	119	0.91	0.64	0.3	0.21
56	0.69	0.23	0.64	0.44	120	0.50	0.40	0.68	0.64
57	0.14	0.39	0.88	0.67	121	0.00	0.57	0.00	0.41
58	0.15	0.59	0.97	0.43	122	0.58	0.61	0.00	0.19
59	0.10	0.07	0.33	0.76	123	0.80	0.95	0.73	0.57
60	0.02	0.29	0.28	0.57	124	0.04	0.11	0.13	0.34
61	0.32	0.47	0.57	0.45	125	0.55	0.61	0.80	0.56
62	0.43	0.25	0.79	0.31	126	0.00	0.36	0.62	0.70
63	1.00	0.51	0.89	0.51	127	0.01	0.22	0.10	0.50
64	0.61	0.54	0.40	0.56					

The efficiency scores, aggregate efficiency (θ_a), determined efficiency (θ) are bounded between 0 and 1. The MFIs with the efficiency scores of 1 are assumed developed or highly productive with high outreaches either socially or financially or both. Hence, we had clustered data with both religious and non-religious institutions, it is a bit challenging to spot the differences. The graphical representation of dual efficiency scores of faith and traditional institutions is exhibited in Figure 1.

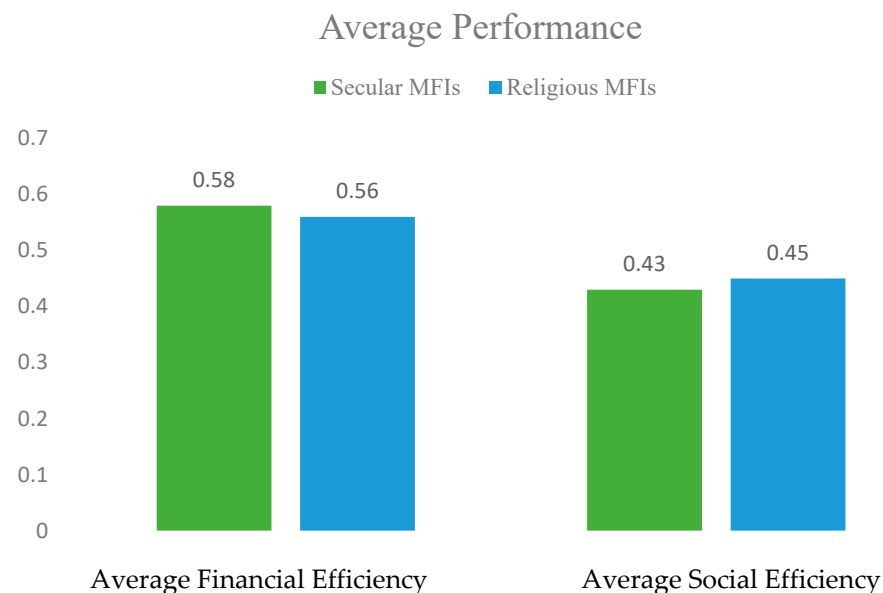


Figure 1. Faith and secular MFIs efficiency scores representation.

5.2. Second Stage Tobit Random Effect Model Regression

The Tobit regression model is an alternative to ordinary least squares regression and is employed when the dependent variable is bounded from below or above or both with positive probability pileup at the interval ends, either by being censored or by being corner solution. The regression with random effect model (unobservable effects are uncorrelated with the observed explanatory variables) shows strong/weak significance levels, the same effect on financial efficiency is vice versa and shows negative relation. The dependent variable aggregate social efficiency (SE) shows an effect with the independent indicators

to test the significance of the type of institution and region. The type of order is followed by NBFC, Bank, Microcredit, Credit corporation, and NGOs which are the five types of microfinance institutions located in three different regions, Asia, Africa, Latin America, and the Caribbean. Table 8 represents the censored regression values, how the religious status depends on the explanatory factors.

Table 8. Censored regression to test social efficiency as a response variable.

Social Efficiency (θ_a) (127 MFIs)	Coefficient	Social Efficiency (θ_a)	Coefficient	Social Efficiency (θ_a)	Coefficient
Religion (faith)	0.04	Religion (faith)	−0.07 **	Religion (faith)	−0.05 *
Region	0.16 ***	Type	−0.01	Region	0.12 ***
	0.2 ***		−0.00		0.15 **
	−0.09 **		0.02		−0.06
Type	−0.02		−0.04		
	0.03		−0.05		
	−0.06				
	−0.09 **				
	−0.17 **				
Cons	0.63 ***		0.51 ***		0.57 ***

Legend: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

6. Discussion and Conclusions

This study examines the cross-country efficiency analysis of 127 MFIs followed by the religious beliefs and principles from 25 countries. In the literature section, we discussed the importance of women in microfinance and the religiosity effects from the published studies. The DEA is a meta-frontier approach that gained attention in determining the efficiencies with technological gaps in time series with the decision-making units (DMUs). The DMUs are the identities of organizations (financial institutions in our case) with heterogeneous financial properties from various groups and types of institutions (Walheer 2018), here the methodology is applied for the European data in different sectors. The cross-country dual efficiency scores from the first stage results show that social performance is weaker in traditional institutions and financial performance is greater and vice versa. It is also observed that the change in selecting variables does not lead to a change in the efficiency score. This observation leads to the general suggestion that management is inefficient to maintain the outreaches accurately. The conclusion also reaches the management is well established to collect the revenues (loans, interest, profits, etc.) or the clients are more responsible with their repayment to main the health of the economy. The Tobit random effect model uses the efficiency scores (social efficiency, in Table 7) to check the effectiveness of the explanatory indicators. The religion, type of the MFI, and location are artificially created dummy variables chosen in groups to establish a relation between the explanatory factors and the efficiencies (SE). The observation is made with the change in the group, there is a change in the significance level. The main intention is to determine the faith and secular performances, and it is observed with the cross-sectional efficiency scores the financial efficiencies show positive significance level at 0.95 and 0.90 but there is no strong significance level at 0.99. If the microfinance institution is healthily maintained with both social and financial outreaches, there is a high significance to determine the religious status will have stronger significance either financially or socially.

The religious factors have positive aspects to certain limits in accessing the loans, indeed the household poor can gain in their business establishments (women). It is well-known from the literature studies that women are more in accessing loans and good in their repayments. When it comes to traditional organizations, there are several formalities for loan assessment and therefore social outreach can damage in the rural areas where there is an absence of absolute empowerment. The financial organization has strategic moves but if there is no sufficient repayment rate in both secular/faith-based MFIs it leads to

negative financial health. Therefore, the efficiency determination should be explored by consideration of the repayment rate in MFIs in future studies.

Microfinance organizations are vanishing the barriers with digital approaches. Although we analyzed with other variables (input and output factors), the results lead to the same conclusions with efficiencies. There should be a combination of dual efficiencies along with technical efficiency which would conclude better results in minimizing the resources in religious and secular microfinance institutions.

The efficiency analysis and regression dealt with the religious, locality, and type of institution factors. There are only a few studies concentrated purely on religious institutions because the count (of religious MFIs) is small in some countries. There is a scope to analyze the performances by considering and concentrating on religious institutions irrespective of religiosity, along with the technical performance.

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Notes

- 1 NBFC—Non-bank Financial corporation.
- 2 NGO—Non-Government Organization.
- 3 ROA—Return on Assets.
- 4 ROE—Return on Equity.
- 5 Data envelopment analysis—constant return to scale.
- 6 All three external variables.
- 7 Two external variables individually.

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