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# Finance-growth nexus and banking efficiency: The impact of microfinance institutions<sup>\*</sup>

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## ABSTRACT

This paper investigates the relative importance of microfinance institutions (MFIs) at both the macro (financial development, economic growth, income inequality, and poverty) and micro levels (efficiency of traditional commercial banks). We observe a significant impact on most of the fronts. MFIs' participation increases overall savings (total bank deposits) and credit allocation (loans to private sector) in the economy. Their involvement enhances economic welfare by reducing income inequality and poverty. Additionally, their active presence helps to discipline the traditional commercial banks by subjecting them to more competition triggering higher efficiency.

## 1. Introduction

Financial systems not only mobilize savings and ease exchange but also play an important role in producing and disseminating information, allocating and monitoring resources, and managing and diversifying risks. Furthermore, well-functioning financial systems reduce information and transaction costs that generate a favorable effect on savings and investment decisions, the pace of technological innovation, and ultimately per capita income and growth rates (Beck, Levine, & Loayza, 2000; Levine, 2005). Financial institutions typically constitute the core of a financial system and enhance economic efficiency and growth by helping to allocate capital to its best uses (Levine, 1997).

Historically traditional commercial banks (CBs) dominated the market as the only viable intermediary both in developed and emerging economies. Throughout the past several decades microfinance institutions (MFIs), first started in the developing world, slowly established themselves as a significant part of financial intermediation everywhere. According to the International Monetary Fund (IMF), economic growth in the 20 most important microfinance markets has increased from 4.4 % to 4.8 % in 2015, whereas the global microfinance market has achieved a growth of 15–20 % in 2015. Asia has been displaying the strongest growth momentum in

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which the most impressive development is the revival of India's microfinance market.<sup>1</sup>

Prior studies have examined a variety of issues associated with microfinance institutions, such as outreach and efficiency (Hermes, Lensink, & Meesters, 2009), household access (Honohan, 2008), informal lending (Islam, Nguyen, & Smyth, 2015), empowerment (Ganle, Afriyie, & Segbefia, 2015), scale economies (Hartarska, Shen, & Mersland, 2013), business models (Bos & Millone, 2015), efficiency (Servin, Lensink, & Berg, 2012), competition (Ly & Mason, 2012), governance (Mersland & Strom, 2009), female leadership (Strom, D'Espallier, & Mersland, 2014), financial performance (Cull, Demirgüç-kunt, & Morduch, 2007), and macroeconomic performance (Ahlin, Lin, & Maio, 2011). Less attention is given to analyzing the impact of MFIs at the macro level, and no study focuses on their effect on the traditional commercial banks.

The objective of this study is to close this gap in the literature by tracing the role and impact of MFIs alongside CBs. Here, we investigate whether and how the presence of microfinance institutions in a dual financial system affects the overall financial development (intermediation e.g., deposit growth and lending activities) and economic welfare (economic growth, income inequality, and poverty) in different countries around the world. Additionally, we inquire whether the competition from MFIs disciplines the CBs and pushes them to become more efficient. We answer these questions by analyzing a sample of 35 countries around the world where both CBs and MFIs operate during a time-period of 14 years (2001–2014).

The study contributes to the extant literature on microfinance specifically and banking literature generally in two ways. First, it analyzes the role of microfinance institutions from a finance-growth perspective. MFIs have changed the financial system of many countries by introducing a dual system in which both microfinance and conventional institutions operate. Also due to rapid growth, microfinance industry nowadays is able to attract private funding, take deposits, and get access to financial markets (Krauss & Walter, 2009). The presence of MFIs is considered as a new pillar, which has two effects on the finance-growth nexus. The direct plausible effect is increasing the welfare of society by reducing poverty, income inequality and providing them more entrepreneurial activities that ultimately enhance the economic growth of a country. On the other hand, the indirect effect of microfinance is to increase fund mobilization and credit allocation through financial deepening (Maksudova, 2010). We empirically cater to both of these effects in this study. To the best of our knowledge, this is the first comprehensive study to focus on the co-existence of microfinance with commercial banks and its contribution towards the finance-growth nexus.<sup>2</sup>

Secondly, this study examines whether microfinance institutions can discipline conventional banks. The presence of MFIs most likely brings more competition to CBs and affects the cost of intermediation. To date, no study has yet examined this relationship between microfinance institutions and the efficiency of commercial banks.

The rest of the paper is organized as follows. Section 2 presents a literature review and develops the hypotheses. Section 3 discusses econometric model specifications and provides information about data and variables. Section 4 reports our main findings. Finally, Section 5 concludes the paper.

## 2. Literature review and hypotheses

We first explain the four major dimensions of the finance-growth nexus (financial development, economic growth, income inequality, and poverty alleviation) and put forward several testable hypotheses. Then, we develop the hypothesis on banking efficiency.

### 2.1. Financial development

Poor people around the world do not have access to financial products and services because they either cannot provide the collateral against loans or are unable to bear the interest and transaction costs associated with them (CGAP, 2009).<sup>3</sup> They get the supply of financial services mainly from informal markets or lenders. A number of studies highlight that poor people prefer collateral free small size financial products and services that are customized to fulfill their basic needs such as the purchase of land, cattle, seeds or sewing machines, etc. (Ledgerwood, 2013). According to Honohan (2008), in most developing countries people have relatively low access to financial institutions and products that provide considerable potential for microfinance to shift lenders and borrowers from informal to formal markets. Beck, Demirgüç-Kunt, and Levine (2007) argue that in developing countries, conventional banks normally avoid poor households because they need different financial services.

Microfinance institutions started to play a complementary role to conventional banks in intermediating financial resources and thus contributing towards financial sector development. Moreover, by providing credit facilities, microfinance institutions increase the income and asset base of low-income people, enabling them to become prospective customers of conventional banks (Barr, 2005). MFIs may also act as a substitute to CBs by absorbing some of the lenders and borrowers of conventional banks and offering them the same

<sup>1</sup> According to *Microfinance Market Outlook (2015)* report, in 2011 market commentators predicted the end of India's microfinance market. At that moment there was a strong wave regarding the ban of microloans by the Andhra Pradesh government because of suicides among over-indebted clients of some large microfinance institutions. However, after the 2014 election, there was a massive foreign investment in the microfinance sector.

<sup>2</sup> Donou-Adonsou and Sylwester (2017) study a single dimension of finance-growth nexus by analyzing the effect of commercial banks and microfinance loans on economic growth.

<sup>3</sup> The Consultative Group to Assist the Poor is a global partnership of more than 30 leading organizations that seek to advance financial inclusion. CGAP combines a pragmatic approach to responsible market development with an evidence-based advocacy platform to increase access to the financial services so that the poor people can improve their lives.

financial services such as saving deposits, collateral-free loans, insurance, and money transfer facilities at a lower cost (Armendáriz & Morduch, 2010). The nature of these interactions as complementary vs substitution between MFIs and CBs positively affects savings mobilization and funds allocation, and thereby increases the financial development of a country. Therefore, we formulate our first hypothesis as:

**H1.** *In a dual financial system, the presence of microfinance institutions increases financial development.*

## 2.2. Economic growth

Beck et al. (2000) argue that the financial development of a country may not affect directly the poor class. Rather it promotes the aggregate economic growth by helping the poorest in a disproportionately better way. To quote the authors: “the more abundant private credit creates a rising tide that lifts all boats, but a bigger lift to the poorest ones” (page 32). According to Maksudova (2010), MFIs contribute towards aggregate economic welfare of an economy by not only reducing poverty and income inequality but also providing various income generating opportunities to low income people. Lopatta and Tchikov (2016) state that MFIs increase growth in two ways: directly by increasing the purchasing power of the people and indirectly through accumulation of capital and employment.

Bikbaeva and Gaibnazarova (2009) state that microfinance is an effective source in providing employment opportunities and increasing the number of domestic firms and additional jobs. Their study shows that MFIs in Uzbekistan together serve around 70,000 clients, who further create jobs for additional 200,000 people. In this way, MFIs directly contribute towards the aggregate economic growth. Buera, Kaboski, and Shin (2012) and Donou-Adonsou and Sylwester (2017) find that MFIs increase economic growth by raising total factor productivity. Therefore, our second hypothesis is:

**H2.** *In a dual financial system, the presence of microfinance institutions increases economic growth.*

## 2.3. Income inequality

Jalilian and Kirkpatrick (2002) state that financial development facilitates microcredit process for poor and vulnerable people of the society by increasing their assets and productivity, thus reducing poverty and income inequality. They highlight “pro-poor growth” that is when the incomes of the poor grow at a higher rate than the incomes of non-poor, and point out that microfinance programs disproportionately benefit the poor by providing them small collateral-free loans compared to more wealthy people.

Ahlin and Jiang (2008) develop a model in which they categorize three types of activities: subsistence, self-employment, and entrepreneurship. They argue that microfinance loans provide poor class an incentive to use the amount of loan for income-generating activities, allowing them to move from subsistence to self-employment. When there is a substantial increase in self-employment share, entrepreneurs need to attract these workers by paying them market wages equal to their self-employment earnings. This channel raises the income levels at the bottom of the pyramid.

Hermes (2014) examines the role of microfinance on poverty reduction in developing countries. His findings confirm that participation in microfinance programs provides poor people the opportunity to increase their income levels, thus reducing the income gap between rich and poor classes. Kai and Hamori (2009) also analyze the relationship between microfinance and income inequality, and observe a negative association.

Beck et al. (2007) state that a more developed financial sector provides more financial services related to deposits, credit, insurance and money transfers, which disproportionately benefit the poor as they generally lack such facilities. The inclusion of poor into the financial system reduces their credit problems, and provides them investment opportunities in income generating activities. Thus, we expect microfinance institutions to provide more financial opportunities and increase the overall financial base of the economy leading to a reduction of income inequality. Therefore, our third hypothesis is:

**H3.** *In a dual financial system, the presence of microfinance institutions reduces income inequality.*

## 2.4. Poverty alleviation

In order to generate more profits, commercial banks usually try to expand their networks and branches in capital-oriented areas or larger cities. They do not focus on areas with low income or low population density. Their approach ignores the poor class having limited access to financial services and products. Ayyagari, Demirgüç-Kunt, and Maksimovic (2008) point out that a lack of access to finance enhances poverty in the society. Microfinance brings the solution to limited access to finance by focusing exclusively on poor class living in low income and rural areas, and providing financial services and products to poor at affordable rates (Armendáriz & Morduch, 2010). Burgess and Pande (2005) observe a reduction of 60 % in rural poverty in India during 1977–1990 when the government of India initiated a policy regarding the opening of banks in areas where previously commercial banks did not operate.

Morduch (2000) mentions the “welfarist school” of thought according to which the introduction of MFIs increases the capacity to help poor people by offering low interest, small size collateral free loans, and services to poor clients. MFIs thus contribute more to social and development activities, and reduces the poverty level. We formulate our fourth hypothesis as:

**H4.** *In a dual financial system, the presence of microfinance institutions reduces poverty.*

## 2.5. Efficiency of commercial banks

The second element of our investigation is to find out whether microfinance institutions can discipline commercial banks that are traditionally known to focus on corporate as well as personal and consumer banking (De la Torre, Peria, & Schmukler, 2010). The growth of MFIs in targeting and reaching the middle class and poor by mobilizing deposit and loan delivery is crowding out commercial banks and reducing their share in total financial assets of a country (The Banker, February 2005). Both types of institutions have started competitive interactions between them and begun to shape their products and target segments accordingly (Cull, Demirgüç-Kunt, & Morduch, 2009).

With regard to the expansion and diversity of microfinance institutions, commercial banks have started targeting those at the upper treads of low-income markets. In particular, the best clients from microfinance banks are now able to signal their creditworthiness to mainstream commercial banks. Moreover, since these clients now generate financial information, commercial banks do not need to rely on “soft information” in their analysis of customers’ creditworthiness (Berger & Udell, 2006). As a result, the prospect for interaction and direct competition increases sharply. Increasing competition from microfinance institutions is putting strong pressure on commercial banks to improve their earnings by controlling operating costs. Therefore, we formulate the following hypothesis:

**H5.** *In a dual financial system, the presence of microfinance institutions increases the efficiency of traditional commercial banks.*

## 3. Empirical method and data

### 3.1. Finance - growth nexus

We employ the following pooled OLS regression model:

$$Finance.Growth.Nexus_{j,t} = \alpha_0 + \beta_1 MFI.Share_{j,t-1} + \beta_2 Inflation_{j,t-1} + \beta_3 Interest.rate_{j,t-1} + \beta_4 Trade_{j,t-1} + \beta_5 EFI_{j,t-1} + \sum_{k=1}^N \beta_k Year.dummies + \varepsilon_{j,t} \quad (1)$$

where the subscript  $j$  denotes individual countries and  $t$  denotes the time in years. The main variable of interest is the relative share of microfinance institutions in a country (*MFI Share*). It is calculated in two alternate ways: the percentage of assets (gross loans) of microfinance institutions as a fraction of the total assets (gross loans) of all financial institutions (MFIs and CBs) in a country<sup>4</sup> The definition of these and all other variables used in the study are mentioned in Table 1. To control for the endogeneity problem between the share of MFIs and a country’s financial development and economic welfare, we use one year lagged values of the explanatory and control variables. We also conduct a robustness analysis to control for individual unobservable heterogeneity across countries. Therefore, we follow Abedifar, Hasan, and Tarazi (2016) and estimate the model with country fixed effects.

We measure finance-growth nexus in four dimensions. The first dimension represents financial development. Following Abedifar et al. (2016) and Levine, Loayza, and Beck (2000), we use two proxies for financial development: deposit mobilization and private credit. The former is total deposits held by commercial banks as a percentage of gross domestic product (*Bankdeposits*), while the latter is measured by private credit as a percentage of the gross domestic product (*Privatecredit*). According to Ahlin et al. (2011), private credit is the most common measure to gauge the overall level of financial depth of a country.

The second dimension of finance-growth nexus is economic growth. It is captured by the annual growth rate of GDP per capita based on purchasing power parity method (*Growth*). The third dimension is income inequality. We follow Beck et al. (2007) and use three proxies to measure inequality: the Gini index (*Gini*), income share held at the highest decile (*Income\_highest*), and income share at the lowest decile (*Income\_lowest*). We consider poverty as the fourth dimension, and use two proxies to measure it: the percentage of people who live on less than \$1.90 a day (*Poverty\_gap*); and the percentage of people who live below the rural poverty line (*Poverty\_headcount*).

We use various macroeconomic factors such as inflation rate, interest rate, trade openness, economic freedom index and unemployment rate as control variables. Inflation has a significant effect on financial development and economic welfare (Rousseau & Wachtel, 2002). We take the annual growth rate of the GDP deflator as a proxy for *Inflation*. We take into consideration the deposit interest rate paid by banks on demand, time or saving deposits (*Interest rate*). According to the “financial repressionists” school, represented largely by McKinnon (1973) and Shaw (1973), interest rate plays an important role in financial development by motivating savers to shift their savings from unproductive real assets to financial assets. They believe that the positive substitution effect dominates the negative income effect in developing countries. On the other hand, the followers of the “financial structuralists” school led by Goldsmith (1969) argue that financial intermediation affects savings directly and positively quite apart from the effects of interest rate.

Trade activities in a country might also affect finance-growth nexus. Therefore, we consider trade openness (*Trade*) in our analysis. It represents the ratio of the sum of exports and imports to GDP. We expect that economic freedom plays an important role as it allows individuals to protect their human and financial resources and prospers without government interventions. Therefore, we include Economic Freedom Index (*EFI*) calculated by the Heritage foundation in our model. This index ranks countries on the basis of rule of

<sup>4</sup> Other alternatives to calculate the share of microfinance institutions could have been to divide by total sales and total employees. Lack of data does not allow us to use these two alternatives.

**Table 1**  
Variable Definitions.

Variable	Definition
<b>Share of Microfinance Institutions</b>	
<i>MFI_Share-TA (%)</i>	Total assets of microfinance institutions in a country divided by the combined total assets of microfinance institutions and conventional banks in the country
<i>MFI_Share-GL (%)</i>	Total gross loans of microfinance institutions in a country divided by the combined total gross loans of microfinance institutions and conventional banks in the country
<b>Finance-Growth Nexus</b>	
<i>Bank deposits (%)</i>	Commercial bank deposits as percentage of GDP
<i>Private credit (%)</i>	Private credit as percentage of GDP
<i>Growth (%)</i>	Annual growth rate of GDP per capita.
<i>Gini (%)</i>	The Gini coefficient used as a measure of income inequality
<i>Income_highest (%)</i>	Percentage share of income that accrues to subgroups of population indicated by the highest decile (10 %)
<i>Income_lowest (%)</i>	Percentage share of income that accrues to subgroups of population indicated by the lowest decile (10 %)
<i>Poverty_gap (%)</i>	The intensity of poverty at the international poverty line
<i>Poverty_headcount (%)</i>	Percentage of rural population below the rural poverty line
<b>Country-Level Factors</b>	
<i>Inflation (%)</i>	Annual inflation rate measured by GDP deflator
<i>Interest rate (%)</i>	Interest rate paid by banks on saving deposits
<i>Trade (%)</i>	Sum of a country's exports and imports as a percentage of GDP
<i>Economic Freedom Index</i>	Index measuring the degree of freedom prevailing in a country
<i>Unemployment (%)</i>	Unemployed people as a percentage of total labor force
<i>Wage rate (%)</i>	Compensation of employees as a percentage of total expenses
<b>Bank-Level Factors</b>	
<i>Cost to assets ratio (%)</i>	Overhead cost as percentage of total assets
<i>Cost to income ratio (%)</i>	Overhead cost as percentage of total revenues
<i>Size</i>	Natural logarithm of total assets
<i>Capital (%)</i>	Equity capital divided by total assets
<i>Credit risk (%)</i>	Non-performing loans divided by gross loans
<i>Concentration</i>	Hirschman-Herfindahl index calculated by summing the squared market share of each bank

Data sources for above variables include Bankscope, Mix market, World development indicators, Heritage foundation and International labor organization.

law, property rights, tax and other regulations. Finally, we control for the percentage of the total labor force who are without work and actively seeking for job (*Unemployment*) because prior studies indicate an inverse relationship between unemployment and financial development and growth. According to [Ernst \(2019\)](#) and [Wasmer and Weil \(2004\)](#), financial development and economic growth are an indication of lower job destruction as investment in more productive channels creates new job opportunities.

We conduct a unit root<sup>5</sup> test for each variable individually and find that some of the variables such as private credit, income at the highest decile, poverty headcount ratio and interest rate are not stationary. Therefore, we use first differences of these variables.

### 3.2. Efficiency of commercial banks

The following regression model is used to test the hypothesis regarding the impact of microfinance institutions on the efficiency of commercial banks.

$$\begin{aligned}
 \text{Efficiency}_{i,t} = & \alpha_i + \beta_1 \text{MFI\_Share}_{j,t-1} + \beta_2 \sum \text{Bank\_Level\_Controls}_{i,t-1} \\
 & + \beta_3 \sum \text{Macroeconomic\_Factors}_{j,t-1} + \sum_{k=1}^N \beta_k \text{Year\_dummies} + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

where subscripts  $i, t$  denote bank  $i$  at time  $t$ , respectively. We estimate efficiency of commercial banks by calculating two alternate measures: overhead costs as a percentage of total assets and as a percentage of total revenues ([Beck, Demirgüç-Kunt, & Merrouche, 2013](#)).<sup>6</sup>

In this regression model, we use two sets of control variables: bank-specific factors to capture bank level variations and macroeconomic factors to capture country level variations. The first set of variables include bank level differences in terms of size, capital, credit risk, and concentration. Differences in the efficiency level across banks can occur due to differences in the size of banks. Larger banks can get more advantage from scale economies and diversification ([Hughes, Mester, & Moon, 2001](#)). They may face competitive

<sup>5</sup> We apply the Im, Pesaran and Shin (IPS) unit root test with null hypothesis of unit root. Because most of the panel data unit root tests only support balanced data, these are not applicable in our case. The IPS test we apply is based on Dicky-Fuller procedure and is commonly used in case of unbalanced panel data.

<sup>6</sup> Overhead costs, also known as operating or non-interest expenses, include employee salaries and benefits, expenses on premises and fixed assets, legal fees, amortization, and impairment losses on intangible assets.



pressure as they have larger clients and relatively easier access to the capital market. They may also use different technologies and business models for their operations. We estimate bank size by using the logarithm of total assets of commercial banks (*Size*). Equity capital is controlled for because an increase in equity can lower moral-hazard problems and increase banks' monitoring incentives (Berger, Herring, & Szego, 1995). Banks may involve in more risk-taking activities when there is an increase in equity capital. Equity capital is measured as a percentage of total assets (*Capital*).

We control for credit risk because non-performing loans are unlikely to make a bank efficient in its operations (Berger & DeYoung, 1997). We use the ratio of non-performing loans to gross loans (*Creditrisk*). The last bank-specific control variable we use is concentration. The relationship between banking concentration and efficiency is unclear a priori. In a more concentrated market, banks have less incentive to enhance their efficiency as argued by the "Quiet Life" hypothesis (Hicks, 1935). On the other hand, efficient banks capture more market share, which may lead to greater market concentration, as posited by the "Efficient Structure" hypothesis (Demsetz, 1973). Banking concentration is proxied by Hirschman-Herfindahl index, estimated as the sum of the squared market share of each bank in the country. This index ranges from 0 to 100, where higher values indicate more concentration.

The second set of control variables comprises of macroeconomic factors. We control for the wage rate<sup>7</sup> in the country. According to Efficiency Wage Theory, higher wages lead to more labor productivity, as employees feel more steadfast and committed towards their work. Several studies consider an increase in wages as a double-edged sword: it not only increases the labor cost of the company but also enhances labor productivity in particular and overall firm productivity in general (Draca, Machin, & Van Reenen, 2011; Gupta & Shaw, 2014; Park & Shin, 2020). Riley and Bondibene (2016) also report that an increase in the national minimum wage increases the labor cost of companies that is offset by increased labor productivity through a decrease in labor turnover and an increase in labor training, motivation, and skill. Thus, the increased cost effects are mitigated against overall productivity benefits. Since banks are from a labor-intensive industry, we expect that an increase in wage level can increase overhead (operating expenses) of banks that can be offset against associated productivity benefits.

We use inflation as another control variable in our analysis. According to Huybens and Smith (1998), an inflationary trend negatively affects the performance of banks via a decline in the real rate of return. Credit rationing becomes more severe when inflation rises. Banks also make fewer loans; resource allocation becomes less efficient. We control for interest rate because of its impact on performance, efficiency and risk-taking of banks (Delis & Kouretas, 2011; Rajan, 2006). When interest rates are low, banks have a greater risk-taking desire. On the other hand, high-interest rates can negatively affect the ability of borrowers to repay their loans (Jarow & Turnbull, 2000). Finally, we control for trade openness because it not only provides diversification opportunities to banks but also increases competition, which allows banks to reduce their operating costs (Ashraf, 2018).

### 3.3. Data

We start with countries where microfinance institutions and commercial banks simultaneously exist during 2001–2014. Data on MFIs are collected from the Mix Market - the largest source for publicly available data on MFIs. The source of commercial bank data is Bankscope. We collect country-level data from the World Bank website and the data for the Economic Freedom Index from the Heritage Foundation. We find almost negligible share of MFIs in comparison to commercial banks, specifically in case of Middle Eastern countries. Because of the availability and consistency of data, we consider countries that have at least 10 % share of MFIs and five years of data. We thus compile a sample of 35 countries in which microfinance institutions and commercial banks co-exist. The list of countries with the number of MFIs and CBs are presented in Appendix A.

The MFIs are classified into five regions across the world: East Asia and Pacific, Eastern Europe and Central Asia, Latin America and Caribbean, Africa and South Asia.<sup>8</sup> The sample includes different types of microfinance institutions including banks, cooperatives/credit unions, village banks, non-banking financial institutions and non-governmental organizations. We deliberately focus on all types of microfinance institutions because some cooperatives, non-governmental organizations, and non-banking financial institutions in Latin American countries have far greater assets at their disposal in comparison to assets of banks in some other regions.<sup>9</sup> Moreover, most of these MFIs perform the function of financial intermediation by providing credit facilities to poor households, and thus generate competition to conventional banks.

### 3.4. Descriptive statistics

Table 2 reports the descriptive statistics of all variables used in the study. We eliminate outliers using winsorization at 2.5th and 97.5th percentiles. The main independent variable *MFI\_Share-TA* has a mean value of 49.0 %. The lowest quartile of countries has a

<sup>7</sup> According to the International Labor Organization (ILO), compensation of employees is a concept defined in the United Nations System of National Accounts 2008 as the total remuneration, in cash or in-kind, payable by an enterprise to employees in return for work done by the latter during the accounting period. The compensation of employees has two main components: (a) wages and salaries payable in cash or in-kind; and (b) social insurance contributions payable by employers, which include contributions to social security schemes, actual social contributions to other employment-related social insurance schemes, and imputed social contributions to other employment-related social insurance schemes.

<sup>8</sup> We exclude the Middle East and North America region because most MFIs in this region have negligible operations.

<sup>9</sup> For example, the average amount of assets of NGO Fomentamos in Colombia is 1060 million dollars, NBFI Financiera Edificar in Peru is 1700 million dollars, and COOP COAC Jardin Azuayo in Ecuador is 460 million dollars during 2001–2014, compared to Banks Kompanion in Kyrgyzstan, FMFB in Tajikistan, ACBA in Armenia, and Equity in Uganda.

**Table 2**  
Descriptive Statistics.

	N	Mean	S.D.	Min	P25	P50	P75	Max
<b>Share of Microfinance Institutions</b>								
MFI_Share-TA (%)	487	0.490	0.274	0.204	0.390	0.546	0.714	0.930
MFI_Share-GL (%)	487	0.413	0.196	0.100	0.236	0.426	0.584	0.750
<b>Finance-Growth Nexus</b>								
Bank deposits (%)	485	0.353	0.203	0.089	0.195	0.326	0.458	0.825
Private credit (%)	485	0.303	0.173	0.071	0.159	0.276	0.403	0.722
Growth (%)	487	0.057	0.030	-0.009	0.029	0.048	0.070	0.174
Gini (%)	329	0.424	0.094	0.286	0.328	0.429	0.510	0.568
Income_highest	329	0.332	0.071	0.232	0.261	0.333	0.393	0.451
Income_lowest	329	0.022	0.010	0.007	0.012	0.019	0.032	0.039
Poverty gap (%)	321	0.087	0.081	0.002	0.023	0.061	0.136	0.290
Poverty headcount (%)	151	0.138	0.149	0.009	0.045	0.078	0.148	0.512
<b>Country-Level Factors</b>								
Inflation (%)	443	0.073	0.054	0.005	0.033	0.060	0.095	0.245
Interest rate (%)	439	0.063	0.038	0.014	0.033	0.057	0.087	0.149
Trade (%)	472	0.091	0.057	0.027	0.480	0.723	0.930	1.641
Economic Freedom Index	474	59.74	5.86	48.9	55.6	59.55	64.0	70.4
Unemployment (%)	473	0.076	0.051	0.011	0.038	0.065	0.103	0.192
Wage rate (%)	372	0.467	0.085	0.313	0.403	0.462	0.537	0.602
<b>Bank-Level Factors</b>								
Cost to assets ratio (%)	5421	0.062	0.046	0.013	0.028	0.048	0.080	0.189
Cost to income ratio (%)	5520	0.683	0.258	0.314	0.499	0.640	0.806	1.349
Size (\$m)	5520	1630	2860	13	103	371	1490	11100
Capital (%)	5220	0.184	0.137	0.055	0.104	0.162	0.241	0.633
Credit risk (%)	5281	0.079	0.098	0.002	0.017	0.039	0.098	0.388
Concentration (%)	5500	0.603	0.155	0.391	0.471	0.570	0.712	0.942

The data for all variables span over a period of 14 years (2001-2014).

share of MFIs lower than 39.0 % whereas the highest quartile has a greater than 71.4 % share. In our sample, Azerbaijan and Dominican Republic have minimum values of 20 % whereas Ecuador and Nicaragua have a maximum share of 91 % and 93 %, respectively.<sup>10</sup> The alternative proxy, *MFI\_Share-GL*, has a mean value of 41.3 % with minimum of 10 % and maximum of 75 %.

Financial development measures are captured by *Bank deposits* and *Private credit*. These variables represent on average 35.3 % and 30.3 % of GDP of the countries in the sample. These percentages are very close to the values of 35.19 % and 28.90 % reported by [Abedifar et al. \(2016\)](#) and [Ahlin et al. \(2011\)](#). The variable economic growth (*Growth*) has an average value of 5.7 %. The inequality measures include Gini Index, Income share at the highest 10 % and Income share at the lowest 10 % deciles. The mean value of *Gini* is 42.4 % which is very much similar to 42.05 % reported by [Donou-Adonsou and Sylwester \(2016\)](#). The mean values of *Income\_highest* and *Income\_lowest* are 33.2 % and 2.2 %, respectively. The two poverty variables, *Poverty gap* and *Poverty headcount* have mean values of 8.7 % and 13.8 %, respectively. [Donou-Adonsou and Sylwester \(2016\)](#) report average values of 5.22 % for *Poverty gap* and 14.30 % for *Poverty headcount* ratio. The set of country level control variables includes *Inflation*, *Interest rate*, *Trade* and *Unemployment rate*. These variables have mean values of 7.3 %, 6.3 %, 9.1 %, and 7.6 %, respectively. The mean score of *Economic Freedom Index* of sample countries is 59 points on a scale of 0–100. To control for the prevailing wage structure of the local labor market, we use one additional country-level control: *Wage rate*. The variable has a mean value of 46.7 % in sample countries.

To measure the efficiency of commercial banks, we consider two alternate measures. We observe that the *Cost to assets ratio* has a mean value of 6.20 % in our sample, whereas the *Cost to income ratio* has a mean of 68.3 %. As bank-level controls we include size, equity capital, credit risk, and concentration. The commercial banks in our sample have average total assets of \$1.63 billion, with \$13 million as the minimum and \$11.1 billion as the maximum value. We use the natural log of total assets of commercial banks as a proxy for *Size*. *Capital* measured as the ratio of equity to total assets has a mean of 18.4 %. *Credit risk* is estimated as the fraction of impaired loans to gross loans. It has an average of 7.9 %. We find that banking concentration (*Concentration*) has an average of 60.3 % for countries in our sample.

<sup>10</sup> High shares of MFIs in Ecuador and Nicaragua are also reported by Inter-American Development Bank (IDB, 2014). According to IDB, there is a tremendous growth in microcredit and micro enterprises in Latin America and Caribbean, specifically after “No Pago” (NO Payment) movement in Nicaragua. In Latin America and Caribbean region, there are more than 1000 microfinance institutions, with a total gross loan portfolio of more than \$40 billion, serving more than 22 million customers. FAMA, a company in Nicaragua is the first ever company in the history of microfinance to issue \$4 million as commercial paper to increase microfinance loan portfolio. Before FAMA, two banks in Nicaragua already issued bonds to expand micro credit portfolio.

### 3.5. Correlation matrix

Table 3 provides the correlation matrix of all variables used in the study. We find high correlation only among the variables used as alternative proxies (*MFI\_Share-TA* and *MFI\_Share-GL*; *Giniand Income\_highest*; *Poverty gap and Poverty headcount*). We find that the two proxies of share of MFIs are significantly positively related with both financial development variables (*Bank deposits* and *Private credit*) and significantly negatively related with *Poverty gap*. We observe that most of the correlations among explanatory and control variables are low. To test for potential multicollinearity, we calculate variance inflation factors (VIF) and find that the highest value of VIF statistic is 2.7. This low value indicates that multicollinearity among the regressors is not likely to be problematic in our regression analysis.

## 4. Results

### 4.1. Impact of MFIs on financial development

The regression results of our main independent variable, the relative share of microfinance institutions (*MFI\_Share-TA*) on two proxies of financial development (*Bank deposits* and *Private credit*) are reported in Table 4. We estimate OLS regressions and present the results in Columns (1) to (4). The fixed effects estimation results are presented in Columns (5) to (8). The results show that the share of MFIs has a strong positive association with financial development variables. Estimates from Columns (1) and (5) show that an additional percentage point of MFI share leads to an increase in bank deposits by 0.07 and 0.12 percentage points, respectively. A difference in *MFI\_Share-TA* equal to the interquartile range (0.324 percentage points) is associated with a 0.022 percentage point higher bank deposits, which is about 8% of the IQR of bank deposits in OLS regression and 14% in FE estimation.<sup>11</sup> In the same way, we find that an additional percentage point of MFI share is associated with 0.11 and 0.16 percentage point higher private credit in OLS and FE regressions (Columns 2 and 6). The IQR of *MFI\_Share-TA* is associated with an increase in private credit equal to 14% in OLS regression (Column 2) and 21% in FE estimation (Column 6).

As an alternative proxy, we calculate the share of MFIs based on total gross loans (*MFI\_Share-GL*). Columns (3) and (7) show an additional percentage point of *MFI\_Share-GL* increases bank deposits by 0.09 and 0.11 percentage points in OLS and FE regressions, respectively.

The IQR of *MFI\_Share-GL* explains 12% (15%) through OLS (FE) of the IQR in bank deposits and 34% (19%) of the IQR in private credit, respectively. We find consistent results in Columns (4) and (8). We also regress two other proxies of financial development variable (financial system deposits and liquid liabilities)<sup>12</sup> against the MFI share variable. As we obtain very similar findings, we do not tabulate these results here. All these findings provide support for the first hypothesis.

As for control variables, *Inflation* has a significant negative association with bank deposits in both OLS and FE estimations. The negative association between *Interest rate* and both proxies of financial development is significant only in FE regressions and it is contrary to the “financial repressionists” school, represented largely by McKinnon (1973) and Shaw (1973) and supports that the income effect dominates the substitution effect in developing countries.

*Trade* has a significantly positive association with *Bank deposits* and *Private credit* in OLS estimations only. Columns (1) to (8) indicate that Economic Freedom Index (*EFI*) has a significant positive association with both financial development variables. This finding indicates that countries with a relatively low level of regulation and a higher level of trade openness experience higher financial development, and is in line with that of Baier, Clance, and Dwyer (2012), Hafer (2013), and Neanidis (2019). Finally, we find a significant inverse association between unemployment and both financial development variables.

### 4.2. Impact of MFIs on economic welfare

Table 5 (Panel A) shows the OLS regression results of economic welfare analysis (GDP growth, Income inequality, and Poverty). In Columns (1) and (7), we regress GDP growth rate and find an insignificant impact of *MFI\_Share-TA* and *MFI\_Share-GL* on *Growth*. Columns 2–4 show the income inequality analysis. We find a strong negative association between *MFI\_Share-TA* and inequality variables. An additional percentage point increase in *MFI\_Share-TA* is associated with a decrease of 0.07 and 0.06 percentage points in Gini index and Income at the highest decile, respectively. In terms of IQR *MFI\_Share-TA* is associated with a decline in Gini index and Income at the highest decile equal to 12% and 15% in Columns (2) and (3).

Columns (8) and (9) show that an additional percentage point of MFI share based on gross loan is associated with reductions of 0.07 and 0.06 in Gini index and Income at the highest decile. The IQR in *MFI\_Share-GL* explains a reduction of 13% and 16% in the IQR of both inequality variables respectively. The negative relationship between the share of MFIs and inequality proxies is consistent with the third hypothesis. In comparing the highest and lowest inequality deciles, the only strong association between MFI share and *Income\_highest* indicates that microfinance helps to reduce the accumulation of wealth in the hands of the richest segment of the country, to whom the majority of the income of the society accrues.

<sup>11</sup> Calculated as the share of MFIs Inter Quartile Range (IQR) multiplied by its coefficient divided by bank deposit IQR ( $0.324 * 0.051$ )/0.263. We use IQR instead of S.D as it is less sensitive to outliers.

<sup>12</sup> Financial system deposits include the sum of all deposits in the financial system of a country divided by its GDP. Liquid liabilities include currency plus demand and interest-bearing liabilities of banks and non-banking financial intermediaries divided by GDP.



**Table 3**  
Correlation Matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MFI_share-TA (1)	1															
MFI_share-GL (2)	0.992***	1														
Bank deposits (3)	0.228*	0.237*	1													
Private credit (4)	0.245*	0.250*	0.903***	1												
Growth (5)	0.049	0.052	0.059	0.022	1											
Gini (6)	-0.110	-0.115	-0.155	-0.250***	-0.108	1										
Income_highest (7)	-0.127	-0.132	-0.149	-0.270***	-0.116	0.991***	1									
Income_lowest (8)	0.061	0.068	0.149	-0.292***	-0.085	0.971***	0.936***	1								
Poverty gap (9)	-0.284**	-0.278**	-0.173	-0.281**	-0.152	0.384***	0.362***	0.373***	1							
Poverty HCR (10)	-0.067	-0.087	-0.028	-0.043	-0.113	0.362***	0.346***	0.331***	0.732***	1						
Inflation (11)	0.168	0.182	-0.322***	-0.258**	-0.262**	0.171	0.162	0.178	0.008	0.031	1					
Interest rate (12)	0.088	0.101	-0.225*	-0.184	-0.062	0.121	0.096	0.155	0.075	0.0781	0.179	1				
Trade (13)	0.182	0.200*	0.130	0.196*	0.077	-0.298***	-0.264***	-0.548***	-0.033	-0.047	-0.256**	-0.322***	1			
EFI (14)	0.127	0.146	0.112	0.101	0.097	-0.139	-0.131	-0.158	-0.258**	-0.161	-0.156	-0.042	0.078	1		
Unemployment (15)	-0.122	-0.132	-0.135	-0.035	-0.047	0.281***	0.275***	0.257***	0.242***	0.202*	0.147	0.033	-0.225*	-0.234***	1	
Wage rate (16)	0.058	0.059	0.294***	0.274***	0.160	0.248***	-0.265***	-0.219***	-0.295***	-0.148	-0.206*	0.239***	0.113	-0.037	-0.060	1

The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively.

**Table 4**  
Impact of Microfinance Institutions on Financial Development.

	Ordinary least squares regressions				Fixed effects regressions			
	(1) Bank deposits	(2) Private credit	(3) Bank deposits	(4) Private credit	(5) Bank deposits	(6) Private credit	(7) Bank deposits	(8) Private credit
MFI_Share_TA <sub>t-1</sub>	0.07* (2.15)	0.11** (3.27)			0.12** (2.76)	0.16*** (3.72)		
MFI_Share_GL <sub>t-1</sub>			0.09* (2.20)	0.24*** (4.97)			0.11* (2.54)	0.14*** (3.32)
Inflation <sub>t-1</sub>	-0.14 (-1.32)	-0.07 (-0.65)	-0.61*** (-3.85)	-0.31 (-1.69)	-0.44*** (-3.74)	-0.39** (-3.25)	-0.33** (-3.24)	-0.26* (-2.56)
Interest rate <sub>t-1</sub>	-0.01 (-0.06)	-0.21 (-1.59)	0.02 (0.09)	-0.08 (-0.35)	-0.57*** (-3.75)	-0.79*** (-5.11)	-0.59*** (-4.17)	-0.72*** (-5.12)
Trade <sub>t-1</sub>	0.33* (2.32)	0.20 (1.36)	0.12 (1.00)	0.31* (2.11)	0.16 (0.94)	0.33 (1.85)	-0.05 (-0.35)	0.09 (0.60)
EFI <sub>t-1</sub>	0.01*** (8.79)	0.01*** (7.02)	0.01*** (4.19)	0.01*** (5.96)	0.02*** (9.54)	0.01*** (8.16)	0.01*** (9.03)	0.01*** (7.57)
Unemployment <sub>t-1</sub>	-0.11 (-0.51)	-0.06 (-0.26)	-0.39* (-2.19)	-0.65** (-3.11)	-0.67* (-2.56)	-0.87** (-3.24)	-0.35 (-1.42)	-0.51* (-2.04)
Constant	-0.41*** (-5.24)	-0.34*** (-4.24)	-0.07 (-0.77)	-0.29** (-2.83)	-0.51*** (-5.09)	-0.44*** (-4.33)	-0.45*** (-4.59)	-0.36*** (-3.69)
Observations	289	289	289	289	289	289	289	289
Adjusted R <sup>2</sup>	0.243	0.321	0.280	0.337	0.293	0.341	0.303	0.361
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	35	35	35	35	35	35	35	35

This table presents the results of pooled ordinary least square (OLS) and fixed effect (FE) regressions of Financial Development variables on *MFI Share* and control variables. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

In Columns (5) and (6), we show results that indicate a negative association between share of MFIs and both poverty variables. An additional percentage point of *MFI Share-TA* is associated with lowering the poverty gap (headcount) by 0.34 (0.12) percentage points. Quantitatively, the IQR of *MFI Share-TA* explains a decline of 97 % and 38 % in the IQRs of *Poverty gap* and *Poverty headcount*, respectively. We find similar results in Columns (11) and (12) when we regress the two poverty variables against *MFI Share-GL*. The negative relationship between MFIs and poverty variables provides support for the fourth hypothesis that MFIs play a significant role in poverty reduction.

Table 5 (Panel B) shows the economic welfare analysis using the fixed effects estimations. The results are similar to those obtained in Panel A. We do not find statistically significant results in case of *MFI Share-TA* (*MFI Share-GL*) on *Growth* in Columns (1) and (7). The second hypothesis regarding economic growth is therefore not supported. All other results are qualitatively similar as to Table 5 (Panel A) and support our third and fourth hypotheses.

Among the control variables, we find a significant positive association between inflation and poverty, in both OLS and FE regressions. The result is similar to that reported by Albanesi (2007) who states that the poor are more vulnerable to inflation because they normally hold more cash as a portion of their entire purchases. They suffer greater losses from inflation than the rich class. Interest rate has a significant positive association with income inequality suggesting that contractionary monetary policy shocks can reduce inequality. We also observe a significant positive relationship between interest rate and poverty measures. Kang, Chung, and Sohn (2013) explain two reasons of this positive association. Firstly, the majority of poor are “debtors”. An increase in interest rate is an additional burden that reduces their borrowing capacities and that leads to more poverty gap. Secondly, an increase in interest rate increases the cost of current consumption, reducing the purchasing power of poor and causing severe poverty. *Trade* and *EFI* have an insignificant association with economic growth. On the other hand, these variables have a significant negative association with income inequality and poverty variables, indicating that more trade and economic freedom lead to an increase in the economic welfare of the people.

#### 4.3. Robustness analysis

To check the robustness of our results, we analyze a larger sample of 45 countries by reducing the selection criterion of the share of MFIs to at least 7% (instead of previously used 10 %). These results are qualitatively similar, and therefore, are not presented in a separate table. We further test whether the results are robust to different sub-samples of countries. We first split the full sample based on the income level of countries, as one would expect that MFIs are more active in developing and lower-income countries. Second, we divide countries into low and high inflation categories because an inflationary environment puts an adverse effect on the economy such as less capital accumulation and investments and an increase in unemployment. We expect that during an inflationary period, the real values of loans tend to fall and microfinance institutions may not be able to contribute towards finance-growth nexus (Beck et al., 2000; Goldsmith, 1969; Huybens & Smith, 1998; King & Levine, 1993). Finally, we analyze the impact of microfinance institutions in the

**Table 5**  
Impact of Microfinance Institutions on Economic Welfare.

Panel A: Ordinary least squares regressions												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount	GDP growth	GINI index	Income Highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.02 (1.44)	-0.07* (-2.54)	-0.06** (-3.06)	0.00 (1.06)	-0.34*** (-4.79)	-0.12* (-2.20)						
MFI_Share-GL <sub>t-1</sub>							0.02 (1.67)	-0.07** (-2.70)	-0.06** (-3.17)	0.00 (1.28)	-0.30*** (-3.81)	-0.16* (-2.48)
Inflation <sub>t-1</sub>	-0.03 (-0.85)	-0.08 (-0.55)	-0.02 (-0.20)	0.02 (1.00)	0.89* (2.46)	-0.15 (-0.56)	-0.00 (-0.14)	0.01 (0.06)	0.02 (0.24)	0.01 (0.43)	0.72* (2.15)	0.11 (0.39)
Interest rate <sub>t-1</sub>	-0.03 (-0.64)	0.33* (2.24)	0.26* (2.33)	0.03 (1.89)	0.53 (1.34)	-0.13 (-0.45)	-0.02 (-0.50)	0.34** (2.64)	0.29** (2.91)	0.03 (1.75)	0.10 (0.26)	0.27 (0.92)
Trade <sub>t-1</sub>	0.02 (0.65)	-0.22*** (-5.94)	-0.30*** (-5.47)	-0.06*** (-6.85)	0.06 (0.28)	-0.13 (-0.91)	0.02 (0.63)	-0.25*** (-6.80)	-0.36*** (-6.35)	-0.06*** (-7.41)	0.04 (0.17)	-0.29 (-1.68)
EFI <sub>t-1</sub>	0.00 (1.57)	-0.00* (-2.59)	-0.00** (-3.16)	-0.00 (-1.59)	0.00 (1.42)	-0.00 (-0.12)	0.00 (1.91)	-0.00** (-2.92)	-0.00*** (-3.41)	-0.00* (-2.16)	0.00 (0.46)	-0.00 (-1.33)
Unemployment <sub>t-1</sub>	-0.16*** (-3.87)	0.30*** (4.80)	0.37*** (5.00)	0.06*** (3.86)	2.44*** (7.48)	0.01 (1.09)	-0.11** (-2.85)	0.32*** (4.86)	0.39*** (4.99)	0.06*** (4.01)	2.18*** (6.16)	0.05 (1.71)
Constant	0.03 (1.63)	0.37*** (5.50)	0.27*** (5.18)	0.02** (3.08)	0.26 (1.43)	0.88*** (6.22)	0.06** (3.00)	0.36*** (6.36)	0.26*** (6.02)	0.03*** (3.89)	0.21 (1.12)	0.85*** (5.41)
Observations	257	165	165	165	163	96	257	165	165	165	163	96
Adjusted R <sup>2</sup>	0.291	0.296	0.307	0.289	0.331	0.360	0.268	0.305	0.278	0.282	0.351	0.372
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	No	No	No	No	No	No	No	No	No	No	No	No
No of countries	35	35	35	35	21	16	35	35	35	35	21	16

(continued on next page)

Table 5 (continued)

Panel B: Fixed effects regressions												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.02 (1.41)	-0.07* (-2.29)	-0.06** (-2.77)	0.00 (0.98)	-0.13** (-2.70)	-0.08** (-3.18)						
MFI_Share-GL <sub>t-1</sub>							0.02 (1.28)	-0.07* (-2.48)	-0.07** (-2.93)	0.00 (1.14)	-0.08** (-2.66)	-0.14** (-2.72)
Inflation <sub>t-1</sub>	-0.03 (-1.73)	-0.08 (-1.44)	-0.02 (-0.17)	0.02 (0.76)	0.41*** (3.77)	0.08 (1.31)	0.01 (0.15)	-0.06 (-0.40)	-0.01 (-0.10)	0.01 (0.78)	0.07 (1.12)	0.37*** (3.52)
Interest rate <sub>t-1</sub>	-0.03 (-0.62)	0.33* (2.23)	0.26* (2.31)	-0.03 (-1.88)	0.36* (2.53)	0.17 (1.99)	0.02 (0.52)	0.34* (2.39)	0.27* (2.46)	-0.03 (-1.94)	0.15 (1.58)	0.31* (2.27)
Trade <sub>t-1</sub>	0.02 (0.60)	-0.18*** (-5.88)	-0.24*** (-5.37)	0.06*** (7.14)	-0.01 (-0.03)	-0.18 (-1.62)	0.02 (0.82)	-0.19*** (-6.33)	-0.26*** (-5.72)	0.06*** (7.56)	-0.14 (-1.23)	0.03 (0.12)
EFI <sub>t-1</sub>	0.00 (1.59)	-0.02** (-3.08)	-0.04*** (-3.73)	-0.01 (-1.75)	0.02 (0.34)	-0.00* (-2.64)	0.00 (1.40)	-0.01*** (-3.58)	-0.04*** (-4.23)	-0.01* (-2.28)	-0.05** (-2.86)	0.00 (0.18)
Unemployment <sub>t-1</sub>	-0.16*** (-3.94)	0.28*** (5.08)	0.34*** (5.33)	0.06*** (4.02)	1.45*** (4.54)	0.36* (2.25)	-0.09** (-2.68)	0.29*** (4.97)	0.37*** (5.27)	0.05*** (3.92)	0.42* (2.12)	1.48*** (4.62)
Constant	0.03 (1.61)	0.37*** (5.97)	0.27*** (5.77)	0.02** (2.99)	0.20 (1.60)	0.04 (0.65)	0.04* (2.13)	0.25*** (6.04)	0.03*** (3.94)	0.12*** (5.34)	0.00 (0.01)	0.20 (1.61)
Observations	257	165	165	165	163	96	257	165	165	165	163	96
Adjusted R <sup>2</sup>	0.272	0.296	0.247	0.286	0.366	0.391	0.268	0.282	0.234	0.241	0.381	0.402
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	35	35	35	35	21	16	35	35	35	35	21	16

This table presents the results of pooled ordinary least square (OLS) regressions of Economic Welfare variables on *MFI share* and control variables. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

This table presents the results of fixed effects regressions (FE) regressions of Economic Welfare variables on *MFI share* and control variables. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

Table 6

Sub-sample Analysis: Impact of Microfinance Institutions on Financial Development and Economic Welfare.

Panel A: Low income countries								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank deposits	Private credit	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.26*** (4.36)	0.26*** (4.07)	0.02 (1.83)	-0.17* (-2.28)	-0.02* (-2.38)	0.09 (1.77)	-0.52* (-2.78)	-0.34* (-2.72)
Inflation <sub>t-1</sub>	0.37 (1.50)	0.26 (1.07)	0.03 (0.40)	-0.16 (-0.91)	0.01 (0.41)	-0.16 (-1.27)	0.30 (0.65)	0.55 (1.19)
Interest rate <sub>t-1</sub>	0.95*** (4.27)	0.79*** (3.68)	0.11 (1.22)	-0.09 (-0.46)	0.01 (0.23)	-0.06 (-0.42)	-1.56** (-4.42)	-1.83*** (-5.56)
Trade <sub>t-1</sub>	0.05 (1.22)	0.04 (1.08)	-0.01 (-0.48)	-0.00 (-0.11)	0.00 (0.26)	-0.00 (-0.03)	-0.04 (-0.28)	0.06 (0.66)
EFI <sub>t-1</sub>	0.01** (3.12)	0.01 (1.60)	0.00 (1.93)	0.00 (1.60)	-0.00 (-0.60)	0.00* (2.11)	-0.00 (-0.24)	0.01 (1.40)
Unemployment <sub>t-1</sub>	-2.69*** (-6.47)	-2.43*** (-6.19)	-0.29* (-2.42)	2.12*** (4.04)	0.23** (3.12)	0.06 (1.27)	0.04 (1.03)	0.16*** (4.66)
Constant	-0.31 (-1.97)	-0.20 (-1.18)	0.11* (2.57)	0.19 (1.26)	0.04 (1.85)	0.13 (1.24)	0.35 (0.79)	0.05 (0.12)
Observations	132	132	132	86	86	83	86	53
Adjusted R <sup>2</sup>	0.242	0.296	0.242	0.273	0.255	0.282	0.342	0.398
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	18	18	18	15	15	15	12	11
Panel B: High inflation countries								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank deposits	Private credit	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.20* (2.42)	0.22** (2.77)	0.02 (0.63)	0.01 (0.47)	-0.00 (-0.08)	-0.01* (-2.40)	-0.31*** (-3.90)	-0.27* (-2.45)
Inflation <sub>t-1</sub>	-0.43* (-2.34)	-0.33 (-1.85)	0.01 (0.19)	0.11 (1.64)	0.12* (2.00)	-0.01 (-1.03)	0.61*** (4.37)	0.73** (3.35)
Interest rate <sub>t-1</sub>	-0.44* (-2.15)	-0.66** (-3.33)	0.02 (0.31)	0.11 (1.79)	0.09 (1.71)	-0.01 (-1.48)	0.36* (2.12)	0.17 (0.55)
Trade <sub>t-1</sub>	2.81*** (4.93)	2.44*** (4.32)	0.25 (1.31)	-0.39 (-1.97)	-0.42* (-2.43)	-0.01 (-0.35)	-1.21* (-2.23)	-1.60* (-2.20)
EFI <sub>t-1</sub>	0.01** (2.63)	0.01* (2.18)	-0.00* (-2.36)	0.00** (2.68)	0.00* (2.29)	-0.00** (-2.94)	-0.00 (-1.56)	-0.00 (-0.81)
Unemployment <sub>t-1</sub>	-0.82* (-2.23)	-1.50*** (-4.16)	-0.19 (-1.50)	0.41*** (3.80)	0.32** (3.35)	-0.03** (-2.74)	1.81*** (4.50)	1.95** (2.88)
Constant	0.15 (0.80)	0.23 (1.22)	0.18** (2.72)	0.26*** (4.75)	0.20*** (4.15)	0.04*** (6.68)	0.32* (2.09)	0.39 (1.68)
Observations	176	176	176	119	119	119	120	59
Adjusted R <sup>2</sup>	0.286	0.330	0.271	0.253	0.249	0.262	0.324	0.351
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	20	20	20	20	20	20	19	13

(continued on next page)



Table 6 (continued)

Panel C: Pre-financial crisis period								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank deposits	Private credit	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.12*** (3.81)	0.11** (3.28)	0.04* (2.31)	-0.32** (-3.28)	-0.01* (-1.99)	0.01 (1.03)	-0.16 (-1.70)	-0.01 (-1.80)
Inflation <sub>t-1</sub>	-0.00 (-0.03)	0.01 (0.09)	-0.06 (-1.46)	0.38* (2.23)	0.04 (0.56)	0.03* (2.45)	-0.41 (-1.50)	-0.00 (-0.03)
Interest rate <sub>t-1</sub>	-0.04 (-0.42)	-0.04 (-0.37)	-0.02 (-0.39)	0.04 (0.18)	0.00 (0.04)	-0.01 (-0.14)	-0.07* (-2.50)	-0.04 (-0.42)
Trade <sub>t-1</sub>	0.21* (2.06)	0.05 (0.44)	0.14** (2.63)	0.03 (0.09)	-0.13* (-2.16)	0.11 (1.48)	-0.98 (-1.73)	-0.21* (-2.06)
EFI <sub>t-1</sub>	0.01*** (5.71)	0.01*** (5.30)	-0.01 (-1.96)	-0.01* (-2.13)	0.00 (0.65)	0.00 (0.72)	-0.01* (-2.00)	0.01*** (5.71)
Unemployment <sub>t-1</sub>	-0.45* (-2.06)	-0.55* (-2.48)	-0.07 (-0.61)	1.45 (1.66)	0.22 (1.25)	0.17 (1.08)	-1.26 (-1.05)	0.45* (2.06)
Constant	-0.06 (-0.90)	0.02 (0.27)	0.14*** (3.62)	0.91*** (3.64)	0.40*** (7.25)	0.31*** (6.50)	0.90 (2.45)	-0.06 (-0.90)
Observations	105	105	93	69	69	69	65	42
Adjusted R <sup>2</sup>	0.294	0.304	0.284	0.282	0.289	0.231	0.349	0.382
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	35	35	35	33	33	33	30	28
Panel D: Excluding the financial crisis period								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank deposits	Private credit	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.14*** (3.52)	0.33*** (4.57)	0.01 (1.42)	-0.07* (-2.36)	-0.07** (-2.91)	0.00 (1.00)	-0.18*** (-3.14)	-0.12* (-2.45)
Inflation <sub>t-1</sub>	0.18 (0.86)	-0.92* (-2.05)	-0.07 (-1.39)	-0.08 (-0.08)	0.04 (0.27)	0.01 (0.53)	-1.31** (-3.29)	0.07 (0.31)
Interest rate <sub>t-1</sub>	0.15 (0.63)	0.53 (0.93)	0.06 (1.05)	0.38* (2.39)	0.31* (2.50)	-0.04 (-1.93)	-0.40 (-0.71)	-0.14 (-0.44)
Trade <sub>t-1</sub>	0.53*** (3.73)	0.04 (0.22)	0.04 (1.14)	-0.47*** (-6.09)	-0.33*** (-5.45)	0.06*** (7.33)	0.10 (0.43)	0.04 (0.26)
EFI <sub>t-1</sub>	0.01*** (6.67)	0.01** (3.02)	-0.00 (-0.71)	0.00*** (4.01)	0.00*** (4.75)	-0.00* (-2.25)	0.01** (2.94)	0.02 (0.68)
Unemployment <sub>t-1</sub>	-0.22 (-1.02)	-1.85*** (-5.66)	0.08 (1.68)	0.65*** (5.12)	0.51*** (5.30)	0.06*** (3.95)	2.56*** (7.82)	2.08*** (9.07)
Constant	-0.52*** (-5.00)	-0.21 (-1.94)	0.03 (1.73)	0.35*** (6.70)	0.25*** (6.43)	0.02*** (3.59)	-0.05 (-0.47)	0.63*** (5.70)
Observations	235	235	197	117	117	117	88	64
Adjusted R <sup>2</sup>	0.291	0.327	0.219	0.308	0.294	0.279	0.372	0.390
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	35	35	35	34	34	34	33	32

This table presents the regression results for Financial Development and Economic Welfare in low income countries. We split the sample into two groups on the basis of median value of GDP of countries; the countries below the median value are classified as low income countries. We regress the dependent variables on *MFI share* and control variables. We employ the fixed-effect technique for estimation. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

This table presents the regression results for Financial Development and Economic Welfare in high inflation countries. We split the sample into two groups on the basis of median inflation rate of countries. The countries above the median value are classified as high inflation countries. We regress the dependent variables on *MFI share* and control variables. We employ the fixed-effect technique for estimation. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

This table presents the regression results for Financial Development and Economic Welfare in the pre-financial crisis period (2001–2006). We regress the dependent variables on *MFI share* and control variables. We employ the fixed-effect technique for estimation. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

This table presents the results for Financial Development and Economic Welfare in absence of financial crisis period. We exclude the period 2007–2008 from our analysis. We regress the dependent variables on the relative share of *MFIs* and control variables. We employ the fixed-effect technique for estimation. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

Table 7

Non-linear Impact of Microfinance Institutions on Financial Development and Economic Welfare.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Bank deposits	Private credit	GDP growth	GINI index	Income highest	Income lowest	Poverty gap	Poverty headcount
MFI_Share-TA <sub>t-1</sub>	0.12* (2.47)	0.16** (3.26)	0.01 (0.51)	-0.22*** (-4.02)	-0.03 (-1.91)	-0.00 (-0.84)	-0.08* (-2.37)	-0.08** (-2.97)
MFI_Share-TA <sub>t-1</sub> <sup>2</sup>	-0.12 (-0.57)	-0.17 (-0.81)	0.04 (0.56)	0.69** (3.30)	0.19* (2.57)	-0.01 (-0.86)	0.17 (1.30)	0.04 (0.37)
Inflation <sub>t-1</sub>	-0.33** (-3.27)	-0.27** (-2.62)	-0.03 (-0.72)	0.38*** (3.77)	0.07 (1.96)	-0.01*** (-3.43)	0.09 (1.44)	0.05 (0.93)
Interest rate <sub>t-1</sub>	-0.58*** (-4.17)	-0.72*** (-5.11)	-0.07 (-1.47)	0.32* (2.39)	0.10* (2.31)	-0.01* (-2.15)	0.30** (2.92)	0.14 (1.76)
Trade <sub>t-1</sub>	0.05 (0.35)	0.09 (0.59)	0.01 (0.10)	0.11 (0.47)	-0.14** (-3.10)	0.02*** (3.35)	-0.08 (-0.66)	-0.17 (-1.54)
EFI <sub>t-1</sub>	0.01*** (9.01)	0.01*** (7.60)	-0.00*** (-4.48)	-0.00 (-0.07)	0.00** (2.74)	-0.00 (-1.96)	0.00** (2.76)	0.00* (2.55)
Unemployment <sub>t-1</sub>	-0.35 (-1.39)	-0.50* (-2.00)	0.07 (0.84)	1.52*** (4.89)	0.17* (2.23)	-0.00 (-0.35)	0.37 (1.99)	0.38* (2.37)
Constant	-0.40*** (-4.24)	-0.31** (-3.19)	0.20*** (5.98)	0.13 (1.13)	0.23*** (7.54)	0.03*** (8.06)	-0.05 (-0.79)	-0.01 (-0.22)
Observations	289	289	257	165	165	165	163	96
Adjusted R <sup>2</sup>	0.282	0.301	0.250	0.261	0.274	0.279	0.321	0.346
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of countries	35	35	35	35	35	35	21	16

This table presents the regression results for Financial Development and Economic Welfare in low income countries. We split the sample into two groups on the basis of median value of GDP of countries; the countries below the median value are classified as low income countries. We regress the dependent variables on *MFI share* and control variables. We employ the fixed-effect technique for estimation. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% level, respectively. See Table 1 for variable definitions.

pre-financial crisis period and the period excluding the crisis. Redoing the analysis using the financial crisis as an exogenous event (Chan, Lin, & Lin, 2020) can reduce any concern on endogeneity that might influence our results.

#### 4.3.1. Impact of microfinance in low-income countries

In Table 6 (Panel A), we examine the impact of the share of MFIs on finance-growth nexus in low-income countries. We divide the sample on the basis of the median GDP per capita (\$2093). Countries with GDP below the median are categorized as low-income countries. In Columns (1) and (2), we regress bank deposits and private credit against the share of MFIs, set of control variables, year, and country dummies. The results show a significant positive association between MFI share with both proxies of dependent variables. In Column (3), we observe an insignificant association between *MFI share-TA* and GDP growth rate. The results presented in Columns (4) to (6) show significant negative association between the share of MFIs and income inequality variables. Finally, in Columns (7) and (8), we observe a significant negative association between the share of MFIs and both poverty variables. Overall, in the sample of low-income countries, we find statistical support for the first, third and fourth hypotheses.

#### 4.3.2. Impact of microfinance in high inflation countries

We identify the sub-sample of high inflation countries by dividing the full sample based on the median value of inflation rate. We perform the same analysis as before and present the results in Table 6 (Panel B). We observe a significant positive association between the share of MFIs with *Bank deposits* and *Private credit* (Columns 1 and 2) and a significantly negative association with inequality and poverty variables (Columns 6, 7 and 8). Overall, in the sample of high inflation countries, we find support for the first, third, and fourth hypotheses.

#### 4.3.3. Impact of microfinance before the financial crisis period

The regression results of the sample covering the pre-crisis period (2001–2006) are presented in Panel C of Table 6. In Columns (1) and (2), the results support the first hypothesis that MFIs play an important role in increasing financial development. We also find support for our second hypothesis. An additional percentage point increase in the share of MFIs is associated with 0.04 percentage point higher economic growth (Column 3). This positive association between share of MFIs and economic growth in the pre-crisis period indicates that although MFIs increase economic growth this effect is very small in magnitude and may be offset by cyclical fluctuations and other exogenous shocks (financial crisis). Income inequality results presented in Columns (4) and (5) suggest a significant negative impact of MFIs. Overall, during the pre-crisis period, we find support for the first three hypotheses.

#### 4.3.4. Impact of microfinance in the period excluding financial crisis

In order to gauge the impact of MFIs in the absence of financial crisis, we exclude the years 2007 and 2008 from our analysis.

**Table 8**  
Impact of Microfinance Institutions on the Efficiency of Commercial Banks.

Panel A: Cost to assets ratio analysis								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MFI_Share-TA <sub>t-1</sub>	-0.03*** (-5.66)	-0.02*** (-4.82)	-0.03*** (-5.26)	-0.03*** (-5.40)	-0.02** (-3.21)	-0.04*** (-7.12)	-0.03* (-1.99)	-0.02*** (-3.38)
Size <sub>t-1</sub>	-0.01*** (-9.26)					-0.01*** (-7.58)		-0.02*** (-6.47)
Capital <sub>t-1</sub>		0.03*** (4.68)				-0.00 (-0.08)		-0.01 (-0.67)
Credit risk <sub>t-1</sub>			0.03*** (4.44)			0.04*** (5.24)		0.01 (1.42)
Concentration <sub>t-1</sub>				-0.02*** (-4.18)		-0.02** (-2.69)		-0.02 (-0.44)
Wage rate <sub>t-1</sub>					0.11*** (8.98)		0.09*** (6.84)	0.07*** (5.29)
Inflation <sub>t-1</sub>							0.03 (0.84)	0.03* (2.43)
Interest rate <sub>t-1</sub>							0.06*** (5.01)	0.03** (2.81)
Trade <sub>t-1</sub>							-0.04 (-1.09)	-0.01 (-0.29)
EFI <sub>t-1</sub>							0.03 (1.03)	0.00 (0.08)
Constant	0.29*** (18.26)	0.08*** (23.36)	0.08*** (22.86)	0.10*** (21.95)	0.02** (3.22)	0.33*** (16.54)	0.02* (2.42)	0.47*** (16.30)
Observations	4470	4269	4493	4548	4620	4421	4320	4240
Adjusted R <sup>2</sup>	0.261	0.147	0.110	0.091	0.181	0.189	0.110	0.192
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of Banks	951	951	788	847	795	781	786	640

  

Panel B: Cost to income ratio analysis								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MFI_Share-TA <sub>t-1</sub>	-0.10** (-2.85)	-0.11*** (-3.39)	-0.06* (-2.41)	-0.11** (-3.18)	-0.18*** (-4.36)	-0.13*** (-3.41)	-0.21* (-2.33)	-0.17* (-1.98)
Size <sub>t-1</sub>	-0.01*** (-4.01)					-0.01* (-2.47)		-0.00 (-0.73)
Capital <sub>t-1</sub>		-0.02 (-0.38)				-0.06 (-0.86)		-0.12 (-1.44)
Credit risk <sub>t-1</sub>			0.61*** (12.24)			0.59*** (11.14)		0.50*** (7.39)
Concentration <sub>t-1</sub>				0.01 (0.17)		0.10* (2.49)		-0.06 (-1.12)
Wage rate <sub>t-1</sub>					0.32*** (3.80)		0.07* (2.23)	0.02 (0.24)
Inflation <sub>t-1</sub>							0.01 (0.11)	0.19 (1.95)
Interest rate <sub>t-1</sub>							-0.00 (-0.02)	0.22 (0.68)
Trade <sub>t-1</sub>							-0.18 (-0.67)	-0.35 (-1.13)
EFI <sub>t-1</sub>							-0.07 (-0.34)	-0.08 (-0.37)
Constant	1.02*** (13.64)	0.74*** (32.19)	0.65*** (33.30)	0.72*** (22.88)	0.92*** (17.59)	0.84*** (9.03)	0.85*** (15.49)	0.82*** (6.36)
Observations	4279	4108	4349	4420	4671	4327	4293	3996
Adjusted R <sup>2</sup>	0.233	0.131	0.123	0.092	0.199	0.209	0.108	0.207
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of Banks	946	942	785	830	795	786	640	640

This table present fixed effects regression results for the efficiency of commercial banks. We regress cost to assets ratio on the relative share of *MFIs* and control variables. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

This table present fixed effects regression results for the efficiency of commercial banks. We regress cost to income ratio on the relative share of *MFIs* and control variables. The robust t-statistics are reported in parentheses and standard errors are clustered at country level. The asterisks \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10 % level, respectively. See Table 1 for variable definitions.

Table 6 (Panel D) presents the results. We find a significant positive association between MFI share and financial development (Columns 1 and 2) and a significant negative association with income inequality (Columns 4 and 5). Finally, in Columns (7) and (8), we observe a significantly negative association between the share of MFIs and poverty variables. The analysis excluding the financial crisis period shows support for the first, third and fourth hypotheses.

Overall, in the sub-sample analysis, we find that the presence of MFIs plays an important role in increasing financial development, reducing income inequality and poverty, whereas for economic growth, we find mixed results.

#### 4.3.5. Non-linear impact of MFI on finance-growth nexus

In our baseline and sub-sample analysis, we find support for all hypotheses in terms of linear relationships. Wagner and Winkler (2013) observe a non-linear U-shaped relationship of MFI size and MFI age with real credit growth during the crisis period. We also examine the possibility of a non-linear relationship between our main variable of interest *MFI\_share* and different dimensions of finance-growth nexus.

The results of Table 7 show that out of four dimensions of finance-growth nexus (financial development, economic growth, income inequality, and poverty), a non-linear relationship is present only in case of income inequality variables: *Giniindex* and *Income\_highest*. The estimated coefficients of *MFI\_share*-TA squared in Columns (4) and (5) are positive and statistically significant. The result indicates that the presence of MFIs reduces income inequality up to a certain level, after which the effect reverses. In our analysis, this optimum level for both variables of inequality is 0.65.<sup>13</sup>

#### 4.4. Microfinance institutions and the efficiency of commercial banks

We now examine whether the presence of microfinance institutions affects the efficiency of commercial banks. Table 8 (Panel A) reports the estimation results when we use *Cost to assets ratio* as a proxy for the efficiency of commercial banks. The results suggest that the share of MFIs has a significant negative association with the cost to assets ratio of commercial banks. The results are robust and consistent when we include each bank-level control variable separately (Columns 2–4) or all variables together (Column 6) in regressions. We also consider country-level controls including wage rate, inflation, interest rate, trade, and EFI in order to check the robustness of the impact on efficiency. Once again, the estimated coefficient of *MFI\_Share*-TA is negative and statistically significant (Column 7). Including all bank and country level control variables in one regression (Column 8), we continue to find a significant negative association between *MFI\_Share*-TA and the cost to assets ratio indicating increasing efficiency of commercial banks.

We use *Cost to income ratio* as an alternative proxy of the efficiency of commercial banks, and present the results in Panel B of Table 8. We find consistent and robust results with respect to the relative share of MFIs. Overall, the regression results indicate that in a dual financial system where microfinance institutions operate together with commercial banks, MFIs reduce the operating cost of commercial banks by imposing more competition, thus enhancing their efficiency. We find support for the fifth hypothesis.

Panels A and B of Table 8 show that almost all control variables exhibit the expected relationship. The variable *Size* has a significant negative association with cost ratio. This indicates that larger size banks have lower cost ratio, most probably because of scale economies and diversification. We introduce *Capital ratio* as a second control variable and find a significant positive association with cost ratio. The result shows that banks with more equity in their capital experience an increase in their operating cost. The finding might indicate that these banks are engaged in more risk-taking activities. *Credit risk* has a significant positive association with cost ratio, suggesting that more nonperforming loans lead to a decline in the efficiency of commercial banks. *Banking concentration* has a negative association with the cost to assets ratio only (Panel A). The result supports the “Efficient Structure” hypothesis proposed by Demsetz, (1973) suggesting that efficient banks reduce their operating costs that enhance their profitability and enable them to gain more market share thereby increasing market concentration. Our results indicate a positive association between *Wage rate* and cost ratio of commercial banks. Although wage rate increases the cost of banks, it also increases the productivity of the employees and reduces their turnover. The productivity gain eventually outweighs the increased cost burden of the banks, which is in line with Draca et al. (2011) and Gupta and Shaw (2014). The significant positive coefficients of two country level controls (*Inflation* and *Interest rate*) indicate that increases in inflation and interest rate also increase the cost ratio of banks. The other country control variables *Trade* and *EFI* have statistically insignificant association with cost ratio.

## 5. Conclusions

Microfinance has become popular in many countries, and the dual financial system, in which both microfinance institutions and conventional banks share the same market, has now emerged. MFIs act differently from CBs in many ways. Specifically, they are not engaged in speculative activities. They usually tend to be more risk-averse, and invest in the real economy by focusing mostly on less privileged populations. This paper investigates the co-existence of microfinance institutions and conventional banks and analyzes the implications of MFIs on the finance-growth nexus. We examine whether and how MFIs can accelerate financial development, economic growth, and reduce income inequality and poverty at the country level. We also explore whether the existence of MFIs alongside CBs could increase the efficiency of the whole banking system by putting banks into more competition. Our sample consists of 35 countries that have a dual financial system over the period 2001–2014.

<sup>13</sup> We also examine the non-linear impact of *MFI\_share*-GL variable and find similar results (the effect exists only in the case of income inequality). We do not report these results for the sake of brevity.

We observe a significant positive impact of the relative share of MFIs on financial development whether it is in terms of financial intermediation as measured by bank deposits or the allocation of credit as measured by private credit. We also find support for increased economic growth in the sub-sample analysis (the pre-crisis period). In case of income inequality, we observe a strong negative association between share of MFIs and both inequality variables: Gini index and income of people at the highest decile. The results of poverty - the last dimension analyzed in finance-growth nexus - show a significant negative impact of MFIs.

In analyzing the link between the presence of microfinance institutions and the efficiency of commercial banks, we observe that there is a negative association between the share of MFIs and cost structure of commercial banks. The result suggests that when conventional banks operate alongside microfinance institutions, they are more cost-effective. MFIs increase the efficiency of commercial banks and discipline them by subjecting them to more competition.

We conduct various robustness checks. In particular, we use different proxies of independent and dependent variables. We compute the share of microfinance institutions on gross loan basis instead of total assets. We estimate regression results using OLS and fixed effects methods. In addition, we split up our sample according to low-income countries, high inflation countries and financial crisis period. In general, the earlier presented results remain unchanged in these robustness checks.

Overall, the results of the study provide important insights about microfinance institutions and their role in enhancing financial development and economic welfare, reducing income inequality, poverty, and inefficiency of commercial banks. Our findings have important policy implications for regulators and practitioners. Microfinancing not only changes the market structure of the financial sector by increasing financial intermediation, but also delivers competition to commercial banks that enhances their cost-efficiency. The fact that MFIs spur financial development, increase credit allocation, and reduce poverty and inequality necessitates that policy makers start taking measures to integrate microfinancing into the mainstream financial system of a country. MFIs should be tapped to those areas where they have a market niche or where commercial banks are unable to cater to low-income borrowers. In addition, MFIs could be more involved with start-ups and small-scale industries, an activity that have the potential to increase economic growth.

In finishing, we note that our results need to be interpreted with caution, as these can be idiosyncratic to the sample countries and period. Future studies can examine a broader set of countries and regions. Additionally, comparing different categories of microfinance institutions can provide new insights.

#### Appendix A. List of countries and the number of microfinance institutions (MFIs) and commercial banks (CBs)

No	Countries	No of MFIs	No of CBs
1	Albania	10	13
2	Argentina	16	50
3	Armenia	12	15
4	Azerbaijan	24	29
5	Bolivia	28	16
6	Brazil	32	90
7	Bulgaria	26	21
8	Cambodia	22	28
9	Chile	7	25
10	Colombia	23	21
11	Costa Rica	15	19
12	Dominican Republic	14	55
13	Ecuador	50	55
14	El Salvador	16	18
15	Georgia	12	22
16	Honduras	23	30
17	Kazakhstan	22	39
18	Kyrgyzstan	27	15
19	Macedonia	5	18
20	Mexico	55	65
21	Moldova	5	15
22	Mongolia	10	11
23	Montenegro	5	10
24	Nicaragua	27	14
25	Niger	10	8
26	Pakistan	21	30
27	Paraguay	10	30
28	Peru	65	35
29	Philippines	75	60
30	Serbia	5	35
31	Sri Lanka	16	35
32	Tajikistan	32	10
33	Uganda	15	23
34	Vietnam	30	54
35	Zambia	5	18
	Total	770	1032



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