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# How Productive Are the Microfinance Institutions in Bangladesh? An Application of Malmquist Productivity Index

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## Abstract

The poverty reduction and financial inclusion of Sustainable Development Goals (SDG) by 2030 can be significantly facilitated by the microfinance industry. However, it is pertinent to assess the sustainability of microfinance institutions (MFIs) in serving this purpose. The estimation of productivity of MFIs in Bangladesh gives a glimpse of their ability to fulfil the dual objectives of financial sustainability and social outreach. Hence, this study aims to measure the productivity of MFIs in Bangladesh using secondary data obtained from the Microfinance Information Exchange (MIX) market. The study employs Malmquist Productivity Index (MPI), which is an extension of the Data Envelopment Analysis (DEA) to estimate the overall, social and financial productivities of 26 MFIs in Bangladesh during the period from 2009 to 2018. In general, this study revealed that majority of the MFIs' overall productivity score varies between 0.9 and 1.20. Moreover, we observed that the social and financial productivities of MFIs in Bangladesh progressed during the entire study period, except for the years 2011 and 2017. This development may be attributed to the average growth in catch-up and technological effect witnessed during the study period. The study has also applied sensitivity analysis by changing the output to evaluate the robustness

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of the overall productivity results; consequently, the new estimates followed a similar pattern (mostly) and further corroborate the outcomes of this study.

**JEL Codes:** C14, O43, G21

### **Keywords**

Microfinance, productivity, microfinance institutions, Malmquist productivity index, Bangladesh

## **Introduction**

In line with the 2030 agenda for sustainable development goals, the world leaders have also expressed their commitment to end the vicious circle of poverty and achieve financial inclusion for all. One of the potential catalysts in the timely achievement of such a goal is the microfinance, previously known as microcredit. The non-conventional institution is the brainchild of Professor Muhammad Yunus who in the mid-1970s positively transformed the lives of the poor from an impoverished village of Bangladesh by offering them financial support in a form of microcredit to expand/start entrepreneurial activities (*The Guardian*, 2017). Consequent to the productive effect of the initiative on poverty reduction via entrepreneurial development, it gained popularity worldwide and attracted many international recognitions. Initially, microfinance was heavily financed by donors' fund; however, foreign donation has recently become scarce due to global financial slowdown (Banna et al., 2019). Still, several donor agencies and benevolent societies provide financial support to MFIs in a struggle to ensure economic development and reasonable financial inclusion of the poor people around the world.

Microfinance has transformed over the years and incorporated several financial products and services in its portfolio, such as loan and saving products, insurance facilities, mobile financial services, remittance services, micro leasing, etc. The loan products include term loans, entrepreneurial and housing loans, children education loans, post-disaster loans, etc. The microfinance institutions (MFIs) also offer a wide range of saving products, such as flexible savings, daily or weekly savings for small earners, term deposits, fixed deposits, saving schemes for seasonal entrepreneurs and statutory savings to safeguard the loan products. The demand for microfinance has not only increased among the poorer households but also among the relatively wealthier clients due to the relevant banking services offered by the MFIs in recent years. This rapid growth in financial inclusion through microfinance has brought significant changes to the financial landscape of many developing countries.

Concomitantly, the dual objectives of social and financial sustainability of MFIs have been a topic of interest among researchers and scholars at least for the past two decades (Allet, 2014; Dorfleitner et al., 2017; Kar, 2013). There is concern of 'mission drift' among the MFIs; in other words, a trade-off is observed

between the MFIs' goals of social outreach and financial sustainability in a bid to meet the demands of the concerned stakeholders, such as clients, owners, donors and regulators of microfinance. This situation depicts the struggle of MFIs to attain financial sustainability via costly external financial sources like commercial debt (Mia & Rana, 2018), thereby hampering the social outreach mission of MFIs.

In a bid to remain relevant in the competitive market, many MFIs have diverged from their main mission towards profitability, which triggers severe competition with a lasting negative consequence on MFIs. As a result, MFIs started to impose a high interest rate, ranging from 20% to more than 80% (Helms & Reille, 2004). Moreover, financial support to the hardcore poor, especially in the remote villages, was largely ignored, despite their huge financial demand. More specifically, out of around 170 million people in Bangladesh, 57.8 million people who are aged 15 years or above are reportedly unbanked by any financial institution, and 24.3% of the total population lives in poverty (World Bank, 2018; Bhuiyan, 2018). Despite the unfavourable conditions, some MFIs have sustained their productivity and profitability via efficient management of their operating expenses (Hermes et al., 2011; Rhyne & Otero, 2006). Hence, many practitioners, scholars, academics and regulators are critically and carefully investigating the sustainability of MFIs, of which productivity remains a crucial determinant. In other word, a productive MFI can attain sustainability by minimizing its cost of operation and/or maximizing its output via utilization of its scarce resources.

Hence, this study investigates the productivity of MFIs in Bangladesh. In doing so, we also estimated the financial and social productivity in line with the two main objectives of MFIs to examine the existence of any conflicting or complementary relationship between the two. To further validate our results, we reassessed productivity using alternative outputs. This study will contribute to the existing literature on the productivity assessment of MFIs in Bangladesh and also aid the concerned authorities in drafting favourable policies towards the sustainability of the industry. Subsequently, the remainder of this study presents a brief overview of microfinance in Bangladesh, followed by a brief literature review, methodology, results, analysis, conclusion and, finally, recommendations for MFIs in Bangladesh.

## **Microfinance in Bangladesh**

The independence war of Bangladesh in the early 1970s posed a major catastrophe to every aspect of the country's development, resulting in the return of several scholars, including Professor Muhammad Yunus who was the pioneer of microfinance, in a bid to rebuild the country. In the mid-1970s, Muhammad Yunus came up with the idea of microfinance to provide financial support and, consequently, promote entrepreneurial activities among 42 poor women in a village called Jobra in Chittagong, Bangladesh. Subsequently, he institutionalized and expanded the microcredit programme along with the government support, resulting in the official establishment of the 'Grameen Bank' in 1983 through 'The Grameen Bank Ordinance, 1983'.

Afterwards, the success of the microcredit programme inspired other institutions to support and participate in the novel financial development process. Needless to say, the development of microcredit programmes was initially met with several challenges, including timely criticisms from the radical Islamic groups for its promotion of financial inclusion and empowerment of poor women. The triumph of microcredit became more apparent in Bangladesh, following the pronouncement of Professor Muhammad Yunus and Grameen Bank as the winners for the 2006 Nobel Peace Prize for their remarkable contributions in alleviating poverty among the poor through microfinancial inclusion.

However, MFIs in Bangladesh, over the years, have diversified their financial and non-financial services. Today, there are hundreds of regulated and unregulated microfinance organizations operating in Bangladesh. According to MRA (2018), in 2018, the microfinance industry had served more than 31.22 million clients through its diversified financial and non-financial services. Consequently, MFIs have succeeded in actualizing the financial inclusion of huge proportion of people who are largely sidelined in the formal financial intermediaries for their lack of physical collateral. The MRA (2018) database revealed that, as of June 2018, the microfinance sector had produced about US\$7.95 billion outstanding loan and also created savings of US\$3.10 billion. The fund composition of the microfinance sector in Bangladesh includes savings collected from the borrowers, the share of cumulative profit, soft loans from Palli Karma Sahayak Foundation (PKSF), donations from national and international bodies and borrowings from the commercial banks (MRA, 2018). Despite having limited foreign donations, MFIs in Bangladesh witness yearly growth in terms of the total outstanding loans, number of clients and the total amount of savings (MRA, 2018). Therefore, it is necessary to investigate the productivity of MFIs to better understand and identify their strengths, weaknesses and opportunities.

## **Brief Literature Review**

The dual objectives of MFIs have been a matter of concern among managers, academics and policymakers. Since foreign donations have significantly dwindled in recent years, MFIs are at risk of financial distress. Consequently, the prime focus of MFIs (majority) has shifted from serving the poor via financial inclusion to achieving profitability/financial sustainability. One of the potential reasons behind this is due to the reliance of expensive sources of funds to support the ongoing growth of MFIs. As a result, MFIs charge exorbitant interest rates, which often raise the cost of borrowing for the clients (Mia & Rana, 2018). Lately, the management of MFIs have focused more on ensuring cost-effective management of their regular operations to earn more profit.

Thus, MFIs now focus more on increasing productivity in order to enhance and broaden the financial inclusion of the poor (Mia & Soltane, 2016; Wijesiri & Meoli, 2015). Generally, firms take major decisions, about the key future strategies, based on their estimated level of productivity. However, the productivity of MFIs mainly refers to their efficient operational dynamism, especially in

providing services (financial and non-financial) to the poor in an effective manner. Besides, MFIs need to gauge their level of productivity for several reasons. First, it allows them to determine their current state of performance in the competitive market. Second, MFIs will also be able to examine the sources of their productivity progress or regress. Third, MFIs will be able to adjust their policies or offer corrective measures according to their level of productivity. Due to these significant benefits, the estimation of productivity of MFIs had been investigated in the current literature from various perspectives (Bassem, 2014; Mia & Chandran, 2016; Mia & Soltane, 2016; Rana et al., 2019; Wijesiri & Meoli, 2015).

The productivity of MFIs can be estimated using parametric or non-parametric approaches, depending on the spectrum of the researcher. Some of the recent studies have examined the productivity from different contexts. For example, Mia and Soltane (2016) explored 50 South Asian MFIs and found that MFIs in that region had witnessed 2.1% productivity for changes in technical efficiency. Another study conducted by Mia and Chandran (2016) has attributed the increase in productivity of MFIs in Bangladesh to improved management and technical efficiency changes—TECs. Also, Bassem (2014) revealed that the productivity of MFIs in the Middle East and North African (MENA) region witnessed 4.9% changes in the total factor productivity (TFP) due to changes in technical efficiencies. Recently, the productivity of MFIs in Palestine and Jordan revealed a 2.6% increase in TFP per annum, owing to technological change—TC (Rana et al., 2019). Furthermore, Ambarkhane et al. (2019) found that Indian MFIs' TFP has increased by 19.9% (mean value) during their study period from 2012 to 2016. The decomposition of their TFP further suggests that TC, pure technical efficiency and scale efficiency had improved by 12.8%, 2.5% and 3.7%, respectively.

Interestingly, some studies highlighted TCs as being the main sources of TFP growth for MFIs in countries such as China, Palestine, Jordan and Kenya, among others (Mia et al., 2018; Rana et al., 2019; Wijesiri & Meoli, 2015). However, in a comparative study between Bangladesh and Indonesia, Jaiyeoba et al. (2018) discovered that productivity growth in the Bangladeshi and Indonesian microfinance market was attributed to the enhancement in management practices, while TC regressed on average during the period from 2007 to 2011.

## **Methodology**

To measure the overall productivity of the selected MFIs in Bangladesh and further understand the factors (decomposition results) influencing the growth or fall of productivity of a Decision-Making Unit (DMU) during the study period, we utilized the Malmquist Productivity Index (MPI), which is an extension of Data Envelopment Analysis (DEA).

### ***Data and Its Sources***

The data used in this study were obtained from a secondary source commonly known as the MIX, a market database for global MFIs. Researchers have relied

extensively on this source since early 2000 for various research niche of microfinance due to the standardization, authenticity and reliability of its data (Ambarkhane et al. 2019; Jaiyeoba et al, 2018; Mia & Soltane, 2016; Wijesiri & Meoli, 2015). After our initial exploration, we finally selected 26 MFIs from Bangladesh and acquired data for the period from 2009 to 2018.

Initially, we considered the inclusion of large number of MFIs and data of longer time period. However, the selection of MFIs/DMU and time period for the study depend on the availability of data, as conventional MPI requires that all the input and output are observed throughout the study period. Due to voluntary nature of data submission to MIX market, only few Bangladeshi MFIs regularly submit their data to the platform. Hence, we were unable to gather data from more MFIs despite the several hundreds of MFIs currently operating in Bangladesh. However, we observed that majority of the DMUs in our lists of selected MFIs emerge among the top 20 MFIs in Bangladesh based on client base and loan outstanding MRA (2018). Having said that, in terms of number of borrower (member), our sample captured around 74% of the overall microfinance market in Bangladesh. Regardless, the data collected from 26 MFIs were sufficient, as it fulfils the minimum number of required DMUs (Golany & Roll, 1989) and also exceed the sample size provided in the similar studies of Jaiyeoba et al. (2018); Ambarkhane et al. (2019); Wijesiri and Meoli (2015) who utilized MPI to estimate productivity. Moreover, the time period covered in our study was longer than any of the above studies. Despite this, we acknowledged the need to treat the findings of this study with caution, as it does not fully represent the diverse microfinance industry in Bangladesh.

### *Data Envelopment Analysis and Malmquist Productivity Index*

This study employs DEA method, a non-parametric and linear programming-based technique used extensively in the banking and finance literature to estimate productivity/efficiency (Sufian, 2011). A computer-based DEA Solver Pro software had been utilized to estimate the productivity of MFIs in this study.

In 1953, Malmquist established a measurement index for productivity, which was subsequently studied/extended by several authors and scholars and applied in the non-parametric framework to analyse efficiency/productivity of various sectors/industries. Among the extensions of Malmquist's work, the most cited are Caves et al. (1982), Färe et al. (1989, 1992, 1994) and Thrall (2000). Malmquist's index estimates TFP of the DMU to determine the growth or fall in productive performance and further reveals the changes in the frontier technology over time via observation of multiple inputs and outputs (Tone, 2004). MPI is defined as the product of catch-up (TEC) and frontier shift (TC), where catch-up/TEC refers to the extent at which DMU is capable of improving efficiency. On the other hand, the frontier shift/TC, also known as innovation term, demonstrates the changes in the efficient frontier among the DMU between the two time periods.

The productivity of formal and non-formal financial institutions can easily be measured using MPI. Charnes et al. (1978) recognized the appropriateness of MPI approach in measuring the productivity of non-governmental organizations

(NGOs). Mia and Soltane (2016) argued that the approach of MPI for measurement of productivity is favoured over other methods due to three elements. These are as follows: first, the price information of input and output are unnecessary; rather, it is determined by its quantity. Second, some of the behavioural assumptions can be relaxed under non-parametric analysis like DEA. Finally, it provides a better index decomposition that facilitates the identification of factor/sources affecting the productivity scores.

For brevity, a detailed empirical expression of MPI is excluded here. However, it could be found in the studies of Jaiyeoba et al. (2018), Ambarkhane et al. (2019) and Wijesiri and Meoli (2015), who had employed similar method to estimate the productivity of MFIs in recent years.

### *Selection of Inputs and Outputs*

In estimating the productivity of MFIs, special attention is paid to the balance selection of input and output to allow simultaneous capturing of the social and financial goals of MFIs. There remain several approaches to the selection of input and output for productivity and efficiency studies of MFIs. For example, some studies have considered production, asset and intermediation approaches to assess productivity (Haq et al., 2010; Kipasha, 2012; Sedzro & Keita, 2009). However, the choices of input and output are not only guided by these approaches but also the nature of operations and overall objectives of MFIs, which were also considered in our study due to diverse operations of the microfinance sector. Context wise, the operation of MFIs could fall under production and intermediary approaches (Gutierrez-Nieto et al., 2007; Mia & Chandran, 2016).

As far as the inputs are concerned, this study had taken two inputs based on the existing literature, namely personnel (STF) (Muneer Babu, 2016) and administrative expenses (ADEXP) (Kar & Rahman, 2018) as a proxy measure for labour and capital, respectively. Employees or personnel are the main drivers of MFIs, as they identify potential clients, disburse loans and collect instalments to ensure seamless operation of MFIs. Furthermore, MFIs need to bear the cost for administrative services related to loan screening, disbursement procedures, office rental, product developments, financing cost, etc. Thus, the overall administrative expense reflects the ongoing costs of productivity.

The output variables of this study were based on the dual objectives of MFIs. As an instance, we have considered financial revenue (REV) as an output, which is a widely used variable in the context of microfinance (productivity/efficiency) research (Mia & Soltane, 2016; Wijesiri & Meoli, 2015). Furthermore, under the social productivity dimension, gross loan portfolio (LOAN) and the number of depositors (DEPSTR) were considered as outputs (Kar & Rahman, 2018; Mia & Chandran, 2016). Since one of the core aims of MFIs is to provide loan services to its clients, LOAN could reflect the productivity of MFIs in this regard. Besides, depositors/savers were included as one of the social outputs because all MRA-registered MFIs in Bangladesh are allowed to mobilize deposits from their clients (Mia & Tabet, 2016). Moreover, savings also play a greater role in poverty alleviation. Hence, the operational agenda of MFIs is not only determined by its



number of loans or disbursed amount but also its depositor base in the market. Apart from these main output variables, two new outputs, namely the number of active borrowers (BWR) and the total amount of deposits (DEPS), were also added to the sensitivity dimension, based on the earlier study of Yaron (1994). The definition of input and output variables used in this study is presented in Table 1.

Due to the nature of the industry, managers of MFIs would be willing to maximize their output as much as possible without altering the input level. Thus, we have used an output-oriented and variable returns to scale (VRS) features of MPI in estimating the productivity of MFIs. In an output-oriented model, an inefficient unit is often made efficient via proportionate increase of its outputs without altering the input numbers. As an instance, the output unit can be improved by providing training and skill enhancement programme to the personnel. Similarly, technological intervention and better management practice may also enhance the output units.

## Results and Analysis

The descriptive statistics of the input and output variables, which were extracted from a total of 26 MFIs in Bangladesh, are presented in Table 2. We provide year-wise and overall descriptive statistics of each input and output used in the study.

**Table 1.** Input–Output Variables.

	Variable Name	Definition	Unit
Input	STF (personnel)	The number of individuals who are actively employed by an entity	Number
	ADEXP (administrative expense)	Non-financial expenses, excluding personnel directly related to the provision of financial services	USD (million)
Output	REV (financial revenue)	Includes all financial income and other operating revenue, which is generated from non-financial services	USD (million)
	LOAN (gross loan portfolio)	All outstanding principals due for all outstanding client loans, excluding written off	USD (million)
	DEPSTR (number of depositors)	The number of individuals who currently has funds on deposit with the institution	Number (million)
	BWR (number of active borrowers)	The number of individuals who currently has an outstanding loan balance with the institution	Number (million)
	DEPS (deposits)	The total value of funds placed in an account with an institution that is payable to a depositor	USD (million)

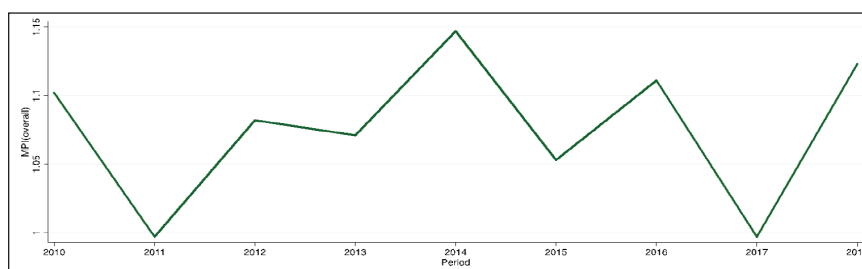
**Source:** The definition is based on Mix Market database.

**Note:** This table provides the definition of the input and output variables used in this study.

Then, the results of the productivity estimated by the MPI are discussed. It should be noted that the value of the MPI (also termed as TFP) later in the text, less than, equal to and above 1 represent the reduced/regressed, unchanged/stagnated and improved/progressed productivity, respectively. For ease of interpretation, first, the overall productivity of the MFIs has been estimated by combining the financial and social outputs. Second, the financial and social productivities were estimated separately, using the same input for both dimensions. Lastly, for robustness, two new outputs were considered to re-estimate the overall productivity without altering the input.

### Overall Productivity

Based on the average value of the sample MFIs, Figure 1 has been drawn to depict the trend of the overall productivity of the microfinance industry in Bangladesh, which was observed to have fluctuated throughout the study period. Furthermore, it can be said that the sampled MFIs in Bangladesh observed an average productivity growth of 7.6% per annum. Although the sample period, DMU, and country vary, the overall productivity performance among the Bangladeshi MFIs was relatively better than the Indonesian (Jaiyeoba et al., 2018), Middle East and North African (Bassem, 2014), Indian (Muneer Babu, 2016) and Yemeni (Al-Awlaqi & Aamer, 2019) MFIs. Furthermore, our obtained results are quite similar to the average annual productivity reported in the Kenyan microfinance industry (Wijesiri & Meoli, 2015), but they are lower than the productivity evaluated by Ambarkhane et al. (2019) in the Indian context. That being said, the years 2011 and 2017 recorded a negligible decline in productivity (less than 1, see Appendix A1), with 2014 being the highest. The highest productivity scores were attributed to the extraordinary average performance of several MFIs such as Eco-Social Development Organization (ESDO) (1.712, indicating a 71.2% progress),



**Figure 1.** Trend of Overall Productivity in the Microfinance Industry (2009–2018).

**Source:** Authors' estimate. The period should be read as 2 years. For example, the period 2010 indicates the productivity from 2009 to 2010. A similar explanation applies to the rest of the period.

**Table 2.** Year-Wise and Overall Descriptive Statistics of the Input and Output.

	STF	ADEXP	REV	DEPSTR	LOAN	DEPS	BWR	Statistics
2009	26	26	26	26	26	26	26	N
	3,719.192	1.860	23.068	1.070	90.178	69.628	0.790	Mean
	6,902.185	4.910	54.731	2.445	208.305	240.127	1.803	SD
	65.000	0.047	0.291	0.010	1.365	0.466	0.008	Min
2010	24,021.000	25.041	205.900	8.360	817.400	1209.000	6.430	Max
	26	26	26	26	26	26	26	N
	3,791.423	2.509	26.070	1.020	100.638	83.400	0.797	Mean
	6,885.904	7.177	60.757	2.295	228.534	293.659	1.771	SD
2011	70.000	0.061	0.350	0.012	1.585	0.468	0.008	Min
	22,458.000	36.524	243.900	8.082	939.100	1,487.000	6.610	Max
	26	26	26	26	26	26	26	N
	3,645.077	2.776	29.200	0.988	104.923	82.387	0.776	Mean
2012	6,457.986	7.752	68.367	2.151	231.504	283.785	1.708	SD
	65.000	0.058	0.295	0.012	1.585	0.498	0.009	Min
	22,128.000	39.527	279.800	8.195	920.700	1,437.000	6.580	Max
	26	26	26	26	26	26	26	N
2013	3,617.192	3.128	32.976	1.030	122.312	94.117	0.753	Mean
	6,316.117	8.821	74.928	2.262	257.869	324.392	1.640	SD
	71.000	0.063	0.405	0.012	2.039	0.675	0.009	Min
	22,261.000	45.134	300.700	8.309	1008.000	1,647.000	6.710	Max
	26	26	26	26	26	26	26	N

(Table 2 continued)

(Table 2 continued)

	STF	ADEXP	REV	DEPSTR	LOAN	DEPS	BWR	Statistics
2014	3,568.942	4.064	38.413	1.309	141,448	115.402	0.772	Mean
	6,166.469	11.187	85.512	3.157	296.476	381.208	1.669	SD
	83.500	0.089	0.539	0.013	2.360	0.861	0.010	Min
	21,851.000	56.270	340.700	13.675	1092.000	1,922.000	6.740	Max
	26	26	26	26	26	26	26	N
2015	3,731.462	3.302	44.230	1.021	175.890	135.423	0.836	Mean
	6,469.912	7.032	96.754	2.188	365.481	434.411	1.819	SD
	96.000	0.011	0.628	0.014	3.508	1.188	0.011	Min
	22,927.000	33.617	363.200	8.544	1176.000	2,181.000	7.030	Max
	26	26	26	26	26	26	26	N
2016	3,987.846	3.579	52.551	1.108	218.470	160.639	0.908	Mean
	6,782.725	6.680	112.337	2.333	449.604	502.451	1.952	SD
	141.000	0.110	0.846	0.026	3.984	1.447	0.019	Min
	25,420.000	31.075	371.800	8.663	1534.000	2,505.000	7.180	Max
	26	26	26	26	26	26	26	N
2017	4,263.462	4.459	62.022	1.184	269.826	181.229	0.967	Mean
	7,049.183	7.231	128.216	2.393	547.431	531.257	2.063	SD
	192.000	0.149	0.933	0.025	4.523	1.674	0.018	Min
	25,885.000	30.754	420.600	8.785	1919.000	2,605.000	7.290	Max
	26	26	26	26	26	26	26	N
	4555.942	10.468	73.849	1.258	301.938	193.128	1.029	Mean

(Table 2 continued)

(Table 2 continued)

	STF	ADEXP	REV	DEPSTR	LOAN	DEPS	BWR	Statistics
2018	7211.868	34.459	150.172	2.517	601.884	537.176	2.246	SD
	194.500	0.130	0.890	0.028	4.714	1.888	0.019	Min
	26147.000	176.100	497.600	8.908	2027.000	2,583.000	8.935	Max
	26	26	26	26	26	26	26	N
2009–2018	4628.846	31.669	87.644	1.686	328.999	205.997	0.990	Mean
	7179.241	140.684	185.859	4.265	637.660	546.442	2.093	SD
	197.000	0.139	0.912	0.028	4.904	2.103	0.020	Min
	26243.000	720.600	776.700	19.929	2425.000	2,594.000	8.112	Max
			Full Sample					
2009–2018	260	260	260	260	260	260	260	N
	3950.938	6.781	47.002	1.167	185.462	132.135	0.862	Mean
	6643.484	46.326	109.495	2.634	414.725	417.908	1.856	SD
	65.000	0.011	0.291	0.010	1.365	0.466	0.008	Min
	26243.000	720.600	776.700	19.929	2425.000	2,605.000	8.935	Max

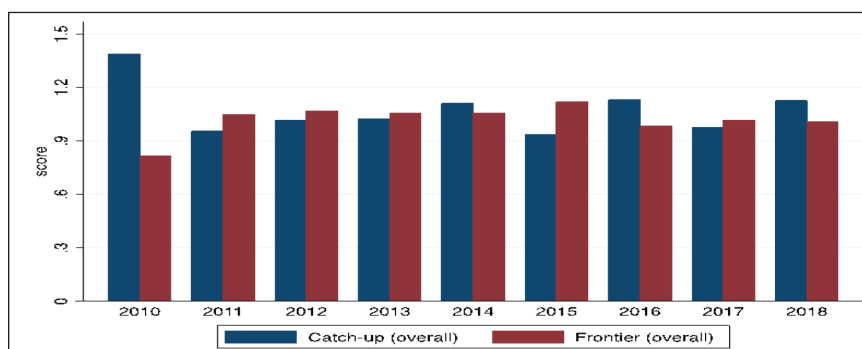
**Source:** Author's calculation based on Mix Market data.

**Note:** All values are in US\$ Million except STF. N, Mean, SD, Min and Max refer to number of observations, mean value, standard deviation and minimum and maximum value, respectively. The definition of all the variables is presented in Table I.

Society for Social Services (1.416) and Swiss Development Cooperation (SDC) (1.711) (these are based on the raw results of year wise productivity of each MFIs).

A significant advantage of using the MPI is that it allows the index to be decomposed to identify whether the catch-up (TEC) or frontier (TC) contributed to the regress or progress in productivity. Our decomposition results are somewhat mixed. For example, it can be observed from Figure 2 that the catch-up effect in overall productivity was higher in 2010, 2014, 2016 and 2018 than the frontier effect. In contrast, the productivity performance for the rest of the year was rather enhanced by the frontier effect, which is also referred to as TC. However, if the average as opposed to year-by-year contribution is considered, it will be observed that the catch-up effect contributes to about 7.3% per annum during the study period (see Table A1). However, the average frontier effect was relatively small in the overall productivity, as it was observed to be only around 2% per annum during the same period. Our findings of a higher contribution of TEC to the overall productivity progress are consistent with the earlier results of Jaiyeoba et al. (2018), and Mia and Chandran (2016) in the Bangladeshi context (sample size and period vary), but in contrast to the Indian microfinance industry (Ambarkhane et al., 2019).

The higher contribution to the catch-up effect could be linked with the long-term existence of microfinance in Bangladesh, whereby managers/employees have learnt how to efficiently convert input to output, based on accumulated hands-on experience over the years. Moreover, MFIs in Bangladesh have been experiencing a paradigm shift (regulatory aspects), and the decline in foreign donations (MRA, 2018) may have forced the management of MFIs to determine the best possible ways to deliver products to its clients at minimum costs. Consequently, the shortage and declining trend in donations may have forced MFIs to innovate in-loan products and the delivery mechanism. It is strongly believed that the overall technological evolution and rapid promotion of ‘Digital Bangladesh’ by the government in recent years has facilitated the usage of the



**Figure 2.** The Catch-Up (TEC) and Frontier (TC) in Overall Productivity (2009–2018).

**Source:** Authors’ estimate. The period should be read as two years. For example, the period 2010 indicates the productivity from 2009 to 2010. A similar explanation applies to rest of the period.

internet and mobile banking, and that the incorporation of technology in the operation of MFIs has likely contributed to the overall technological progress (frontier) in the microfinance industry. Therefore, MFIs that do not perform up to the intended level may incorporate inclusive and digitalized services in their operations. By doing so, their cost of operation would be minimized and their service coverage to a wider audience enhanced.

As we are also interested in the individual-level productivity of the sampled MFIs, Figure 3 has been drawn based on the annual overall productivity score (see Table B1 for overall individual productivity of MFIs). At an individual level, the productivity of MFIs varies to a significant degree over the years, and it is apparent from Figure 3 that a greater degree of variation among MFIs exists in the years 2014–2015 and 2017–2018 (except for the Samaj Kalyan Sangstha-SKS foundation in the 2013–2014 period). Among others, the SKS Foundation was observed to have progressed to 171%; Gram Unnayan Karma (GUK), 101%; and Rural Development Scheme (RDS), 116%, during the 2013–2014, 2014–2015 and 2015–2016 periods, respectively. On cross-checking their data, it was observed that these higher productivities were obtained by minimizing the inputs (e.g., staff) and increasing or maintaining the output levels. It was also observed in the study that the majority of MFIs recorded overall productivity score between 0.9 and 1.20 during the study period (see Figure 3).

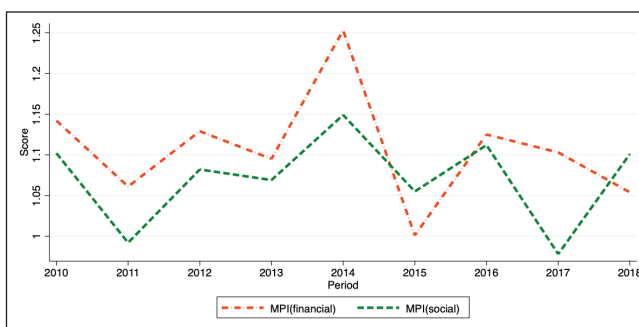
**Financial and Social Productivity**

After categorizing productivity into two dimensions based on the dual objective of MFIs, our findings documented that, on average, MFIs in Bangladesh achieved financial and social productivity progress in all the selected years, except for



**Figure 3.** MFI-Wise Overall Productivity Over the Years (2009–2018).

**Source:** Authors' estimate based on the DEA result.



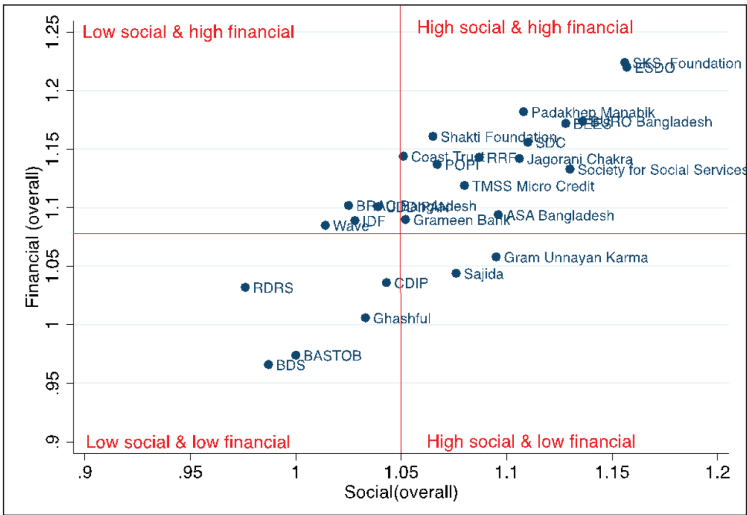
**Figure 4.** The Trend of Financial and Social Productivity (2009–2018).

**Source:** Authors' estimate based on DEA result. The period should be read as 2 years. For example, the period 2010 indicates the productivity from 2009 to 2010. A similar explanation applies to the rest of the period.

social productivity in years 2011 and 2017 (Figure 4). A similar productivity pattern could also be observed from 2010 to 2015, with financial productivity exceeding social productivity. Conclusively, the highest and lowest financial productivity progress were observed in 2014 (2013–2014) and 2015 (2014–2015), respectively. Our year-wise raw result revealed that a couple of MFIs like Shakti and SKS Foundation observed a relatively higher financial productivity (2.652 and 3.019, respectively), thereby resulting in an overall increase in the productivity level of the whole sample in 2014. The inspection of the raw data of these two MFIs revealed them to have slashed their input to a significant degree (e.g., employees and administrative expenses) and consistently maintained their output, which has resulted in their superior financial productivity. In contrast, Gram Unnayan Karma and RDRS recorded a very poor social productivity (0.386 and 0.381, respectively) in 2017, which is reflected in the overall regress of the social productivity in the whole sample.

As a promising result of financial and outreach productivities have been recorded, a step was taken further to identify the best practising MFIs. Therefore, a fourth quadrant has been drawn based on the average financial and social productivity scores of MFIs (Figure 5). An interesting finding is that only two MFIs (Sajida and Gram Unnayan Karma) achieved a high social productivity, while four MFIs (Initiatives for Development Foundation-IDE, Wave, Brac Bangladesh and United Development Initiatives for Programmed Actions-UDDIPAN) achieved high financial productivity without attaining high financial and high social productivities, respectively. If the results in the upper-left quadrant are strictly interpreted, it will be observed that the contained MFIs have focused more on their financial sustainability than their core objective of serving the poor. Nonetheless, it could also be noted that a total of five MFIs (Centre for Development Innovation and Practices-CDIP, Ghashful, Initiative for People's Self-Development-BASTOB, Business Development Services-BDS and Rangpur Dinajpur Rural Service-RDRS) achieved low social and financial productivities simultaneously. These MFIs require special attention for the improvement of their





**Figure 5.** Quadrant Analysis Between Financial and Social Productivity of MFIs.

**Source:** Authors’ estimate based on DEA result. The average values of the financial and social productivity of MFIs have been used to draw this figure.

**Note:** Except BDS and BASTOB, all other MFIs have observed overall (average) productivity progress as it is above 1 both for social and financial dimensions of productivity. Thus, in general, all of the MFIs (except BDS and BASTOB) are doing well (differences exist in magnitude) in achieving their dual mission.

overall performance, as the lack of due attention to their operational activities may hinder them from contributing (specifically BDS and BASTOB) to the society as they are supposed to.

Apart from these, all other MFIs are located at the upper-right quadrant (high social and high financial productivity), indicating that these MFIs could serve the poor and attain financial viability concurrently. Therefore, based on the overall results, our findings corroborate some existing literature, highlighting a no trade-off between the financial and social objectives of MFIs (also referred to as mission drift). Hence, the financial and outreach goals of MFIs could go hand in hand, as it has been observed that majority of MFIs have achieved high levels of financial and outreach productivities (see the upper-right-hand quadrant) in this study. Among the sample MFIs, the SKS Foundation and ESDO have been observed to have excellent productivity progress in the two different dimensions, and can be considered as benchmark/role models in the sector.

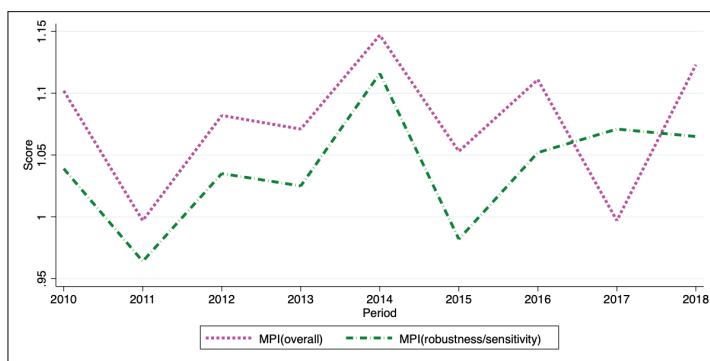
### *Additional Overall Productivity Analysis*

Since the DEA is a data-sensitive method, changes in the input–output combination could alter the result. Hence, many researchers have suggested undertaking some kind of sensitivity analysis to ensure that the findings are robust and remain

consistent regardless of the changing input–output combinations (Agarwal et al., 2014; Cooper et al., 2004). As cited in Agarwal et al. (2014), some of the commonly employed sensitivity techniques in DEA include varying the output values, excluding/changing the reference set, excluding super-efficiency DMUs, etc. Considering the relatively small number of DMUs and availability of data, the DEA model has been rerun by considering two new outputs (number of borrowers and the number of deposits), and the overall sample results are reported in Figure 6. It can be observed that the original and new estimates of overall productivity of the selected MFIs follow a similar pattern until 2016, reiterating the consistency of the earlier reported results. Thereafter, we observed that the overall productivity estimated by the new input–output set outpaced the original estimates for 2017. Nonetheless, the new estimate for the overall productivity between 2016 and 2018 was observed to have gradually increased, with the original estimate being almost a V-shape.

## Conclusion and Recommendations

The development of social indicators and micro-entrepreneurial activities is triggered remarkably by the rapid and continuous expansion of the microfinance sector in Bangladesh. This study has endeavoured to investigate the productivity of MFIs in Bangladesh, and some promising results are recorded. On average, most MFIs in Bangladesh remain productive despite the handful number of unproductive ones. The decomposition results in the study are somewhat mixed, indicating a higher catch-up effect in overall productivity in the years 2010, 2014, 2016 and 2018, more than it is in the frontier effect; however, the productivity performance of remainder years was bolstered by the frontier effect. However, the study observed that apart from the year-by-year performance, on average, the



**Figure 6.** Additional Sensitivity/Robustness Analysis of the Overall Productivity (2009–2018).

**Source:** Authors' estimate. The period should be read as 2 years. For example, the period 2010 indicates the productivity from 2009 to 2010. A similar explanation applies to the rest of the period.

catch-up effect contributed to about 7.3% (with the frontier effect contributing to only 2%) per annum over the entire study period. Therefore, it can be argued that the overall technological evolution in Bangladesh has enabled people to seamlessly access the internet and use the mobile banking platform extensively, and simultaneously, MFIs have incorporated smart and digital technologies in their operations, resulting in an overall technological progress (frontier) in the microfinance industry.

Although a greater degree of variation in the productivity of the MFIs was observed from the 2014–2015 to 2017–2018 period, the majority of the MFIs' productivity score (year wise) in the entire study period lie between 0.9 and 1.20. Moreover, it was also observed in the study that, on average, MFIs in Bangladesh had achieved social and financial productivity progress over the years except in 2011 and 2017. It was also observed that financial productivity often exceeded social productivity. Nevertheless, majority of the sampled MFIs are located at the quadrant of high social and financial productivity, indicating that these MFIs are able to serve the poor and attain financial objectives simultaneously. Finally, the results of this study are also supported by the robustness or sensitivity test, and the overall productivity of the original and new estimates of the selected MFIs were observed to follow a similar pattern for most of the years, which reiterates the consistency of the results.

This study recommends that MFIs that do not attain the expected productivity performance should integrate digitized services in their operations. Such an operational approach would benefit MFIs not only in the minimization of operational costs but also in the enhancement of their service coverage to a wider spectrum. Moreover, as the study has also identified several MFIs that focus more on financial goal than social, they should rectify their operational strategies and give equal weight to their dual goals. In this case, operational strategies of the benchmarking MFIs (e.g., SKS Foundation and ESDO) could be a good reference point. Nonetheless, user-friendly loans and savings services could also enhance social outreach productivity of MFIs by expanding and retaining the client base.

This study contributes to the existing literature on productivity estimation, especially in the microfinance sector. The outcome of this study can be considered as a reference point for MFIs operating in Bangladesh to better understand their current position and trajectory, and also make them aware of their strengths and weaknesses in their areas of operations. Moreover, findings of this study can help them in formulating the required strategies and policies to satisfy their social and financial objectives for future operations.

Indeed, this study has its limitations. The selected sample size is small when compared to the existing population, owing to the missing data from secondary sources. Despite considering limited MFIs, prominent and large NGOs were also considered in the study. MFIs operating in different parts of Bangladesh have made this study important and crucial to understanding the overall productivity of MFIs in the country. Nevertheless, this study opens opportunities for scholars and academics to further explore determinants of productivity through a second-stage analysis by incorporating some organizational, market and macro-level variables through a regression approach.

## Appendix A

**Table A1.** Year-wise Types of Productivity (2009–2018).

Year	Overall Productivity			Social Productivity			Financial Productivity			Productivity (robustness/sensitivity)		
	MPI	Catch-Up	Frontier	MPI	Catch-Up	Frontier	MPI	Catch-Up	Frontier	MPI	Catch-Up	Frontier
2010 (2009–2010)	1.102	1.388	0.817	1.102	1.388	0.816	1.142	1.458	0.812	1.039	1.393	0.774
2011 (2010–2011)	0.997	0.954	1.048	0.992	0.955	1.042	1.061	0.971	1.092	0.964	0.953	1.009
2012 (2011–2012)	1.082	1.014	1.069	1.082	1.015	1.069	1.129	1.004	1.124	1.035	1.077	0.970
2013 (2012–2013)	1.071	1.025	1.058	1.069	1.020	1.062	1.095	1.077	1.017	1.025	1.063	0.968
2014 (2013–2014)	1.147	1.111	1.058	1.149	1.116	1.056	1.253	1.060	1.173	1.116	0.941	1.174
2015 (2014–2015)	1.053	0.935	1.118	1.055	0.936	1.118	1.001	0.909	1.095	0.982	0.910	1.080
2016 (2015–2016)	1.111	1.131	0.985	1.112	1.128	0.988	1.125	1.133	0.993	1.052	0.999	1.062
2017 (2016–2017)	0.997	0.977	1.018	0.978	0.974	1.002	1.103	1.016	1.088	1.071	1.000	1.074
2018 (2017–2018)	1.123	1.126	1.009	1.101	1.110	1.002	1.054	1.093	0.965	1.065	1.140	0.938
Average	1.076	1.073	1.020	1.071	1.071	1.017	1.107	1.080	1.040	1.039	1.053	1.01

**Source:** Authors' estimate based on the DEA result.

## Appendix B

**Table B1.** Average Productivity Results of MFIs.

MFIs	MPI (overall)	MPI (financial)	MPI (social)	MPI(robustness/ sensitivity)
IDF	1.029	1.089	1.028	0.983
SDC	1.110	1.156	1.110	1.048
CDIP	1.041	1.036	1.043	1.031
Padakhep Manabik	1.159	1.182	1.108	1.134
BDS	0.987	0.966	0.987	0.957
Jagorani Chakra	1.106	1.142	1.106	1.100
UDDIPAN	1.040	1.101	1.039	1.033
TMSS Micro Credit	1.080	1.119	1.080	1.033
Wave	1.015	1.085	1.014	0.959
RRF	1.087	1.143	1.087	1.004
Society for Social Services	1.142	1.133	1.130	1.118
BEES	1.129	1.172	1.128	1.047
POPI	1.067	1.137	1.067	1.040
BASTOB	1.010	0.974	1.000	1.016
ASA Bangladesh	1.102	1.094	1.096	1.037
BURO Bangladesh	1.138	1.174	1.136	1.105
BRAC Bangladesh	1.047	1.102	1.025	1.045
RDRS	0.976	1.032	0.976	0.867
Coast Trust	1.052	1.144	1.051	1.018
Grameen Bank	1.068	1.090	1.052	1.090
Shakti Foundation	1.065	1.161	1.065	0.944
Ghashful	1.034	1.006	1.033	1.059
SKS Foundation	1.151	1.224	1.156	1.159
Gram Unnayan Karma	1.093	1.058	1.095	1.003
ESDO	1.171	1.220	1.157	1.081
Sajida	1.076	1.044	1.076	1.044

**Source:** Authors' estimate based on the DEA result.

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