Productivity Convergence of Microfinance Institutions:

The Role of Financial Performance and Inclusion

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ACRONYMS

API   Application Program Interface

CRS   Constant returns to scale

DEA   Data Envelopment Analysis

EFFCH   Technical efficiency change

E-KYC   Electronic Know Your Customer

FSP   Financial Service Provider

GLP   Gross loan portfolio

GDP   Gross domestic product

IMF   International Monetary Fund

LAC   Latin America and the Caribbean

MENA   Middle East and North Africa

MFIs   Microfinance Institutions

MIX   Microfinance Information Exchange

MPI   Malmquist Productivity Index

MSMEs   Micro small and medium enterprises

MFS   Mobile Financial Services

NBFIs   Non-bank finance institutions

NGOs   Non-government organizations

OSS   Operational self sufficiency

PECH   Pure efficiency change

ROA   Return on assets

ROE   Return on equity

SA   South Asia

SECH   Scale efficiency change

SFA   Stochastic Frontier Analysis

SMEs   Small and medium enterprises

TECHCH Technological change

TFPCH   Total factor productivity change

VRS   Variable returns to scale

Chapter 1 Introduction

1.1 Problem Statement

There is a widespread use of microfinance institutions (MFIs) in most developing regions. It is important to note that these institutions are not the same as conventional banks. The loan size of an MFI is smaller, and the risk associated with its credit is greater. MFIs provide loans primarily to the poor and to microenterprises. Thus, the rapid growth of microfinance is considered to be an effective development strategy to address the gaps in traditional banking. In developing countries with underdeveloped financial systems, where the majority of the population lacks formal access to credit, microfinance activities are predominantly concentrated.

Microfinance is deemed important as its contributions to four Sustainable Development Goals (SDGs), such as goals 1, 5, 8 and 10. The four goals are about no poverty, gender equality, decent work, and economic growth and reduce inequalities, respectively. Microfinance lending to poor borrowers and micro businesses contributes to financial inclusion and income generation for the borrowers. In the long run, this could help alleviate poverty (Imai et al., 2012; Khandker, 2005; Weiss & Montgomery, 2005). Moreover, women are the target clientele of most MFIs in developing regions. Thus, empowering women is one of the main features of microfinance lending (Hermes & Lensink, 2007; Weber & Ahmad, 2014; Aggarwal et al., 2015). The provision of financial services to microenterprises and small and medium enterprises (SMEs) assists in generating employment and long-term sources of income for the microfinance borrowers. Empowering the poor with financial resources can reduce inequality among the population.

It is imperative that these types of institutions exist in order to increase financial inclusion and meet the financial needs of unbanked populations. An assessment of their productivity is therefore crucial. Although there are different consensuses regarding the impact or the performance of MFIs, the statistics show that the industry is expanding with an increase in borrowers. By 2018, there were about 180 million microfinance borrowers all over the world (Stephens & Khemar, 2019). As a result, the existence and sustainability of these financial intermediaries are extremely crucial. A vast number of researchers have focused on the microfinance concept by understanding its importance. The study also looks at one of most prominent and desirable aspects of microfinance as "performance". Performances that are efficient and productive are essential for MFIs to endure in the market as well as contribute to financial inclusion, poverty reduction, economic growth, etc.

There is a number of studies analyzing the performance using productivity in microfinance literature. Among them, most studies emphasize on financial sustainability and outreach of MFIs (Abdul & Munir, 2006; Cull et al., 2007, Lebovics et al., 2016; Churchill, 2020; Chauhan, 2021). However, the role of MFIs through financial inclusion has not been extensively studied. Furthermore, it is important to understand how MFIs complement small-scale businesses, otherwise known as microenterprises. In the developing world, the majority is engaged in microenterprises, which are critical to the development of financial inclusion and economic prosperity.

Figure 1 illustrates the gross loan portfolio based on the credit product of MFIs globally from 2007 to 2018. According to the trend in the graph, the gross loan portfolio of microenterprises is increasing over the time. In addition, the gross loan portfolio of SMEs is increasing too, but not as much as that of microenterprises due to the larger size of loans to

SMEs. Moreover, the gross loan portfolio for household finance indicates household purchases that do not include individual or household businesses. Those purchases are consumption, housing/mortgage, and other household financings (education, health, etc.). The time trend graph (Figure 1) illustrates that the low-income borrowers are continuingly getting access to loans to fulfill their household necessities too. Consequently, MFIs have been expanding their financial services throughout the years to benefit microenterprises, small to medium-sized enterprises, and households.

Figure 1 Gross Loan Portfolio Based on Three Main Credit Products of MFIs 2007-2018
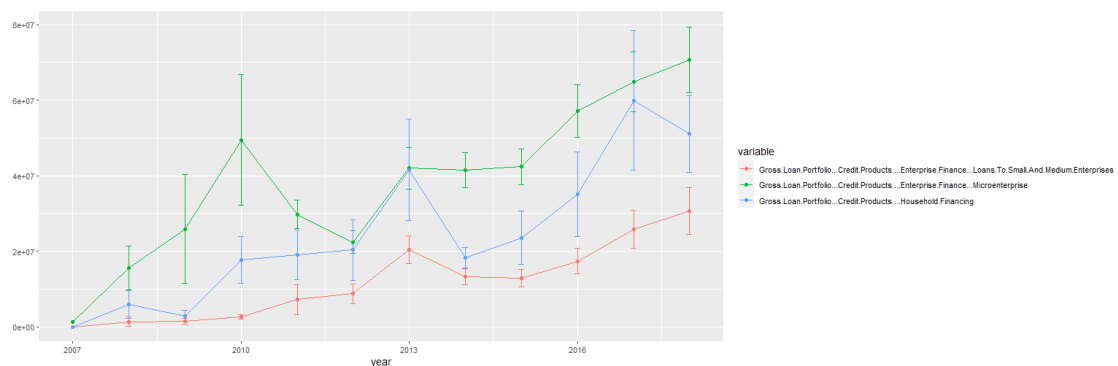
Notes: This graph is created from the MFIs who have provided the data to MIX database. There are number of MFIs who do not provide data to MIX. Thus, this is an overview based on the available data. In the graph, y axis indicates the value of the gross loa portfolio in USD.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

The thesis focuses on two regions in the world with distinct characteristics in terms of the microfinance industry, namely Latin America and the Caribbean (LAC) and South Asia. Microfinance emerged in LAC and South Asia in the 1970s, and both regions have since gained considerable prominence in microfinance. Even so, microfinance has developed several notable characteristics across both these regions. For instance, the microfinance sector in South Asia is largely rural rather than urban. According to Stephens & Khemar (2019),

South Asia has 72% active borrowers in rural while LAC has only 23%. It is also not surprising that the microfinance industry in South Asia grew out of poverty concerns since it emerged at a time when poverty was widely discussed. Nevertheless, the microfinance industry in LAC is more focused on providing financial products to microenterprises than combatting poverty. Thus, microfinance was introduced into LAC as a way for the informal sector to gain access to credit for starting successful microenterprises. LAC has very early embraced the notions of profitability and commercialization. Hence, Microfinance in LAC is also viewed as a branch of commercial banking, working more like a business.

It is crucial to measure the performance of MFIs in these regions in order to determine their sustainability and their contributions to financial inclusion through lending to microenterprises. However, it is important to respect the characteristics and the trends of microfinance industry in each region. In this study, only profit-oriented MFIs in LAC are being considered, due to the commercialization and the likelihood of a change in legal status. These findings provide insights into the performance of profit-oriented MFIs concerning their financial performance and financial inclusion initiatives through lending to microenterprises.

In contrast, most of the MFIs in South Asia are non-governmental organizations (NGOs)[1], and borrowers are poorer[2] than in the LAC. Hence, in the study of South Asia, the focus is not only on financial inclusion and financial performance but also on the social performance of both profit-oriented and not profit-oriented MFIs. The social performance of an MFI indicates serving the poor or the depth of the outreach. Other common indicators, which are being used by the microfinance literature to measure social performance, include

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[1] According to Global Outreach & Financial Performance Benchmark Report – 2017-2018 (Khamar, 2019), there are 84 NGOs active in microfinance industry in South Asia while 75 NBFIs, 19 banks, 3 cooperatives and 2 Rural banks.
[2] The average loan balance per borrower is 378USD while it is 2092USD in LAC (Khamar M. , 2019)

the proportion of women borrowers, the average loan size, and the percentage of borrowers living below the poverty line.

The main purpose of this study is to examine the convergence in productivity of MFIs in both regions in different performance aspects. However, the concept of productivity convergence has been under-discussed in the microfinance literature. Despite the previous studies examining the productivity and efficiency of MFIs, only one study that examines the convergence of MFIs (Li et al, 2019). An examination of how MFIs evolve in the sample is vital. For instance, it is important to understand whether the institutions grow or lag compared to the leading institutions in the region and whether the disparities among the institutions are widening or closing. Therefore, a thorough analysis of the productivity convergence of MFIs is crucial, since they are the financial institutions in many developing countries that provide services to the unbanked and small businesses.

1.2 Objectives of the Study

The aim of this study is to measure and explain the convergence of productivity in MFIs. Various aspects of productivity are assessed in two regions. The first analysis examines the financial performance and financial inclusion of LAC. In this particular case, the analysis focuses exclusively on the profit-oriented MFIs located in the region by analyzing the recent trends in the microfinance industry. The second analysis includes both profit-oriented and not profit-oriented MFIs in South Asia. Moreover, social performance is also considered in this analysis for South Asia.

The research questions for the thesis were developed based on the main objective of the study;

1. Is there a convergence in productivity change of microfinance institutions in the financial performance aspect?

    1.1 What are the determinants of productivity convergence or divergence in the financial performance aspect?

2. Is there a convergence in productivity change of microfinance institutions in the financial inclusion aspect?

    2.1 What are the determinants of productivity convergence or divergence in the financial inclusion aspect?

3. Is there a convergence in productivity change of microfinance institutions in the social performance aspect? (Only for the analysis in South Asia)

    3.1 What are the determinants of productivity convergence or divergence in the social performance aspect?

4. What are the differences and similarities between the productivity convergence/divergence patterns of microfinance institutions in Latin America and the Caribbean region, and South Asia?

1.3 Research and Methodology

This study mainly utilizes quantitative methodologies to answer the established research questions. In order to evaluate the changes in productivity, Malmquist Productivity Index (MPI) was used. The study uses the Malmquist Productivity Index (MPI) by (Färe et al. 1994). Moreover, Färe et al.(1992) decomposed the MPI into two components: technical efficiency and technological efficiency, two mutually exclusive components. Technical and technological change assist in identify the catching up and innovation, respectively (Färe et al., 1994). The model calculates the distance function and creates the production frontier using the data from

MFIs. The production frontier uses to compare the performance of MFIs relative to the best practicing MFIs lie on the production frontier.If an MFI moving towards the frontier implies "catching-up", and the shift of the frontier is "innovation". One of the advantages of MPI is that it allows to estimate the determinants of productivity change based on the decomposition of total factor productivity change as technological change and technical efficiency change. Moreover, the efficiency changes further decomposed into another two sections as scale and pure efficiency change.

Productivity convergence is measured using the results of the MPI. Conditional β convergence and σ convergence apply in the study to measure productivity convergence. MFIs with relatively low productivity change will experience β convergence when their productivity changes are more pronounced than the leading MFIs'. σ convergence identifies whether the dispersion of the efficiency scores diminishes over time. Although the two concepts are different, they are related and β convergence is essential but not the only reason for σ convergence (Sala-i-Martin, 1996).

1.4 Significance of the Study

In this study, the purpose is to evaluate the performance of MFIs across LAC and South Asia according to productivity change and convergence. The significance of each analytical chapter varies. There are only a few studies focusing on the productivity of MFIs in LAC. The majority of those studies examined the performance of MFIs from a financial and social standpoint, seeking evidence of the trade-off between the two. Despite the fact that MFIs in LAC provide more loans to microenterprises rather than to the poor, no study has been conducted on the financial inclusion aspect of MFIs in LAC. Therefore, this study focused on understanding

the performance of MFIs in LAC based on their financial performance and contributions to financial inclusion by lending to microenterprises. Moreover, productivity convergence is a new concept in the microfinance literature. In the existing studies, only one applies the convergence approach, Li et al. (2019).

The second analytical chapter is devoted to MFIs in South Asia, which is regarded as the origin of microfinance. In the region, several studies have assessed the performance of MFIs; however, there are a few studies that have focused on how MFIs promote financial inclusion by lending to microenterprises. The study aims to consider the nature of the microfinance industry in South Asia by categorizing the MFIs as profit-oriented or not profit oriented, and measuring the performance based on financial performance, social performance, and financial inclusion. In addition, an analysis of productivity convergence across all three aspects of the two different legal entities could provide a more accurate picture of how MFIs perform in the region.

1.5 Dissertation Structure

According to the thesis outline, Chapter 1 described the context, research gaps, questions, methodology, and contributions. The second chapter discusses microfinance literature in relation to performance. Within Chapter 3, the key methodologies of the study will be examined, as the Malmquist Productivity Index and convergence analysis. The first analytical chapter in Chapter 4 examines the profit-driven MFIs in LAC. Presented in Chapter 5, the second analytical chapter discusses profit-oriented and not-profit-oriented MFIs in South Asia. In Chapter 6, the conclusion, policy implications are presented.

Chapter 2 Literature Review

2.1 Structural Changes of the Microfinance Industry

It is well known that microfinance institutions (MFIs) are popular in developing nations as providers of financial services to the poor and micro businesses. Simply stated, it is available to people and businesses who do not have access to traditional banking systems that require collateral in order to lend. The promising nature of microfinance has inspired many countries around the globe to embrace this concept as a tool against poverty. A few decades have passed since the concept was adopted in many countries, and it has undergone some significant changes since its creation.

At first, we could identify the initial model as mainly NGO-driven, practicing group lending, and target rural poor with the intention of poverty reduction and expanding the outreach. The MFIs received support from the government or donor organizations due to financial instability. The high-interest rate charged by MFIs and the profitability attract diversified practitioners into the industry, and commercialization of microfinance has begun. This process changes some characteristics of microfinance as MFIs practice individual lending instead, changing the legal status which enables them to enter into the capital market, the introduction of diversified products rather than focusing on lending and savings, etc.

This study's main objective is to investigate how MFIs' performance and productivity can be converged for each analytical aspect. For example, chapter 4 (which focuses on Latin America and the Caribbean (LAC), discusses the convergence between financial performance and financial inclusion through lending to microenterprises. Chapter 5 (an examination of South Asia) examines the aspects of financial, social, and financial inclusion by examining lending to

microenterprises. In addition, two methods are used to measure performance based on productivity change and productivity convergence. The Malmquist Productivity Index (MPI) is utilized to measure productivity changes, and conditional β and σ are used to measure convergence. Accordingly, the literature review is dedicated to the performance factors examined in each of the analytical chapter, namely financial, social, and financial inclusion via lending to microenterprises.

2.2 Literature on Efficiency and Productivity of Microfinance Institutions

Numerous studies in the microfinance literature focus on the performance of MFIs aiming to achieve their dual objectives of financial sustainability and reaching a greater number of poor clients. Those studies try to contribute to the ongoing debate regarding the trade-off between dual objectives of MFIs. Some studies concluded that there is no evidence of a trade-off between MFIs, while some studies confirm the existence of a trade-off between the dual objectives of MFIs.

Several studies demonstrate the trade-off between dual objectives of MFIs. Gutierrez-Nieto et al. (2007) use operating expenses and the number of credit officers as two key inputs, and the number of loans outstanding, gross loan portfolio, and interest and fee income as three main outputs to assess the efficiency of 30 MFIs in LAC. The study employs the Data Envelopment Analysis (DEA) and reveals that efficiency is influenced by the institutional type and locations of MFIs. By utilizing DEAs, Haq et al. (2010) examined the cost-effectiveness of 39 MFIs in Africa, Latin America, and Asia. A prominent finding of the study is that NGO institutions are the most efficient. These institutions are also capable of meeting the dual objectives of microfinance (sustainability and poverty alleviation). Moreover, the study reveals that bank MFIs have better

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performance inefficiency under the intermediation approach. Study findings suggest that bank MFIs have access to a local capital market, and their financial intermediaries enable them to outperform NGO MFIs over the long run.

On the other hand, some studies suggest that MFIs' dual objectives are not mutually exclusive. The study by Adhikary & Papachristou (2014) shows that no statistically significant negative relation between outreach and MFI financial performance in South Asia between 2003 and 2009. With the aid of data from 28 MFIs in Vietnam employing the DEA approach, Lebovics et al. (2015) investigate whether social and financial efficiency are mutually exclusive in the context of inferred subsidies by international donors or the state. In the study, there is no evidence of trade-offs between dual objectives. Moreover, subsidies are helpful to high financial efficiency while attaining social goals too.

Besides investigating the trade-off between the dual objectives of MFIs, some studies examine productivity and efficiency based on the determinants. Using balanced panel data sets from 2006 through 2011, Bassem (2014) examines the change in the productivity of 33 Middle East and North Africa (MENA) MFIs by using the Malmquist productivity index by using balanced panel data set from 2006 through 2011. According to the study, the microfinance industry in the MENA region experienced a decline in overall productivity during the study period. In addition, the study analyzes the Malmquist productivity index and shows that MFIs in the MENA region are experiencing progress in pure technical efficiency rather than scale efficiency. Furthermore, the study concludes that MFIs must obtain technological progress to meet their dual objectives.

The Malmquist productivity index was used by Gebremichael & Rani (2012) to evaluate 114 Ethiopian MFIs' total factor productivity change. In this study, two inputs are similar to those

used in Gutierrez-Nieto et al. (2007) are used, and it is discovered that the Malmquist productivity change shows an average of 3.8% annually. In addition, the study points out that the primary source of growth in the total factor productivity is the improvement in technical efficiency. Lastly, the study concludes that technological progress is crucial to achieving MFIs' dual objectives of reaching financial sustainability and a greater number of poor clients. The study by An (2017) uses a Malmquist productivity index and examines the efficiency of MFIs in India throughout 2008-2012 and reveals a 0.3 percent decrease in productivity in Indian MFIs. The study also identifies those changes in technical efficiency, pure efficiency change, and scale efficiency change that contribute to the overall inefficiency. In addition, the study shows that profit institutions are more efficient than non-profit organizations in India. Azad et al. (2015) determined the Malmquist productivity index between 2008 and 2012 to analyze the performance of 15 MFIs in Bangladesh. Study findings indicate that the MFIs had efficiency progress of 93.5%, primarily attributable to pure efficiency improvements.

Using the DEA method, Nghiem et al. (2006) evaluated the technical and scale efficiency of 46 MFIs in the North and Central regions of Vietnam. The study uses three outputs, including borrowers, groups, and savers, and labor costs as well as non-labor costs as inputs. According to the study, the average level of technical efficiency is 80%, and the location and age of employees significantly impact technical efficiency. The study by Rana et al. (2021) measures the sustainability of 26 MFIs in Bangladesh between 2009 and 2018. MFIs' overall productivity ranged between 0.90 and 1.20. From 2011 to 2017, however, the social and financial productivity of MFIs fell.

This study is among the few studies that investigates the convergence of the performance of MFIs (Li et al., 2019). The study investigates whether there is any evidence of convergence of

MFIs and to what extent patterns of performance of MFIS converge over time. The study applies the intertemporal DEA approach to measure the efficiency and σ and β convergence to measure convergence. Further, the study applies conditional β convergence to understand how the convergence changes with condition variables. In the first half of the period, capital deepening accounted for the greatest improvement in performance; in the second half of the period, capital deepening and technological innovations increased performance. The study also finds that MFIs have increasingly converged over time due to integration, competition with commercial banks, and engagement with private investors.

2.3 Literature on Financial Inclusion Through Lending to Microenterprises

Numerous financial institutions and well-established financial systems throughout the world make access to financial services more accessible. In spite of this, the formal financial system fails to serve certain populations adequately. By ensuring their access to the financial system is affordable, financial inclusion can be achieved.

Financial inclusion can be defined as,

> "Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way"
>
> (World Bank , n.d.)

In light of this definition, individuals and businesses should be considered when discussing financial inclusion. The purpose of MFIs' loans is to generate revenues for creditors and at the same time, to ensure that the borrowers can repay the loans. As it pertains to financing businesses, MFIs are playing a crucial role, especially for microenterprises. According to Midgley (2008), microfinance and microenterprise programs should be viewed as an essential component of a

larger and more comprehensive strategy for combating poverty based on social development. This is due to the fact that most microenterprises belong to the low-income or the poor, and once they are given a source of income, they can sustain themselves in the long run. The development of microenterprises, therefore, has the potential to alleviate poverty and increase economic growth.

According to the World Bank (n.d), small and medium-sized enterprises (SMEs) account for the majority of businesses worldwide and generate economic growth and jobs. Globally, they account for more than 50% of employment and 90% of businesses. Up to 40% of GDP is generated by formal SMEs in emerging economies. This figure rises significantly when informal SMEs are taken into account. According to the World Bank, 600 million new jobs will be needed by 2030, which makes the development of SMEs a priority for many countries around the world. Seven out of ten jobs in emerging markets are generated by SMEs.

Some studies investigate how MFIs impact microenterprises or whether they are efficient in lending to microenterprises. In the studies related to the effect of microfinance on microenterprises, mixed results have been reported. There are also studies examining different aspects related to microenterprises. These include studies of women-led microenterprises, start-up microenterprises, etc. There is a recent study by Adusei & Adeleye (2021), which examines whether startup microenterprise financing influences microfinance institution financial performance. It uses data from 532 MFIs located in 73 countries. The results show that financial support for microenterprises makes it possible for MFIs to improve their financial performance. Combined interaction analysis of start-up microenterprise financing and MFI size suggests that start-up microenterprise financing has a negative impact on MFI financial performance. Therefore, larger MFIs would probably gain less by financing microenterprises at the start-up

stage. The study of Dhungana & Ranabhat (2022) examines the role of microcredit on micro-enterprise development in Nepal's Gandaki region by using 378 microfinance customers who have been receiving microfinance for five years or more. The research indicates that microcredit has played a significant role in the development of microbusinesses and enterprises through microfinance intervention. Microcredit has increased investment in revenue and profits generated by microbusinesses and expanded them while creating employment. Proper utilization of microcredit is critical to the success and sustainability of microcredit enterprises.

Furthermore, Ruslan et al. (2020) find that in Malaysia, SMEs having access to microcredit have higher sales than non-credit borrowers. The analysis reveals, however, that microcredit access has no effect on SME employment development. Another study based on Malaysia was conducted by Jalil (2021), to explore the influence of microfinance on the long-term development of Malaysia's rural micro-enterprises. The study shows that rural microenterprises developing through microfinance are more likely to succeed. Furthermore, digital finance plays a role in mediating the interaction.

Meanwhile, some studies have failed to find a positive impact of microfinance on microenterprises. Among the objectives of Awaworyi (2014) is to analyze the microfinance impact on microenterprises (a meta analysis), based on 25 empirical studies. However, the study confirms that there is insufficient evidence to establish the impact of microenterprises. In Surabaya, Indonesia, Atmadja et al. (2016) examined the impact of microfinance on microenterprises owned by women using 100 microenterprises. Attempts were made to determine how human capital, financial capital, and social capital impacted microenterprises. The study utilizes the probit model to analyze the findings. In this study, performance and financial capital

are negatively correlate, while performance and human capital are positively correlated. Furthermore, the study reveals that in the absence of higher returns, microcredit as a means to enhance business performance may not be a good idea.

In light of the literature, there are relatively few studies examining productivity changes in MFIs. Moreover, productivity convergence is a relatively new concept in microfinance literature. More importantly, investigations into the efficiency of MFIs in lending to microenterprises are leading the existing literature on microfinance in a new direction. In this study, productivity convergence is employed to analyze Latin America and the Caribbean region and South Asia in order to fill in the existing gaps and provide insight into microfinance literature.

Chapter 3 Methodology

3.1 Malmquist Productivity Index (MPI)

Performance can be defined as a relative concept. It can be either measured by the performance of one unit in the current year relative to the last year or relative to the performance of another unit in the current year. A natural way of measuring performance is using the productivity ratio, which is the ration of inputs to outputs (Coelli et al. 2005). It is not difficult to find the ratio when there is only one input and one output. Nevertheless, in practice, we have to deal with several inputs and outputs, and we can only use one index, which aggregates both inputs and outputs.

A number of different methods exist for measuring productivity. Four major methods of evaluating productivity can be named as essential: total factor productivity indices, least-squares econometric production models, data envelopment analysis (DEA), and stochastic frontiers. In comparison with the first two methods, stochastic frontier and DEA methods are highly employed in many studies due to their inherent limitations. The first two methods can be applied to aggregate time-series data, and the results provide the technical change or total factor productivity change. Moreover, both methods assume that the firms are technically efficient. On the other hand, DEA and stochastic frontier provide relative efficiency among firms and do not assume that the firms are technically efficient. Further, these two methods can be used to measure both efficiency and technical change for panel data (Coelli et al. 2005).

A Malmquist Productivity Index (MPI) is used in the study to measure productivity change across MFIs. This index was chosen for several reasons, including its ease of

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computation, its suitability in situations of multiple outputs, the need for no economic assumptions, and no specific form of estimation or a large number of observations. Additionally, MPI has applied to microfinance literature (See, for example, Rana et al., 2021; Lavanya & Mohini, 2021; Bassem, 2014; Ambarkhane et al., 2019).

The origin of the MPI can be identified as the input distance function in consumption analysis developed by Malmquist (1953). Caves et al. (1982) extended this framework to define a productivity index based on distance function. The Malmquist Productivity Index attracted widespread interest. There are two indexes related to MPI as Törnqvist productivity index by Caves et al. (1982) and the Fisher productivity index by Färe & Grosskopf (1992) and Balk (1993). Furthermore, MPI decomposes into various sources, as Färe et al. (1994) first showed. This study applies the Malmquist productivity index, which was introduced by Färe et al. (1994). MPI refers to a benchmark technology based on constant returns to scale, unlike best practices which are based on variable returns to scale. This convention provides the capability to incorporate scale economies, different from benchmark technologies based on best practices (Lovell, 2003).

Other factors that made MPI attractive for this analysis include its decomposition. MPI or total factor productivity change (TFPCH) is primarily decomposed into technological efficiency change (TECHCH) and technical efficiency change (EFFCH), which indicates the production frontier shift and catching up effect. Moreover, EFFCH further decomposes into pure efficiency change (PECH) and scale efficiency change (SECH), implying effective managerial decisions and operate in an optimal scale. Furthermore, this study uses the output-oriented Malmquist productivity index. The output-oriented measure defines how much

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output quantities can be proportionally expanded without changing the quantity of input used.

To define the MPI, we assume that for each period $t = 1, \cdots, T$, the production technology S^t model transformation of inputs $x^t \in \mathbb{R}_+^N$ into outputs, $y^t \in \mathbb{R}_+^M$,

$$S^t = \{(x^t, y^t): x^t \text{ can produce } y^t \qquad (1)$$

A feasible input vector and output vector are defined in Equation (1). The output efficiency of a unit is determined by the proportionate change in output amounts as compared to the output quantities achieved with frontier technologies. The output-oriented distance function at t is defined as follows (Shepherd, 1970; Färe et al., 1994);

$$D^t (x^t, y^t) = min\, \theta \{\theta: (x^t, y^t / \theta) \in S^t\} \qquad (2)$$

The radial distance is represented by θ . If $(x^t, y^t) \in S^t$ then $D^t(x^t, y^t) \leq 1$, and $D^t (x^t, y^t) = 1$ if and only if (x^t, y^t) is on the boundary. We can interpret MPI using the distance function in t and $t + 1$.

$$MPI^t = \frac{D^t \left(x^{t+1}, y^{t+1}\right)}{D^t \left(x^t, y^t\right)} \qquad (3)$$

$$MPI^{t+1} = \frac{D^{t+1}\left(x^{t+1}, y^{t+1}\right)}{D^{t+1}\left(x^t, y^t\right)} \qquad (4)$$

The geometric mean of adjacent periods as t and $t + 1$ is explained by equations 3 and 4. In equation 3, output-oriented distance function measures the geometric mean by referring to the technology in time t and equation 4 refers the technology in time $t + 1$.

After measuring the geometric means of two time periods, the MPI can be expressed as follows;

$$MPI = Technical\ efficiency\ change \times Technological\ change$$

$$MPI = EFFCH \times TECHCH$$

$$MPI(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \times \left[\frac{D^t(x^t, y^t)}{D^{t+1}(x^t, y^t)} \times \frac{D^t(x^{t+1}, y^{t+1})}{D^{t+1}(x^{t+1}, y^{t+1})}\right]^{1/2} \quad (5)$$

EFFCH plots the institution's position relative to the efficiency frontier, whereas TECHCH measures whether the frontier shifts over time in response to technological advancements. Technical change refers to the evolution of technology over time. A company that applies new technology is likely to be efficient as it minimizes input usage and maximizes output. Technological progress will also shift the frontier of production upward. A technological change indicates the firm's ability to keep up with modern technology, and panel data can be used to identify technological change (Coelli et al.2005).

By using CRS (constant returns to scale) and VRS (variable returns to scale) DEA frontiers, we can further decompose the EFFCH into two parts: scale efficiency (SECH) and pure efficiency (PECH). PECH is computed by estimating the efficient frontier (technical efficiency) and taking into account deviations from the frontier caused by managerial inefficiencies. Accordingly, SECH is determined by the ratio between overall technical efficiency (using CRS) and PECH, which indicates the institution's ability to select the optimal scale to operate at.

$$\text{PECH} = \frac{D_{VRS}^{t+1}(x^{t+1}, y^{t+1})}{D_{VRS}^t(x^t, y^t)} \quad (6)$$

$$\text{SECH} = \left[\frac{D_{VRS}^{t+1}(x^{t+1}, y^{t+1})/D_{CRS}^{t+1}(x^{t+1}, y^{t+1})}{D_{VRS}^{t+1}(x^t, y^t)/D_{CRS}^{t+1}(x^t, y^t)} \times \frac{D_{VRS}^t(x^{t+1}, y^{t+1})/D_{CRS}^t(x^{t+1}, y^{t+1})}{D_{VRS}^t(x^t, y^t)/D_{CRS}^t(x^t, y^t)}\right]^{1/2} \quad (7)$$

The MPI and its components can be used to analyze productivity trends and to determine why changes in productivity progress or regress. It is possible to identify the MPI results by evaluating its components. If the MPI or component's index is higher than 1, then there has been an

improvement in productivity change. Conversely, if the index is less than 1, then productivity change regresses, and if it is equal to 1, then productivity change continues as before.

3.2. Conditional β Convergence and σ Convergence

The concept of productivity convergence is relatively new concept in microfinance literature; however, it has been widely used to analyze a wide range of economic variables. In addition, there are a great number of studies in the banking literature that have applied the productivity convergence concept (For example, see, Matthews et al., 2010; Casu & Girardone, 2010; Tziogkidis et al.,2020). In terms of productivity change, convergence analysis is of great importance since it provides insights regarding the performance of the units in the sample (in this study, MFIs). The equitability of MFIs in efficiency will be a great asset to both their sustainability and their ability to serve low-income clients. Accordingly, the study assesses whether the lagging MFIs in the samples are catching up to the leading MFIs and the patterns of differences in productivity changes using standard deviation.

There are two main convergence approaches as σ and β convergence. This study uses conditional β convergence[3] and σ convergence to measure the productivity convergence of MFIs. The study uses the conditional β-convergence approach proposed by Barro & Sala-i-Martin (1992) and Sala-i-Martin (1996). MFIs with relatively low productivity changes will experience β convergence when their productivity changes are greater than the leading MFIs. To assess convergence of productivity change between $t = 0$ and $t = 1$, we can examine whether there is a negative relationship between the level of productivity change at $t = 0$ and the change in

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[3] There are two types of β convergence: absolute and conditional. In this study, conditional β convergence is used over absolute convergence to assess the influence of other variables on convergence and to increase the significance of the results.

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productivity change between 0 and 1. This study selects conditional β-convergence over absolute convergence by considering that the productivity levels of MFIs may differ on many other variables relevant to each country (macro-economic variables).

The following equation describes how to derive conditional β-convergence as:

$$\Delta \ln(y_{i,t}) = \alpha + \beta \ln(y_{i,t-1}) + \gamma z_{i,t} + u_{i,t} \quad (8)$$

In equation 8, $y_{i,t}$ indicates the productivity change and $\Delta y_{i,t}$ is the growth rate of productivity change in MFI i, at time t. Moreover, $z_{i,t}$ indicates conditional variables, $u_{i,t}$ is the standard error term, and α, β, γ are the parameters to be calculated. β convergence can be identified if the rate of change of productivity negatively correlates with the initial productivity level.

Apart from the β convergence, "half-life" is an informative parameter that measures the time that a representative MFI would halve the gap between the initial efficiency level and its final convergence equilibrium.

$$\text{Half-life} \; = \; \frac{\log 2}{\beta} \quad\quad (9)$$

A half-life usually measures the number of years. This parameter is essential for making policy-related decisions. In this study, the half-life calculates for all the components of MPI, which assists in understanding which component should be highly focused on to speed the convergence of productivity among MFIs.

Chapter 4 Productivity Convergence in Latin America and the Caribbean: The Role of Financial Performance and Inclusion

4.1 Introduction

Microfinance in Latin America and the Caribbean (LAC) appears to be dominated by commercialization. It reflects the high profitability, intensive competition, and supremacy of regulated MFIs relative to other regions (Christen,2001). Besides the commercial orientation, pliability, and sensitivity to customer demand, greater attentiveness to the urban context and its customers' heterogeneity are the other salient features of the microfinance industry in the region (Berger, 2006). The procedure of innovation in microfinance in the region intensified on feasible lending technologies for informal and small scale urban enterprises, allowing microfinance institutions (MFIs) to reach different population sectors that are considered to be unbankable (Navajas and Tejerina, 2006). The rapid entrance of new players into the market results in market penetration and, in some cases, market saturation (Christen, 2001).

The features of MFIs in the region create a different image than the original microfinance concept, which stemmed from Bangladesh in the 1970s. Initially, microfinance has mainly driven by welfare intention than profitability. Most of the microfinance practitioners were non-government organizations (NGOs) with financial assistance from donors or subsidized by the government. Over time, extensive changes in the structure of microfinance can be observed. Among the regions in the world, LAC is the region that shows many changes in its MFIs.

There are several important facts behind the focus on MFIs in LAC. According to Microfinance Barometer 2019, LAC has the largest outstanding loans ($43.8 billion) with the highest number of MFIS, 248 institutions and 22.2 million borrowers (second largest among the

regions). Nevertheless, the region continues to have the lowest penetration in rural areas (23% of rural clients). East Asia and the Pacific has the highest rural penetration (79%), while South Asia has 72%. The figures of the rural penetration lead us to think the MFIs in LAC have more attention on urban borrowers (around 77%). Not only the less rural penetration, other characteristics such as changing the legal status, increased competition, commercialization stimulate the importance of analyzing MFIs in LAC.

Figure 2 The Number of Microfinance Borrowers and Financial Service Providers (FSP) in LAC in 2017
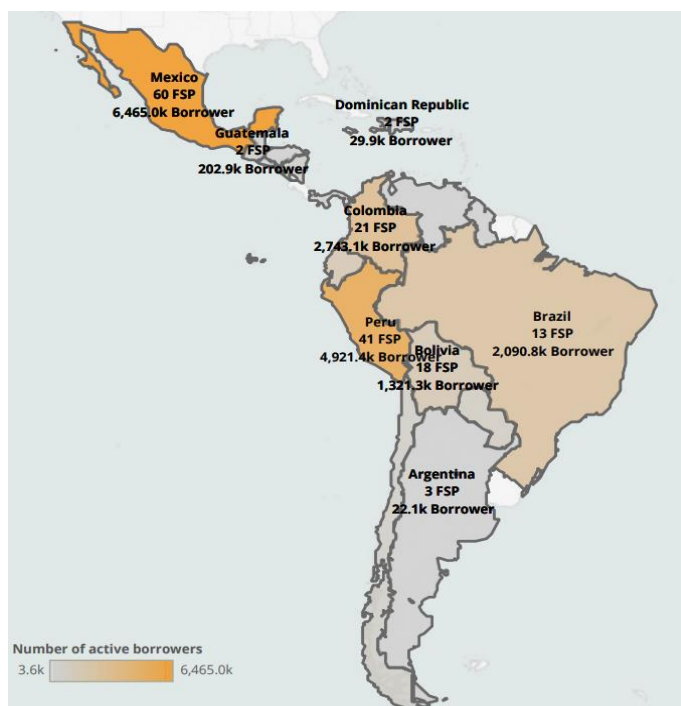
Note : FSP indicates Financial Service Providers and 'k' indicates, thousands

Source : Khamar, M. (2019). *Global Outreach & Financial Performance Benchmark Report 2017-2018.* New York , Washington DC: MIX. (p.21)

Figure 2 provides the number of bororwers and the number of financial service providers in each country in LAC[4]. By 2017, Mexico was the leading country in LAC with the highest number of microfinance borrowers and service providers, followed by Peru, Columbia, and Bolivia. Microfinance is practiced by various entities. In particular, profit and non-profit-oriented MFIs. For two reasons, this study examines only profit-oriented MFIs as non-bank financial institutions (NBFIs), commercial banks, and credit unions.

This study only focuses on profit-oriented MFIs due to several reasons. Firstly, financial inclusion is measured in this study through loans to microenterprises. Due to the fact that profit-oriented MFIs differ from NGO MFIs, which work primarily with vulnerable populations like the poor and disadvantaged women. The second reason is that MFIs in LAC use a greater percentage of commercial funds and have a greater amount of assets than MFIs in other parts of the world (Servin et al. 2012) as well as being under pressure to become regulated companies (Mersland & Strøm 2009). The microfinance sector has also become controversial in LAC due to the commercialization of MFIs. Upgrades and downscaling are important aspects of commercialization. It is becoming increasingly common for NGOs to upgrade their MFIs into formal financial institutions, whereas some banks are downscaling into the microfinance sector. BancoSol is an example of this phenomenon. It is Bolivia's first microfinance bank and was founded in 1992 by the non-profit organization Prodem. In light of changes such as changes in legal status, competition, and regulations, it is important to assess the performance of profit-oriented MFIs in the region.

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[4] The data is based on the MFIs which provided data for MIX data base. Thus, the data can be changed when considering all the MFIs in each country.

Furthermore, this research explores convergence in productivity in microfinance literature. An MFI should be efficient and productive to minimize costs, increase profitability (financial performance), and allow them to lend (in this case, to microenterprises). Microfinance as a whole is to be appraised from two perspectives, one relating to financial performance, and the other to financial inclusion through lending to the microenterprise sector. In spite of the fact that profit-oriented MFIs have distinct characteristics, it is imperative to understand their behavior and differences in efficiency and productivity changes.

Despite Li et al. (2019) incorporating the concept of productivity convergence into their study, this study focuses more on financial inclusion through MFIs than outreach or loan size. Thus, the research examines changes in productivity and convergence using a variety of approaches. An important method of measuring productivity is Malmquist Productivity Index (MPI) (see, for example, Bassem 2014; Wijesiri & Meoli 2015; Mia & Soltane 2016). The most significant benefit of MPI is that it can be broken down into four categories: technological, technical, pure, and scale efficiency. This study utilizes output-oriented MPI. Moreover, productivity convergence is measured by using conditional beta (β) convergence and sigma (σ) convergence proposed by Barro & Sala-i-Martin (1992) and Sala-i-Martin (1996).

Consequently, this study adds to the existing literature of microfinance in Latin America and the Caribbean in several important ways. Firstly, the study focuses on microenterprise lending as a means of financial inclusion. Studies on the performance of MFIs in lending to microenterprises are few. However, it has been indicated that LAC is different from other regions because microenterprise lending dominates the region. Secondly, the application of productivity convergence for profit-oriented MFIs in the region. As aforementioned, only one study has

applied convergence theory in microfinance literature. In addition, this study thoroughly investigates the convergence of the determinants of productivity change progress /regress.

4.2 Literature Review: Efficiency and Convergence of Microfinance Institutions in LAC

In studies evaluating the performance of MFIs across different geographical areas, only a small number of studies focus exclusively on LAC. Hassen & Sanchez (2009) investigated the technical and scale efficiencies of MFIs across types and regions in South Asia, the Middle East and North Africa and LAC in 2005. The study reveals technical efficiency is higher for formal MFIs than for non-formal MFIs. Moreover, South Asia has the highest technical efficiency among the three regions. Pure efficiency identifies as the main attribute of inefficiency in MFIs. A study by Serven et al. (2012) examines the ownership type and the impact on technical efficiency in the region, taking 315 institutions over the period 2003-2009, and finds that NBFIs and banks have more efficient operations than NGOs and cooperatives. The Färe–Primont index has been used in studies by Kar & Rahman (2018) to measure efficiency level changes within MFIs. The findings of LAC reveal that the annual TFP change of -2.355% from 2003 to 2013. Negative growth of TFP change is primarily caused by changes in scale efficiency and residual scale efficiency. Taking the size and age of MFIs into account, Wijesiri et al. (2017) confirm that MFIs in LAC performed better in financial efficiency; however they performed worse in outreach efficiency. In the study of Nourani et al. (2021), social, financial and operational efficiencies compare from 2013 to 2019 using regulated, and unregulated MFIs in different regions. The study reveals that LAC has outstanding operational efficiency levels and both regulated and unregulated financial institutions perform poorly on financial sustainability and efficiency in social outreach.

Nevertherless a substantial amount of studies related to efficiency and productivity exist in

the literature, and convergence analysis is still new to the microfinance industry. Li et al. (2019) examine the performance of MFIs in the financial and social domains. An intertemporal DEA method is used to analyze the performance patterns of 171 MFIs for 2003-2012. Overall, financial and social performances have improved, but financial performance stands out. The study uses 5-year sub-periods and identifies that capital deepening has a significant impact and technological innovations in the later years. Furthermore, among the regions, LAC and Eastern Europe, and Central Asia show a higher level of the financial production frontier while the social productivity frontier hardly shifts upward. More importantly, the study identifies that lagging MFIs are making significant improvements in productivity than leading MFIs (converging).

The discussion of the existing literature reveals that still there is a room for further researches regarding the performance of MFIs. The application of convergence and distribution analysis in microfinance is the main contribution of this study to the existing literature. The understanding of the behavior of the performance of MFIs may expand with more informative findings from the study.

4.3 Data and Methodology

4.3.1 Data

The study uses microfinance data from Microfinance Information Exchange (MIX, https://www.themix.org/). The data consists of 149 profit-oriented MFIs in 18 countries in LAC, spanning 2007 to 2018. Due to inconsistencies in the data, only 118 of these MFIs were considered in the financial inclusion calculations. MPI is calculated with DEAP software. To measure convergence, R 4.0.3 software is used, as well as the "missForest" package in R to impute missing data.

4.3.2. Variables

According to the study, the MPI is calculated with three inputs: number of loan officers, total assets, and cost per borrower. For the financial performance, four outputs are examined: operational self-sufficiency (OSS), return on equity (ROE), return on assets (ROA), and gross loan portfolio (GLP). Financial inclusion calculates by using three main variables: the number of loans to microenterprises, the gross loan portfolio of loans to microenterprises, and each MFI's active borrowers as a percentage of each country's population. Furthermore, to calculate conditional β convergence, a number of macro variables were used as conditional variables. Variables that are included are the financial development index, gross domestic product, domestic credit to the private sector (as a proportion of GDP), per capita gross domestic product, and real interest rates. The data is derived from World Bank and International Monetary Fund (IMF) databases.

An overview of the input and output variables of the MPI is presented in Table 1. There has been an increase in input variables between 2007-2018 (the number of loan officers, assets, and cost per borrower). One important factor has been identified as the rising cost per borrower. From 2007 to 2018, costs per borrower increased by 72%. The cost per borrower is derived by dividing operating expenses[5] from the number of active borrowers each year. The global financial crisis has been a factor affecting the performance of MFIs. The microfinance industry has been facing many challenges as a result of the economic crisis. There are many challenges in obtaining capital, including the high cost of funds, the rise in nonperforming loans, and a decline in expat remittances (Campion et al. 2010). Despite this, financial inclusion indicators have shown an

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[5] Operating expenses include personnel expenses, depreciation, amortization, and administrative expenses

upward trend. It is noteworthy that the analysis has an impact from the global financial crisis during 2008-2009. Real interest rate and growth in the gross domestic product can be identified as two variables that could address the impact of global financial crisis.

Table 1 Descriptive Statistics of the Variables

Year / Variable	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Input variables												
Loan officers	201	206	216	245	284	303	338	347	393	429	407	417
Assets (million, $)	85	96	121	152	180	219	238	241	247	275	305	328
Cost per borrower ($)	221	246	256	287	308	323	351	371	379	362	372	382
Output variables – Financial Dimension												
ROA (%)	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
ROE (%)	0.14	0.12	0.04	0.08	0.10	0.07	0.08	0.07	0.08	0.07	0.08	0.08
OSS (%)	1.19	1.16	1.11	1.19	1.15	1.13	1.14	1.13	1.14	1.13	1.13	1.13
GLP (million, $)	70.1	77.9	96.6	117	143	174	187	193	197	217	240	252
Output variables – Financial Inclusion Dimension												
Active borrowers / Population	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.005	0.005
Loan outstanding (microenterprises)	43600	46283	51953	63915	75527	80875	85554	87991	96086	98419	95986	95918
GLP (million, $) (microenterprises)	46.2	48	59	81	97	105	98	102	104	114	127	135

Notes: The descriptive statistics derive from using the data of profit-oriented MFIs in the sample. The input variables and output variables of financial performance are calculated using 149 profit-oriented MFIs, and 118 profit-oriented MFIs are used to calculate the variables of the financial inclusion aspect. ROA – Return on Assets, ROE- Return on Equity, OSS-Operational Self-Sufficiency (financial revenue as a percentage of total expenses), GLP – Gross Loan Portfolio. The definitions and the calculations of the variables are in the appendix section.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

4.4. Financial Dimension

4.4.1. Results of MPI – Financial Performance

The Malmquist Productivity Index (MPI) breakdown reveals changes in technological (TECHCH), technical (EFFCH), pure (PECH), and scale efficiency (SECH). Table 2 depicts the productivity change in financial performance for the period 2007-2018. TFPCH (0.969) indicates a regression in the average annual productivity change. This is consistent with Hassan and Sanchez (2009), Wijesiri et al. (2017), Kar & Rahman (2018), and Nourani et al. (2021) studies

that show regression in the average annual productivity change. The fact remains that none of the studies looked only at profit-oriented MFIs in the region.

Table 2 Results of MPI (2007-2018) – Financial Performance

TFPCH 0.969		
TECHCH 0.977	EFFCH 0.992	
	PECH 0.996	SECH 0.995

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

There is a regress in both main MPI components, TECHCH and EFFCH, corresponding to a 2.3% regress (0.977) and a 0.8% regress (0.992). Moreover, the decomposition of EFFCH reveals that its components, PECH and SECH, also display an annual average regress of 0.4% (0.996) and 0.5% (0.995), respectively. In addition, Hassan & Sanchez (2009) determined that PECH and TECHCH are the main predictors of the decline in TFP from 2001 to 2005. TECHCH is regressing from 2007 to 2018, suggesting a downward shift in the production frontier in the region. Since the production frontier is constructed by the best-performing institutions, the downward shift in the frontier illustrates deteriorating performance of the leading MFIs.

Additionally, when EFFCH is further decomposed, both PECH and SECH indicate a decline over the past 12 years. It suggests poor management practices and a failure to perform optimally by PECH and SECH. Consequently, MPI confirms the weaknesses of the profit-oriented MFIs in LAC in financial performance during 2007-2018 and the need to improve both technological and technical efficiency.

4.4.2. Results of Conditional β and σ Convergence

For the period 2007-2018, MPI index values are used to calculate conditional β and σ convergence. It analyses the productivity convergence or divergence of MFIs. The conditional β convergence analysis shows that all the components of MPI exhibit conditional β convergence (negative coefficients that are significant). Conditional β convergence indicates that MFIs with low productivity changes (lagging) grow faster than those with high productivity changes (leading). It takes 45 years for TFPCH to close the gap between lagging and leading MFIs, with a 1.5% rate of convergence. EFFCH and PECH, however, report a lower convergence rate of 0.9%, despite longer half-life years.

On contrary to the conditional β convergence, there is σ divergence for all the components in MPI. The existence of σ divergence suggests an increase in dispersion (standard deviation) across MFIs. SECH and PECH, two of EFFCH's variables, show the greatest dispersion in σ-convergence analysis. However, β convergence alone is not enough for σ convergence to occur (Sala i- Martin 1996, Higgins et al. 2008).

Table 3 Results of Conditional β and σ-Convergence – Financial Performance

Component	β	T value	Speed of convergence[6]	Half-life	R^2	σ-convergence		△ SD/2008
						2008	2018	
TFPCH	-0.14	-7.64***	1.5%	45	0.438	0.081	0.165	1.03
TECHCH	-0.11	-9.68***	1.2%	57	0.497	0.060	0.072	0.2
EFFCH	-0.09	-4.06***	0.9%	76	0.270	0.055	0.126	1.3
PECH	-0.09	-5.54***	0.9%	75	0.357	0.039	0.065	0.7
SECH	-0.12	-4.45***	1.2%	57	0.270	0.027	0.081	2

Notes: $p<0.01^{***}$, $p<0.05^{**}$, $p<0.1^*$. The figure shows the σ convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

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[6] The speed of convergence is calculated as, -ln(1+Tβ)/T.

There are two main reasons for the absence of either σ or β convergence. It may be because random fluctuations in $t = 1$ are relatively large, compared to what can contribute to the convergence process. Similarly, random fluctuations in the $t = 0$ could also account for the observed β convergence. There can also be systematic differences between σ and β convergence. The β coefficient is more sensitive to changes in productivity of MFIs that differ from the mean in $t = 1$, as opposed to MFIs that are close to the mean. MFIs in the tail of the distribution tend to converge to the average, whilst those in the middle diverge from it, resulting in considerable β convergence and σ divergence. In other words, σ divergence does not necessarily imply the absence of convergence of MFIs, while significant β convergence is not a guarantee of convergence of MFIs.

In the case of conditional β convergence with respect to financial performance, the results indicate a different picture compared to Li et al. (2019). The study confirms β convergence for LAC (all types of MFI sampled). A key point to note is the use of the intertemporal DEA method and decomposition of efficiency into three dimensions: learning, capital intensity, and innovation. Capital deepening is the key factor contributing to convergence in financial performance in LAC, followed by learning and innovation.

4.5. Financial Inclusion

4.5.1. Results of MPI- Financial Inclusion

A total of 118 MFIs in the region are used to measure MFI performance in the financial inclusion dimension. By breaking the MPI into components, technological (TECHCH), technical (EFFCH), pure (PECH), and scale efficiency (SECH). MPI (table 4) shows that annual

productivity changes between 2007 and 2018 declined by 0.7 % (0.993). Even so, TECHCH shows an annual average increase of 0.6% (1.006). While TECHCH increased, the decline in productivity change (TFPCH) explains the more significant impact of the decrease in EFFCH. Accordingly, PECH and SECH are regressing on efficiency change by 0.6% (0.994) and 0.7% (0.993), respectively.

Table 4 Results of MPI – Financial Inclusion

TECHCH 1.006	EFFCH 0.987	
	PECH 0.994	SECH 0.993

The top of the table reads: TFPCH 0.993

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

In this region, MFIs fail to utilize inputs to achieve desired outcomes (number of loans to microenterprises, gross loan portfolio of loans to microenterprises, and number of active borrowers as the percentage of population); in other words, technical inefficiency. Technical inefficiency is comprised of two parts: inefficient scale and poor managerial practices (pure technical inefficiency). With EFFCH declining, productivity change among MFIs is more heterogeneous, which means the average MFI is further away from the production frontier.

According to MPI of the inclusion aspect, the TFPCH value is 0.993 in comparison to 0.969 for financial performance, and the production frontiers moved upward from 2007-2018. However, the financial inclusion aspect is associated with a lower efficiency change (a regression) for EFFCH (0.987). Profit-oriented MFIs in LAC are therefore perceived to be underperforming in both financial performance and inclusion, a finding that is similar to that of Nourani et al. (2021).

4.5.2. Results of Conditional β Convergence and σ-Convergence

A convergence analysis of the productivity change in the financial inclusion aspect is depicted in Table 5. The results indicate both conditional β and σ convergence. According to the convergence analysis for financial inclusion, we can see that previously lagging MFIs are gaining momentum at a much faster pace than previously leading MFIs. Within 59 years, the difference between leading and lagging MFIs can be halved. In comparison with other MPI components, EFFCH and its components (PECH and SECH) have a low speed of convergence (1%). In addition, the dispersion of the distribution is falling during the study period, while SECH and TECHCH report increases in the dispersion (σ-divergence) in financial inclusion.

Table 5 Results of Conditional β and σ Convergence – Financial Inclusion

Components	β	T value	Speed of convergence	Half-life	R^2	σ-convergence		Δ SD/2008
						2008	2018	
TFPCH	-0.110	-17.39[***]	1.1%	59	0.791	0.288	0.180	-0.38
TECHCH	-0.118	-8.41[***]	1.2%	55	0.580	0.066	0.072	0.09
EFFCH	-0.104	-21.41[***]	1.1%	63	0.856	0.286	0.141	-0.51
PECH	-0.103	-17.27[***]	1.0%	63	0.800	0.218	0.133	-0.39
SECH	-0.009	-6.73[***]	1.0%	68	0.483	0.043	0.058	0.86

Notes: p<0.01[***,] p<0.05[**,] p<0.1[*.] The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

The financial inclusion aspect of profit-oriented MFIs provides favorable conditions as both β and σ convergence. Even with a decline in both aspects, profit-oriented MFIs have improved their performance in financial inclusion with advances in technology over the past 12 years. Additionally, both the conditional β convergence and σ convergence results reveal that lagging MFIs are catching up with leading MFIs. Yet, there is still a degree of heterogeneity in financial

performance as there is a σ divergence between MFIs. In LAC, there is a convergence of financial inclusion, yet lagging versus leading institutions persist for longer periods.

Moreover, the study should address one more important issue. One of the limitations of MPI is the lack of a technique to measure the significance of the results. In view of this, the study attempts to provide information regarding previous studies that have been conducted using MPI over the period of 2007-2018. Nevertheless, due to the lack of studies conducted using MPI based on LAC during the period, the values are compared to those from other regions. Bassem (2014) , focused on MFIs in the MENA region using MPI from 2006 to 2011. The total factor productivity change indicates progress in productivity change, 1.049. While other components of MPI report the values as technological change 0.971, technical efficiency change 1.080, pure efficiency change 1.054 and scale efficiency change 1.024.

A study by Wijesiri & Meoli (2015) examined the use of MPI by MFIs in Kenya between 2009 and 2012. As indicated by the results of the MPI, there is progress in productivity change of 1.0693. Further components are technological change 1.1387, technical efficiency change 0.9390, pure efficiency change 0.9820, and scale efficiency change 0.9562. A number of other studies, such as Mia & Chandran (2015), Mia & Bassem (2016), Ambarkhane et al. (2019), and Khan & Gulati (2021), have used MPI to assess how productivity has changed in MFIs during the period 2007-2018. Across all studies, the MPI ranges from 0.9 to 1.2. Therefore, it is reasonable to conclude that the MPI of this study is consistent with the MPI values of similar studies conducted in the same time period and using the same methodology.

4.6. Discussion and Conclusion

It is beneficial for the sustainability of a financial institution, as well as its customers, especially microfinance institutions that provide small loans with a high probability of default. It is the purpose of this study to identify changes in productivity and convergence of profit-oriented MFIs in Latin America and the Caribbean during the period 2007-2018. The Malmquist Productivity Index (MPI) is used alongside its four determinants technologically (TECHCH), technically (EFFCH), purely (PECH), and scale-efficiently (SECH). Furthermore, conditional β-convergence and σ- convergence apply to find the productivity convergence. There are two main aspects considered to assess the performance of profit-oriented MFIs in LAC as financial performance and financial inclusion via lending to microenterprises.

The findings of the MPI reveal that there is a regress of the productivity change in both aspects, financial performance and financial inclusion, during the period of 2007-2018. According to the findings, the main determinants of productivity change regress in financial performance are technological change and technical efficiency changes and its determinants. In order to improve the financial performance of profit-driven MFIs in LAC, it is necessary to improve technology, improve managerial practices, and conduct their activities at an optimal scale in order to increase productivity. In the financial inclusion dimension, the main determinants of the regress are technical efficiency change and its determinants as pure and scale efficiency. Consequently, better managerial practices and optimal scale should be the main focus of efforts to improve productivity in financial inclusion. A comparison of the total factor productivity change between profit-oriented and non-profit MFIs in LAC shows that the productivity change for financial inclusion (0.993) is higher than financial performance (0.969).

Moreover, the findings of convergence analysis reveal that there is both conditional β and σ-convergence, indicating that previously lagging MFIs (catching up) are improving their productivity change faster than previously leading MFIs (catching up) and that the dispersion among productivity changes of MFIs is decreasing. In the financial inclusion aspect, 59 years is the span of time needed to halve the productivity gap (using the result of total factor productivity change) between lagging and leading MFIs in the region. It is important to note that, while total factor productivity change implies β convergence, scale efficiency indicates σ divergence in financial inclusion. Furthermore, the findings of scale efficiency in conditional β convergence record the highest number of years (69 years) to halve the gap between leading and lagging MFIs. In addition, it is noteworthy that both findings of MPI and productivity convergence illustrate that profit-oriented MFIs are required to maintain an appropriate scale of operations in order to achieve higher efficiency change and convergence in productivity.

There is, however, a conditional β convergence and a σ divergence among profit-oriented MFIs in the region with regard to financial performance. Consequently, previously lagging MFIs are moving towards the distribution mean (catching up to previously leading MFIs); conversely, previously leading MFIs are moving away from the distribution mean. In addition, conditional β convergence reveals that EFFCH and PECH have the highest number of years needed to decrease the gap between leading and lagging MFIs. Moreover, σ convergence shows that the highest gaps in the standard deviation records are in terms of technical efficiency and its components, scale, and pure efficiency. Hence, the findings of both MPI and the productivity change suggest that technology and technical efficiency should be improved in order to advance productivity convergence.

Furthermore, it is essential to explain how MFIs in LAC can improve the technology applied in lending and improve their technical efficiency. In microfinance, digital technology can be identified as one of the primary means of enhancing performance. In other terms, FinTech in microfinance industry. Having access to such information can be helpful for reducing operational risk, launching new business models (such as mobile banking), ensuring consumer protection, improving labor efficiency, etc. As one of the key changes that need to be made by MFIs, technology must be viewed as an investment over the long term. The cost of technology is high, since it is constantly upgraded and becomes obsolete after a few months or years. There are many benefits associated with technology in addition to reduced costs. As a long-term commitment, technology contributes to better efficiency, better risk management, and improved data analytics to create and sell more products to a wider customer base. For instance, use of e-money and e-wallet concepts in countries in LAC. Furthermore, FINCA Guatemala MFI, set up a village group meeting online using a famous telecommunication app, WhatsApp. This technique secures the clients who could not attend the village meetings due to insecure environments in urban cities in the country. Furthermore, FINCA Guatemala has issued an app called SoyFINCA to find the nearest points of payment and other facilities (FINCA Canada, n.d).

A consequence of this study is that criticism of the profit-driven MFIs in LAC needs to be reconsidered. The results of the study indicate that despite the rapid expansion and development of profit-oriented MFIs in the region, policymakers should pay close attention to their financial performance. Taking into account the findings of this study, profit-oriented MFIs have a better chance of achieving financial inclusion through microfinance lending. It is therefore crucial to enhance the financial performance and sustainability of profit-oriented MFIs in order to broaden financial inclusion in the region.

Chapter 5 Productivity Convergence of Microfinance Institutions in South Asia: The Role of Financial Performance, Social Performance and Financial Inclusion

5.1 Introduction

The focus of this chapter is on South Asia, a region that exhibits distinct characteristics from Latin America and the Caribbean (LAC). Particular attention is given to the poorer and more disadvantaged women borrowers. Undoubtedly, there is an immense relevance to scrutinizing how the MFIs in South Asia perform over two main microfinance dimensions: financial self-sufficiency (financial performance) and outreach (social performance). Nevertheless, it is important to understand that one of the aims of MFIs is to provide financial services to microenterprises that do not have access to traditional banking services.

There are lacking number of studies that focus on the performance of MFIs in lending to microenterprises. This study attempts to analyze the performance of MFIs (both profit-oriented and not profit-oriented MFIs) in three aspects as financial performance, social performance and financial inclusion. In addition, the study identifies the factors responsible for productivity convergence or divergence among MFIs in the region. It is necessary to understand the practice of microfinance in South Asia. In this regard, Figure 4 displays the number of microfinance borrowers and financial service providers (FSPs) in the region. As shown, the highest number of borrowers and FSPs has been recorded in India, followed by Bangladesh[7]. Moreover, considering the global performance of microfinance, India and Bangladesh are the top two countries having the highest number of active borrowers as 37,891,700 and 26,916,400, respectively in 2017

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[7] It is noteworthy that the information on Figure 3 is based on the MFIs which have reported data to MIX database.

(Khamar, 2019). In addition, it is noteworthy that the average loan balance per borrower is 378 USD, whereas the average deposit balance per depositor is 92 USD in South Asia. In comparison with LAC, where the average loan balance per borrower is 2092 USD and the average deposit balance per borrower is 1277 USD, it is evident that South Asia serves lower income borrowers by 2017 (Khamar, 2019).

Figure 3 The Number of Borrowers and Financial Service Providers in South Asia, 2017
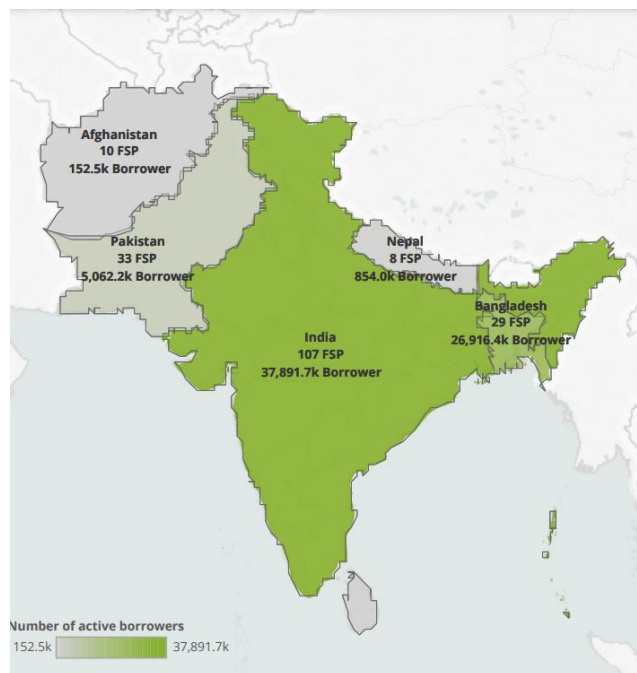
Note : FSP indicates Financial Service Providers and 'k' indicates, thousands

Source : Khamar, M. (2019). *Global Outreach & Financial Performance Benchmark Report 2017-2018.* New York , Washington DC: MIX. (p.31).

In addition, women constitute the majority of the clientele in South Asia. Figure 3 depicts the gross loan portfolio based on gender. It is interesting to highlight that after 2015, a major improvement can be seen in the gross loan portfolio of women borrowers. Thus, analyzing the

social performance of MFIs in the region is imperative due to the fact that they are the main clientele who are the most disadvantaged population in the region.

Figure 4 Time Trend Graph for Gross Loan Portfolio based on Gender (2007-2018)
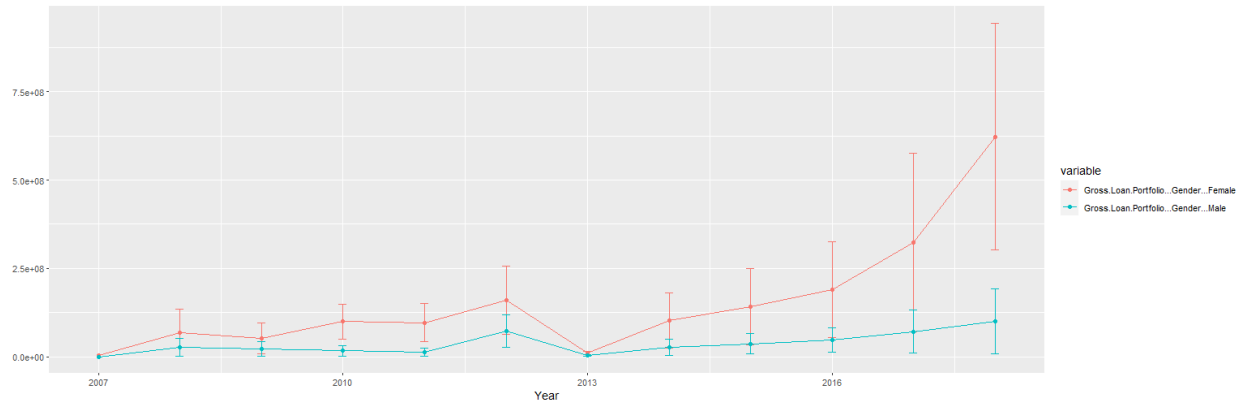
Notes: This graph is created from the MFIs who have provided the data to MIX database. There are number of MFIs who do not provide data to MIX. Thus, this is an overview based on the available data. In the graph, y axis indicates the value of the gross loan portfolio in USD.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

The study applies Malmquist Productivity Index (MPI) to measure productivity change over time. The decomposition of MPI as technological change, technical efficiency change, pure efficiency change and scale efficiency change helps to understand the reasons for progress/regress in productivity change. To measure the productivity convergence, the study applies conditional β convergence to identify whether lagging MFIs are catching up with highly efficient MFIs. However, β convergence is necessary but not sufficient for the overall convergence (Sala-i-Martin, 1996, Higgins et al., 2008). β convergence itself is not enough to reduce the disparities, but it is just one force to reduce the disparities. Hence, the study applies σ convergence.

There are significant contributions of this study. First, the study evaluates the performance of both profit-oriented and not profit-oriented MFIs in financial inclusion via lending to

microenterprises. The majority of the studies are only focusing on the financial and social performance on the point of financial sustainability and depth of the outreach or the number of women borrowers. Second the application of productivity convergence in the microfinance industry in South Asia. In the study of Li et al.(2019), productivity convergence theory was applied; however, South Asia was not included in the sample. Thus, this is the first instance in South Asia where productivity convergence is used in the microfinance industry. Third, the study investigates the determinants of productivity change progress or regress and examines the convergence of those determinants as well. The study provides insight into how MFIs in the region function depending on their type as profit-oriented or not profit institutions, and the methodologies applied could provide insights into policies to improve the productivity of MFIs in South Asia.

The remainder of the chapter is organized as follows: section 2 discusses the literature review of microfinance industry performance indicators in South Asia. Section 3 discusses the data and methodology. The findings of the analyses of productivity change are presented in section 4, and the conclusion and policy implications are discussed in section 5.

5.2 Literature Review

Efficient performance is crucial to every institution in order to provide services in a cost-effective and high-quality manner. This takes on even greater importance when credit institutions like microfinance make small loans to high-risk borrowers without securing fixed assets as collateral. There is tremendous importance associated with the existence and sustainability of MFIs since those institutions are the leading sources of lending to the poor and microenterprises. Through the study's focus on the main aspects such as financial sustainability, provision of

financial services to the poor, and provision of financial services to microenterprises, the study examines the changes in productivity and efficiency of MFIs. The literature survey is organized based on the different aspects of the performance of MFIs as financial, social performance, and financial inclusion.

5.2.1 Literature on Financial Performance, Social Performance and Financial Inclusion

The focal point of the MFIs is to provide financial services to the poor (outreach) who have no access to commercial banks. The provision of financial assistance to assist with the development of income-generating businesses is useful in reducing poverty. In order to overcome the cost issue and to ensure MFIs continue to maintain their financial sustainability, donors and NGOs are the primary sources of financial support (lending loans at lower interest rates than market rates). In comparison with commercial banks, the average loan size of MFIs is relatively small due to their target clients. Moreover, there is a risk of lending to the poor with no guarantee of repayment. Joint liability eliminates the need for collateral and enables poor people to borrow from MFIs without providing collateral. As well as that, the MFIs are required to hire a relatively higher number of loan officers for direct monitoring and for building good relationships, which increases the operation cost of the institution. These characteristics explain why MFIs must bear a high cost for delivering of small loans to poor borrowers. Meanwhile, the institution must attain financial stability in order to remain competitive.

Nevertheless, there have been significant changes in the microfinance industry over the past few years. Subsequently, a shift from subsidized MFIs to efficient and financially sustainable MFIs can be observed due to several developments and changes, such as the commercialization of microfinance, increasing competition, technological changes, financial liberalization, and

policies (Rhyne & Otero, 2006). These developments raised a discussion about whether MFIs sacrifice efficiency and financial sustainability for outreach. Regardless of how these changes are impacted, they can create favorable and unfavorable conditions for outreach and sustainability. As a consequence, the commercialization of microfinance attracted commercial funds, which enlarged the market reach by offering a wider range of credit products. Furthermore, competition, financial liberalization, and technological advances encourage MFIs to improve their efficiency and increase their capacity to serve the poor (Hermes et al., 2011). On the other hand, a focus on financial sustainability and efficiency may divert attention away from the poor as a result of the high cost associated with such lending. Consequently, there may be an incompatibility between the emphasis on outreach and the need for financial sustainability. In light of this discussion, there are two main opposing camps in the microfinance movement, referred to as Institutionalists and welfarist (Woller et al., 1999). Institutionalists argue that MFIs' primary objective should be financial deepening and the creation of sustainable financial intermediation for the poor, while welfare activists contend that MFIs can empower the poor economically by providing them with self-employment opportunities.

The focus of this study is not on contributing to the ongoing debate regarding the trade-off between sustainability and outreach to the poor, but rather on the productivity change and convergence of productivity change among MFIs. It is of utmost importance to understand how profit-oriented and not-profit MFIs utilize scarce inputs to generate outputs, such as financial performance, social performance and financial inclusion. Furthermore, ensuring the equitability of the performance of MFIs is essential to provide further financial services to the poor and microenterprises. A presentation of the empirical studies on the performance of MFIs cannot ignore the empirical studies about trade-offs between financial and social performances.

Nonetheless, the literature survey of this study attempts to index the findings regarding the financial and social performance along with the determinants of efficiency or the productivity change associated with each of them. Also included in the literature survey is an analysis of studies that have focused on South Asia and individual countries within South Asia.

Abdul & Munir (2006) used the DEA method to estimate the efficiency and financial sustainability of MFIs in India, Bangladesh, and Pakistan. Based on constant and variable returns to scale technologies, they consider both output- and input-oriented DEAs. Technical Efficiency is 0.395, 0.08, and 0.28 for Pakistan, Bangladesh, and India, respectively. Pure technical efficiencies for these countries; however, are each between 0.713-0.823, 0.175-0.543, and 0.413-0.452. As a result of the analysis, it is revealed that the inefficiency of MFIs in Pakistan, India, and Bangladesh is mainly related to technical inefficiencies. The results suggest that the management skills and technology of MFIs need to be enhanced in order to improve their efficiency.

Bairagi (2014) used stochastic frontier-output distance functions to calculate the performance of MFIs in Bangladesh from 2003 to 2011. This research concludes that the increase in total factor productivity growth is primarily a consequence of technological advancements. Mia & Soltane (2016) conduct a study to examine 162 MFIs in Bangladesh using MPI over the period of 2007 to 2012. Technical efficiency and better management practices are responsible for the 4.3% productivity change per year found in the study. Awaworyi & Marr (2014) compare the sustainability and outreach in Latin America and the Caribbean (LAC) and South Asia. The study confirms a trade-off between depth of outreach and financial sustainability in both regions.

Kar & Deb (2017) examined the performance of 31 MFIs in India from 2009-2015 using the DEA method. The study reveals MFIs in India can reach the production frontier if they trim the

output (measured by Portfolio at Risk 30). An (2017) finds the main attribute to the overall efficiency in Indian MFI is technical efficiency and its components. Khan & Gulati (2019) focus on 82 Indian MFIs using data from 2015-2016 and applied bias-corrected scores incorporating bootstrapping in the DEA model. The Indian microfinance market had an average financial efficiency of 0.604 versus 0.555 for social efficiency, resulting in average overall efficiency of 0.649 in the year 2015-2016. This indicates that MFIs are able to reduce their inputs by 35.1 % at the given output level. Furthermore, there are significant differences between the financial performance of NBFIs and NGOs. Additionally, these variations in efficiency levels among types of MFIs are statistically insignificant when it comes to efficiency in terms of social and overall efficiency.

The study of Ambarkhane et al. (2019), examined the productivity change of 21 Indian MFIs in 2014. According to the study, the MFIs are catching up with best-practicing MFIs in the region; however, scale efficiency should be improved. The study of Chauhan (2021) examines NGO MFIs using a DEA approach and Tobit regression model over the period from 2009 to 2015. NGOs-MFIs were found to be more efficient financially than social. A regression analysis shows that operational self-sufficiency (OSS) is a critical variable for the financial and social efficiency of NGO MFIs.

Khan & Gulati (2021) investigated MFIs in South Asia by analyzing four countries: India, Bangladesh, Nepal, and Pakistan from 2010 to 2015. The study uses bias-adjusted efficiency scores for financial and social performances. Results showed that South Asian microfinance institutions on average are more financially efficient than socially efficient. Also, Indian MFIs outperformed peer nations' MFIs in both terms of financial sustainability. Aside from that,

Pakistani MFIs performed poorly in both financial and social areas. Furthermore, the study asserts that MFIs in South Asia must revamp their operating strategies to make them more efficient in order to achieve at least one of their objectives.

5.2.2 Literature on Financial Inclusion by Lending to Microenterprises

The South Asian economy relies heavily on micro, small, and medium-sized businesses (MSMEs), including cottage firms. National data reveals that 99.6% of all enterprises are MSMEs with, 33.9% of the gross domestic product. In addition, 76.6% of the workforce belongs to MSMEs (Shinozaki et al., 2021). Additionally, the report states that the lack of access to financial services was a bottleneck for MSMEs. Bank lending to MSMEs in the region is reported as 7% of nation's GDP during 2015 and 2019 and 14.8% of the total bank lending for 2015 to 2020. The non-bank finance (NBFIs) industry is slowly growing in the region and supports the working capital needs of small businesses, but it remains in its infancy. The report stresses, among other things, the importance of MFIs in providing rural MSMEs and their entrepreneurs with access to finance, yet the number of non-performing loans continues to increase. Financing MSMEs by NBFIs accounts for 3.2% (of national GDP) and 6.5% of total bank lending in the region. However, it is noteworthy that the non-performing loans of NBFIs stand an average as 5.6%.

In spite of how important MSMEs are in South Asia and how MFIs play a crucial role in lending to them, few studies have focused on this topic. Shankar (2016) focuses on microfinance lending in three Asian countries as, India, Bangladesh, and Pakistan. The study mainly discusses the disparity between microfinance loans and SME loans from commercial banks. Using primary data, Naeem et al. (2015) examines the impact of microfinance on women entrepreneurs in

Quetta, Pakistan. The study compares women beneficiaries of microfinance for two or more years with and group of new women borrowers (20 women) form an NGO MFI in the region, BRAC. The findings reveal that there is a positive impact of microfinance on microenterprises. Microenterprises that receive microfinance have an increase in their working capital as well as fixed assets as compared to those that do not receive microfinance. Rathnayaka et al. (2019) used 100 respondents to investigate the influence of microfinance on microenterprises in Kalutara, Sri Lanka. The study demonstrates a positive impact of microfinance on the growth of MSMEs.

5.3 Data and Methodology

5.3.1 Data

The study uses the MIX Market database (https://www.themix.org/) to analyze the efficiency and convergence of performance of MFIs from 2007-2018. The sample consists of 51 profit-oriented MFIs and 47 not profit-oriented MFIs in six countries in South Asia[8]. Inputs and outputs are necessary to calculate the MPI. The study uses three inputs to calculate the MPI as the number of loan officers, total assets and cost per loan. Different outputs are used for financial performance, social performance, and financial inclusion aspects. Return on assets, return on equity, operational self-sufficiency and gross loan portfolio are for the financial performance aspect. Percentage of women borrowers, ratio of the number of active borrowers to the population of the country, and the ratio of the average loan per borrower to gross national income per capita of the country are for the social performance. Output variables for financial inclusion are the number of loans to microenterprises and the gross loan portfolio of loans to microenterprises.

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[8] The countries are India, Bangladesh, Nepal, Pakistan, Afghanistan and Sri Lanka

Furthermore, the study used some macro variables as conditional variables to measure the conditional β convergence. The conditional variables are taken from the World Bank database and the International Monetary Fund (IMF) database. Five conditional variables are the financial development index, annual growth of the gross domestic product, per capita gross domestic product, domestic credit to the private sector (as a % of gross domestic product), and real interest rate. It is noteworthy that the analysis has an impact from the global financial crisis during 2008-2009. Real interest rate and growth in the gross domestic product can be identified as two variables that could address the impact of the global financial crisis.

5.3.2 Methodology

The study applies Malmquist Productivity Index (MPI) proposed by Färe et el. (1994) which, is explained in Chapter 3. All the components of MPI are studied to understand the reasons for productivity convergence. Furthermore, conditional β convergence and σ convergence are used to measure productivity convergence. A detailed description of the methodology is provided in chapter 3. DEAP software is used to measure the MPI and missing data is calculated by using "missForest" function in R software.

5.4 Results

The analysis conducts by using both profit-oriented and not-profit oriented MFIs in South Asia. The results are organized based on three aspects: financial performance, financial inclusion and social performance. The MPI findings are presented first, followed by the convergence analysis.

5.4.1 Results for Profit-Oriented MFIs in South Asia

5.4.1.1 Profit-Oriented MFIs – Results of MPI for Financial Performance

The findings of the Table 6 depicts that there is an overall regress of the productivity change for financial performance aspect of profit-oriented MFIs in South Asia. In the following Table 6, MPI is decomposed into TFPCH (total factor productivity change) and its two major components, EFFCH (efficiency change) and TECHCH (technological change). Additionally, the further decomposition of EFFCH into PECH (pure efficiency change) and SECH (scale efficiency change).

Table 6 depicts the annual productivity change for all the components of MPI. According to the annual mean of the time period considered, 2007-2018, productivity change has decreased by 2.2% (represented by TFPCH, 0.978) over the period examined. MPI components TECHCH and EFFCH also demonstrate a decline in productivity change 0.7% and 1.5%, respectively.

Table 6 Profit-oriented MFIs – Results of MPI for Financial Performance

TFPCH 0.978		
TECHCH 0.993	EFFCH 0.985	
	PECH 0.999	SECH 0.985

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

There has been a downward shift in the production frontier as well as the institutions have the ability to improve the output by utilizing inputs efficiently. The components of EFFCH, PECH and SECH have also demonstrated a decline in productivity change. Of these three components, SECH has suffered the greatest decline. Scale Efficiency Change or SECH refers to the ability of

the institution to operate at an optimal scale. These findings suggest that in order to increase productivity, it is necessary to improve technological enhancements, maximize the use of inputs, and, more specifically, operate on an optimal scale. In line with Ambarkhane et al. (2019), SECH is identified as the main determinant to be improved.

Nevertheless, MPI has a number of advantages; one of the main disadvantages is that significance cannot be measured. Accordingly, the study attempts to provide support for the findings (MPI) by comparing them to previous studies that have examined the efficiency and productivity of MFIs in the region.

5.4.1.2 Profit-Oriented MFIs – Results of Productivity Convergence for Financial Performance

Table 7 presents the findings of the convergence analysis of the financial performance of profit-oriented MFIs. According to the findings, there is a conditional β convergence for the components of MPI except for EFFCH. Conditional β convergence provides information about the growth rate of the productivity change of lagging MFIs being higher than previously leading MFIs. There is evidence for overall conditional β convergence (represented by TFPCH) with 10% significant level. Except for no β convergence in EFFCH, other components also provide evidence for conditional β convergence with 10% significant level. The speed of convergence and half-life are also important aspects. In other words, speed of convergence implies the speed at which we can reduce the gap between lagging and leading MFIs by halve, whereas half-life refers to the number of years it will take to reduce the gap between lagging and leading MFIs in the region. In light of the convergence analysis, it would take 127 years to half the gap between lagging and leading profit-oriented MFIs in productivity change.

Table 7 Profit-Oriented MFIs- Results of Productivity Convergence for Financial Performance

Component	β	T value	Speed of convergence	Half-life years	R^2	σ-convergence	
						2008	2018
TFPCH	-0.05	-1.64*	0.5%	127	0.13	0.09	0.21
TECHCH	-0.09	-7.17***	1%	69	0.56	0.07	0.62
EFFCH	-0.05	-0.82	0.4%	141	0.11	0.03	0.10
PECH	-0.07	-2.31*	0.7%	88	0.19	0.04	0.08
SECH	-0.17	-1.87*	1.9%	36	0.16	0.02	0.14

Notes: $p<0.01^{***,}$ $p<0.05^{**,}$ $p<0.1^{*}$. The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

On contrary to the conditional β convergence, there is σ divergence for all the components in MPI. The existence of σ divergence indicates that the dispersion (standard deviation) among MFIs increases. Nevertheless, β convergence alone is not sufficient for σ convergence (Sala i-Martin 1994, Higgins et al. 2008). Mainly, we can identify two reasons for the absence of either σ or β convergence.

5.4.1.3 Profit-Oriented MFIs – Results of MPI for Financial Inclusion

According to the following Table (8), there has been a decline in productivity change (TFPCH, 0.978) during the period of 2007-2018 in South Asia. Nevertheless, considering the main components of TFPCH, there is an increase in TECHCH during the period under study. This implies an upward shift of the production frontier due to technological enhancements and innovations. A decline in EFFCH suggests that profit-oriented MFIs in Asia are not efficiently utilizing their resources to produce loans for microenterprises. The main determinant for the productivity change regress of the EFFCH is attributed to PECH, which implies ineffective management by the institutions. Alternatively, the ability to choose the best inputs and outputs.

Nonetheless, it is noteworthy that there is an upward shift of 4.7% in the production frontier (TFPCH). It follows that the profit-oriented MFIs in the region are more efficiently using technology to serve microenterprises.

Table 8 Results of MPI for Profit-Oriented MFIs in South Asia for Financial Inclusion

TFPCH 0.978		
TECHCH 1.047	EFFCH 0.934	
	PECH 0.959	SECH 0.974

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

5.4.1.4 Profit-Oriented MFIs – Results of Productivity Convergence for Financial Inclusion Aspect

In the following Table (9), MPI is decomposed into TFPCH (total factor productivity change) and its two major components, EFFCH (technical efficiency change) and TECHCH (technological change). Additionally, further decomposition of EFFCH into PECH (pure efficiency change) and SECH (scale efficiency change). The findings of the productivity convergence reveal that there is no β convergence (insignificant) for TFPCH and PECH. All the other components provide evidence for conditional β convergence for during the period of 2007-2018. This implies that the lagging profit-oriented MFIs do not grow faster than previously leading profit-oriented MFIs in the sample. In other words, the lagging MFIs are not catching up with leading MFIs in productivity change in lending to microenterprises in the region.

Table 9 Results of Productivity Convergence of Profit-Oriented MFIs for Financial Inclusion

Component	β	T value	Speed of convergence	Half-life years	R^2	σ-convergence	
						2008	2018
TFPCH	-0.04	-0.85	0.4%	142	0.27	0.144	0.570
TECHCH	-0.06	-3.23**	0.6%	108	0.53	0.107	0.188
EFFCH	-0.15	-2.42**	1.6%	42	0.39	0.076	0.352
PECH	-0.07	-0.98	0.6%	99	0.34	0.064	0.322
SECH	-0.15	-2.54**	1.6%	41	0.16	0.057	0.227

Notes: p<0.01***, p<0.05**, p<0.1*. The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

Moreover, the findings that there is only σ divergence for all the components of MPI. The overall conclusion about the productivity convergence for financial inclusion aspect is that there is no evidence for convergence in productivity change among profit-oriented MFIs for financial inclusion through lending to microenterprises.

5.4.1.5 Profit-Oriented MFIs - Results of MPI for Social Performance

The findings of MPI reveal that there is a regress of the productivity change in the social performance aspect of profit-oriented MFIs in South Asia. According to Table 10, there is a decline of 2.3% (0.977) of the TFPCH during 2007-2018. MPI's two main components, TECHCH and EFFCH, also indicate a decline in productivity changes over the period studied. However, PECH, one of the decompositions of EFFCH, indicates a 1.000, which indicates that there has been no reversal or progress of the pure efficiency change during the 12-year period. Thus, we can understand that the main reasons for the regress of the productivity change in social performance of profit-oriented MFIs are technological change and scale efficiency change

Table 10 Profit-Oriented MFIs - Results of MPI for Social Performance

TFPCH 0.977		
TECHCH 0.982	EFFCH 0.995	
	PECH 1.000	SECH 0.994

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations using the MIX market database (https://www.themix.org/)

5.4.1.6 Profit-Oriented MFIs - Results of Productivity Convergence for Social Performance

The finding of the productivity convergence reveals that there is evidence for conditional β convergence (10% significance) for the social performance of profit-oriented MFIs in South Asia. However, it will take around 154 years to halve the disparities among lagging and leading MFIs in the region. The highest time to reduce the gap between the lagging and leading is mainly contributed by EFFCH and its components. Moreover, there is no evidence for the σ convergence among profit-oriented MFIs in the social performance aspect. Except for TECHCH, all the other components show σ divergence.

The findings of the financial performance, social performance, and financial inclusion studies of profit-oriented MFIs in South Asia indicate that these institutions have not achieved a gain in productivity change during the period 2007-2018. Profit-oriented MFIs illustrate conditional β convergence in financial and social performance but are not demonstrated in terms of financial inclusion. The critical characteristic of profit-oriented MFIs is the widening of the standard deviation among productivity changes across all three dimensions.

Table 11 Profit-Oriented MFIs- Results of Productivity Convergence for Social Performance

Component	β	T value	Speed of convergence	Half-life years	R^2	σ-convergence	
						2008	2018
TFPCH	-0.04	-2.30*	0.4%	154	0.17	0.110	0.149
TECHCH	-0.08	-5.25***	0.8%	83	0.45	0.085	0.082
EFFCH	-0.06	-2.846**	0.6%	109	0.29	0.071	0.100
PECH	-0.09	-2.815*	1.04%	66	0.33	0.007	0.017
SECH	-0.07	-3.98***	0.7%	90	0.35	0.072	0.098

Notes: p<0.01***, p<0.05**, p<0.1*. The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations using the MIX market database (https://www.themix.org/)

5.4.2 Results for Not Profit-Oriented MFIs in South Asia

5.4.2.1 Not Profit-Oriented MFIs – Results of MPI for Financial Performance

According to the findings of MPI there is an overall regress in TFPCH (-4.2%) during the period 2007-2018. The main components of MPI reveal that there is progress of EFFCH (1.2%) and its components, PECH (0.3%) and SECH (0.9%).

Table 12 Results of MPI for Financial Performance in Not Profit-Oriented MFIs in South Asia

TFPCH 0.958			
TECHCH 0.947	EFFCH 1.012		
		PECH 1.003	SECH 1.009

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations using the MIX market database (https://www.themix.org/)

It is clear that the main contribution to the decline of the overall productivity change is TECHCH which has a regress of 5.3%. This indicates a downward shift of the production frontier due to lack of technological advancements among the not profit oriented MFIs in Asia.

The production frontier is constructed from the highest performing MFIs in the sample. It is, therefore, possible to understand that the technology used by the best performing not profit-oriented MFIs in South Asia is deteriorating. Despite the overall regress, not profit-oriented MFIs continue to demonstrate progress in EFFCH and its components compared to the finding of profit-oriented MFIs in the region. The lagging variable in reaching a productivity change progress in financial performance is the technology for the not profit-oriented MFIs in the region.

5.4.2.2 Not Profit-Oriented MFIs – Results of Productivity Convergence for Financial Performance

The findings of the productivity convergence of financial performance in not profit-oriented MFIs reveal that there is conditional β convergence of all the components of MPI. This indicates that the growth rate of the productivity change of previously lagging MFIs are increasing faster than previously leading MFIs in the sample. Alternatively, previously lagging MFIs are catching up with previously leading MFIs. In addition, the half-life to reduce the gap between lagging and leading MFIs by half is 71 years.

On the other hand, the results of the σ convergence reveal that an overall σ divergence (TFPCH) for the productivity change in not profit-oriented MFIs in the region. However, EFFCH and its components (PECH and SECH) indicate σ convergence. Based on the findings of the results, we can conclude that, although there are three components of MPI having σ convergence, the determinant components of the σ convergence of TFPCH is TECHCH.

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Table 13 Results of Productivity Convergence for Financial Performance in Not Profit-Oriented MFIs in South Asia

Component	β	T value	Speed of convergence	Half-life years	R^2	σ-convergence	
						2008	2018
TFPCH	-0.09	-4.22***	0.9%	71	0.52	0.167	0.238
TECHCH	-0.10	-3.21**	1.1%	61	0.43	0.085	0.175
EFFCH	-0.05	-0.83***	0.4%	76	0.10	0.114	0.094
PECH	-0.11	-8.70***	1.1%	61	0.70	0.069	0.054
SECH	-0.07	-5.32***	0.7%	90	0.53	0.0723	0.070

Notes: p<0.01***, p<0.05**, p<0.1*. The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

5.4.2.3 Not Profit-Oriented MFIs – Results of MPI for Financial Inclusion

The findings for the financial inclusion aspect of not profit-oriented MFIs reveal that there is an overall regress 4.6% (TFPCH). However, TECHCH indicates a progress of 1.9% during the period of 2007-2018. This indicates an upward shift of the production frontier due to technological advancements. On the other hand, there is a decline of EFFCH (6.3%) and its components PECH (4.1%) and SECH (2.3%). Based on the composition of MPI, it is clear that the main contribution to the regress of the MPI is from EFFCH and its components.

Table 14 Results of MPI for Financial Inclusion in Not Profit-Oriented MFIs in South Asia

TFPCH 0.954		
TECHCH 1.019	EFFCH 0.937	
	PECH 0.959	SECH 0.977

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using the geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations using the MIX market database (https://www.themix.org/)

Nevertheless, as an average TECHCH has a progress of the productivity change over the period studies. Therefore, to increase the productivity change in the financial inclusion aspect, it is important to improve the effective use of inputs by proper managerial practices and operate on an optimal scale.

5.4.2.4 Not Profit-Oriented MFIs – Results of Productivity Convergence for Financial Inclusion

The findings for the productivity convergence for financial inclusion aspect in not profit-oriented MFIs reveal no conditional β convergence and σ convergence. The findings in Table 15 confirm that the lagging not profit-oriented MFIs in South Asia are not catching up with leading MFIs in the financial inclusion aspect.

Table 15 Results of Productivity Convergence for Financial Inclusion in Not Profit-Oriented MFIs in South Asia

Component	β	T value	Speed of convergence	Half-life years	R^2	σ-convergence 2008	σ-convergence 2018
TFPCH	0.057	0.75	-	-	0.11	0.068	0.319
TECHCH	-0.053*	-2.25	0.5%	127	0.30	0.0317	0.0464
EFFCH	0.0160	0.305	-	-	0.08	0.055	0.1153
PECH	0.036	0.523	-	-	0.17	0.052	0.247
SECH	0.140	1.24			0.08	0.026	0.174

Notes: $p<0.01^{***,}$ $p<0.05^{**,}$ $p<0.1^*$. The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations using the MIX market database (https://www.themix.org/)

Additionally, the disparity in productivity is measured from a financial inclusion perspective, showing that the disparities are widening over time (standard deviation is increasing). It follows that MPI's findings related to financial inclusion of profit-oriented and not profit-oriented MFIs provide similar findings in that there is both σ divergence and no β convergence. It should be

noted, however, that the findings for profit-oriented MFIs show a conditional β convergence for TECHCH, EFFCH, and SECH. Yet only TECHCH indicates that there is a β convergence in the aspect of financial inclusion in the study of not-for-profit MFIs.

5.4.2.5 Not Profit-Oriented MFIs – Results of MPI for Social Performance

The results of the social performance of not profit MFIs in the region reveal that there is also an overall regress in the productivity change (6.8%) during the period 2007-2018. Moreover, the main two components of MPI indicate that there is a regress in TECHCH (7.4%) and progress in EFFCH (0.1%). This implies that the production frontier shifts downward, but on average, the location of the MFIs from the frontier has been improved. From the decomposition of EFFCH, it is clear that SECH is the determinant resulting in a decline in EFFCH. Thus, it is imperative that the overall regress results from the decline of technological change and the scale efficiency change of not profit-oriented MFIs in the region.

Table 16 Results of Productivity Convergence for Social Performance in Not Profit-Oriented MFIs in South Asia

TFPCH 0.932		
TECHCH 0.926	EFFCH 1.001	
	PECH 1.011	SECH 0.995

Notes: The output-oriented MPI is calculated from 2007 to 2018. The above table only indicates the average annual productivity (using geometric mean) and efficiency change of MPI components. The table creates according to the hierarchy of the composition of MPI components. Among the components, TFPCH indicates the MPI index.

Source: Author's calculations using the MIX market database (https://www.themix.org/)

5.4.2.6 Not Profit-Oriented MFIs - Results of Productivity Convergence for Social Performance

The findings of the productivity convergence for the social performance aspect reveal that there is conditional β convergence for all the components of MPI. Furthermore, the results of the σ convergence reveal that although there is an overall σ divergence, EFFCH and its components, PECH and SECH indicate σ convergence.

Table 17 Results of Productivity Convergence for Social Performance in Not Profit-Oriented MFIs in South Asia

Component	β	T value	Speed of convergence	Half-life	R^2	σ-convergence	
						2007	2018
TFPCH	-0.10	-5.53***	1.1%	61	0.56	0.137	0.165
TECHCH	-0.13	-4.55***	1.4%	47	0.52	0.063	0.131
EFFCH	-0.09	-6.343***	0.9%	74	0.54	0.097	0.082
PECH	-0.09	-11.81***	0.9%	71	0.81	0.067	0.030
SECH	-0.09	-6.04***	0.89%	77	0.53	0.075	0.067

Notes: $p<0.01$***, $p<0.05$**, $p<0.1$*. The figure shows the σ-convergence of 2008 and 2018 for each component of MPI.

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

The results of the half-life show that it will take 61 years to halve the gap between leading and lagging not profit MFIs in the region in the social performance aspect. The overall findings of not profit oriented MFIs reveal that MFIs do not gain a productivity gain during the period of the study, 2007-2018. By looking into the values of TFPCH it is clear that the lowest productivity change/ highest regress is recorded in social performance aspect (0.932). Furthermore, based on the three aspects, the main contribution to the regress for financial and social aspects is

technological change, while efficiency change and its components, scale efficiency change, are the main attributes to the regress in the financial inclusion aspect.

5.4.2.7 Summary of the Findings of Profit-Oriented and Not Profit-Oriented MFIs in South Asia

Six different analyses are presented in this study, based on profit orientation and performance aspects, including financial, social, and financial inclusion. The findings are derived from two different methodologies, MPI and convergence. A comparison of profit-oriented and not profit-oriented MFIs using the results of MPI reveals that productivity change (based on TFPCH) for profit-oriented MFIs is higher compared to not profit-oriented MFIs[9]. So, it is possible to conclude that the profit-oriented MFIs perform better compared to not profit-oriented MFIs in all three aspects as financial, social and inclusion. This finding is similar with the findings of Khan & Gulati (2019) and Khan & Gulati (2021) that profit-oriented MFIs outperform in South Asian countries. As one of the main findings from the MPI study, profit-oriented MFIs lack in terms of EFFCH in all three aspects, indicating that MFIs are incapable of making efficient use of existing inputs to maximize their outputs (financial performance, financial inclusion, and social performance). Furthermore, TECHCH is also a determinant of productivity change regress in financial performance and social performance in profit-oriented MFIs in the region.

On the other hand, the findings of MPI of not profit-oriented MFIs (based on TFPCH) reveal that TECHCH is the main determinant of the regress in financial and social performance aspects. Moreover, EFFCH is the main determinant for the regress in productivity change in financial inclusion aspect. Furthermore, there is another important fact to be addressed. MPI has numerous benefits when calculating productivity change; however, one of the major limitations of non-

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[9] Both profit oriented and not profit oriented have a regress in productivity change, profit-oriented MFIs have TFPCH closer to 1.

parametric techniques such as MPI is the inability to verify the significance of the results. Consequently, the study compares the MPI with other similar studies conducted in South Asia. It is noteworthy that there have only been a few studies on the efficiency of MFIs in South Asia; however, most studies focus on a specific country in South Asia. The study only considers the previous research in the same years as this study which have applied MFIs to measure productivity change.

Mia & Bassem (2016) is one of the recent major studies on efficiency in South Asia. The study measures the productivity change in Bangladesh, India, Nepal, Pakistan and Sri Lanka using MPI during the period 2007-2012. The annual means of the results reveal that there is progress in the productivity change, 1.021. The other components of MPI are technical efficiency change of 1.021, technological change of 1, pure efficiency changevof 1.006, and scale efficiency change of 1.015. From 2007 to 2012, Mia & Chandran (2015) studied MFIs in Bangladesh using MPI. The study measured the performance using two aspects as financial productivity and social outreach productivity. The study reveals progress in the total factor productivity of 1.039. Other components of MPI as technological change of 1.122, technical efficiency change of 0.926, pure efficiency change of 1.007 and, scale efficiency change of 0.92. Similarly, social outreach productivity also indicates progress in total factor productivity change of 1.05. Other components of MPI are technological change 0.991, technical efficiency change of 1.059, pure efficiency change of 1.031 and, scale efficiency of 1.028.

An (2017) studied profit-oriented and not profit-oriented MFIs in India during the period of 2008 to 2012. The results indicate progress in profit-oriented MFI as total factor productivity change of 1.022. In addition, the other components are technological change of 1.057, technical efficiency change of 0.967, pure efficiency change of 0.971 and scale efficiency change of 0.996.

However, not profit-oriented MFIs indicate a regress in the productivity change of 0.960. The other components of MPI are technological change of 0.966, technical efficiency change of 0.994, pure efficiency change of 0.995 and scale efficiency change of 1.000.

Moreover, Khan & Gulati (2021), conduct their study on Indian MFIs during the period from 2005 to 2018. The study has applied bootstrap MPI and categorized MFIs into two groups as non-bank financial companies and not non-bank financial companies. The study only focuses on the total factor productivity change and its primary decomposition as technical efficiency change and technological change. The results for non-bank financial companies reveal productivity change progress of 1.076 for the period studied. In addition, technological change is 1.019 and technical efficiency change is 1.058. Moreover, the total factor productivity change for non bank financial companies is 1.056 while technical efficiency change and technological change are 1.036, 1.026 respectively.

Ambarkhane et al. (2019) also focus on 21 Indian MFIs from 2012 to 2016. The study utilized output-oriented MPI. The total factor productivity change of the study is 1.199, which indicates progress in productivity change. Moreover, the other components also indicate progress in the productivity change as technological change of 1.128, technical efficiency change of 1.063, pure efficiency change of 1.025 and scale efficiency change of 1.037. In addition to the overall productivity change, the study calculates MPI for profit-oriented and not profit-oriented MFIs. Total factor productivity change for profit oriented MFIs records as 1.262. Other components of MPI are technnological change 1.157, technical efficiency change 1.091, pure efficiency change 1.101 and scale efficiency change 0.99. On the other hand, not profit-orineted MFIs also report a progress in the productivity change as 1.133 and other components of MPI as technological

change of 1.097, technical efficiency change of 1.033, pure efficiency change of 0.947 and scale efficiency change of 1.090.

Prior studies using MPI and focusing on South Asia or a country in South Asia and conducted between 2007 and 2018 showed progress in total factor productivity change, whereas this study revealed a regression in productivity change. Several factors may contribute to this, including using a country in South Asia, a different period of time, and different variables for inputs and outputs. Yet, the most important aspect of this comparison is to demonstrate the robustness of the MPI results. It is evident that the MPI of these previous studies lie between 0.9 to 1.3. Thus, the results of this study can be considered robust since the MPI ranges from 0.9 to 1.2.

In addition to the findings of MPI, convergence analyses reveal that profit-oriented MFIs have low speed of convergence (based on convergence of TFPCH) compared to not profit-oriented MFIs in the region. Notably, financial inclusion in both profit-oriented and not profit-oriented MFIs, indicates no evidence for β convergence in the financial inclusion aspect. Furthermore, there is σ divergence for all the aspects of both profit-oriented and not profit-oriented MFIs in the region. However, there are some important facts to be highlighted in σ convergence results. The social performance of profit-oriented MFIs reveals that there is a σ convergence for TECHCH, indicating that σ divergence in EFFCH and its components have a higher impact on the overall σ divergence (TFPCH). Moreover, financial and social performance in not profit-oriented MFIs indicate an overall σ divergence (TFPCH); however, in both aspects EFFCH and its components indicate σ convergence.

5.5 Discussion and Conclusion

This study focused on the productivity convergence of profit-oriented and not profit-oriented MFIs in South Asia during the period 2007-2018. In this study, three aspects of productivity convergence are examined: financial performance, social performance, and financial inclusion. Data were obtained from the MIX database in the World Bank database. To measure the productivity change, the study employed the output-oriented Malmquist Productivity Index (MPI). The advantage of employing MPI in calculating productivity change is the decomposition of total factor productivity change into technological change and technical efficiency change. Technological change measures productivity change based on the movement of the production frontier, which is constructed from the best practicing institutions in the sample. The reasons for the upward/downward shift can be recognized as technological enhance/degrade. On the other hand, technical efficiency change measures how efficient the use of input to maximize the output of the institution. Technical efficiency change measures relevant to the location of each institution from the production frontier.

First, the study focused on the profit-oriented MFIs in the region and measured the productivity change in financial performance, financial inclusion and social performance. The findings of MPI revealed that there is a regress of productivity change in all three aspects. The productivity regress of financial performance of profit-oriented MFIs was recorded as 0.978, and the study revealed the main determinants for the regress as scale efficiency change and technological change. Furthermore, the findings of conditional β convergence revealed that there was overall β convergence; however, there was no β convergence for technical efficiency change. On the other hand, the findings of σ divergence in all the components confirm that the disparities

among leading and lagging MFIs were widening when the performance calculated in financial performance aspect.

The findings for the financial inclusion through lending to microenterprises by profit-oriented MFIs revealed that there was an overall regress of 0.978 during the period from 2007-2018. The main determinants for the regress of the productivity change are technical efficiency change and its component, pure efficiency change. Furthermore, the convergence analysis revealed that there was no β convergence mainly due to pure efficiency change. The findings for both MPI and convergence emphasized that profit-oriented MFIs should focus more on efficient managerial practices to improve the productivity change in lending to microenterprises in the region. Moreover, the social performance of profit-oriented MFIs revealed that there was also an overall regress of productivity change (0.977) during the period studied. The main determinants of the productivity change regress were technological change and scale efficiency change. Moreover, the findings of the convergence analysis confirmed that there was evidence for conditional β convergence: however, σ divergence of all the components.

The findings of not profit-oriented MFIs revealed a similar outcome for productivity change. The total factor productivity change for financial performance aspect records the value, 0.958 and main determinant for the productivity change regress was technological change. The findings of conditional β convergence revealed that there was β convergence for all the components of MPI. There was overall σ divergence; however, σ convergence for technical efficiency change and its components. Thus, it is clear that productivity change and convergence can be improved by utilizing advanced technology in the financial performance of not profit-oriented MFIs in South Asia.

The financial inclusion aspect of not profit-oriented MFIs illustrated a regress of 0.954 during the examined period. The main components that contributed to the regress of the productivity change were efficiency change and its component, pure efficiency change. The findings for productivity convergence analysis revealed that there was no β convergence for the components other than technological change and σ divergence for all of the components of MPI. Similar to the findings of financial inclusion aspect of profit-oriented MFIs, it is necessary to apply effective managerial practices and decisions to improve the productivity change in lending to microenterprises.

Finally, social performance of not profit-oriented MFIs revealed the highest productivity regress among the three components as 0.932. This implies that the NGOs in South Asia are not achieving productivity change by serving the poor and women borrowers. The main reason for the regression of productivity change are technological change and scale efficiency change. Moreover, the findings of productivity convergence analysis, there was conditional β convergence for all the components in MPI. However, there was σ divergence except for efficiency changes and its components, scale and pure efficiency change.

Considering all three aspects of profit-oriented and not profit-oriented MFIs in South Asia, a conclusion can be made as MFIs are not perform well in financial performance, financial inclusion and social performance. However, a common pattern can be identified among the three aspects of the performance of profit-oriented and not profit-oriented MFIs in the region. That is, the determinants of productivity change regress are similar to financial inclusion and social performance aspects regardless of the orientation of the institution. Performing an optimal scale is one of the facts that can be contributed to increasing productivity change in both financial and

social aspects. The application of technological enhancements and advanced techniques in lending to microenterprises can contribute to improving the productivity change in lending to microenterprises. As well as effective managerial decisions are crucial to improve productivity change in financial inclusion aspect in both profit-oriented and not profit-oriented MFIs.

According to the findings of the analysis, it is imperative that realistic solutions be developed to improve the productivity change of MFIs using technological advancements and technical efficiency. The findings of both profit-oriented and not profit-oriented MFIs revealed that technological change is necessary to be addressed. In this case, technology refers the how MFIs convert the inputs into outputs. In this regard, it is imperative to explore a number of techniques that could be applied to improve the efficiency of the method when converting inputs to outputs. For instance, one of the vital steps in microfinance lending is information screening of the borrower. The fact that microfinance deals with high-risk borrowers make it crucial to obtain the accurate information about the borrower. For example, multiple borrowing is one of the main reasons for loan defaults in microfinance. Therefore, it is beneficial for MFIs to have access to a database that contains the borrower's credit history.

Credit bureaus can be identified as the main resource to obtain the data about the borrower's credit history. In India, there is a developed credit bureaus for microfinance as CIBIL, High Mark Credit Information Services Pvt. Ltd, Equifax India and Experian. In Nepal, there are 70 MFIs which are registered in Credit Information Bureau in Nepal by 2022 (Credit Information Bureau of Nepal, n.d). However, microfinance leaders like Bangladesh and Pakistan are still struggling with establishing credit bureau for microfinance. For instance, Business Finance for the Poor in Bangladesh program is assisting Bangladesh in establishing the first microfinance bureau in the country (Business Finance for the Poor in Bangladesh, n.d). Hence, it is crucial to develop a

credit bureau for microfinance in each country in South Asia and let access to all MFIs regardless of the profit orientation. It would be beneficial to assess creditworthiness at the beginning of the lending process to prevent loan defaults. Additionally, this technology can reduce the amount of time that loan officers have to spend reviewing documentation and conducting background checks. As a result, labor efficiency and risk management will be improved.

Across the globe, FinTech is revolutionizing the financial services industry. It is inevitable that MFIs will be forced to embrace technology. Though adoption of technology has been slow, MFIs must adopt it more rapidly in order to reduce cost, be more flexible, and improve the customer experience. As a result, there would be a separation of some processes. Furthermore, it is crucial to understand the potential competitors of MFIs as agent banking and mobile financial services (MFS) provide banks with a highly cost-efficient way of offering small-ticket products in remote locations (Srivastava et al., 2019). As a result of the partnership with mobile operators, banks can invest in high-end technology for transactions, increasing the likelihood of technology integration into financial services. Therefore, banks will face intense competition with microfinance institutions for the same pool of customers. The better image banks have in the market allows them to wean customers away from MFIs.

In South Asia, there are some countries leading in FinTech in microfinance Industry. India is one of the leading Asian countries with digital techniques in microfinance sector. E-KYC (electronic know your client), Aadhaar (Application Program Interface (API) to know the authentication of the client), electronic signatures, unified payment interface and Digi lockers can be identified as the recent FinTech advancements in India (KPMG, 2021). Furthermore, in Bangladesh there are several digital financing techniques practiced among MFIs. For instance,

application of web-based real-time loan management systems, centralized databases, digital field applications, mobile cash, cashless loan disbursements and, etc. (Business Finance for the Poor in Bangladesh, n.d). However, the utilization of technology in other South Asian countries is not dynamic as India. Thus, it is vital for MFIs in South Asian countries to adopt digital technology to improve the productivity of lending activities from technology pioneers in the region.

Moreover, technical efficiency is the other main aspect of MPI. This component mainly explains the maximization of the input used to make the maximum outputs relative to the best practicing MFIs in the production frontier. Two main components of achieving this is by pure efficiency change- better managerial practices (choosing the optimal input and output combination and reducing the waste) and scale efficiency change - perform in an optimal scale. Hence, to improve the better managerial practices, it is important to improve the efficient use of inputs, mainly the labor and capital. Therefore, it may be possible to address the problem by providing training and experience to the labor force and management. In addition, the proper use of technology to increase the cost efficiency of labor as well as the labor efficiency of the company is another widely discussed solution. It is also important to introduce profitable products that are aligned with the current market trends rather than focusing on the conventional mix of products.

The other main aspect of improving technical efficiency is that perform in an optimal scale. Thus, MFIs should know their most productive scale. The findings of the study reveal that MFIs lacked scale efficiency in several aspects. It can either be MFIs perform beyond the capacity or lower the capacity. There can be several realistic solutions to achieve scale efficiency. For instance, alliances with the leading MFIs can assist small-scale MFIs in reaching higher number of borrowers with low costs on infrastructure and inputs. On the other hand, to control the cost

related to the incompatible size of operations, it is possible to use technologies like branchless

lending, agents and etc.

Chapter 6 Conclusion and Policy Implications

6.1 Summary of the Findings of Chapter 4 and 5

The two primary chapters of the thesis focus on productivity change and convergence among microfinance institutions (MFIs) in Latin America and the Caribbean (LAC) and South Asia. As highlighted in the thesis, examining the performance of MFIs in developing regions is vital. The performance of MFIs was measured using different aspects of performances related to the microfinance concept. Financial performance and financial inclusion of profit-oriented MFIs in LAC are the primary performance aspects discussed in Chapter 4. In addition to the two aspects considered in Chapter 4, the social performance aspect is also considered in Chapter 5 on South Asia. Furthermore, in Chapter 5, both profit-oriented and not profit-oriented MFIs are considered.

Two methodologies are applied in both chapters as Malmquist Productivity Index (MPI), to measure productivity change with the benefit of the decomposition of the index. The MPI is mainly decomposed into technical efficiency change (EFFCH) and technological change (TECHCH). Technical change implies how efficient an MFI is in utilizing the scarce inputs in generating the outputs. This is further decomposed into two components pure efficiency change (PECH) and scale efficiency change (SECH) and conditional β convergence and σ convergence to measure productivity change. Pure efficiency change is about the managerial practices of the institutions or the ability of the management to choose the optimal input and output combination. Scale efficiency implies whether the institution is performing on an optimal scale or not. The decomposition of the index is helpful in identifying the determinants of the productivity change progress or the regress.

Thereafter, the study measures the productivity convergence of MPI and its components separately using conditional β convergence and σ convergence. Conditional β convergence is selected over absolute convergence due to the importance of the macro variables related to the financial markets in each country. β convergence is helpful to understand whether previously lagging MFIs are growing faster (in the sense of productivity change) compared to previously leading MFIs in the region. In simple terms, whether the lagging MFIs are catching up with leading MFIs. β convergence is not sufficient to derive a conclusion about the productivity convergence. Hence the study applies σ convergence, measured by standard deviation. σ convergence provides the evidence for decreasing the dispersion among MFIs in the sample.

Prior to providing policy implications based on the findings, Table (19) compares the findings of two regions, LAC and South Asia. However, the comparative study only includes profit-oriented MFIs in both regions. Comparing the financial performance of MFIs in LAC and South Asia reveals that productivity change has declined in both regions, 0.969 and 0.978, respectively. Nevertheless, TFPCH values indicate that South Asia has a higher productivity change compared to LAC. Moreover, considering the decomposition, it becomes apparent that in LAC, TECHCH is the main reason for productivity change regress, while EFFCH and SECH are the most responsible determinants in South Asia for regress in productivity change. Thus, to improve the productivity change in LAC, the main attention should go the improvement of the technology applied in the process of lending. South Asia's profit-oriented MFIs, on the other hand, should strive to improve their technical efficiency, primarily by performing at an optimal scale.

Table 18 Results of MPI of Profit-Oriented MFIs - Financial Performance and Inclusion

Region	LAC		South Asia	
Financial Performance	TFPCH	0.969	TFPCH	0.978
	TECHCH	0.977	TECHCH	0.993
	EFFCH	0.992	EFFCH	0.985
	PECH	0.996	PECH	0.999
	SECH	0.995	SECH	0.985
Financial Inclusion	TFPCH	0.993	TFPCH	0.978
	TECHCH	1.006	TECHCH	1.047
	EFFCH	0.987	EFFCH	0.934
	PECH	0.994	PECH	0.959
	SECH	0.993	SECH	0.974

Source: Author's calculations

In terms of financial inclusion, both aspects of productivity change show a decline. South Asia shows a lower productivity change than LAC, which is 0.978. There is a common feature in TECHCH that, in both regions, TECHCH shows productivity progress in the financial inclusion. Hence, in both regions, profit-oriented MFIs efficiently use the technology to produce loans to microenterprises. In addition, productivity progress in TECHCH is higher in South Asia, 4.7%, than LAC, which is 0.6%. Nevertheless, the main determinant of the regress in the productivity change in the financial inclusion aspect in both LAC and South Asia is inefficiencies in technical efficiency change and its components. It is important to compare the findings with previous studies comparing LAC and South Asia. The findings of this do not alone with Hassen &

Sanchez (2009), which stated that the South Asian MFIs have a higher technical efficiency change than LAC.

Table 19 Results of Convergence Analysis of Profit-Oriented MFIs - Financial Performance and Inclusion

Region	LAC	β	Half-life	σ	South Asia	β	Half life	σ
Financial Performance	TFPCH	-0.14***	45	Div	TFPCH	-0.05*	127	Div
	TECHCH	-0.11***	57	Div	TECHCH	-0.09***	69	Div
	EFFCH	-0.09***	76	Div	EFFCH	-0.05	141	Div
	PECH	-0.09***	75	Div	PECH	-0.07*	88	Div
	SECH	-0.12***	57	Div	SECH	-0.17*	36	Div
Financial Inclusion	TFPCH	-0.11***	59	Conv	TFPCH	-0.04	142	Div
	TECHCH	-0.12***	55	Div	TECHCH	-0.06**	108	Div
	EFFCH	-0.10***	63	Conv	EFFCH	-0.15**	42	Div
	PECH	-0.10***	63	Conv	PECH	-0.07	99	Div
	SECH	-0.01***	68	Div	SECH	-0.15**	41	Div

Note: In the table, "Conv" indicates convergence and "Div" indicates divergence.

Source: Author's calculations

Comparison of financial performance and inclusion aspects of profit-oriented MFIs from two regions based on the convergence provides interesting results. On the financial performance front, both regions show overall conditional β convergence. However, it is noteworthy that conditional β convergence in South Asia is only 10% significant and EFFCH does not have significant negative β convergence. In addition, the half-life of TFPCH (number of years to halve the gap

between lagging and leading MFIs) is considerably higher in South Asia. It is 127 years while 45 years in LAC. According to the findings, although South Asia has a higher MPI than LAC, it is lagging behind in terms of convergence. The comparison between two regions imply that MFIs in South Asia do not catch up with leading MFIs in a fast pace like MFIs in LAC. Furthermore, the findings for σ convergence in financial performance aspect indicate that the dispersion among MFIs in both regions has been increasing over the years (which indicated as "Div" in the table).

The financial inclusion aspect shows varying results for both conditional β and σ convergence analyses. LAC has a significant and negative β convergence with a half-life of 59 years, while South Asia has a significant, negative β convergence with a half-life of 142 years. Moreover, the financial inclusion aspect of LAC provides evidence for σ convergence too (which is indicated as "Conv" in the table). Although there is overall σ convergence in LAC in the financial inclusion aspect, it is noteworthy that, TECHCH and SECH indicate a σ divergence. On the other hand, there is no β and σ convergence for financial inclusion aspect in South Asia.

The overall findings of productivity convergence analysis for profit-oriented MFIs in LAC and South Asia reveal that profit-oriented MFIs in LAC are leading in their performances in both financial and financial inclusion aspects. However, it is noteworthy that there is σ divergence in the financial performance aspect in LAC. The pace of catching up (β convergence) in financial inclusion of profit-oriented MFIs in LAC can be sped up by improving technical efficiency change and its constituents, pure and scale efficiency change. Comparatively, South Asia lags behind both in financial inclusion and convergence. Improvements in technical efficiency and the components of it (pure efficiency and scale efficiency) are key to improving financial

performance; in the case of financial inclusion, technological change and changes in pure efficiency are crucial.

Excluding section in the comparative study of LAC and South Asia is the performance of not profit-oriented MFIs and social performance of profit-oriented MFIs in South Asia. In brief the social performance aspect of profit-oriented MFIs in South Asia has a productivity change regress (0.977) mainly due to lacking performance of technological change, technical efficiency changes and its component, scale efficiency change. Moreover, there is conditional β convergence for profit-oriented MFIs in the region; however, the half-life is 154 years. Nevertheless, there is no σ convergence in the performance of profit-oriented MFIs in South Asia. According to the findings of not profit MFIs, productivity regress in all three aspects such as financial, social, and financial inclusion. Technological change is the main determinant of the regress of the productivity change in both financial and social aspects. However, technical efficiency change and its components, pure and scale efficiency change, should improve to gain the productivity change in financial inclusion by lending to microenterprises.

6.2. Policy Implications to Improve the Performance of the Microfinance Industry in Latin America and the Caribbean

According to the findings of the profit-oriented MFIs with regard to financial performance and financial inclusion aspects, these MFIs should improve their performance. In spite of LAC's reputation as a highly commercialized microfinance region, the study reveals that profit-oriented MFIs in the region are more likely to lend to microenterprises than to demonstrate financial performance. The main recommendation for profit-oriented MFIs in the LAC is to improve efficiency and financial sustainability primarily by focusing on the development of technologies

and innovations in lending. It is possible to achieve this by utilizing digital financing techniques to improve the efficiency and quality of lending and monitoring borrowers.

In addition, sharing the technological advancements and innovative lending practices of the best-performing MFIs with lagging profit-oriented MFIs will contribute to improving catching up with them. The region has adopted several digital microfinancing technologies such as e-money and e-wallet. However, it is noteworthy that it is expensive for the MFIs to adopt the technologies due to the high cost. Therefore, assistant in developing the infrastructure is crucial in the microfinance sector in the region. Furthermore, better managerial practices and performance at an optimal scale have a high impact on improving β convergence between these institutions. It is noteworthy that financially sustainable MFIs can provide microenterprises with cost-effective loans and further support financial inclusion.

6.3. Policy Implications to Improve the Performance of the Microfinance Industry in South Asia

The findings of profit-oriented MFIs in the South Asian region alarm about the sustainability, outreach as well as financial services to microenterprises in the region. As a policy recommendation, technological advancements and innovations to improve the efficiency of the operations of MFIs are critical in the region, especially to improve financial sustainability and outreach of profit-oriented MFIs in the region. Thus, capital investments and government support may necessary to implement productive technologies in the microfinance industry. The next policy implication is about lending to microenterprises. Profit-oriented MFIs have shown the worst performance results in this aspect even compared to financial and social aspects. The main determinants of for the productivity change regress and productivity divergence are technical

efficiency change and its components. Consequently, there ought to be policies that encourage efficient performance internally through improving the labor productivity of loan officers in lending to microenterprises, implementing efficient techniques from best-performing MFIs to reduce cost and improve transaction quality, etc.

Furthermore, results on not profit-oriented MFIs in South Asia have also revealed that these organizations do not perform optimally when it comes to achieving financial sustainability, providing loans to microenterprises, and even outreaching. Policy recommendations to improve financial sustainability and outreach are mainly improving the technological advancements and adopting better technological techniques from best-practicing MFIs in the region. The improvements in the technology may enhance both productivity change and convergence in financial sustainability and outreach in not profit MFIs in South Asia. In order to improve loans to microenterprises by not profit MFIs, the efficiency in the institution's performances should be improved, which is similar to the policy recommendation for the financial inclusion aspect of profit-oriented MFIs in South Asia.

6.4 Limitations of the Study and Further Research

The study is limited by several factors. First, the selection bias of MFIs has an impact on the results. The data are extracted from the MIX database, and there are MFIs that do not contribute data to the database. In addition, when selecting the MFIs, the availability of the data is considered, and some missing data were imputed. It may affect the overall result. It's possible that some of the important MFIs in some of the regions haven't been included in the sample. Moreover, characteristics of MFIs are not considered in the analysis and the result may have impact from country characteristics too. More importantly, one of the drawbacks of the MPI is

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inability of checking the significance of the results. Thus, as the further study, it is possible to apply some techniques as two stage bootstrapping method and other parametric methodologies to measure the significance of MPI.

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Appendices

Appendix I

Table 20 The Definitions of Input, Output and Conditional Variables

Variables	Definitions
Input variables	
Number of loan officers	The employees who engage in managing the GLP as the main task.
Assets	The value of all resources controlled by the MFI.
Cost per borrower	Operating expense / average number of active borrowers
Output variables	
ROA	(Net operating income - taxes) / average total assets
ROE	(Net operating income - taxes) / average total equity
Operational self-sufficiency (OSS)	Financial revenue / (Financial expense + net impairment Loss + Operating Expense)
Gross loan portfolio	This includes current, delinquent, and renegotiated loans, excluding written off.
Financial inclusion variables	
Number of active borrowers per population of the country	Number of active borrowers/populations of each country
Number of loans for microenterprises	The number of outstanding loans given to microenterprises.
Gross loan portfolio of loan to microenterprises	The values of loans (excluding written-off) given to microenterprises.
Conditional Variables	
Financial Development Index	This index considers the efficiency, depth and access of the financial institution of the country. This is a combination of the Financial Institutions Index and the Financial Markets Index.
Annual growth of the Gross Domestic Product	The annual percentage growth rate of GDP
The gross domestic income per capita	Gross domestic income/ mid-year population
Domestic credit to the private sector (as a percentage of Gross domestic production)	Financial resources to the private sector, as loans, purchases of non-equity securities, trade credits, and other accounts receivables that establish a claim for repayment.
Real interest rate	Real interest rate = nominal interest rate − inflation rate.

Appendix II

Table 21 MPI of Financial Performance of Profit-Oriented MFIs in LAC

	MFI name	EFFCH	TECHCH	PECH	SECH	TFPCH
1	ACCESS	0.978	0.961	1	0.978	**0.94**
2	Alternativa Microfinanzas	0.978	0.964	1.001	0.977	**0.943**
3	Apoyo Económico	1.006	0.912	1.005	1.001	**0.918**
4	Apoyo Integral	1.01	0.844	0.999	1.011	**0.852**
5	Bancamía	1.009	0.913	1.008	1.001	**0.921**
6	Banco ADEMI	0.977	0.894	0.987	0.991	**0.873**
7	Banco ADOPEM	1.008	0.976	1.005	1.003	**0.983**
8	Banco Caja Social	0.99	0.967	0.988	1.002	**0.958**
9	Banco COOPNACIONAL	1.003	0.975	1.003	1	**0.978**
10	Banco da Família	0.991	0.959	0.991	1	**0.95**
11	Banco Delta, S.A.	1.002	0.957	1.001	1.001	**0.959**
12	Banco D-Miro	1.015	0.943	1.015	1	**0.958**
13	Banco Do Vale	0.998	0.807	1	0.998	**0.805**
14	Banco Familiar	1.013	0.868	1	1.013	**0.879**
15	Banco Fassil	1.002	0.9	1	1.002	**0.902**
16	Banco FIE	0.983	0.873	0.985	0.997	**0.858**
17	Banco Forjadores	1.006	0.892	1.003	1.003	**0.898**
18	Banco Fortaleza	1.008	0.933	1.001	1.007	**0.94**
19	Banco Popular	1.013	0.947	1.009	1.004	**0.96**
20	BANCO PRODEM	1.005	0.942	1.009	0.996	**0.947**
21	Banco Pyme de la Comunidad	0.992	0.901	0.988	1.004	**0.893**
22	Banco PYME EcoFuturo	0.998	0.909	1.001	0.996	**0.907**
23	Banco Solidario	1.005	0.965	1.003	1.002	**0.97**
24	Banco VisionFund Ecuador	1.019	0.962	1.015	1.004	**0.98**
25	Banco W	1.039	0.988	1.042	0.997	**1.026**
26	BANCODESARROLLO	1.027	0.94	1.032	0.996	**0.965**
27	BancoEstado	1.011	0.954	1.012	0.999	**0.965**
28	BanCompartir	1.003	0.896	1.002	1.001	**0.9**
29	BancoSol	1.01	0.887	1.01	1	**0.896**
30	BANFONDESA	0.988	0.945	1.001	0.988	**0.934**
31	Bitechi Soluciones	0.968	0.944	0.964	1.003	**0.914**
32	CACMU	0.96	0.938	0.956	1.004	**0.9**

	MFI name	EFFCH	TECHCH	PECH	SECH	TFPCH
33	CIDRE IFD	0.974	0.91	0.972	1.003	**0.887**
34	CMAC Cusco	0.969	0.996	0.969	1	**0.965**
35	CMAC Del Santa	0.981	0.993	0.98	1	**0.974**
36	CMAC Huancayo	0.976	1.061	0.978	0.998	**1.035**
37	CMAC Ica	0.987	1.031	0.986	1.001	**1.017**
38	CMAC Maynas	0.986	1.019	0.985	1.001	**1.004**
39	CMAC Paita	0.978	1.003	0.983	0.995	**0.981**
40	CMAC Piura	0.974	0.982	0.983	0.991	**0.956**
41	CMAC Sullana	0.974	1.004	0.983	0.991	**0.978**
42	CMAC Tacna	1.008	1.061	1.007	1.001	**1.07**
43	CMAC Trujillo	1.015	1.054	1.013	1.002	**1.07**
44	CMCP Lima	0.918	0.915	0.945	0.972	**0.84**
45	COAC 4 de Octubre	0.999	0.963	1.01	0.989	**0.962**
46	COAC Atuntaqui	1.003	0.967	1.008	0.995	**0.97**
47	COAC Chone	0.994	0.928	0.995	0.998	**0.922**
48	COAC Fernando Daquilema	0.978	0.941	0.976	1.002	**0.92**
49	COAC Jardín Azuayo	0.984	0.913	1	0.984	**0.898**
50	COAC Kullki Wasi	0.973	0.959	0.979	0.994	**0.934**
51	COAC La Benéfica	0.98	1.01	0.979	1.001	**0.99**
52	COAC Luz del Valle	0.971	0.966	0.974	0.996	**0.938**
53	COAC Mushuc Runa	1.004	0.965	1.003	1.002	**0.969**
54	COAC Padre Vicente	0.997	0.956	1	0.997	**0.953**
55	COAC San Antonio	0.907	1.032	0.972	0.933	**0.936**
56	COAC San José	0.951	1.062	0.984	0.967	**1.01**
57	COAC Santa Anita	0.95	1.038	0.972	0.978	**0.986**
58	COCDEP	0.934	1.039	0.978	0.955	**0.971**
59	Compartamos Banco	0.971	1.067	0.989	0.982	**1.036**
60	Compartamos Financiera	0.979	1.044	0.985	0.993	**1.022**
61	Comultrasan	0.978	1.011	0.989	0.989	**0.989**
62	Confiar	0.97	1.043	0.977	0.993	**1.012**
63	CONSER	0.984	1.019	0.987	0.997	**1.003**
64	Coop Jesús Nazareno	1.002	1.057	1.001	1	**1.059**
65	Coop Juan XXIII	1.002	1.032	1.002	1	**1.034**
66	Coop. Maquita Cushunchic Ltda	0.972	1.01	0.972	0.999	**0.982**
67	COOPAC Norandino	0.927	1.017	0.953	0.973	**0.943**

	MFI name	EFFCH	TECHCH	PECH	SECH	**TFPCH**
68	COOPAC Santo Cristo	0.948	0.967	0.962	0.986	**0.917**
69	COOP-ASPIRE	0.996	1.013	1.001	0.995	**1.009**
70	Cooperativa Microempresas de Colombia	0.965	0.935	0.982	0.983	**0.903**
71	COOPROGRESO	0.951	0.946	0.981	0.969	**0.9**
72	CRAC Los Andes	0.934	0.88	0.973	0.96	**0.822**
73	CRAC Sipan	0.935	0.888	0.968	0.965	**0.83**
74	CRECER IFD	0.955	0.949	0.979	0.976	**0.906**
75	CrediAmigo	0.987	0.944	0.988	0.999	**0.932**
76	CrediClub	0.955	0.981	0.976	0.978	**0.937**
77	CrediConfía	0.957	1.023	0.978	0.978	**0.979**
78	CREDIMUJER	1.021	1.027	1.02	1.002	**1.049**
79	Crediscotia	0.998	1.028	1.012	0.985	**1.025**
80	Credisol	0.969	0.996	0.983	0.987	**0.965**
81	Crezcamos	0.994	1.031	1.002	0.992	**1.025**
82	Diaconia FRIF IFD	0.97	1.057	0.978	0.992	**1.025**
83	EDPYME Acceso Crediticio	0.961	1.018	0.973	0.988	**0.979**
84	EDPYME Alternativa	0.959	1.011	0.982	0.976	**0.969**
85	EDPYME Credivision	0.951	0.942	0.978	0.973	**0.896**
86	EDPYME Marcimex	0.958	0.94	0.981	0.977	**0.901**
87	Emprende Microfinanzas	0.959	0.915	0.977	0.982	**0.877**
88	FACES	0.999	0.854	0.998	1.001	**0.853**
89	FDL	0.975	0.867	0.985	0.99	**0.845**
90	FHA	1.001	0.865	0.989	1.012	**0.867**
91	FIDERPAC	0.984	0.914	0.985	0.999	**0.899**
92	FIE Gran Poder	0.969	0.874	0.97	0.999	**0.847**
93	FinAmigo	0.981	0.923	0.981	1	**0.905**
94	FINANCIA CAPITAL	0.985	0.938	0.986	0.999	**0.924**
95	Financia Credit	1	0.979	1	1	**0.979**
96	Financiera Credinka	0.988	0.939	0.991	0.997	**0.928**
97	Financiera Efectiva	1.071	0.999	1.039	1.031	**1.07**
98	Financiera El Comercio	1.074	1.091	1.024	1.049	**1.172**
99	Financiera Fama	1.092	1	1.035	1.056	**1.092**
100	Financiera Independencia	1.079	1.016	1.032	1.046	**1.097**
101	Financiera Proempresa	1.075	1.093	1.034	1.04	**1.175**
102	FINCA - ECU	1.068	1.062	1.023	1.044	**1.134**

	MFI name	EFFCH	TECHCH	PECH	SECH	TFPCH
103	FINCA - NIC	1.085	1.053	1.033	1.051	**1.143**
104	FINCA - PER	1.084	1.06	1.033	1.049	**1.149**
105	FinComún	1.095	1.071	1.039	1.054	**1.173**
106	FINSOL	1.09	1.012	1.039	1.049	**1.104**
107	FONDECO IFD	1.042	1.043	1.028	1.013	**1.087**
108	FONDESURCO	1.023	1.086	1.024	1	**1.111**
109	FUBODE IFD	1	1.045	1.005	0.995	**1.045**
110	FUDEMI	1.009	1.036	1.013	0.996	**1.046**
111	Fundaci¢n Amanecer	1.015	1.088	1.015	1	**1.105**
112	Fundación Espoir	1.004	1.051	1.007	0.996	**1.055**
113	FUNDENUSE	1.012	1.001	1.011	1	**1.013**
114	FUNDESER	0.954	1.005	0.982	0.971	**0.959**
115	FUNED OPDF	0.946	1.037	0.974	0.971	**0.981**
116	IDEPRO IFD	1.024	1.02	1.022	1.002	**1.045**
117	IMPRO IFD	1.029	1.028	1.027	1.002	**1.057**
118	Impulsarte para Crecer	1.005	1.06	1.012	0.994	**1.066**
119	INSOTEC	1.011	1.112	1.012	0.999	**1.124**
120	Instituto Estrela	1.016	1.05	1.016	1	**1.067**
121	Interfisa Banco	1.004	1.042	1.007	0.997	**1.047**
122	León 2000 IMF	1.103	1.018	1.087	1.016	**1.123**
123	MCN	1.024	0.99	1.024	1.001	**1.014**
124	MiBanco	0.987	1.005	1.004	0.983	**0.992**
125	MiCredito Nicaragua	0.968	1.025	0.993	0.976	**0.992**
126	Microserfin	0.868	0.994	0.936	0.928	**0.863**
127	ODEF Financiera	1.019	1.091	1.019	1	**1.112**
128	OMLA	0.97	1.008	0.995	0.975	**0.978**
129	Oportunidad Microfinanzas	0.98	0.911	1	0.98	**0.893**
130	Pichincha Microfinanzas	0.979	0.907	0.994	0.984	**0.888**
131	PILARH OPDF	0.958	0.868	0.985	0.973	**0.832**
132	ProCaja	0.957	0.85	0.992	0.965	**0.813**
133	ProCredit - ECU	0.948	0.858	0.986	0.962	**0.814**
134	ProCredit - NIC	0.956	0.912	0.977	0.979	**0.871**
135	ProCredit - SLV	0.993	0.953	1	0.993	**0.946**
136	PRODESA	0.996	0.962	1.001	0.996	**0.958**
137	Progresemos	0.967	0.997	0.979	0.989	**0.964**

	MFI name	EFFCH	TECHCH	PECH	SECH	TFPCH
138	Provident	0.982	1.016	0.995	0.987	**0.998**
139	REFICOM RL	0.99	1.014	0.995	0.994	**1.004**
140	Sartawi	0.989	0.983	0.994	0.995	**0.972**
141	SEFIA	0.991	1.027	0.997	0.994	**1.018**
142	SOGESOL	0.996	1.118	1	0.996	**1.114**
143	SOLFI	0.996	1.046	0.999	0.996	**1.042**
144	Solución Asea	0.994	0.966	0.996	0.998	**0.96**
145	Soluciones Cabales del Noreste	0.997	0.952	1	0.997	**0.949**
146	Soluciones Fresnos del Norte	0.996	0.946	0.997	0.999	**0.942**
147	SUFIRMA	0.999	0.929	0.999	1	**0.928**
148	Te Creemos	1.003	0.937	1.003	1	**0.94**
149	Visión Banco	1	1.017	1	1	**1.017**
	Annual average	0.992	0.977	0.996	0.995	**0.969**

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

Table 22 MPI of Financial Inclusion of Profit Oriented MFIs in LAC

	MFI Name	EFFCH	TECHCH	PECH	SECH	TFPCH
1	ACCESS	0.933	0.721	1	0.933	**0.673**
2	Apoyo Económico	1.01	0.734	1.012	0.998	**0.741**
3	Apoyo Integral	0.997	0.775	0.937	1.064	**0.772**
4	Bancamía	0.977	0.804	0.983	0.993	**0.786**
5	Banco ADEMI	0.971	0.773	0.992	0.979	**0.751**
6	Banco ADOPEM	0.944	0.814	0.95	0.994	**0.768**
7	Banco COOPNACIONAL	1.005	0.941	1.031	0.975	**0.945**
8	Banco da Família	0.996	0.885	1.022	0.974	**0.881**
9	Banco D-Miro	0.969	0.957	0.964	1.004	**0.927**
10	Banco do Vale	1.066	0.929	1.04	1.024	**0.99**
11	Banco Familiar	0.979	1.038	1.023	0.957	**1.016**
12	Banco Fassil	0.925	1.005	0.978	0.946	**0.93**
13	Banco FIE	0.988	1.053	1.061	0.931	**1.04**
14	Banco Forjadores	1.01	1.017	1.09	0.927	**1.028**
15	Banco Popular	1.01	1.033	1.071	0.943	**1.044**
16	BANCO PRODEM	1.02	1.006	1.018	1.002	**1.026**
17	Banco Pyme de la Comunidad	1.029	1.056	1.009	1.02	**1.087**
18	Banco PYME EcoFuturo	1.008	0.977	0.987	1.021	**0.985**

	MFI Name	EFFCH	TECHCH	PECH	SECH	TFPCH
19	Banco Solidario	0.983	1.012	0.948	1.036	**0.995**
20	Banco VisionFund Ecuador	0.98	1.089	0.952	1.029	**1.067**
21	Banco W	0.949	1.237	0.927	1.024	**1.174**
22	BANCODESARROLLO	0.915	1.143	0.911	1.004	**1.046**
23	BancoEstado	1.11	1.27	1.089	1.02	**1.411**
24	BanCompartir	1.124	1.258	1.088	1.034	**1.414**
25	BancoSol	0.974	1.207	0.98	0.993	**1.175**
26	CACMU	0.999	1.277	1.002	0.997	**1.276**
27	CIDRE IFD	0.992	1.139	0.99	1.002	**1.13**
28	CMAC Cusco	1.024	1.133	1.043	0.981	**1.16**
29	CMAC Del Santa	0.99	1.102	0.991	0.999	**1.091**
30	CMAC Huancayo	0.977	1.117	0.974	1.003	**1.091**
31	CMAC Ica	1.001	1.103	1.001	1	**1.104**
32	CMAC Maynas	1.063	1.138	1.061	1.002	**1.21**
33	CMAC Paita	1.066	1.18	1.061	1.005	**1.258**
34	CMAC Piura	1.062	1.209	1.056	1.006	**1.284**
35	CMAC Sullana	1.076	1.091	1.061	1.014	**1.174**
36	CMAC Tacna	1.067	1.079	1.053	1.013	**1.151**
37	CMAC Trujillo	0.999	1.021	1	0.998	**1.019**
38	CMCP Lima	1.007	0.963	1.007	0.999	**0.969**
39	COAC 4 de Octubre	0.894	0.885	0.912	0.98	**0.791**
40	COAC Atuntaqui	0.888	0.845	0.921	0.965	**0.751**
41	COAC Chone	0.879	0.914	0.906	0.971	**0.804**
42	COAC Fernando Daquilema	0.92	0.927	0.948	0.97	**0.853**
43	COAC Jardín Azuayo	0.933	0.903	0.959	0.973	**0.842**
44	COAC Kullki Wasi	0.983	0.888	0.995	0.988	**0.873**
45	COAC La Benéfica	1	0.941	1	1	**0.941**
46	COAC Luz del Valle	1.006	0.974	1.005	1.002	**0.98**
47	COAC Mushuc Runa	0.915	0.995	0.921	0.994	**0.91**
48	COAC Padre Vicente	0.926	0.94	0.935	0.99	**0.87**
49	COAC San Antonio	1.015	1.018	1.016	0.999	**1.033**
50	COAC San José	0.973	0.974	0.966	1.007	**0.947**
51	COAC Santa Anita	0.958	0.908	0.953	1.005	**0.87**
52	Compartamos Banco	0.971	0.909	0.971	1	**0.883**
53	Compartamos Financiera	0.971	0.898	0.968	1.003	**0.871**

	MFI Name	EFFCH	TECHCH	PECH	SECH	TFPCH
54	Coop Juan XXIII	1.021	0.894	1.014	1.006	**0.913**
55	Coop. Maquita Cushunchic Ltda	0.972	0.929	0.966	1.006	**0.903**
56	COOPAC Norandino	0.943	0.933	0.974	0.968	**0.88**
57	COOP-ASPIRE	0.933	1.015	0.971	0.961	**0.947**
58	Cooperativa Microempresas de Colombia	0.947	1.006	0.977	0.969	**0.953**
59	COOPROGRESO	1.02	0.987	1.01	1.009	**1.006**
60	CRAC Los Andes	1.037	0.909	1.024	1.013	**0.943**
61	CRAC Sipan	0.822	0.887	0.837	0.982	**0.729**
62	CRECER IFD	0.976	0.879	0.992	0.984	**0.859**
63	CrediAmigo	0.957	0.951	0.974	0.983	**0.91**
64	CREDIMUJER	0.949	0.92	0.955	0.993	**0.873**
65	Crediscotia	0.945	0.928	0.944	1.001	**0.877**
66	Credisol	0.947	0.877	0.999	0.947	**0.83**
67	Crezcamos	0.938	0.988	0.94	0.998	**0.927**
68	Diaconia FRIF IFD	0.954	0.997	0.964	0.99	**0.952**
69	EDPYME Acceso Crediticio	0.94	1.126	0.943	0.997	**1.059**
70	EDPYME Alternativa	0.949	1.142	1	0.949	**1.084**
71	Emprende Microfinanzas	0.91	1.212	0.91	1	**1.103**
72	FACES	0.898	1.174	0.916	0.981	**1.054**
73	FDL	0.905	1.104	0.906	0.999	**1**
74	FIDERPAC	0.913	1.062	0.914	0.999	**0.97**
75	FIE Gran Poder	0.929	1	0.938	0.991	**0.929**
76	Financiera Credinka	0.958	1.026	0.967	0.99	**0.983**
77	Financiera Efectiva	1	1.041	1	1	**1.041**
78	Financiera El Comercio	1	1.054	1	1	**1.054**
79	Financiera Fama	1.003	1	1.003	0.999	**1.003**
80	Financiera Independencia	1.01	0.945	1.01	1	**0.954**
81	Financiera Proempresa	1.013	0.985	1.013	1	**0.998**
82	FINCA - ECU	1.006	0.981	1.008	0.998	**0.986**
83	FINCA - NIC	1	1.001	1	1	**1.001**
84	FINCA - PER	0.97	1.007	0.97	1.001	**0.977**
85	FinComún	1.085	1.008	1	1.085	**1.094**
86	FINSOL	1.1	1.027	1.048	1.049	**1.129**
87	FONDECO IFD	1.066	0.984	1.053	1.013	**1.049**

	MFI Name	EFFCH	TECHCH	PECH	SECH	TFPCH
88	FONDESURCO	1.035	0.979	1.028	1.007	**1.013**
89	FUBODE IFD	0.986	0.959	0.993	0.993	**0.946**
90	FUDEMI	1.006	0.994	1.013	0.993	**1**
91	Fundaci¢n Amanecer	1.141	0.942	1.143	0.999	**1.075**
92	Fundación Espoir	1.198	0.945	1.2	0.998	**1.131**
93	FUNDENUSE	1.162	1.1	1.165	0.997	**1.278**
94	FUNDESER	1.134	1.076	1.136	0.998	**1.22**
95	IDEPRO IFD	0.975	1.124	0.991	0.984	**1.096**
96	IMPRO IFD	0.978	1.114	0.992	0.986	**1.09**
97	Impulsarte para Crecer	0.899	1.121	0.914	0.983	**1.007**
98	INSOTEC	0.936	1.11	0.956	0.979	**1.039**
99	Instituto Estrela	0.998	1.104	1.015	0.983	**1.102**
100	Interfisa Banco	0.973	1.1	0.995	0.979	**1.071**
101	León 2000 IMF	0.923	1.125	0.952	0.97	**1.039**
102	MCN	0.903	1.187	0.936	0.965	**1.072**
103	MiBanco	0.964	1.149	0.982	0.982	**1.109**
104	Microserfin	1.001	1.182	1.001	1	**1.183**
105	OMLA	0.971	1.2	0.981	0.99	**1.166**
106	Oportunidad Microfinanzas	0.94	1.214	0.964	0.975	**1.14**
107	Pichincha Microfinanzas	0.952	1.086	1.001	0.951	**1.033**
108	PILARH OPDF	0.992	0.982	0.998	0.994	**0.974**
109	ProCaja	0.984	0.904	0.991	0.993	**0.889**
110	ProCredit - NIC	1.012	0.913	1.014	0.997	**0.923**
111	PRODESA	0.983	0.886	0.996	0.987	**0.871**
112	Progresemos	0.989	0.903	1.012	0.978	**0.893**
113	Sartawi	1.006	0.942	1.012	0.994	**0.947**
114	SEFIA	1.027	0.956	1.03	0.997	**0.982**
115	SOGESOL	1.016	0.983	1.024	0.992	**0.999**
116	Solución Asea	1.039	1.004	1.039	0.999	**1.042**
117	Te Creemos	1.036	0.995	1.029	1.007	**1.031**
118	Visión Banco	1.046	1.042	1.038	1.007	**1.089**
	Annual average	0.987	1.006	0.994	0.993	**0.993**

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

Table 23 MPI of Profit-Oriented MFIs in South Asia

MFI	Financial Performance					Financial Inclusion					Social Performance				
	EFFCH	TECHCH	PECH	SECH	TFPCH	EFFCH	TECHCH	PECH	SECH	TFPCH	EFFCH	TECHCH	PECH	SECH	TFPCH
Adhikar	0.909	0.889	0.992	0.916	**0.808**	0.903	1.087	0.984	0.918	**0.982**	1	0.924	1	1	**0.924**
Annapurna Cooperative	0.907	0.957	0.98	0.926	**0.868**	0.907	1.066	1.023	0.886	**0.967**	1.022	0.992	1	1.022	**1.015**
Arohan	0.917	0.935	0.973	0.942	**0.858**	0.918	1.043	1.028	0.893	**0.958**	1	0.977	1	1	**0.977**
ASA India	0.892	1.068	0.963	0.926	**0.953**	0.947	1.059	1.022	0.926	**1.003**	0.935	1.122	1	0.935	**1.049**
ASA Pakistan	0.933	1.087	0.971	0.961	**1.014**	0.913	1.037	0.977	0.934	**0.947**	0.966	1.048	1	0.966	**1.013**
Asirvad	0.966	1.23	0.984	0.982	**1.188**	0.917	1.076	0.943	0.972	**0.986**	0.993	0.971	1	0.993	**0.965**
Asomi	0.973	1.16	0.982	0.991	**1.129**	0.906	1.091	0.922	0.983	**0.989**	0.992	1.102	1	0.992	**1.093**
Bandhan	0.967	1.069	0.972	0.995	**1.034**	0.979	1.058	0.986	0.992	**1.036**	0.998	1.082	1	0.998	**1.08**
Berendina Micro Investment	0.981	1.06	0.991	0.99	**1.04**	1	1.058	1	1	**1.058**	1.01	1.144	1	1.01	**1.156**
Bharat Financial (SKS)	0.987	1.141	0.999	0.987	**1.126**	1.016	1.128	1.012	1.004	**1.146**	1.003	0.994	1	1.003	**0.997**
BSFL	0.998	1.077	1	0.998	**1.074**	0.972	1.1	0.972	0.999	**1.068**	1.008	0.981	1	1.008	**0.989**
BSS	1.005	1.093	1.004	1.001	**1.099**	0.969	1.116	0.988	0.98	**1.081**	1.027	1.007	1	1.027	**1.035**
BWDA	1.001	0.976	1	1.001	**0.977**	1.033	1.113	1.012	1.021	**1.15**	1	0.86	1	1	**0.86**
Chaitanya	0.983	0.973	1	0.983	**0.957**	1.038	1.155	1.012	1.026	**1.199**	0.964	0.889	0.997	0.967	**0.857**
CreditAccess Grameen	0.98	0.955	1	0.98	**0.936**	1.038	1.093	1.012	1.026	**1.134**	0.999	0.853	1.003	0.996	**0.852**
CTS	1	1.02	1	1	**1.02**	1.039	1.154	1.031	1.008	**1.199**	1.024	0.991	1.004	1.019	**1.014**
Equitas	1.014	1.099	1.011	1.003	**1.114**	1.043	1.19	1.033	1.011	**1.242**	1.021	1.022	1.006	1.015	**1.043**
FMFB - AFG	0.858	1.027	0.974	0.88	**0.881**	0.998	1.106	0.999	0.998	**1.103**	0.853	1.022	0.962	0.887	**0.872**
FMFB Pakistan	0.905	1.25	0.974	0.929	**1.131**	0.931	1.133	0.954	0.976	**1.055**	0.924	1.17	0.993	0.93	**1.08**
Fusion	0.96	1.2	0.993	0.966	**1.151**	0.891	1.133	0.931	0.957	**1.009**	1.001	1.212	1.004	0.997	**1.213**
Grameen Bank	0.986	1.113	1	0.986	**1.097**	0.906	1.131	0.919	0.985	**1.025**	1.028	1.093	1.008	1.02	**1.123**
GU Financial	0.983	1.078	0.989	0.994	**1.059**	0.951	1.085	0.941	1.011	**1.032**	1.018	0.915	1.01	1.008	**0.932**
IDF Financial	0.989	1.05	0.995	0.994	**1.039**	0.995	1.065	0.972	1.023	**1.059**	1.01	0.897	1.001	1.009	**0.906**
IMPACT	0.997	1.03	0.998	0.999	**1.027**	0.991	1.054	0.958	1.034	**1.044**	1.035	0.877	1.001	1.033	**0.908**
JWS	0.983	0.929	1.011	0.973	**0.914**	0.993	1.143	0.996	0.997	**1.135**	1.004	0.75	0.997	1.007	**0.753**
Kashf Foundation	1.006	1.053	1.006	1	**1.06**	1.002	1.175	1.005	0.997	**1.177**	0.994	0.762	1.003	0.991	**0.757**
Khushhali Bank	1.004	0.946	1.011	0.994	**0.95**	0.947	1.124	0.948	0.999	**1.065**	1	0.767	1	1	**0.767**
Madura	1.043	1.058	1.038	1.005	**1.104**	0.793	1.057	1	0.793	**0.838**	1.001	0.884	1	1.001	**0.885**
Muktinath Bikas Bank	1.07	1.091	1.059	1.011	**1.167**	0.807	1.013	1.008	0.8	**0.817**	1.039	0.899	1.009	1.029	**0.934**

	Financial Performance					Financial Inclusion					Social Performance				
Nerude	1.051	1.034	1.041	1.01	**1.087**	0.768	1.011	1.033	0.744	**0.777**	1.044	0.853	1.008	1.036	**0.89**
Nirdhan	1.006	0.983	1.019	0.988	**0.989**	0.713	1.008	0.72	0.99	**0.719**	0.983	1.008	1.004	0.979	**0.991**
Orix Leasing	1.021	0.944	1.015	1.005	**0.963**	0.893	0.973	0.908	0.984	**0.87**	1.025	1.019	1.003	1.022	**1.045**
OXUS - AFG	0.991	1.066	0.993	0.998	**1.056**	0.819	1.015	0.826	0.99	**0.831**	0.988	1.052	1	0.988	**1.039**
Pak Oman	0.974	1.051	0.993	0.981	**1.024**	0.835	0.977	0.85	0.982	**0.815**	0.981	1.149	1.002	0.98	**1.127**
RGVN	0.955	1.011	0.973	0.982	**0.966**	0.858	0.952	0.885	0.97	**0.817**	0.968	1.09	1	0.968	**1.055**
Safco Support	0.989	0.955	0.991	0.998	**0.944**	0.85	0.96	0.873	0.973	**0.815**	0.978	1.097	1	0.978	**1.073**
saija	1.023	0.83	1	1.023	**0.849**	0.831	0.995	0.853	0.974	**0.827**	0.984	0.926	1	0.984	**0.911**
Samasta	0.985	0.822	0.991	0.994	**0.809**	0.905	0.998	0.929	0.975	**0.903**	0.992	0.88	1	0.992	**0.873**
Sarvoday a Nano	0.983	0.888	0.987	0.996	**0.873**	0.944	1.005	0.957	0.987	**0.95**	0.978	0.954	1	0.978	**0.932**
Satin	1.037	0.89	1.031	1.006	**0.924**	1	0.991	1	1	**0.991**	1	1.062	1	1	**1.062**
SB Bank	1.027	0.94	1.029	0.998	**0.965**	1.005	0.98	1.005	1.001	**0.985**	1.005	1.006	1	1.005	**1.011**
SMILE	1.007	0.827	1.019	0.988	**0.833**	0.863	0.973	0.879	0.982	**0.84**	0.997	0.956	1	0.997	**0.953**
Sonata	1.023	0.889	1.02	1.003	**0.91**	0.935	0.897	0.938	0.997	**0.839**	1.036	0.9	1	1.036	**0.933**
Spandana	1.022	0.9	1.021	1.002	**0.92**	1.047	0.922	1.055	0.993	**0.966**	1.022	0.904	1	1.022	**0.924**
Suryoday	0.994	0.893	1.002	0.992	**0.888**	1.007	0.949	1.013	0.994	**0.955**	1.001	0.944	1.004	0.996	**0.944**
SV Creditline	0.977	0.826	0.989	0.988	**0.807**	0.988	0.998	1.002	0.986	**0.986**	1	0.993	1	1	**0.993**
Telenor Microfina nce	0.964	0.789	0.977	0.987	**0.761**	0.969	0.96	0.987	0.981	**0.93**	0.975	1.039	1	0.975	**1.013**
Ujjivan	0.981	0.876	0.984	0.997	**0.859**	0.933	0.939	0.955	0.978	**0.877**	0.973	1.087	1	0.973	**1.058**
Utkarsh	0.98	0.939	0.982	0.998	**0.92**	0.884	1.058	0.813	1.087	**0.936**	0.981	1.02	1	0.981	**1.001**
Uttrayan Financial	0.995	0.97	0.987	1.009	**0.966**	1.029	1.062	0.951	1.082	**1.093**	0.996	1.07	1	0.996	**1.066**
Village Financial	1.086	0.982	1.063	1.022	**1.067**	1.001	1.052	1.015	0.987	**1.053**	0.973	1.157	1	0.973	**1.127**
Annual average	0.985	0.993	0.999	0.985	**0.978**	0.934	1.047	0.959	0.974	**0.978**	0.995	0.982	1	0.994	**0.977**

Source: Author's calculations by using the MIX market database (https://www.themix.org/)

Table 24 MPI of Not Profit-Oriented MFIs in South Asia

	Financial Performance					Financial Inclusion					Social Performance				
MFI	EFFCH	TECHCH	PECH	SECH	TFPCH	EFFCH	TECHCH	PECH	SECH	TFPCH	EFFCH	TECHCH	PECH	SECH	TFPCH
Akhuwat	0.987	0.824	0.989	0.999	**0.813**	0.931	0.955	0.924	1.007	**0.889**	1	0.776	1	1	**0.776**
ASA Bangladesh	1.124	0.858	1.06	1.061	**0.965**	1.03	1.06	1.022	1.008	**1.091**	1.148	0.883	1.109	1.035	**1.014**
BASTOB	1.117	0.843	1.104	1.012	**0.942**	1.021	0.981	1.038	0.984	**1.001**	1.082	0.922	1.1	0.984	**0.998**
BEES	1.2	0.998	1.162	1.032	**1.197**	1.021	1.126	1.028	0.993	**1.15**	1.123	0.983	1.109	1.013	**1.104**
Belghoria Janakalyan Samity	1.062	0.987	1.019	1.042	**1.048**	1.062	1.124	1.066	0.996	**1.193**	1.104	0.984	1.097	1.006	**1.086**
BRAC Bangladesh	1.042	1.072	1	1.042	**1.118**	0.994	1.175	1	0.994	**1.168**	1.028	1.072	1.002	1.026	**1.102**
BURO Bangladesh	1.084	1.005	1.066	1.017	**1.089**	1.025	1.058	1.041	0.985	**1.084**	1.06	0.991	1.083	0.979	**1.05**
BWDC	1.023	0.993	1.021	1.003	**1.016**	0.997	1.048	1.015	0.981	**1.044**	1.01	1.015	1.033	0.978	**1.026**
Cashpor	1.001	0.983	0.999	1.002	**0.984**	0.98	1.014	1.021	0.96	**0.994**	1.013	1.041	1.058	0.957	**1.054**
CDIP	1.009	0.937	1.008	1.001	**0.946**	0.958	1.011	1.006	0.952	**0.968**	0.982	1.057	1.024	0.958	**1.037**
CSC	1	0.948	1	1	**0.948**	0.922	1.136	0.981	0.94	**1.047**	0.984	1.077	1.016	0.969	**1.06**
Disha India	0.961	0.913	0.967	0.994	**0.877**	1	1.08	1	1	**1.08**	0.973	1.028	0.998	0.975	**1**
ESDO	0.963	0.922	0.969	0.994	**0.888**	1	1.108	1	1	**1.108**	0.968	1.024	0.993	0.975	**0.991**
FFO	0.977	0.886	0.98	0.997	**0.866**	0.964	0.866	0.996	0.968	**0.834**	0.973	0.86	0.99	0.983	**0.836**
FINCA - AFG	0.973	0.898	0.976	0.997	**0.874**	0.891	0.976	0.925	0.963	**0.869**	0.987	0.843	0.992	0.994	**0.832**
FINCA Pakistan	0.983	0.796	0.982	1.001	**0.782**	0.893	0.94	0.918	0.974	**0.84**	0.981	0.858	0.992	0.988	**0.841**
FORWARD	0.981	0.786	0.984	0.997	**0.771**	0.893	0.875	0.915	0.976	**0.782**	0.984	0.847	0.992	0.992	**0.833**
Ghashful	0.967	0.906	0.972	0.994	**0.876**	0.875	0.815	0.927	0.944	**0.713**	0.94	0.781	0.971	0.968	**0.735**
Grameen Sahara	0.961	0.93	0.97	0.99	**0.893**	0.877	0.807	0.931	0.941	**0.708**	0.933	0.841	0.974	0.958	**0.785**
IDF	0.961	0.911	0.981	0.98	**0.876**	0.875	0.857	0.937	0.935	**0.751**	0.931	0.821	0.987	0.943	**0.765**
Jagorani Chakra	0.968	0.868	0.982	0.986	**0.84**	0.891	0.848	0.938	0.951	**0.756**	0.954	0.794	0.988	0.965	**0.758**
JBS	0.958	0.782	0.977	0.981	**0.749**	0.887	0.873	0.951	0.932	**0.774**	0.93	0.826	0.99	0.939	**0.768**
Mahasemam	0.971	0.836	0.991	0.98	**0.812**	0.886	0.82	0.912	0.971	**0.727**	0.963	0.815	0.995	0.968	**0.785**
Mahashakti	1.002	1.061	1.001	1.001	**1.063**	0.966	0.793	1.004	0.962	**0.766**	1.032	1.003	1.001	1.031	**1.035**
National Rural	1	1.021	1	1	**1.021**	0.876	0.783	0.912	0.96	**0.686**	1	0.967	1	1	**0.967**
NWCSC	1	1.023	1	1	**1.023**	0.894	0.906	1	0.894	**0.81**	1	1.025	1	1	**1.025**
Orangi	1.011	1.047	1.007	1.004	**1.058**	0.955	0.895	0.974	0.981	**0.855**	1	0.967	1	1	**0.967**
Padakhep Manabik	0.959	1.025	0.985	0.973	**0.983**	0.905	0.992	0.902	1.003	**0.898**	0.946	1.045	1	0.946	**0.989**
POPI	1	1.008	1	1	**1.007**	0.952	0.926	0.952	1	**0.881**	1.014	1.02	1	1.015	**1.035**
Prayas	1.031	0.947	1.007	1.023	**0.976**	0.996	0.983	0.988	1.009	**0.979**	1.025	0.886	1.004	1.02	**0.908**
Punjab Rural	1.075	1.006	1.015	1.059	**1.082**	1.047	1.048	1.041	1.006	**1.098**	1.079	0.899	1.021	1.057	**0.97**
	Financial Performance					Financial Inclusion					Social Performance				

RCDP	1.083	1.112	1.031	1.051	**1.205**	1.017	1.071	0.999	1.017	**1.089**	1.055	0.932	1.003	1.051	**0.983**
RDRS	1.036	0.995	1	1.036	**1.031**	0.976	1.058	0.971	1.005	**1.032**	1.046	0.905	1	1.046	**0.947**
RRF	1.038	0.972	1	1.038	**1.009**	0.983	1.143	0.979	1.004	**1.124**	1.011	0.937	1	1.011	**0.948**
Sahara Utsarga	1.061	1.13	1	1.061	**1.199**	1.045	1.115	1.04	1.004	**1.165**	1.041	1.096	1	1.041	**1.141**
Sajida	1.078	0.984	1.006	1.072	**1.061**	1.035	1.069	1.051	0.985	**1.107**	1.092	0.906	1.039	1.05	**0.989**
Sanghami thra	0.999	0.923	1	0.999	**0.922**	1.009	1.048	1	1.009	**1.057**	1	0.818	1	1	**0.818**
SDC	1.04	0.908	1.039	1.001	**0.944**	0.862	1.189	0.866	0.995	**1.025**	1.015	0.95	1.001	1.014	**0.964**
Shakti Foundatio n	1.051	0.813	1.044	1.007	**0.854**	0.867	1.196	0.872	0.994	**1.037**	1.023	0.823	1.002	1.02	**0.841**
SKDRDP	1.038	0.83	1.021	1.016	**0.861**	0.875	1.155	0.883	0.991	**1.011**	1.013	0.788	1	1.014	**0.799**
SKS Foundatio n	1.004	0.867	1.001	1.003	**0.87**	0.878	1.211	0.899	0.977	**1.064**	0.988	0.853	1.002	0.986	**0.843**
Society for Social Services	1.007	0.951	0.984	1.024	**0.958**	0.862	1.146	0.895	0.964	**0.988**	0.998	0.844	1.006	0.991	**0.842**
Thardeep	0.991	1.131	0.978	1.014	**1.121**	0.859	1.175	0.892	0.963	**1.009**	0.999	0.988	1.006	0.993	**0.987**
TMSS Micro Credit	0.973	0.977	0.971	1.002	**0.95**	0.854	1.24	0.883	0.967	**1.059**	0.987	0.951	1.003	0.984	**0.938**
UDDIPA N	0.956	0.955	0.975	0.981	**0.913**	0.836	1.173	0.859	0.974	**0.981**	0.983	0.971	1	0.983	**0.954**
Unique Nepal LBSL	0.953	1.027	0.972	0.98	**0.979**	0.856	1.189	0.9	0.952	**1.018**	0.98	0.995	0.999	0.981	**0.975**
Wave	0.968	1.096	0.971	0.996	**1.061**	0.864	1.234	0.915	0.944	**1.067**	0.957	1.031	0.959	0.997	**0.986**
Annual average	1.012	0.947	1.003	1.009	**0.958**	0.937	1.019	0.959	0.977	**0.954**	1.006	0.926	1.011	0.995	**0.932**

Source: Author's calculations by using the MIX market database (https://www.themix.org/)