A Detailed Study Examining The Current Contributions Of Microfinance Institutions In Closing The Female Employment Gap Between India And The World, And How Indian Microfinance Institutions Can Better Achieve This Through Scalable Financial Inclusion, Focusing On The Operational Strategies And Economies Of Scale That Drive Sustainable Growth And Outreach To Women.

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Abstract

Microfinance involves the provision of small, unsecured loans to underprivileged communities and is a particularly active industry in India. Many of these institutions primarily or exclusively serve women, contributing significantly to female employment rates within the sector. This research provides a detailed analysis of the extent to which microfinance institutions (MFIs) can proportionally reduce their share of the female employment gap between India and the rest of the world, the long-term economic sustainability of the MFI business model, and the specific management practices that influence their long-run average costs and impact on closing the female employment gap.

Introduction

Microfinance institutions (MFIs) are organizations dedicated to providing unsecured loans to underprivileged, often rural, communities. These loans are typically small—averaging around $500—and are designed to promote micro-enterprises. MFIs operate on a system of joint liability, where a group of around five friends collectively pledge to repay the loan in the event of borrower default. This system reflects the strong sense of community spirit and trust that underpins rural lending structures. This approach aligns with the mission of delivering "banking for the poor," a movement originally championed by Grameen Bank, founded by Nobel Peace Prize laureate Muhammad Yunus in Bangladesh.

By adopting this innovative lending model, MFIs have the potential to address the deep-rooted inequalities faced by women in India, much like the approach of the Grameen Bank in Bangladesh. While gender-based barriers have been progressively dismantled in the West, discrimination remains widespread in India, particularly for women from lower socioeconomic backgrounds. The paper "Gender Inequality in India: A Reflection and Review" by Naveen Kumar et al. [1] highlights the pervasive nature of gender inequality in the country, particularly in areas such as income, education, and employment. For women from disadvantaged communities, these issues are further exacerbated by their economic status. MFIs play a crucial role in addressing these disparities by providing access to income-generating opportunities and promoting

financial independence for women who are often excluded from traditional financial systems.

This study examines the role of MFIs in advancing economic opportunities for women in India and analyzes the management practices that allow certain MFIs to achieve greater progress in reducing gender disparities.

The former was accomplished by developing a formula to estimate the number of new clients MFIs need to acquire by a given year to proportionally contribute to closing the female employment gap in India - relative to predicted factors like market share of individual MFIs, population, employment rates, self employment rates, and number of branches belonging to India and the specific MFI. This formula was applied to a survey of company databases that collectively represent approximately 60% of the microfinance industry. By comparing the results from this formula with the MFIs' projected number of borrowers, the current role of MFIs in female economic inclusion was analyzed through estimating the year by which the entire MFI sector could meet its share of the required growth to bridge the gap in its entirety.

The latter is accomplished through an analysis of the allocation methods utilized by microfinance institutions (MFIs), as these methods represent primary contributors to the variable costs incurred by these organizations. To conduct this investigation, MFIs were categorized into three groups based on trends in the disparity between the borrowers required to close the gender employment gap and the projected borrowers each year: those exhibiting an upward trend, downward trend, or those showing no discernible trend. For MFIs exhibiting a trend, long-run average costs were calculated annually to assess the influence of economies of scale on their capacity to address the employment gap. Furthermore, the number of borrowers per branch was examined to determine whether a

strategy involving numerous small branches or fewer large branches was more effective in facilitating access to microfinance. Finally, an analysis of the average loan size was conducted to ascertain whether a higher number of smaller loans or a smaller number of larger loans had a more significant impact on achieving sustainable increases in female employment rates. By concentrating on these factors, this study seeks to elucidate how the operational strategies of MFIs can effectively contribute to the equalization of employment opportunities for women.

Methodology

Organization

Throughout our study, the Sklearn python package was used, utilizing polynomial regression to project a range of both macroeconomic and microeconomic factors. A bespoke function was created to determine the most appropriate degree polynomial model (based on the R^2 value) to predict a given variable over a given period of time. Using one function to determine all models allows for the maintenance of a consistent standard whilst removing any bias.

For a comprehensive review of the methodology, the Jupyter Notebooks, wherein all computations were conducted, are appended to the publication. This study is supported by data derived from public records, all of which are consolidated in the accompanying Excel file.

Examining the role of microfinance companies in closing the female employment gap between India and the rest of the world

The formula for total borrowers needed can be used to estimate the year that MFIs will have fully proportionally contributed to closing the female employment gap between India and the global average.

Aiming to calculate the total borrowers needed to fully complete a given MFIs proportional contribution required to close their share of the Indian and world female employment gap over the duration between the current year and a variable year, the formula can be understood through the following logical process.

The first step is to calculate the total number of new jobs needed for India to match the global female employment rate by the variable year. This is calculated by multiplying the projected working-age female population in India by the global female employment rate at the time of the variable year and then subtracting the current number of jobs. The latter was calculated by multiplying the current Indian working-age female population by India's current employment rate. Due to a lack of direct data, employment rates were calculated by subtracting the rate of unemployed females seeking work from the female labor force participation rates in their respective years (year 2023 or the variable year). This gives the number of additional jobs required for India to reach parity with the global female employment rate.

Next, the formula accounts for the proportion of the responsibility that each MFI should take on, based on the size of its operations relative to the proportion of the microfinance industry that all

MFIs account for. This is achieved by multiplying the aforementioned total jobs needed to bridge the given MFI's portion of the female employment gap by the projected ratio of branches a given MFI operates out of the total number of MFI branches in India at the time of the variable year.

In order to account for the proportion of loans that go to women and the success rate of loans-success being contextually determined as causing income generation, the formula incorporates two key factors: the percentage of loans used for income-generating activities and the proportion of female borrowers. These values were derived from the annual reports of the respective companies, averaged over the two most recent fiscal years. In cases where data was unavailable the industry average was used instead with 99% of loans being assumed to go to women, and 98.5% of loans assumed to be used for income-generating activities, taken from the SaDhan Microfinance Report. By dividing the total number of jobs in respect to the size of operations by the rates of female borrowers and income-generating loans, the formula adjusts for the real-world conditions of the microfinance sector and helps start to provide a increasingly practical estimate of the number of clients each MFI needs to engage to meet its share of the employment challenge.

This value for the number of clients that all MFIs need to engage with to equalize the gap is then multiplied by the market share of the given MFIs borrowers in relation to the total borrowers of loans that influence the probability of self-employment in the variable year. The market share ratio data was calculated by dividing the total relevant MFI borrowers, as reported in the Sa-Dhan report, by the total relevant borrowers. The total number of borrowers is estimated by dividing the overall value of relevant loans in India by the average

relevant loan ticket size of small scale enterprises, due to the absence of direct secondary data on total relevant loans. This market share ratio enables the formula to project the number of borrowers that MFIs need to maintain while considering the proportion of loans that MFIs should manage.

Finally, this value is then multiplied by the projected Indian self employment rate in the variable year, allowing the formula to conform to only projecting the borrowers that MFIs are required to help as those who will start their own income generation are self employed.

After formulating this equation, relevant data from microfinance companies accounting for approximately 60% of the market share of MFIs was documented. This included each company's number of branches, number of borrowers, percentage of loans utilized by women, and percentage of loans allocated for income-generating activities, spanning multiple years up to 2023. Subsequently, forecasts for the number of branches and borrowers for each observed MFI were generated using the same polynomial regression methodology. Additionally forecasts for each other variable present in the formula used were generated using the same polynomial regression methodology. Following this, we applied this formula to each company to compute a list indicating the industry's progress each year toward closing the gender employment gap. The difference between the sum of predicted borrowers from the survey of the industry and the projected number of borrowers required to close the gap was then calculated for each year. Consequently, the first year exhibiting a positive difference in the total cumulative projected borrowers and the required borrowers to close the gap by each year x would indicate the predicted year when the portion of the gap attributable to MFIs would close.

Methodology: Investigating the Impact of Management Practices on Economies of Scale and Female Employment Increases in MFIs
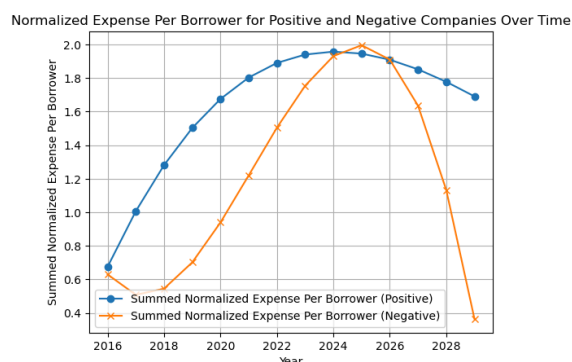
Another objective of the study was to identify reasons for certain patterns in our data. For example, it was firstly observed that Annapurna Finance, Chaitanya India, Muthoot, and Satin exhibited upward-sloping cumulative change in borrowers, whereas Credit Access and Spandana-Sphoorty had downward-sloping curves. As a result, it was theorized that the former companies experience economies of scale, while the latter experience diseconomies of scale, leading to suggestions regarding the operational practices contributing to these outcomes.

To investigate this, the long-run average costs (LRAC) were calculated for each company by dividing the total expenses by the number of borrowers each year. Then the difference between the borrowers needed to close the gap before a given year and the projected cumulative borrowers for that year was analyzed, determining whether the trend was positive or negative and then classifying the companies as such.

The LRAC curves were plotted against projected number of borrowers, and a polynomial regression model was fitted to the data for companies showing significant trends to create projections. An upward trend in LRAC for the majority of positive-sloping companies indicates that economies of scale play a significant role in closing the female employment gap in India. Conversely, a downward trend for these companies suggests that increasing scale does not necessarily lead to improvements in employment outcomes, highlighting persistent
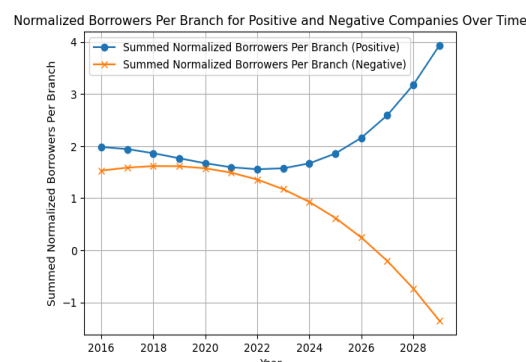
barriers despite economies of scale. These could include limited access to education, cultural barriers which deter women in rural areas from pursuing business, market saturation as the MFI industry matures, or economic instability in growing economies such as India.

Figure 1: Comparing Expense Per Borrower for Companies with Positive and Negative Sloping Borrowers

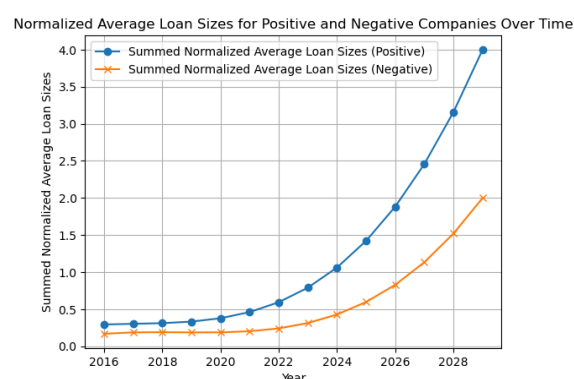Normalized Expense Per Borrower for Positive and Negative Companies Over Time

To understand the management practices contributing to economies or diseconomies of scale, the allocation methods were examined, which represent the primary variable expenses in this business model where there are no production costs. Our analysis began with a comparison of branch arrangements to maximize outreach, evaluating whether a strategy of fewer larger branches or more smaller ones yields better efficiency. Overcrowded branches may slow loan allocation, resulting in higher long-run average costs (LRAC), while underutilized branches can incur high fixed costs without significantly improving outreach. To assess this issue, the normalized number of borrowers per branch for both companies with positive and negative slopes was calculated.

Figure 2: Comparing Borrowers Per Branch for Companies with Positive and Negative Sloping Borrowers

Normalized Borrowers Per Branch for Positive and Negative Companies Over Time

Additionally, the impact of loan size relative to the number of clients was investigated, focusing on the trade-off between issuing numerous small loans versus fewer large loans. Although small loans can increase borrower numbers, they may jeopardize long-term growth in female employment due to the higher vulnerability of micro-enterprises to failure. In contrast, larger loans tend to enhance the likelihood of business success but restrict the overall number of new enterprises launched. By comparing the average loan sizes between companies with positive and negative projected-to-needed borrower curves, the analysis aimed to identify which approach fosters greater increases in scale and most effectively promotes women's employment equality in India.

Figure 3: Comparing Loan Sizes for Companies with Positive and Negative Sloping Borrowers

Normalized Average Loan Sizes for Positive and Negative Companies Over Time

Discussion

The algorithm utilized in this study operates under several assumptions. Firstly, it assumes that the percentages of female borrowers and loans directed toward income generation are consistent with average figures for MFIs, as reported in the Sa-Dhan report, for companies lacking proprietary data. Additionally, the formula presumes uniform output across all MFI branches. Since the number of branches serves as a long-term indicator of outreach rather than year-on-year borrower fluctuations, this assumption emphasizes the significance of physical expansion in sustaining long-term impact, though it introduces certain limitations in accuracy.

Furthermore, the use of polynomial regression throughout the analysis presents additional limitations. Specifically, all models are restricted to a third-degree polynomial to mitigate overfitting. In instances where an increasing trend was observed, gradients were constrained to remain positive. Additionally, if a regressed statistic exceeded 100%, the polynomial degree was adjusted downward. While these measures maintain model functionality, they do introduce minor inaccuracies that do not compromise the study's overall findings.

The assumption of uniform operational efficiency across all branches also neglects potential regional differences in resource allocation, infrastructure, and local economic conditions, which could influence loan distribution and repayment rates. Also, the study only surveys 60% of MFIs, whilst also only observing large MFIs, therefore the results can only be limited to draw conclusions about large MFIs included in the study. Moreover, while the study assumes a steady percentage of loans directed toward income generation, this proportion may vary in response to broader economic trends, borrower preferences, and evolving regulatory frameworks. If these factors are not accounted for, they may affect the formula's projections and introduce further variability into the results.

Overall, these assumptions do allow some degree of reliable conclusions to be drawn, but this is at the cost of compromising on total accuracy.

Results and Analysis

Predicted Equalization of Female Employment rate Due to MFI Contributions

The formula predicted that the share of the female employment rate for which MFIs are proportionally responsible is expected to be fulfilled by the year 2028. This outcome is attributed to the total scaled borrower difference, which, across each company in our survey of the industry, sums to a positive value for the first time in that year. Assuming there are no significant economic shocks, it can be inferred that the proportional contribution rates of MFIs will stabilize and remain proportionally above the world female employment rate after 2028.

Managerial Practices and Their Impact on Female Employment of Microfinance Institutions

The analysis underscores the relationship between borrower growth, expense management, branch utilization, loan sizes, and managerial practices that shape the role of

microfinance institutions (MFIs) in fostering economic empowerment among women and reducing gender disparities in India's labor force.

Firstly, it was observed that MFIs with upward-trending cumulative borrower curves tend to have lower expenses per borrower, suggesting that effective management practices leveraging economies of scale are instrumental in narrowing the female employment gap.

Secondly, the comparison of borrower density across branches highlighted a concerning pattern among MFIs of underutilized branches. Specifically, institutions with fewer borrowers per branch are more likely to exhibit downward-sloping cumulative borrower curves, resulting in a lower contribution from a given MFI towards closing the employment gap. In contrast, MFIs that operate fewer but larger branches relative to their size tend to have a greater impact on reducing gender disparities. This trend suggests that MFIs investing in expanding their long-term outreach by increasing the number of branches, despite their current branches not being fully utilized, face decreased efficiency. Consequently, they contribute less proportionally to closing the female employment gap, as the valuation of the company's assets has increased without a significant rise in female employment.

Our findings indicate that institutions with upward-sloping cumulative borrower curves are associated with larger average loan sizes compared to those with downward borrower trends. This correlation suggests that adopting a model focused on fewer, larger loans leads to greater improvements in female employment, likely due to the increased probability of micro-enterprise success, thereby resulting in more sustained, long-term growth in female employment.

Conclusion

In conclusion, this analysis highlights the impact of managerial practices in defining how microfinance institutions (MFIs) contribute to promoting women's economic empowerment and narrowing female employment disparities between India's labor force compared to the world average. MFIs that strategically manage expenses and capitalize on economies of scale tend to exhibit upward-trending cumulative borrower curves, thereby contributing more effectively to narrowing the female employment gap. In contrast, institutions with underutilized branches—characterized by lower borrower numbers per branch—demonstrate reduced efficacy in bridging this gap. Conversely, MFIs that emphasize fewer but larger branches and larger loan sizes achieve more substantial progress in addressing gender disparities by fostering a sustainable impact on female employment. By incorporating these targeted management practices and addressing the unique needs of female borrowers, MFIs can significantly strengthen their contributions to diminishing the gender employment gap and promoting economic empowerment for women in underserved communities. Furthermore, the projected fulfillment of proportional contributions to the gap in female employment rates between India and the global average being completed by MFIs in 2028 provides partial evidence to support the notion that microfinance is fulfilling its role in today's economy as a vehicle for female economic inclusion and empowerment.
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