

Exploring the Evolution and Impact of Microfinance in India: Developing Credit Scoring Models for the underbanked/unbanked

Kabir Dhawan
Research Intern
Saathi (<https://saathi.life/>)

Abstract

This paper explores the evolution and impact of microfinance in India and discusses the development of credit-scoring models for the underbanked and unbanked populations. It examines the historical progress of microfinance, highlighting significant initiatives like the Self-Help Group (SHG)-Bank Linkage Programme and Joint Liability Group (JLG) models that have been pivotal in extending financial services to marginalized communities. The adaptability of microfinance institutions (MFIs) in addressing diverse socio-economic challenges is emphasized.

Despite significant advancements, the paper identifies ongoing challenges, including limited access to capital, regulatory constraints, and inconsistent investment validation methods. Addressing these challenges requires coordinated efforts from policymakers, financial institutions, and MFIs to foster a supportive environment for the sector's growth and sustainability.

The study also underscores the critical need for robust credit scoring models tailored to the unique needs of the underbanked and unbanked. These models are essential for assessing creditworthiness accurately, managing risks, and ensuring the sustainable growth of MFIs.

Introduction

Financial inclusion and socioeconomic development are some of the foundational pillars for achieving equitable economic growth and addressing the inequalities that exist in any nation. However, there is a significant disparity between urban and rural areas in India, and it has existed for thousands of years. However, with the latter facing insurmountable barriers to accessing formal financial services and economic opportunities, Microfinance institutions (MFIs) have emerged as transformative services to bridge this gap. By providing individually tailored solutions to modern problems, they effectively empower marginalized groups in the rural population, stimulating socioeconomic progress in the process.¹

In the pursuit of inclusive development, India has made significant strides in recent years, with notable economic growth and progress in various sectors. However, this growth has not been uniform across the country. Rural areas continue to face numerous challenges related to poverty, unemployment, and lack of access to basic services.² The situation is exacerbated by limited access to formal financial services, leaving a large segment of the rural population excluded from the mainstream financial system.³ Lack of access to credit and savings facilities hampers entrepreneurship, investment in livelihood activities, and resilience to economic shocks in the rural Indian community.

It is in this context that microfinance has gained prominence as a potential solution to address financial exclusion and uplift rural communities. Microfinance is a financial innovation that provides small loans, savings, and other financial services to poor and low-income individuals who are excluded from the traditional banking system.⁴ The concept of microfinance emerged subsequent to the launch of institutions such as Grameen Bank⁵ in Bangladesh, founded by Muhammad Yunus.⁶ Inspired by the success stories of microfinance, various organizations and institutions have established MFIs in India, all with the aim to empower the rural poor and catalyze sustainable development.

The impact of microfinance on poverty alleviation, women empowerment, and rural development has been a subject of extensive research and debate. Numerous studies have

sought to evaluate the effectiveness of microfinance interventions in improving the livelihoods of the poor and fostering inclusive growth.^{7 8} While some researchers emphasize the positive effects of microfinance on income generation, entrepreneurship, and empowerment, others caution against potential mission drift, over-indebtedness, and the need for careful monitoring to ensure the positive impact.^{9 10}

Despite the successes of microfinance, the sector faces significant challenges in accurately assessing the creditworthiness of potential borrowers. Traditional credit scoring models, which rely heavily on formal financial histories, are often inadequate for evaluating the risk profiles of individuals with limited or no banking records. This paper explores the evolution and impact of microfinance in India, focusing on developing innovative credit-scoring models that leverage alternative data sources to assess the creditworthiness of the underbanked and unbanked. By examining various approaches and their implications, this research aims to contribute to the ongoing efforts to enhance financial inclusion and ensure the sustainable growth of the microfinance sector in India.

Evolution and Current State of Microfinance in India

Historically, the world has seen several ways of issuance of loans to destitute populations. “*Montes pieties*”, or mounts of piety, were a series of medieval Christian credit institutions that were formed in Italy to provide funds to support the poor in their difficult times.¹¹ The system was gradually exported out of Italy and expanded to all of Europe laying the foundations for modern-day Banking. The first mutualist financial institution in the form of a savings and loan cooperative opened in 1879 in Germany, serving the working population by providing them with access to credit. However, nothing was sufficient to inhibit the growth of poverty and the so-called “third world.” It was here, in the third world, that the expression “microcredit”, which evolved to microfinance, as we know it today, took birth as the brainchild of the Bangladeshi economist Muhammed Yunus.¹² He realised by personally funding the business of a group of forty-two women making bamboo furniture for a living, that small loans made a disproportionate difference in the life of the poor, and if given a just chance, the small loan would always be repaid, sowing the seed for an idea of a viable business model. His idea of Microfinancing received a lukewarm reception from the traditional banking system, so in 1983, he founded the Grameen Bank (bank for the poor), which recorded stellar growth in years to come and earned him a Nobel Prize in 2006.¹³

Micro-financing includes simple financial services, such as small loans, savings accounts, funds transfers, and insurance on financial services, such as business training. The unique feature of microfinance is the assistance of people who are living in poverty who don't usually qualify for regular banking services because of a lack of identification or collateral for securing loans.

In India, until the nineties, people experiencing poverty were deemed "unbankable", largely due to the lack of collateral which was required for any form of formal finance. The poor were in a vicious cycle of breeding more poverty. However, with the emergence of the idea of Microfinancing and its uniqueness of not needing collateral, India looked at it optimistically as a possible tool to get its poor out of their vicious cycle of poverty. Before Microfinancing, the poor could only look at commercial lenders, landlords, or traders, who had formed the informal, easy-access option to get finance, but this was marred by exorbitantly high interest rates. There were regional rural banks and some rural development programmes (Integrated Rural Development Program) which lent money through heavily subsidised schemes; however, they were often siphoned off by the local people in power. Needless to say, that these schemes brought heavy losses to the banks due to high arrears and default rates. ¹⁴

The Informal lenders were well placed to have a lot of information about the needy households and could enforce repayments by effective, sometimes unlawful means but were limited in resources. In contrast, the formal lenders, like the state-owned banks, had plenty of resources but limited to no information about the clients, and hence could not effectively enforce repayment mechanisms in the absence of a collateral.

Microfinance began to be seen as a way to find the best of the formal and informal options above, namely, access to information and strength of resources. This came for India at a time when the Indian government's boost towards alleviation of poverty was picking up pace, and Microfinancing was looked at as a means to achieve that. Over time, Microfinancing has been linked with the following objectives:

- Promotion of social and economic development amongst the weaker sections of the society
- Strengthen self-help groups and use them as a tool to steer economic development.

- Promotion of women empowerment, financial liberation of women, and support of women entrepreneurs.

The first microcredit summit was held in 1997 in Washington, and the G8 outlined the principles of microfinance in 2004. The year 2005 was named “International Year of Microcredit” by the UN.¹⁵

Since its advent, the microfinance sector has been instrumental in creating opportunities by providing credit access to over 64 million borrowers who had been beyond the reach of traditional banking services. A few significant features of Microfinance may be listed as follows:¹⁶

- Borrowers are from low-income backgrounds.
- Loan amounts are small (microloans)
- Loan tenure is short.
- There is no/minimal requirement for collateral.
- The repayment is at a higher frequency.
- Purpose of the loan is usually income generation.

Microfinance Models

A few models of Microfinance have been prevalent to fulfil the Microfinancing needs in the Indian subcontinent. These are discussed below.^{17 18 19}

Associations Model

In the association model, the target community forms an association through which microfinance and other activities are initiated for themselves. The associations may be formed by a group of women, cultural or religious groups and create support for work-based issues. The association gathers capital and intermediates between banks, MFIs and its members. An example of the association model is the self-help groups. The NABARD -Self Help Group- Bank Linkage Programme (SHG-BLP) being spoken of as the largest such in the world.²⁰

Community Banking Model

Members of the community join together to pool capital resources to lend to members. The transparency of practice is very high in this model, and guarantees are provided by social

collateral as services are distributed through member groups where each member's eligibility for a loan is based on their peer's performance. Royal Bank of Scotland (RBS) Foundation India²¹ is a successful example of a community banking model.

Cooperatives Model

The cooperative model is very similar in structure to associations and community banks model. However, their ownership structure differs because it does not include the poor. The cooperative is formed by a group of middle or upper-class individuals who then offer Microfinance services to the poor. These members are shareholders and have their share in equity capital and also share the profit. The Cooperative Development Forum Hyderabad is an example of the cooperative model. Grameen Bank (Bangladesh)²², Self-Employed Women's Association (SEWA) Bank²³(India) and K-Rep Bank (Kenya)²⁴ are all well-known examples of MFIs based on the Cooperative Model.

Credit Unions Model

In a credit union, members of the community pool their money together and offer loans to one another at a low interest rate. While their structure is similar to community banks, they differ in their size, being substantially smaller, and are not profit-oriented. Their interest rates are just enough to allow the sustainability of the credit union. SACCOs (Savings and Credit Cooperative Organizations) in Kenya are a prominent form of credit union where members pool in their resources to provide loans and other financial services to each other. ²⁵

Non- Governmental Organisation Based Microfinancing

The activities of NGOs include offering micro financing services, improving the credit rating of the poor, and providing training, education, and research. The NGOs also acted in as intermediaries between the poor and donor agencies. BRAC (Bangladesh Rural Advancement Committee) is one of the largest NGOs in the world and operates a comprehensive microfinance program in Bangladesh. It provides small loans to the poor, especially women, to start or expand small businesses. BRAC's approach combines microfinance with other development programs in education, health, and social development to create a holistic impact.²⁶

For-Profit Banks

Specialised microfinance banks, or even commercial banks today, also offer various financial services to the poor based on their creditworthiness, but their primary purpose may be to ensure a high return on investment. Banco Compartamos (Mexico) is one of the largest microfinance institutions in Latin America. Initially starting as an NGO, it transformed into a for-profit commercial bank to scale its operations. Compartamos focuses on providing small loans to micro-entrepreneurs, particularly women, to help them grow their businesses.²⁷ On the other hand, Equity Bank (Kenya) is a commercial bank in Kenya that has successfully integrated microfinance into its operations. It offers a range of microfinance products, including microloans, savings accounts, and insurance services, targeting low-income individuals and small businesses. Equity Bank's innovative approach has significantly contributed to financial inclusion in Kenya.²⁸

In the Indian subcontinent, Bandhan Bank started as a microfinance institution and transitioned into a full-fledged commercial bank in 2015. It focuses on providing micro-loans to the underbanked and unbanked populations in India, primarily targeting women entrepreneurs and small businesses. Bandhan Bank has a strong presence in rural and semi-urban areas, offering a range of financial products and services.²⁹

Rotating Savings and Credit Associations (ROSCA's)

Informal associations formed to save and simultaneously borrow, commonly known as a "kitty" amongst women and "chit" amongst the micro, small and medium businesses (MSMEs), are numerous in India. It is essentially a group of individuals, usually women for the kitty groups, who form a group and make regular cyclical contributions to a common fund, which is given as a lump sum to one member in each cycle.³⁰ ROSCAs have become a vital tool for communities to access credit. They help individuals finance education³¹ and health services,³² as well as acquire vehicles, housing,³³ land, livestock, and other means of production.³⁴ Additionally, ROSCAs support the purchase of non-capital goods and facilitate social and cultural events.³⁵ This mechanism provides a broad range of financial solutions to meet diverse needs within the community.³⁶ CredRight is a fintech platform using alternate data to underwrite loans for the small business that are part of the chit fund who need funds but did not win the chit prize in a given month.^{37 38}

The four pillars of the microfinance credit system are supply, demand for finance, intermediation, and regulation. Irrespective of the model of micro finance, the ultimate goal is the accessibility of finance to the poor population.

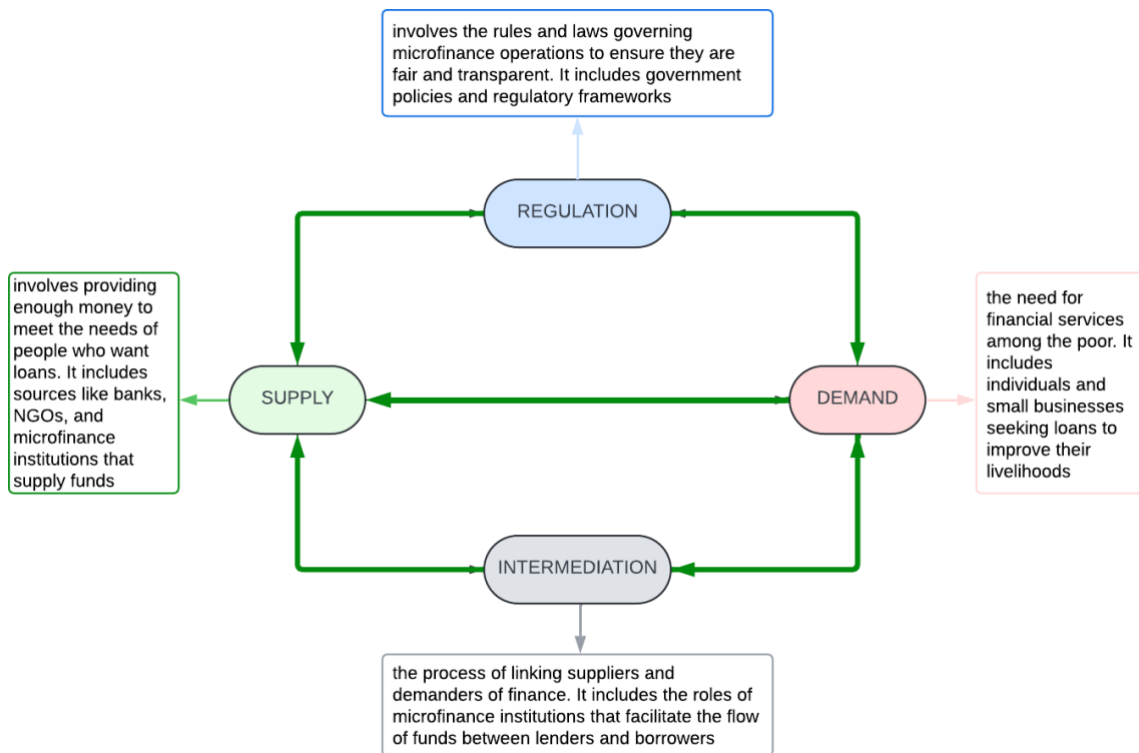


FIGURE 1: THE PILLARS OF MICROFINANCE ³⁹

Financial Inclusion and MFIs

Financial inclusion is the extension of financial services to large, uncertain populations to promote its growth potential and is the key enabler to reducing poverty and boosting prosperity.⁴⁰ Financial inclusion is a priority for the government of India, which initiated the National Mission for Financial Inclusion (NMFI) called the Pradhan Mantri Jan Dhan Yojna (PMJDY)⁴¹ in 2014 to “provide banking services to every unbanked household, guided by the principles of *“banking, the unbacked, securing the unsecured, funding, the unfunded, and solving the answer, then underserved areas.”*⁴² In 2018, the aim shifted its focus from every unbanked household to every unbanked adult.⁴³



FIGURE 2: NATIONAL STRATEGY OF MONETARY INCLUSION 2019-2024⁴⁴

Before the concept of Microfinancing, mainstream banks were reluctant to offer financial services to the poor. They considered these clients high-risk due to a lack of collateral and perceived inability to repay loans. Additionally, reaching rural and suburban areas involved high costs, and the low number and scale of operations translated to low transaction values, making it unprofitable for banks. Consequently, the poor were often left without access to essential financial services.⁴⁵

Microcredit helps people like vegetable vendors, artisans, farmers, rickshaw pullers, and fishermen get loans to improve their lives. It aims to lift people out of poverty by providing financial resources. Microfinance Institutions (MFIs) are growing fast, reaching many small borrowers.

In India, microfinance began with the Self-Help Group-Bank Linkage model by NABARD in 1992. This model has evolved, with significant penetration into the market by 2019. The Reserve Bank of India (RBI) regulates MFIs and supports them through Self-Regulatory Organizations (SROs) like MFIN and Sa-Dhan. These SROs help ensure responsible lending and growth while preventing borrower over-indebtedness. The RBI's regulations and policies, such as increasing lending caps, support the sector's expansion.⁴⁶

Microfinance primarily benefits women, who make up 99% of the borrowers. The models have shifted from paper guarantees to social guarantees, emphasizing community support to ensure loan repayment.

The NABARD report on microfinance in India for 2022-23 provides a comprehensive overview of the sector's growth and impact. The report highlights significant progress in financial inclusion, with increased outreach and loan disbursements to marginalized communities. Key initiatives, such as the Self-Help Group (SHG)-Bank Linkage program and the Joint Liability Group (JLG) model, have been instrumental in empowering rural populations, especially women. NABARD's Self Help Group-Bank Linkage Programme, the largest microfinance initiative globally, impacts 16.2 crore households through over 134 lakh SHGs. These groups collectively hold deposits exceeding ₹58,893 crore, with an annual loan offtake surpassing ₹1,45,200 crore, and outstanding loans amounting to over ₹1,88,079 crore. This program highlights NABARD's significant role in promoting financial inclusion and economic empowerment for rural communities in India.⁴⁷

The report also addresses challenges like over-indebtedness and the need for better regulatory frameworks. It emphasizes the role of technology in enhancing service delivery and recommends policy measures to ensure sustainable growth.

According to the Equifax Microfinance India Report 2023, the microfinance sector in India has become a key player in financial inclusion, empowering economically vulnerable groups. Microfinance Institutions (MFIs) have shown significant growth, disbursing numerous loans and improving the financial well-being of millions. Non-Banking Financial Companies specializing in Microfinance (NBFC-MFIs) have a notable presence, accounting for 41% of loans disbursed and outstanding portfolios. As of JAS 2023, MFIs have disbursed 205 lakh

loans. West Bengal is a notable hub for economic inclusion, with private sector banks leading in loan disbursement, providing 5,145,416 loans worth INR 23,160 crores from July-August - September 2022 to July-August-September 2023.⁴⁸

Socio-economic and Transformative development and MFIs

MFIs provide rural households access to credit, savings and insurance products. This financial inclusion empowers people to stand or expand small businesses, invest in their agricultural needs and cope with emergencies with improved. Financial access comes with increased income generation which is then used to improve the quality of life. The Self-Employed Women's Association Bank (SEWA) is an MFI focused on empowering women in the rural communities of Gujrat. SEWA provides financial services to female entrepreneurs and agricultural workers, promoting income generation and financial inclusion. A study by NHBC, witness to assessing the women's self-help group program, found that more than 78% of respondents reported improved economic and social status and improved access to credit. About 30% of the respondents of the low-income group migrated to higher income levels after joining the WSHG program. Interestingly, 66% of the WSHGs in Himachal Pradesh reported the creation of personal assets, 73% reported an increase in access to microfinance, 74% reported increase in monthly income, 78% reported an increase in support during an economic crisis, and 79% reported an increase in financial literacy.⁴⁹

Some MFIs offer financial products that are specifically tailored for education, such as school fee loans and educational materials. This empowers parents to invest in their children's education and break the cycle of illiteracy, allowing the younger generation to be equally equipped and capable of making use of newer opportunities. Another aspect where MFIs help in socio-economic development is by providing health insurance products. Communities can access quality healthcare services without fear of catastrophic expenses, which improves healthcare outcomes.

Assessing the Impact of MFIs

Whether an MFI is able to serve as many clients as possible and keep its costs under control can be measured by the efficiency ratio.

Gross loan portfolio to total assets is another efficiency indicator that measures the extent of the assets that an MFI allocates towards loans.

The Outreach performance indicator is used to assess the MFI in its ability to expand the width and depth of its client base. It includes the geographical spread of the MFI and the needs of clients assessed by poverty level, place of residence, and gender. The outreach concept covers six diverse dimensions that include the size of the client base, the poverty level of the clients, the cost to the clients to access the service, the perceived value of the microfinance product indicating its worth, the scope of the products which reflect the diversity, and the sustainable and timely provision of the service.^{50 51}

Challenges and Criticism

It is now being questioned whether the microfinance companies and the non-banking financial companies in India even trying to facilitate the Sustainable Development Goals or national policies that target the reduction of poverty and empowerment of women. These MFIs and NBFCs have been called a big curse or a big wolf because of their unlawful and exorbitant interest rates levied on the poor borrower, plunging entire families into the bottomless pit of debt.⁵²

One of the major challenges faced by the NBFC establishments in India includes overborrowing. The average microfinance loan size has significantly increased, which is compounded by borrowing from more than one lender in tandem by the borrower. Besides this, the NBFCs have also found it difficult to retain investor support. Additionally, banks have also started venturing into the microfinance space, some even partnering with MFIs strategically. Vice versa, many microfinance institutions have converted themselves into smaller finance banks, allowing them to increase their interest-rate interest rates.⁵³

Client's lack of literacy and financial education

Many people in India do not have any grasp on the basics of finance, and the awareness of the financial services available to them is minimal.⁵⁴ The lack of financial literacy among households and individuals with limited intellectual skills poses significant challenges for microfinance institutions (MFIs) in India. These individuals struggle with managing daily expenses, financial transactions, and assets. As noted by researchers and policymakers globally, financial literacy is crucial for integrating this vulnerable population into the formal

banking system. Studies, primarily in developed countries, show a strong link between financial knowledge and improved financial behaviours, leading to better income generation and living standards. Enhancing financial literacy is essential to prevent debt traps and ensure the economic upliftment of the poor in developing nations like India.⁵⁵

High expense of the outreach

MFIs provide small loans to the urban poor and those underbanked in distant locations, which involves logistical, human resource, and fuel costs associated with the outreach. Consequently, margins are reducing, necessitating the digitization and automation of processes or levying of higher interest rates.

Self-help group (SHG) growth

The SHG or the joint liability Group (JLG) model used by many MFIs increases the possibility of the borrower taking more debt than they can handle. The robust government engagement in supporting the SHGs has resulted in their widespread and rapid expansion, putting strain on the MFIs and their profitability and viability.

High Interest Rates

MFIs have been charging higher interest rates than Banks since inception, although there was a cap of 7.89% on the interest rate of the small loans enforced by the RBI in 2021. However, in 2022, the RBI issued new directives for microfinance lending and has included all entities - banks, NBFCs, and MFIs, under the same purview of law, subjecting them to the same regulations for microfinance and, at the same time, redefined the borrower limits from a family income of Rs 1,20,000 pa to 3,00,000 pa and lifted the interest rate cap allowing the MFIs to decide their own interest rate. This has resulted in borrowers facing higher interest from MFIs.⁵⁶

While this new directive allows for an expansion of market opportunity, the interest-rate cap removal promotes risk-based underwriting. This will also encourage healthy competition and harmonize the regulatory framework for different types of lenders, enabling the customers to

make an informed choice about their credit needs. Above all, with strong governance architecture, the new framework may help scale the industry further, ensuring better and wider financial inclusion.⁵⁷

Lack of Validation of Investment

Access to information for appraisal and the quality and quantity of information available to build investment decisions cannot be validated because of a lack of any consistent and trustworthy valuation methods. This constraint hinders their ability to access market data necessary for accurate investment appraisal. The absence of consistent and trustworthy valuation methods prevents MFI management teams from effectively utilizing the information they possess to make sound investment decisions and impact the financial stability of the MFI. Inadequate investment validation can lead to suboptimal allocation of resources, increased financial risks, and potential losses, which ultimately hamper the development and effectiveness of MFIs in fulfilling their mission of providing financial services to underserved populations.⁵⁸

MFI dependence on the Banking system

Consistent access to capital remains a significant challenge for India's microfinance sector, which relies heavily on banks and financial institutions. Since MFIs depend on borrowing from banks rather than raising debt from the capital market, larger NBFC MFIs face higher borrowing costs. Large and mid-sized MFIs primarily borrow from private and foreign banks, while smaller MFIs rely on private banks and apex lenders.

Many MFIs in India rely on funding from commercial and private banks, who, in turn, charge them high borrowing rates. Around 80% of MFIs came from commercial banks, and majority of them are registered as NGOs relying on banks for stable funding for their microfinancing activities.⁵⁹

Over-Indebtedness of Clients and Loan Default

With ineffective risk management and substantially increased borrowings, microfinance institutions report late payments on a large percentage of their loans.⁶⁰ This, in addition to the lack of any collateral, is a source of over-indebtedness and an increased risk of default and bad debts.⁶¹

Also, over 35% of borrowers have had access to more than one lender in 2018-2019, consequent to overborrowing and aggressive lending, raising concerns around control of NPAs.⁶²

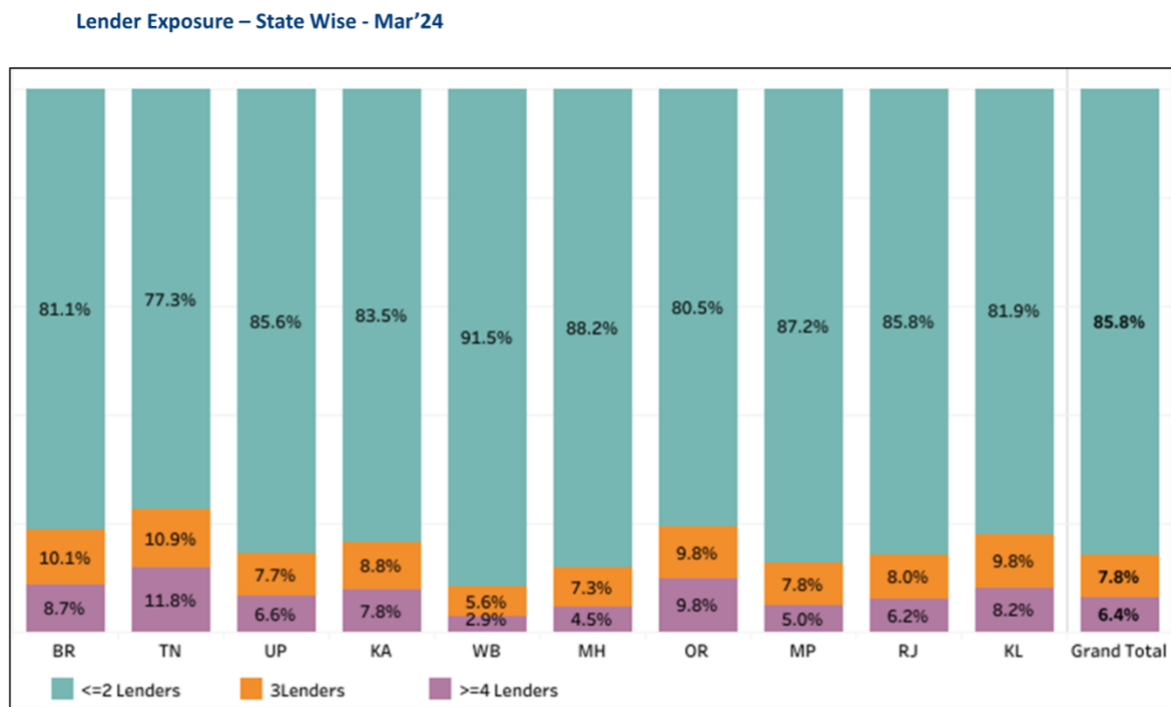


FIGURE 3: OVERBORROWING PATTERNS IN MICROLOANS IN INDIA⁶³

Lack of Diversified and Innovative Products

Most of India’s MFIs have yet to offer the diverse range of products that are included in microfinancing, like working capital loans, insurance, and savings loans, amongst others. This results in a very limited operation of the MFI, which also overlooks the low wage worker in particular.⁶⁴

Addressing these challenges

India has the fastest-growing microfinance sector in the world. However, regulatory constraints, such as complex licensing requirements, limit the growth and expansion of MFIs. Hence, a balanced approach to a policy that ensures consumer protection while allowing a conducive regulatory environment to encourage innovation and healthy and responsible lending practices becomes necessary.

The borrowers need financial literacy to address over-indebtedness. Policymakers must look at addressing the information gap and devise regulations that promote transparency and client protection.

The presence of informal lenders that pose severe competition in remote areas also needs addressing by creating awareness about the advantages and disadvantages of micro financial services.⁶⁵

The Joint Liability Group (JLG) model has allowed MFIs to grow at a phenomenal rate by enabling doorstep access to financial services to the underserved population, a large percentage of it being women. The Pradhan Mantri Jan-Dhan Yojana (PMJDY) has been pivotal in providing millions of Indians with access to banking services. The scheme is enhanced by the Jan-Dhan Aadhaar-Mobile (JAM) trinity, which links bank accounts, Aadhaar cards, and mobile numbers, facilitating greater financial inclusion.

Additionally, India Stack, with its paperless, cashless, and consent layers, enables lenders and Fintech companies to develop customer-centric products. The widespread adoption of Aadhaar has further transformed the traditional banking system into a digital model, offering electronic Know Your Customer (eKYC) and authentication services, streamlining financial operations and improving accessibility.

Due to the above initiatives, microfinance is proliferating in India; however, the current High Touch Model (HTM) of borrower engagement, which involves high interaction between loan officers and borrowers, faces challenges. Unlike the Low-Touch Model (LTM), HTM increases operational costs and leads to high staff turnover. Also, it does not provide enough incentive for borrowers to attend group meetings or maintain group dynamics after adopting cashless collections (KPMG 2021).⁶⁶

This has led microfinance institutions to adopt the more efficient Tech-Touch Model (TTM), which combines the efficiency of LTM with the personal engagement of HTM. TTM uses automation and self-service tools while maintaining customer support, helping lenders move towards digital microfinance.

Credit Scoring Methods: Traditional vs. Alternative

The start of modern credit scoring may be dated back to the 1950s judgemental approach to determine the creditworthiness of an individual.^{67 68} Commonly called the 5C's approach, it included the assessment of the 5C's: Character, Capital, Collateral, Capacity and Condition:

- Character: determined by familiarity with the borrower or their family
- Capital: the amount of loan requested
- Collateral: assets offered as security by the borrower
- Capacity: judged by the borrower's ability to repay
- Condition: an assessment of the current market conditions

The 5C's approach couldn't handle a large volume of applications daily, leading to the development of scorecards. These scorecards, in use to date, make consistent and unbiased decisions, ensuring fair treatment for all borrowers. They generate a score that quantifies the risk of lending money.

When someone applies for a loan at a bank, the bank collects information about them. This includes personal details like the number of people they support, how long they've lived at their current address, and how long they've been at their current job. The bank also gets information from local credit bureaus, such as how many times the person has applied for credit, any court judgments against them, and if they have missed any payments.

Once people are approved for loans, the bank tracks their repayment history over time, and based on their payment behaviour, the bank labels them as either good or bad borrowers. If they have fewer than a certain number of missed payments, they are marked as good borrowers; otherwise, they are marked as bad borrowers.

Using this information, the bank creates a scorecard. This scorecard gives each borrower a score that helps predict if they are likely to be a good or bad borrower. The cut-off score, determined by a statistical method, is the point that best separates the good borrowers from

the bad ones. If a borrower's score is equal to or higher than the cut-off score, they are predicted to be a good borrower; otherwise, they are predicted to be a bad borrower.

The scorecard is also used to assess people who were initially rejected for loans to predict their reliability. This combined data from both accepted and rejected borrowers helps the bank build a final scorecard to make better loan decisions.

Scorecards have not been limited to assessing creditworthiness; they also serve various functions beyond that. An Application Scorecard helps banks decide whether to grant credit to new applicants by analyzing their credit history, income, employment details, debts, and other financial information. It produces a score that predicts the likelihood of the applicant defaulting on the loan. For example, someone with a stable job and a good credit history would likely get a high score, indicating low risk.

A Behavioural Scorecard monitors existing customers' credit usage and behaviour over time to adjust credit limits and terms. It uses data such as payment history, credit utilization, account balances, and changes in financial status to produce a score reflecting the current credit risk posed by the customer. Consistently on-time payments and low balances result in a high score, suggesting a low risk for future credit.

A Collection Scorecard helps prioritize and manage delinquent accounts by assessing the likelihood of repayment. It evaluates information on overdue payments, account age, historical payment behaviour, and customer communication responses to produce a score indicating the probability of recovering the owed amount. A high collection score suggests a higher chance of successful collection based on factors like previous partial payments or responsive communication.⁶⁹

There are various mathematical methods to predict risk scores, such as logistic regression, neural networks, and decision trees. The probability scores from the modelling process assist business managers in decision-making, but converting these scores into a point-based scorecard is beneficial. It makes the scores easier for business users to understand and simplifies the calculation process through simple addition. Score points, calculated using a defined minimum/maximum scale with a specified odds ratio and rate of change of odds, provide an alternative way to represent the scorecard without affecting its predictive power.

For high-risk applicants, several strategies can be implemented: rejecting the loan proposal if the risk is excessively high, charging a higher interest rate for those with medium risk,

requiring a larger down payment or deposit, imposing higher premiums on insurance policies, offering prepaid services instead of postpaid or blocking international calls in the telecommunications industry, and conducting a greater number of checks before loan approval.

On an ongoing basis, scorecards can be used for various purposes: identifying good clients for upselling and cross-selling, increasing credit limits on credit cards and lines of credit, deciding whether to grant a top-up loan or reissue an expired credit card, directing high-risk accounts to stricter collection methods or outsourcing them to a collection agency, determining when and from whom to repossess assets like automobiles, expensive goods, or houses, and placing an account on a watch list for potential fraudulent activity.

Such traditional credit scoring models, like the FICO, VantageScore, etc, rely heavily on credit histories and financial data from credit bureaus. While these models are effective for those with established credit histories, they fail to evaluate individuals without formal financial records, often excluding the unbankable and the credit-invisible populations.

Gen Z and Millennials, who now have significant buying power, handle finances differently from previous generations. This change is due to various factors like the 2008 recession, the housing crisis, high debt levels, the gig economy, and the rise of digital banking. These factors have made it harder for them to access financing, highlighting the need for new solutions.⁷⁰

The Alternative Credit scoring models, on the other hand, use non-traditional data sources like social media profiles, online behaviour, online shopping, mobile usage, asset ownership, etc. These factors are then used to accurately determine credit risk. Unlike the scorecards of the traditional credit scoring method, machine learning algorithms are used to analyze the alternate data to identify trends and patterns that may signal risk.⁷¹

Alternative credit scoring gathers reliable data from various sources to determine whether an applicant can and intends to repay a loan. A customer's online presence, known as their digital footprint, serves as valuable alternative data for credit scoring models. This footprint

confirms the person's existence and legitimacy while providing insights into their financial stability.

In addition to profiling a customer's social accounts, various types of data can be used to assess creditworthiness. With internet usage increasing worldwide, including in underbanked markets, online activity provides valuable insights into customers. For example, device fingerprinting reveals a lot of digital information about the phone, computer, or tablet borrowers use to connect to a lending website; using private mode or an emulator suggests they might not be who they claim to be. Email profiling can identify if a customer's email address is non-existent or from a suspicious or disposable domain, indicating potential untrustworthiness. Phone analysis can reveal clues about financial stability, as using cheaper mobile carriers in some regions may suggest lower financial stability, while fake phone numbers suggest fraud. Additionally, analyzing location data helps identify applications from high-risk areas, filtering out customers likely to default or commit fraud.

In the Indian scenario, it is useful, especially for the blue-collar workers who are unbanked or underbanked. Consider the example of Ms Manju (fictitious), who moved from a village to Mumbai for a job. She lives in a shared accommodation and works as a domestic helper, receiving her wages in cash. Now, she wants to purchase a moped for commuting, has saved half the amount, and requires a loan for the rest. Traditional lenders are unlikely to grant her a loan for several reasons: lack of bank statements as proof of income, no credit history, no formal rent agreement, and lack of collateral. However, what they miss is that Ms Manju is a responsible and hardworking individual. She carefully manages her expenses, regularly sends money to her family, and has a stable job record. With her skills and dedication, the likelihood of her being unemployed for an extended period is low. The gap between lenders and borrowers like Ms Manju can be bridged using alternative data and analytics to create an alternate credit score.

Machine learning enhances predictive analytics in banking for credit scoring by combining and analyzing data more effectively. For example, in Ms Manju's case, geo-data from Google's API could be used to gather details about her current residence and the places she has visited over the past few weeks. Machine learning can calculate her employability index

to assess her job opportunities. Additionally, ML algorithms can be used to evaluate her willingness to repay the loan by analyzing her responses to various tests. These are just a few possibilities, and the scope is vast. ML can handle micro-segmentation from thousands of segments and detect micro-patterns on a frequently updated basis.

As digital touchpoints continue to grow rapidly, the use of alternative data is expected to increase.

A new type of psychometric credit scoring methodology is being increasingly popularized. One such credit scoring methodology developed by EFL Global as a part of the financial inclusion initiative assesses the creditworthiness of an individual by gamifying the credit application process. A credit risk score is created through a dynamic psychometric assessment aimed at analyzing character traits that have a relationship to credit risk. This approach is designed for applicants who do not have a credit history and, therefore, cannot be scored using traditional credit scoring methods. Besides their easy reachability to underserved populations, gamification and survey methodologies are also fun ways that are also backed by rigorous scientific evidence. They also are low-cost screening tools and fit for emerging markets as they address information asymmetry.

This psychometric testing targets the 2 billion people globally who are unbanked and have no banking relationship and another 1.3 billion who, although have access to banks but have no credit history.⁷² Empowering more consumer access to credit will add fuel for the economic growth of the nations.⁷³ An example of a model using alternative data to create consumer credit profiles is the FICO Score XD2, which not only brings new customers into the system but also provides clarity on the consumers who are credit retired, that is, they have not used credit in the last six months, and also for consumers who have negative information in their files. This new system incorporates public records and property data and supplements it with credit file data and public registry information.⁷⁴

Björkegren & Grissen (2020), in their research paper, critically examined the use of mobile phone data to improve credit scoring for individuals in a middle-income South American country with limited access to traditional banking services. In this country, only 34% of adults have bank accounts, but 89% of households have mobile phones.

The study focuses on a telecom company transitioning customers from prepaid to postpaid plans and evaluates how behavioural indicators from mobile phone usage can predict creditworthiness. By analyzing call detail records (CDR) and financial histories from a credit bureau, the study identifies patterns in phone usage that correlate with repayment behaviour. For instance, individuals with regular monthly usage patterns and strong social connections were more likely to repay their bills on time.

The study's approach to deriving behavioural indicators is significant because it uses data intuitively linked to creditworthiness, making it more acceptable to implementation partners wary of 'black box' methods. This method involved extracting approximately 5,500 indicators from raw transaction records, focusing on aspects like call frequency, social interactions, and geographic mobility. The telecom provided data on 7,068 subscribers, of whom 11% defaulted on their postpaid plans. These insights suggest that phone usage data can quantify behaviours traditionally considered 'soft,' making them measurable and useful for formal credit assessments.

The broader implication of the study highlights how mobile phone data can extend credit access to the unbanked population. As traditional credit bureau models fail with sparse financial histories, the mobile phone-based method maintains consistent performance across different levels of user engagement. This approach offers a low-cost, scalable solution for screening potential borrowers, enabling digital credit services without the need for physical interactions.

The paper identifies several challenges in implementing mobile phone data for credit scoring. First, **privacy concerns** are paramount, as data must be anonymized, and consumers must opt-in for their data to be used. Second, **data manipulation risks** arise if subscribers can game the system to improve their scores, necessitating robust and less susceptible indicators. Third, **phone sharing** complicates credit assessments, as shared accounts produce a single score reflecting multiple users' behaviours. Finally, **multiple accounts per user** dilute data accuracy, as usage spread across different networks can lead to incomplete activity profiles.⁷⁵

There are many straightforward indicators of behaviour that Björkegren & Grissen (2020) found plausibly related to the repayment of credit. For example, a responsible borrower may carefully manage their balance over time, so usage is smoother. An individual whose usage

repeats on a monthly cycle may be more likely to have a salaried income. Or, an individual whose calls to others are returned may have stronger social connections that allow them to better follow through on entrepreneurial opportunities.

A study by Berg et al. (2019) examined the potential of digital footprints—data trails left by online activities—to predict consumer default. Using over 250,000 observations, the research demonstrates that digital footprint variables can match the predictive power of traditional credit bureau scores. Furthermore, the combination of both data sources improves lending decisions, reducing default rates and expanding credit access for individuals with positive digital footprints while limiting access for those with negative footprints.

The findings suggest that digital footprints can significantly enhance financial inclusion, potentially benefiting the approximately 2 billion unbanked adults globally. However, the study also acknowledges the Lucas critique, suggesting that individuals may alter their online behaviour if they know it influences credit decisions, akin to wearing an expensive suit to impress a bank. This behavioural change could have pervasive effects on daily life.

Regulatory scrutiny is another critical consideration, as the use of digital footprints must comply with fair lending laws to prevent discrimination. The potential for traditional financial institutions to lobby against the use of digital footprints due to competitive threats is also noted, highlighting the complex interplay between innovation, regulation, and market dynamics.⁷⁶

Use of Technology and Data Analytics in Credit Scoring

The integration of big data and machine learning (ML) has fundamentally transformed credit scoring by enabling the accurate analysis of vast and diverse datasets. This process begins with the collection of data from various sources, including transaction records, social media interactions, and mobile usage patterns.⁷⁷ Once the data is aggregated, feature engineering identifies and selects the most relevant features that influence credit risk. Subsequently, ML algorithms such as logistic regression, decision trees, and neural networks are employed to train predictive models.⁷⁸ These models are continually updated with new data, enhancing their accuracy and adapting to evolving consumer behaviours. This dynamic approach ensures that credit scoring remains precise and relevant, leveraging the latest information to make informed lending decisions.

Digital Microfinance and FinTech

Fintech companies have revolutionized the financial services industry by leveraging technology to create more inclusive credit scoring models. One of the key innovations is the development of mobile banking platforms, which not only provide financial services but also collect a wealth of user data that can be used to build comprehensive credit profiles. These platforms enable even those without traditional credit histories to be evaluated for creditworthiness based on their financial behaviour and transaction patterns observed through their mobile interactions. Additionally, the integration of blockchain technology has introduced a new level of security and transparency in maintaining credit histories. Blockchain ensures that all credit-related transactions are securely recorded and immutable, which helps build trustworthy and verifiable credit records. Furthermore, fintech companies are harnessing the power of artificial intelligence (AI) to drive dynamic risk assessments. AI algorithms analyze vast amounts of data to evaluate risk in real time and provide personalized credit solutions tailored to individual borrower profiles. This dynamic approach not only improves the accuracy of credit assessments but also allows for more customized financial products that meet the unique needs of each borrower. Through these technological advancements, fintech companies are making significant strides in democratizing access to credit and enhancing financial inclusion.⁷⁹

The Digital India initiative, coupled with rising internet penetration, has boosted India's digital population to over 751 million active users as of January 2024. Mobile internet users primarily drive this growth in the world's second-largest internet market.

Fintech stands for financial technology and refers to innovative financial services or products delivered through technology. According to PwC, it involves tech-focused startups and new market players creating new products and services that challenge those offered by traditional financial institutions. Catalini, Halaburda, King, and Vergne (2017) describe fintech as a movement towards the digitization, decentralization, and removal of middlemen in economic transactions, driven by technologies like peer-to-peer networking, big data analytics, machine learning, blockchain technology, and open APIs.⁸⁰

Specific banking segments vulnerable to fintech disruption include retail banking, payment solutions, and consumer credit, with FinTechs offering innovative, cost-effective alternatives.

Payment solutions, in particular, are experiencing significant investment and innovation. Crowdfunding and P2P lending are emerging as solutions for SMEs, addressing gaps in traditional funding. Wealth management is also a potential area for fintech disruption, provided regulatory challenges are addressed.

Customer segments most susceptible to fintech disruption include millennials, small businesses, and the underbanked, who value cost efficiency and digital experiences. Fintechs are well-positioned to cater to these groups through innovative products and services, potentially filling gaps left by traditional banks. For millennials, fintech offers the digital convenience they prefer, while SMEs and the underbanked benefit from alternative funding solutions and financial inclusion efforts.⁸¹

The paper "Psychometrics as a Tool to Improve Screening and Access to Credit"⁸² explores how psychometric assessments can enhance credit screening and expand access to credit, particularly for small business owners in Peru. The study focuses on the Entrepreneurial Finance Lab (EFL) tool, which uses psychometric tests to evaluate the personality traits, intelligence, and integrity of potential borrowers. This approach provides an alternative method for assessing creditworthiness, especially useful for individuals lacking traditional credit histories.

For already banked entrepreneurs, the psychometric tool acted as a secondary screening mechanism, complementing traditional credit assessments. For unbanked entrepreneurs lacking credit histories, the tool served as the primary method to gauge their creditworthiness. The EFL tool incorporated various psychometric tests that measured personality traits, intelligence, and integrity, which are significant indicators of an individual's loan repayment likelihood. By analyzing the responses, the tool provided deeper insights into borrowers' behavioural patterns, effectively supplementing traditional credit scoring methods.

The main takeaways from the study highlighted several significant findings. The use of psychometric assessments was found to reduce the risk of loan portfolios. For banked entrepreneurs, combining traditional credit scores with psychometric tests led to more effective screening outcomes. For unbanked entrepreneurs, the psychometric tool facilitated increased access to credit without elevating risk, thereby promoting financial inclusion. The study also demonstrated that the tool complemented rather than replaced traditional credit bureau information, offering a more comprehensive assessment of creditworthiness. Given

the success observed in Peru, the study suggests that psychometric assessments could be beneficial in other regions facing similar challenges in credit access.

Globally, companies like ZestFinance are leading the way in alternative credit scoring by using a mix of traditional and non-traditional data. ZestFinance operates under the belief that "all data is credit data." They utilize an extensive range of data points from both online and offline activities to determine creditworthiness. Their proprietary algorithm, which is kept confidential, examines factors such as how an applicant types their name, whether they read information on the company's website, their type of phone connection, and their spending habits relative to their location. For example, if an application is submitted online, the algorithm might consider browser behaviour, such as the number of pages viewed and time spent on the application page. These behaviours are transformed into scores that reflect the applicant's attention to detail.

Similarly, Lenddo, based in Singapore, offers a patented scoring system known as LenddoScore, which predicts an individual's willingness to repay loans. This score complements traditional credit scores by exclusively using non-traditional data derived from a customer's social and online behaviour. The LenddoScore considers data points from credit bureaus, telecom companies, browsers, mobile activity, social networks, e-commerce transactions, financial records, form-filling patterns, and psychometric data. This approach allows lenders to assess creditworthiness even in the absence of conventional credit history, thus enhancing financial inclusion.

In India, several companies are leveraging alternative credit score models to enhance financial inclusion. CreditVidya, based in Hyderabad, combines alternative data with traditional credit reports using AI-based algorithms to generate credit scores. Their 'CV Score' considers 10,000 data points from applicants' commercial SMSes, such as utility bill payments, e-commerce transactions, and phone location data. Lender partners, including banks and NBFCs, use this score to approve or reject loan applications based on the company's proprietary algorithm that analyzes unstructured data according to the lender's risk appetite.

Similarly, Early Salary is an online lending platform providing short-term financing solutions by blending traditional credit scoring with new social and online scoring technologies. The

platform collects data from SMS, browsing history, and social networking sites like Facebook and LinkedIn. Customers must log in via social media, allowing Early Salary to use their internet presence as a benchmark for assessing creditworthiness.

CASHe, another online lending platform, targets young salaried professionals with short-term personal loans. It employs a proprietary predictive algorithm called the 'Social Loan Quotient' to create credit profiles using alternative data, such as mobile and social media footprints, education, monthly salary, and career experience. This dynamic score evolves with more user interactions. While financial institutions provide the loans, these technology companies support partner lending institutions by digitizing the loan underwriting process.

Challenges and Opportunities in Developing These Models

Alternative credit scoring systems face several challenges, primarily centered around data quality and the methodologies used. The vast amount of data these systems rely on can be inconsistent and unreliable, raising concerns about the accuracy and fairness of the credit scores produced. The methods used to analyze this data are often opaque, making it difficult to understand how scores are calculated or to verify their validity. Additionally, there's skepticism about whether these alternative data points can accurately predict an individual's ability to repay loans. This lack of transparency and potential for bias can lead to unintended discrimination, disadvantaging certain groups, such as those with less social media presence or from marginalized backgrounds.

Moreover, the reliance on big data and machine learning algorithms in these systems introduces further complications. These algorithms can inadvertently encode existing biases present in the training data, leading to discriminatory lending practices. For example, an algorithm trained on data from a predominantly white population might unfairly disadvantage non-white borrowers. Also, the complexity of these algorithms often makes it difficult to pinpoint how decisions are made, reducing accountability. If the data used for credit scoring includes proxies for sensitive characteristics like race or gender, it can lead to systemic discrimination. Despite the potential for reducing subjectivity in loan approvals, these challenges highlight the need for careful regulation and transparency to ensure fair access to credit.

Psychometric tests can have inherent biases. They often assess individuals based on their verbal and mathematical abilities, which assumes that respondents have a certain level of education. This can unfairly favor those who are better educated. Additionally, these tests can be manipulated because some answers—such as showing proficiency with technology or a tendency to save money—are obviously preferred by lenders. This means that individuals can tailor their responses to meet the lender’s expectations, which may result in lenders taking on clients who may not be as reliable as their test results suggest. However, EFL (Entrepreneurial Finance Lab) claims to address these issues by allowing users to select an "I don’t understand the question" option and by simplifying assessments through statements rated on a sliding scale.

For alternative credit scoring methods to be effective, they need to be customized for specific demographics. For instance, psychometric testing may be valuable when applied to well-educated teenagers and young professionals. On the other hand, alternative scoring methods that use social media data to create behavioural profiles might be more suitable for individuals from less privileged backgrounds. To ensure that these alternative systems are inclusive and do not replicate the biases of traditional credit scoring methods, it is important not to apply a one-size-fits-all standard across diverse groups.

Future

Financial inclusion is a critical benefit of alternative credit scoring, enabling access to credit for underserved populations. This access is essential for fostering economic growth and reducing poverty, as it allows individuals and small businesses to invest in opportunities that drive development. For instance, individuals who previously could not obtain loans due to a lack of credit history can now access financial services thanks to alternative data points like utility bill payments and social media activity. This inclusive approach helps bridge the gap between traditional financial systems and marginalized communities, ultimately contributing to a more equitable economic landscape.

Enhanced risk management is another significant advantage offered by alternative credit scoring. By incorporating a wider range of data points, lenders can improve the accuracy of their risk assessments, thereby reducing default rates and increasing profitability. Traditional credit scores often fail to capture the complete financial behaviour of an individual, especially for those without extensive credit histories. However, alternative credit scoring models analyze diverse data sources such as payment histories and online behaviours, providing a

more holistic view of a borrower's creditworthiness. This comprehensive analysis enables lenders to make better-informed decisions, leading to more stable and profitable loan portfolios.

The drive for innovation in financial services is also fuelled by alternative credit scoring models. These models pave the way for the creation of financial products and services specifically tailored to the needs of the unbankable population. For example, fintech companies develop unique loan products that consider non-traditional data, such as mobile phone usage patterns and e-commerce activity, to assess creditworthiness. This innovation not only caters to the financial needs of underserved communities but also enhances the overall financial ecosystem by introducing diverse and adaptive financial solutions.⁸³

Lastly, data-driven decision-making is a cornerstone of alternative credit scoring. By leveraging advanced data analytics, lenders can make more informed lending decisions and optimize their credit portfolios. The use of big data and machine learning algorithms allows for real-time analysis of vast amounts of information, identifying trends and patterns that traditional methods might miss. This approach not only enhances the precision of credit assessments but also enables continuous improvement in lending strategies. As a result, financial institutions can better manage risks, allocate resources more efficiently, and ultimately serve a broader range of customers with varying financial backgrounds.

Conclusion

The evolution of microfinance in India has significantly impacted financial inclusion, particularly for the underbanked and unbanked populations. This paper has explored the historical development of microfinance, highlighting its role in empowering economically vulnerable groups through innovative credit mechanisms. Key models, such as the Self-Help Group (SHG)-Bank Linkage Programme and Joint Liability Group (JLG) models, have been instrumental in reaching the marginalized sectors, showcasing the dynamic adaptability of microfinance institutions (MFIs) in diverse socio-economic contexts.

The study underscores the critical need for developing robust credit scoring models tailored to the unique needs of the underbanked and unbanked. Such models are essential for accurately assessing creditworthiness and managing risks, thereby ensuring sustainable growth for MFIs. By integrating financial literacy programs and leveraging technology, MFIs can enhance their service delivery, improve client outcomes, and foster greater financial stability among their clientele.

Despite the progress made, challenges persist, including limited access to capital, regulatory constraints, and the need for consistent and reliable investment validation methods.

Addressing these issues requires a concerted effort from policymakers, financial institutions, and MFIs to create an enabling environment that supports the sector's growth and sustainability.

In conclusion, microfinance in India has made remarkable strides in promoting financial inclusion. However, continuous innovation and collaboration are necessary to overcome existing challenges and further enhance the sector's impact. By developing and implementing effective credit scoring models and fostering an inclusive financial ecosystem, MFIs can play a pivotal role in transforming the economic landscape for India's underbanked and unbanked populations.

Bibliography

¹ Ledgerwood, J., Earne, J., Nelson, C., & World Bank. (2013). *The new microfinance handbook: a financial market system perspective*. World Bank.

² SENGUPTA, J. (2014). Inclusive Growth in India: MYTHS AND REALITIES. *World Affairs: The Journal of International Issues*, 18(4), 86–93. <https://www.jstor.org/stable/48505123>

³ Kabeer, N. (2005). Gender Equality and Women's Empowerment: A Critical Analysis of the Third Millennium Development Goal. *Gender and Development*, 13(1), 13–24. <http://www.jstor.org/stable/20053132>

⁴ Armendáriz, Beatriz & Morduch, Jonathan. (2005). *The Economics of MicroFinance*.

⁵ Grameen Bank. (2023). *Introduction – Grameen Bank*. [Grameenbank.org.bd](https://grameenbank.org.bd). <https://grameenbank.org.bd/about/introduction>

⁶ Beard, A. (2012, December 1). *Muhammad Yunus*. Harvard Business Review. <https://hbr.org/2012/12/muhammad-yunus>

⁷ Shetty, A. J. K., & Vasanthi, M. K. (2019). Micro finance: An emerging horizon of inclusive growth. *Social Science and Humanities Journal (SSHJ)*, 801-808.

⁸ Mahato, J., & Jha, M. K. (2023). Does financial inclusion promote sustainable livelihood development? Mediating effect of microentrepreneurship. *Journal of Financial Economic Policy*, 15(4/5), 485-499.

-
- ⁹ Armendariz B., and A. Szafarz (2011). "On Mission Drift in Microfinance Institutions", in B. Armendariz and M. Labie (eds.) *The Handbook of Microfinance*, Singapur: World Scientific Publishing, pp. 341-366
- ¹⁰ Karlan, D., & Zinman, J. (2011). Microcredit in Theory and Practice: Using Randomized Credit Scoring for Impact Evaluation. *Science*, 332(6035), 1278–1284.
<https://doi.org/10.1126/science.1200138>
- ¹¹ Jacobi, L. (2019). *The Transcendental Economy*. Cambridge University Press EBooks, 123–157.
<https://doi.org/10.1017/9781108673471.005>
- ¹² Zainuddin, M., & Yasin, I. M. (2020). Resurgence of an Ancient Idea? A Study on the History of Microfinance. *FIIB Business Review*, 9(2), 78–84. <https://doi.org/10.1177/2319714520925933>
- ¹³ *The Origins of Microfinance: Grameen Bank | Cases Volume 11*. (n.d.). Vol11.Cases.som.yale.edu.
<https://vol11.cases.som.yale.edu/kompanion-financial-group/microfinance/origins-microfinance-grameen-bank>
- ¹⁴ Copestake, J. (2010). Microfinance and development finance in India: research implications. *Centre Emile Bernheim: Research Institute in Management Studies*.
- ¹⁵ *UN LAUNCHES INTERNATIONAL YEAR OF MICROCREDIT 2005* | UN Press. (2004, November 18). Press.un.org. <https://press.un.org/en/2004/dev2492.doc.htm>
- ¹⁶ Tara S. Nair. (2001). Institutionalising Microfinance in India: An Overview of Strategic Issues. *Economic and Political Weekly*, 36(4), 399–404. <http://www.jstor.org/stable/4410238>
- ¹⁷ Barman, D., Mathur, H. P., & Kalra, V. (2009). Role of Microfinance Interventions in Financial Inclusion: A Comparative Study of Microfinance Models. *Vision: The Journal of Business Perspective*, 13(3), 51–59. <https://doi.org/10.1177/097226290901300305>
- ¹⁸ Srinivas, Hari, "Microfinance - Credit Lending Models". GDRC Research Output E-059. Kobe, Japan: Global Development Research Center. Retrieved from <https://www.gdrc.org/icm/model/model-fulldoc.html> on Sunday, 7 July 2024
- ¹⁹ Saptarshi, M., Manohar, A., Bhurat, S., & Jayadatta S, M. (2021). Microfinance and Its Models: A Model to Eradicate Poverty and Its Analysis. *International Journal of Advances in Engineering and Management (IJAEM)*, 3(6), 1538–1554. www.ijaem.net. <https://doi.org/10.35629/5252-030615381554>
- ²⁰ Fernandez, A. P. (2006) "History and spread of the self-help affinity group movement in India", IFAD Knowledge for Development Effectiveness Occasional Paper, 3(6), The International Fund for Agricultural Development (IFAD): Asia and the Pacific.
http://myrada.org/myrada/docs/history3_sag_ifad.pdf.
- ²¹ *RBS - About RBS Foundation India*. (n.d.). www.rbs.in. Retrieved July 7, 2024, from <https://www.rbs.in/about-us/about-rbs-foundation.html>

-
- ²² Büthe, T. (2000). *Banker to the Poor: Micro-Lending and the Battle Against World Poverty*.
- ²³ Rose, K. (1992). *Where Women are Leaders*. Zed Books.
- ²⁴ Anyango, E., Sebstad, J., Cohen, M., McGuinness, E., & Kimuyu, P. (2002). *The Transformation of Microfinance in Kenya*.
- ²⁵ Ledgerwood, J., & White, V. (2006). *Transforming Microfinance Institutions Providing Full Financial Services to the Poor*. The World Bank.
- ²⁶ Ahmed, S. M., & Rafi, M. (2013). "Innovations in Microfinance: BRAC's Approach and Impact." *Journal of Developmental Entrepreneurship*, 18(3), 1350018.
- ²⁷ Rhyne, E., & Guimon, J. (2007). "The Banco Compartamos Initial Public Offering." *ACCION Insight*, No. 23. Retrieved from Accion.
- ²⁸ Mwangi, P., & Ouma, S. (2012). "Impact of Equity Bank on Microfinance Industry in Kenya." *Journal of Business and Economics Research*, 10(2), 91-108.
- ²⁹ Bansal, H. (2015). "Bandhan Bank: The New Kid on the Block." *Business Today*. Retrieved from Business Today.
- ³⁰ Zambrano, A. F., Giraldo, L. F., Perdomo, M. T., Hernández, I. D., & Godoy, J. M. (2023). Rotating Savings and Credit Associations: A Scoping Review. *World Development Sustainability*, 3, 100081. <https://doi.org/10.1016/j.wds.2023.100081>
- ³¹ Vokes, R., & Mills, D. (2015). 'Time for School'? School fees, savings clubs and social reciprocity in Uganda. *Journal of Eastern African Studies*, 9(2), 326-342.
- ³² Oraro, T., & Wyss, K. (2018). How does membership in local savings groups influence the determinants of national health insurance demand? A cross-sectional study in Kisumu, Kenya. *International journal for equity in health*, 17, 1-9.
- ³³ Smets, P. (2000). ROSCAs as a source of housing finance for the urban poor: An analysis of self-help practices from Hyderabad, India. *Community Development Journal*, 35(1), 16-30.
- ³⁴ Benda, C. (2013). Community rotating savings and credit associations as an agent of well-being: a case study from northern Rwanda. *Community Development Journal*, 48(2), 232-247.
- ³⁵ Lappeman, J., Litkie, J., Bramdaw, S., & Quibell, A. (2020). Exploring retail orientated rotating savings and credit associations: festive season 'stokvels' in South Africa. *The International Review of Retail, Distribution and Consumer Research*, 30(3), 331-358.
- ³⁶ Dinç, Y., Jahangir, R., Nagayev, R., & Çakır, F. (2022). Economics of savings-based finance: an interest-free model of rotating savings and credit association in Turkey. *Journal of Islamic Accounting and Business Research*, 13(2), 338-363. Chicago

-
- ³⁷ *CredRight*. (n.d.). *Www.credright.com*. Retrieved July 8, 2024, from <https://www.credright.com/>
- ³⁸ Dudeja, P. (2018, June 6). *Fintech is transforming one of India's oldest inclusive finance tools*. Accion. <https://www.accion.org/fintech-transforming-indias-chit-fund-industry-inclusive-finance/>
- ³⁹ Tiwari, P., & Fahad, S. M. (n.d.). *Microfinance Institutions in India*. *Www.gdrc.org*. Retrieved July 8, 2024, from <https://www.gdrc.org/icm/conceptpaper-india.html>
- ⁴⁰ World Bank. (2016). *Financial Inclusion*. World Bank. <https://www.worldbank.org/en/topic/financialinclusion>
- ⁴¹ Department of Financial Services. (n.d.). *Pradhan Mantri Jan-Dhan Yojana | Department of Financial Services | Ministry of Finance*. *Pmjdy.gov.in*; Ministry of Finance, Govt of India. <https://pmjdy.gov.in/>
- ⁴² *Schemes Overview | Department of Financial Services | Ministry of Finance | Government of India*. (n.d.). *Financialservices.gov.in*. <https://financialservices.gov.in/beta/en/schemes-overview#:~:text=The%20Government%20initiated%20the%20National>
- ⁴³ Ministry Of Finance. (n.d.). *Pradhan Mantri Jan Dhan Yojana*. MyScheme - One-Stop Search and Discovery Platform of the Government Schemes. Retrieved July 8, 2024, from <https://www.myscheme.gov.in/schemes/pmjdy>
- ⁴⁴ Reserve Bank of India. (2020). *National Strategy for Financial Inclusion 2019-2024*. <https://irdai.gov.in/documents/37343/366723/National+Strategy+for+Financial+Inclusions+%E2%80%93+2019-24.pdf/13a4f7f1-09db-0f00-4393-e42500fea33c?version=1.0&t=1631531409564&download=true>
- ⁴⁵ Ledgerwood, Joanna. 2013. *The New Microfinance Handbook: A Financial Market System Perspective*. © Washington, DC: World Bank. <http://hdl.handle.net/10986/12272>
- ⁴⁶ KPMG. (2019, December). *Microfinance – contributions to financial inclusion; opportunity and challenges ahead*. <https://assets.kpmg.com/Content/Dam/Kpmg/In/Pdf/2019/12/MFI-Microfinance-Contributions-To-Financial-Inclusion.pdf>.
- ⁴⁷ NABARD. (2024). *Status of MICROFINANCE IN INDIA 2022-23*. <https://www.nabard.org/auth/writereaddata/tender/1409233729status-of-microfinance-in-india-2022-23.pdf>
- ⁴⁸ EQUIFAX. (2025). *Microfinance India Report 2023*. <https://assets.equifax.com/marketing/india/assets/mfi-india-report-2023.pdf>
- ⁴⁹ KRUPA BAI, G. M. (2012). Women Empowerment through Self Help Groups. *Global Journal for Research Analysis*, 3(8), 1–2. <https://doi.org/10.15373/22778160/august2014/112>

-
- ⁵⁰ Prakash, B. B. (2018). Impact Assessment of Microfinance in India: Survey, Issues and Challenges. *Indian Journal of Economics and Development*, 14(4), 734. <https://doi.org/10.5958/2322-0430.2018.00195.6>
- ⁵¹ G, S. (2023). “A study on The Role of Microfinance Institutions in Promoting Financial Inclusion and Economic Development.” *Journal of Emerging Technologies and Innovative Research (JETIR)*, 10(7). www.jetir.org.
- ⁵² Bhattacharya MD university of Calcutta, Professor Dr. Pranab Kumar, Microfinance Companies in India Are not at All a Blessing, It Is Rather a Big Curse: It Should Be Stopped Immediately by Law (April 7, 2023). Available at SSRN: <https://ssrn.com/abstract=4412233> or <http://dx.doi.org/10.2139/ssrn.4412233>
- ⁵³ Soni, N., & Sharma, A. M. (2020). Progress pathway of Microfinance in India: Challenges and Potential. *Amity Management Review*, 9.
- ⁵⁴ Milana, C., & Ashta, A. (2020). Microfinance and financial inclusion: Challenges and opportunities. *Strategic Change*, 29(3), 257-266.
- ⁵⁵ Sayankar, V., & Mali, V. (2026). FINANCIAL LITERACY FOR MICROFINANCE CLIENTS: A STEP TOWARDS FINANCIAL INCLUSION. *Journal of the Maharaja Sayajirao University of Baroda ISSN: 0025-0422*, 56(2). ResearchGate.
- ⁵⁶ Kumari, A. (2024, February 9). *RBI slams microfinance institutions for charging higher rates to borrowers*. @Bsindia; Business Standard. https://www.business-standard.com/economy/news/rbi-slams-microfinance-institutions-for-charging-higher-rates-to-borrowers-124020901590_1.html
- ⁵⁷ Mohanty, C., Dr. Suresh Kumar Sahoo, & Srinivas Subbarao Pasumarti. (2020). Need Of Strong Governance Architecture & Structural Interest Rate in Indian Microfinance Industry. *International Journal of Scientific and Technology Research*, 9(4), 638–642.
- ⁵⁸ 7 Challenges faced by Microfinance Institutions. (2020, January 14). Finezza Blog. <https://finezza.in/blog/7-challenges-faced-by-microfinance-institutions/>
- ⁵⁹ Singh, P. (2024). Understanding the structure of Micro Finance Institutions in India and suggesting a Regulatory Framework. In *iibf.org*. Indian Institute of Banking and Finance. <https://www.iibf.org.in/documents/reseach-report/report-24.pdf>
- ⁶⁰ Soni, S. (2023, January 8). *Microfinance sector’s portfolio delinquent by over 90 days has increased: RBI report*. *Financialexpress*. <https://www.financialexpress.com/business/sme-msme-fin-microfinancesectors-portfolio-delinquent-by-over-90-days-has-increased-rbi-report-2936726/>
- ⁶¹ Sangwan, S., Nayak, N. C., & Samanta, D. (2020). Loan repayment behaviour among the clients of Indian microfinance institutions: A household-level investigation. *Journal of Human Behaviour in the Social Environment*, 30(4), 474–497. <https://doi.org/10.1080/10911359.2019.1699221>

-
- ⁶² SIDBI. (2019). *Vision of microfinance in India*. PwC. <https://www.pwc.in/assets/pdfs/consulting/financial-services/vision-of-microfinance-in-india.pdf>
- ⁶³ CRIF. (2024). MicroLend QUARTERLY PUBLICATION ON MICROFINANCE LENDING. In *CRIF High Mark*. https://www.crifhighmark.com/media/3511/crif-microlend-vol-xxvii_mar-2024.pdf
- ⁶⁴ Jha, S. K., Bhawe, N., & Satish, P. (2021). Scaling Social Enterprises through Product Diversification. *Sustainability*, 13(21), 11660. <https://doi.org/10.3390/su132111660>
- ⁶⁵ Abubakar, L. S., Zainol, F. A., & Abdullahi, M. S. (2015). Lingered Challenges of Microfinance Institutions (MFIs) and the Way Forward. *International Journal of Academic Research in Economics and Management Sciences*, 4(3). <https://doi.org/10.6007/ijarems/v4-i3/1815>
- ⁶⁶ KPMG Assurance and Consulting Services LLP. (2021). *Rejuvenating microfinance in India – embracing digital*. <https://assets.kpmg.com/content/dam/kpmg/in/pdf/2021/03/microfinance-digital-fintech-mfi-technology-finance.pdf>
- ⁶⁷ Dastile, X., Celik, T., & Potsane, M. (2020). Statistical and machine learning models in credit scoring: A systematic literature survey. *Applied Soft Computing*, 91, 106263. <https://doi.org/10.1016/j.asoc.2020.106263>
- ⁶⁸ Durand, D. (1941). *Risk Elements in Consumer Installment Financing*.
- ⁶⁹ *What is Scorecard Development and How to Build Credit Scorecard on Application, Behavioural and Collection - Roopya - Data Driven Loan Origination & Underwriting Platform*. (2024, February 22). Roopya.money. <https://roopya.money/what-is-scorecard-development-and-how-to-build-credit-scorecard-on-application-behavioural-and-collection/>
- ⁷⁰ Hand, D.J., & Henley, W. (1997). Statistical Classification Methods in Consumer Credit Scoring: a Review. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 160.
- ⁷¹ AI. (2023, March 22). *Traditional Vs. Alternative Credit Scoring: Differences and Advantages*. GiniMachine. <https://ginimachine.com/blog/traditional-vs-alternative-credit-scoring/>
- ⁷² World Bank. (2021). *The Global Findex 2021: Interactive Executive Summary Visualization*. World Bank. <https://www.worldbank.org/en/publication/globalindex/interactive-executive-summary-visualization>
- ⁷³ Scott, C. (2019, April 17). *A New Way to Score Credit Risk - Psychometric Assessments*. Fico.com. <https://www.fico.com/blogs/new-way-score-credit-risk-psychometric-assessments>
- ⁷⁴ Gaskin, J. (2022, August 11). *FICO Fact: How Alternative Data Enhances the Accuracy of Consumer Credit Profiles*. Fico.com. <https://www.fico.com/blogs/fico-fact-how-alternative-data-enhances-accuracy-consumer-credit-profiles>

⁷⁵ Björkegren, D., & Grissen, D. (2020). Behaviour Revealed in Mobile Phone Usage Predicts Credit Repayment. *The World Bank Economic Review*, 34(3), 618–634. The World Bank Economic Review. <https://doi.org/10.1093/wber/lhz006>

⁷⁶ Berg, T., Burg, V., Gombović, A., & Puri, M. (2019). On the Rise of FinTechs: Credit Scoring Using Digital Footprints. *The Review of Financial Studies*, 33(7). <https://doi.org/10.1093/rfs/hhz099>

⁷⁷ Khandani, A. E., Kim, A. J., & Lo, A. W. (2010). Consumer credit-risk models via machine-learning algorithms. *Journal of Banking & Finance*, 34(11), 2767–2787. <https://doi.org/10.1016/j.jbankfin.2010.06.001>

⁷⁸ Lessmann, S., Baesens, B., Seow, H.-V., & Thomas, L. C. (2015). Benchmarking state-of-the-art classification algorithms for credit scoring: An update of research. *European Journal of Operational Research*, 247(1), 124–136. <https://doi.org/10.1016/j.ejor.2015.05.030>

⁷⁹ Philippon, T., Hellwig, M., Levine, R., Schoenholtz, K., Admati, A., Cecchetti, S., Véron, F., Beaudemoulin, N., Ingves, S., Rajan, R., Acharya, V., Schnabl, P., Tuckman, B., & Howell, S. (2016). *NBER WORKING PAPER SERIES THE FINTECH OPPORTUNITY*. https://www.nber.org/system/files/working_papers/w22476/w22476.pdf

⁸⁰ Catalini, C., Halaburda H., King M., & Vergne J.P. (2017). Call for papers: The First Annual Toronto FinTech Conference. Available from <https://www.ivey.uwo.ca/scotiabank-digital-banking-lab/research/the-toronto-fintech-conference/>

⁸¹ Zalan, Tatiana; Toufaily, Elissar (2017): The promise of Fintech in emerging markets: Not as disruptive, Contemporary Economics, ISSN 2300-8814, University of Finance and Management in Warsaw, Faculty of Management and Finance, Warsaw, Vol. 11, Iss. 4, pp. 415-430, <https://doi.org/10.5709/ce.1897-9254.253>

⁸² Bruhn, M., & Stucchi, R. (2015). Psychometrics as a tool to improve screening and access to credit. *IDB WORKING PAPER SERIES N° IDB-WP-625*. <https://doi.org/10.13140/RG.2.1.1956.0402>

⁸³ *Use of Alternative Data to Enhance Credit Reporting to Enable Access to Digital Financial Services by Individuals and SMEs operating in the Informal Economy Guidance Note PREPARED BY INTERNATIONAL COMMITTEE ON CREDIT REPORTING (ICCR)*. (2018). https://www.gpfi.org/sites/gpfi/files/documents/Use_of_Alternative_Data_to_Enhance_Credit_Reporting_to_Enable_Access_to_Digital_Financial_Services_ICCR.pdf