



## WHAT EXPLAINS THE OVERWHELMINGLY POSITIVE PERCEPTION TOWARDS MICROFINANCE INSTITUTIONS? APPLICATION OF FIRTH'S LOGISTIC REGRESSION IN A SMALL SAMPLE

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### ABSTRACT

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This paper focuses on analyzing small-sample business survey data. We survey 129 businesses in Nepal, where a majority of businesses express an overwhelmingly positive perception towards microfinance institutions (MFIs). The survey focuses mainly on how businesses perceive the services provided by local MFIs. In order to address the bias in maximum likelihood estimation in the context of small sample size, we utilize Firth's adjusted maximum likelihood estimation procedure in the application of logistic regression. The results show that it is the borrowing of a loan from an MFI, not the actual business performance, which influences a business owner's perception towards the role of MFIs in various aspects of rural development. While there is no strong evidence of the MFI loans helping with the actual business performance, and thereby influencing the perceptions, we discuss the potential benefits of owning a business that may be contributing to the positive perceptions towards the institutions with which they are associated. These findings have important implications from the managerial perspective of both MFIs and governing institutions in developing countries.

**Contribution/Originality:** This study documents how businesses express positive perception towards MFIs because of their membership, not necessarily because they have more favorable business outcomes. Methodologically, the paper uses Firth's logistic regression to address the bias present in maximum likelihood estimates computed from a small sample, something common in microfinance studies.

### 1. INTRODUCTION

This paper analyzes the factors that determine a business owner's perception towards microfinance institutions (MFIs), and, for that matter, financial institutions in general. According to a business survey data from Nepal, the proportion of business owners who maintain a positive attitude towards MFIs is very high, regardless of the source of start-up financing. As high as 93% of businesses perceive MFIs help the rural economy. One would expect that such a high positive perception might be a reflection of successful business performance due to the financing made available by the MFIs. However, not all of these businesses have used MFIs for initial financing, nor those who have borrowed have necessarily performed better than their counterparts. According to the data, 53% of the businesses have received loans from local MFIs as their start-up funds, and the remaining 47% have used alternative financing sources. About 60% of all businesses report a satisfactory performance over the length of their

business operation, with a difference of only 7.5% between those who have borrowed from an MFI and those who have not (63.2% versus 55.7%, respectively). In that regard, the paper is an attempt to explore less debated issues of what explains an overwhelmingly positive attitude of small businesses towards MFIs. In particular, it isolates the impact of business financing versus business performance on the highly positive perception business owners have towards MFIs. These issues are essential for the effective managerial practice of both business owners and MFIs.

The microfinance movement has successfully marketed the idea that these institutions help reduce poverty, empower women, and serve as the backbone of the rural economy. However, there are critics who say MFIs are too focused on issues at the individual level and are not able to address the broader macroeconomic and financial issues such as business expansion and employment generation. Anecdotes from developing countries report microfinance institutions making empty promises to the poor. Yet, the same poor keep utilizing these services in the hope that they are going to benefit from the financial institutions in their backyard. This indicates that MFIs are able to promote a collective perception among their members attributed to something else. Our goal is to find out if it is the fact that a member borrows a loan from an MFI that determines the individual's positive attitude towards MFIs or it is their actual business performance. This is an important topic in the context of many microfinance impact evaluations reporting mixed results pertaining to an individual's socio-economic outcomes. We explore this question focusing on the uniqueness of our data and using Firth's logistic regression technique, Firth (1993) which helps adjust the bias present in maximum likelihood estimates when working with a small sample, something common in microfinance impact evaluation studies.

The remainder of this paper is structured in the following order: a review of literature specifically focused on the role, impact, and effectiveness of microfinance, followed by a description of the data and methodology, empirical analysis, discussion of results, and conclusions.

## 2. BACKGROUND AND LITERATURE REVIEW

MFIs have been the "go-to" institutions for many small and medium scale businesses around the world. These institutions flourished across the globe, especially in financially under-developed countries, since Grameen Bank was established in 1976. Mohammad Yunus, its founder, received a Nobel Peace Prize in 2006 for the notable success of microfinance initiatives in developing countries. Existing research argues in favor of microfinance being a key to poverty reduction (Khandker, 2005; Morduch & Haley, 2002; Quinones & Remenyi, 2014; Weiss & Montgomery, 2005) as well as women empowerment and social change (Ashe, 2002; Cheston & Kuhn, 2002). Some papers see the potential for MFIs to work as a stepping-stone towards employment generation and business expansion (Ghimire, Rigatti, & Sexton, 2017; Ghimire, Clifford, & Costa, 2019). The supply side of the industry, i.e. the MFI managers and the local leaders, has generated a great deal of enthusiasm about microfinance and expanded these programs to almost every poor village possible in developing countries. The demand side story, for the most part, is similar to the supply side. Its beneficiaries speak highly of the MFIs, actively participate in micro-credit programs, and pay back their loans on time. That being said, there are some instances where households have suffered from microfinance programs like never before. For example, Melik (2010) reports of cases where people can quickly sink into a cycle of debt, with many lenders charging exorbitant rates of interest. Yet, these same households, when asked, report overwhelmingly positive support towards the microfinance programs. These stories are consistent across countries and over time.

The supporters of MFIs rejoice in the anecdotal evidence of microfinance's good deeds; the proponents argue that microfinance has the potential to transform rural economies. With time, the effects of microcredit have become substantial enough to analyze, and questions have arisen of whether microcredit is beneficial. Results vary by countries, communities, and the type of data scholars have used. Banerjee (2013) reviews studies that have been conducted since microcredit research began over twenty years ago and explains the complexities of microcredit as it adapts to meet the needs of specific community dynamics. In the particular case of Nepal, women's group-based

lending was established in order to meet both the business development objectives of microfinance and empower women seeking credit to improve their autonomy in the domestic and public sector (Cheston & Kuhn, 2002). A similar study is presented in Ashe (2002) and Aoki and Pradhan (2013). There are many other scholarly articles that study issues from poverty to women empowerment, to business expansion and employment generation in a variety of contexts (Ghimire et al., 2017; Ghimire et al., 2019; Kulkarni, Azam, & Gaiha, 2017; Ngala, 2017; Peters, 2017; Sharma, 2007). A survey of the issues covered in microfinance research, as presented in literature such as Banerjee (2013); García-Pérez, Fernández-Izquierdo, and Muñoz-Torres (2020); Gutiérrez-Nieto and Serrano-Cinca (2019), etc., does not indicate works that perform perception analysis and this paper attempts to fill that gap.

In undertaking the task of researching a fluctuating indicator such as business expansion, researchers must consider multiple statistical issues. For example, Rajbanshi, Huang, and Wydick (2015) use a dataset from eastern Nepal to study the effect of microfinance on first-time borrowers against previously recorded experimental studies to determine the possible discrepancies between the two due to falsely correlated variables. The paper highlights the timing with which a borrower takes a microfinance loan and the experimental error of documenting the effects of microfinance after a population has initially been exposed to credit institutions, thus underestimating the most substantial impact of microfinance borrowing observable only in the initial stages. This issue is subdued in our method because we have a unique census-like sample which has both borrowers and non-borrowers before and after the event took place. The second factor that can influence data recording on microfinance borrowing is whether the subjects took loans when microfinance became available in the beginning or at a later time. Our study takes this concept into account by including those individuals who claimed to take microfinance loans as primary sources of capital for starting a business. Those who decided to start a business based on other forms of capital and take loans later on, were not counted as the treated population because the impact would not be the same. This argument is consistent with the literature that highlights the impact evaluation methods (Armendáriz & Morduch, 2010; Banerjee, Duflo, Glennerster, & Kinnan, 2015; Copestake, Bhalotra, & Johnson, 2001). There are several other issues, such as the correlated unobservable, the attrition bias, and the sample size bias. In this paper, we focus on the last one – the issue of small sample size.

### 3. DATA

The survey data used in this analysis was collected using a questionnaire focused on information such as business type and establishment, personal information, microfinance awareness, sources of capital, and business performance. This survey is unique in that it is census-like data at the village level, but it reflects the characteristics of many small villages around the developing world, enabling us to get important insights about Microfinance Institutions (MFIs) and similar financial institutions. To understand the perceptions of the local people, the survey asked if business owners thought that MFIs helped with business growth, employment generation, and entrepreneurship development in the local areas. The respondent answered “yes” or “no” and the response was coded “1” or “0” respectively.

The survey included a wide array of data from the owner of the business, including their performance, as well as their interaction with the local microfinance institution. Out of the 129 respondents who owned a business, 53% were male, and 47% were female; 60% of respondents were between 20-40 years old; an overwhelming 90% of the business owners were married; education levels varied widely and was in a moderately strong negative association with their age. Shops constituted 50% of businesses surveyed. These shops offered a range of goods, from food to electronics. Survey subjects were almost exclusively (99%) sole proprietors, and 60% of them had begun in the last 15 years, aligning with the overall trend of the rapid growth of microfinance in the area.

On average, the initial loan the owners took out to start their business was 316,000 Nepalese rupees (or roughly \$3,160 @ 1USD = Rs. 100 in 2015). The average repayment period was 3.5 years, and 74% of respondents reported that they had been able to repay the loan within the specified time or were on track to.

According to the data, 53% of the businesses in the village received microfinance loans as their start-up funds, and the remaining 47% used alternative resources. We analyze their business performance over the length of their operation and find that out of the total only about 60% have actually grown their business revenue. Of those who used MFI loans as start-up funds, about 63.2% reported business growth, while of those who used alternative financing, about 55.7% reported business growth (see Figure 1). This indicates a weak association between MFI start-up financing and business growth (see also the large p-value corresponding to the significance test for independence, namely p-value = 0.386).

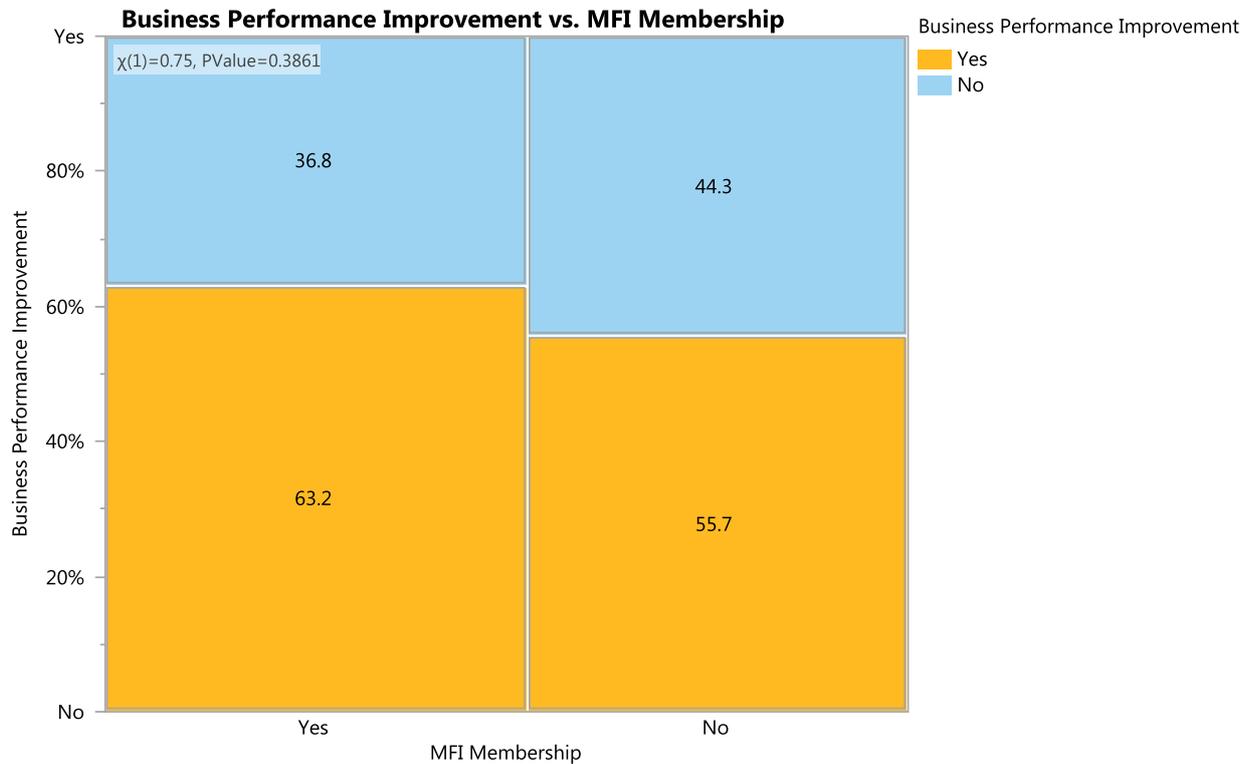


Figure-1. Conditional distribution of business performance improvement given MFI membership, showing no significant association between business growth and borrowing a loan.

This not-so-significant association between borrowing a loan and their business performance is not consistent with the perception of the businesses towards the role of MFIs in rural development. We consider three aspects of the rural economy and assess how local businesses perceive the role of MFIs in their development. In particular, we ask the following three questions:

1. Do you think MFIs help with employment generation?
2. Do you think MFIs help with business expansion/growth?
3. Do you think MFIs help with entrepreneurship development?

The survey results are reported in Table 1:

Table-1. Perception response.

Indicator	Yes	No
Business Growth	88%	12%
Entrepreneurship Development	93%	7%
Employment Generation	77%	23%

The results reported in Table 1 show that 88% of the respondents perceive MFIs as helping with business expansion and growth, as high as 93% of the businesses perceive MFIs as helping with entrepreneurship

development, and 77% of the respondents perceive MFIs as helping with employment generation. In a broader sense, the respondents speak highly of the MFIs' role in rural areas. So, we aim to explore the factors that help explain such an outcome in detail.

#### 4. ESTIMATION TECHNIQUE

We have a categorical variables expressed as “yes” or “no” in response to the survey questions. To test whether it is the membership, and thus the borrowing, or the business performance that impacts a business owner's perception towards MFIs, we predict the probability of a business owner responding ‘yes’ to our questions that asked whether the owner thought if MFIs would help with entrepreneurship development, business growth, and employment generation. We estimate the following regression equation:

$$Perception_i^k = \alpha_i + \alpha_1 Membership_i + \alpha_2 Performance_i + \eta Z_i + \varepsilon_i \quad (1)$$

where *Perception<sub>i</sub><sup>k</sup>* is a binary variable that takes the value 1 if the recorded response was a ‘yes’, and zero otherwise; *Membership<sub>i</sub>* accounts if the business had a membership with an MFI at the time the business came into operation and borrowed an initial investment from the MFI; *Performance<sub>i</sub>* takes the value 1 if the business was able to expand its revenue during the period it has been in operation; *Z<sub>i</sub>* represents the business owner's personal characteristics such as sex, age, and education;  $\varepsilon_i$  stands for the error term.  $k = 1, 2, 3$ , represent the response variables pertaining to the individual perception towards business growth, entrepreneurship development, and employment generation.

While the issue of microfinance in itself is an interesting topic, analyzing a small sample, as in our case, requires special consideration of bias-corrected estimation results. We highlight the methodological issues that arise in analyzing such data and present a few representative papers that address such issues. Hulme (2000) suggest three methodological options for the impact assessment of microfinance: the scientific method, the humanities tradition, and participatory learning and action. Oluombo and Iriobe (2017) suggest using both quantitative and qualitative approaches to analyze microfinance impact assessments. McKenzie (2012) suggests the need for more time periods and measurements of outcomes such as business profits, income, and expenditures at relatively short intervals to increase the statistical power. Similarly, special attention is needed to address the issues of unique data that, in many instances, have a small sample size. Literature related to bias correction follows two main approaches: the corrective approach proposed by Cox and Snell (1968) and the bias reduction method proposed by Firth (1993). The first approach corrects the bias after the MLE calculation and the second approach computes a less biased estimator than the regular MLE within the score function.

The Firth procedure has gained more popularity in recent years, and we adopt this method to reduce the bias in model effect estimation that may result from our small sample. Technically, this is a penalized maximum likelihood regression that corrects for rare-event dependent variable, but this method has been used as an ideal solution for a small sample as well (Heinze & Pühr, 2010; Heinze & Schemper, 2002; Rainey & McCaskey, 2015). The use of the Firth's method in a small sample has been standard practice in the literature (Carter et al., 2020; Magalhães, Gómez, Gallardo, & Venegas, 2020; Tuman & Erlingsson, 2020). In the particular case of microfinance, Vanroose (2016) compares the results from the event history analysis with the Firth method and finds similar results pertaining to the MFI location decisions. Hence, we estimate the three separate regressions from Equation 1 using the Firth logistic regression, which fits a logistic model by penalized maximum likelihood estimation. The method originally was proposed to reduce bias in maximum likelihood estimates in generalized linear models, but it also has utility in logistic regression in circumstances in which "separation" is problematic due to either rare events or small sample size. Our application of the method adds value to the literature in the context of analyzing perceptions of a small sample business survey.

### 5. EMPIRICAL RESULTS

We perform multiple statistical analyses to test the association between perceptions towards microfinance institutions and membership vs. business performance. Below, we show that perceptions are highly correlated with MFI membership compared to their performance. The findings can be summarized using a panel of mosaic (also known as Marimekko) plots, from which it is clear that MFI membership has a much more significant effect on perceptions than business performance improvement, see Figure 2:

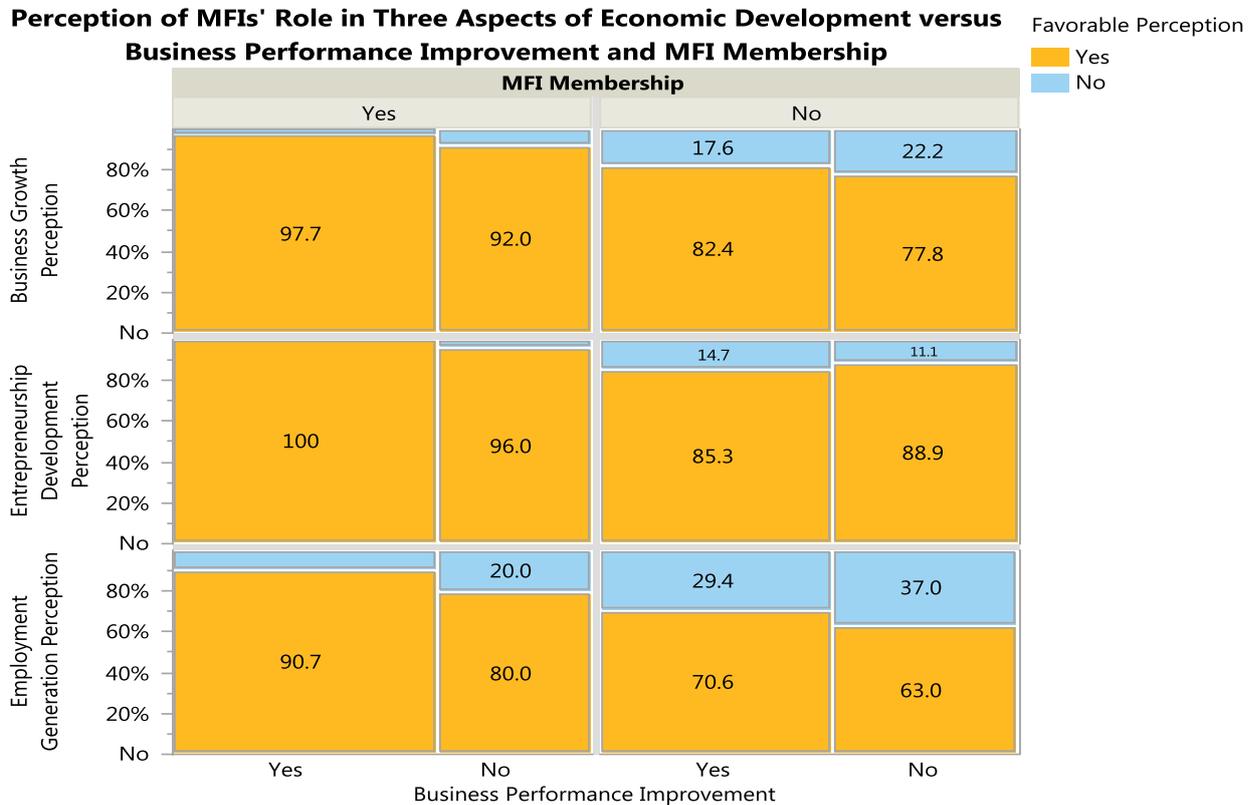


Figure-2. Conditional distributions of the perception of MFIs' role in the three aspects of economic development given business performance and MFI membership.

Figure 2 contains three horizontal panels, one for each of the aspects of economic development: business growth, entrepreneurship development, and employment generation. The left half of the mosaic plots represents those who borrowed MFI start-up funds, and the right half corresponds to those who used other means of financing. Within each half, we see a comparison between those who did experience business performance improvement versus those who didn't. A comparison of these side-by-side mosaic plots reveals that MFI membership is much more significantly associated with perception than business performance improvement. In the next three subsections, we detail the analyses corresponding to the information depicted in Figure 2.

#### 5.1. Perception towards Business Growth

We begin our analysis by examining the association between perception towards the role of MFIs in business growth, business performance, and borrowing from the MFIs. Table 2 shows how improved business performance is weakly associated with the business owners' perceptions towards the role of MFIs in business growth; but, their membership with the MFIs and the fact that they borrowed a start-up loan is strongly associated with their positive perception towards the MFIs role in business expansion and growth. We use Pearson and Likelihood Ratio tests to test the following hypothesis:

**Hypothesis 1: There is no association between performance and business perception**

**Hypothesis 2: There is no association between borrower and business perception**

Both the Pearson Chi-squared and Likelihood Ratio tests fail to reject the first hypothesis, but both tests reject the second hypothesis. The results show that the association between performance and business perception is not statistically significant (Pearson Chi. Sq p-value = 0.274; LR Chi. Sq. p-value = 0.279). Whereas the association between perception and borrowing is statistically significant, as indicated by the p-value that is smaller than 0.05.

**Table-2.** Frequency and row percentage for business growth perception.

		Performance			Total		Borrower		Total
		0	1				0	1	
Perception towards Business Growth	0	8	7	15	0	12	3	15	
		53.33	46.67	11.63		80	20	100	
	1	44	70	114	1	49	65	114	
		38.6	61.4	100		42.98	57.02	100	
	Total	52	77	129	Total	61	68	129	
		40.31	59.69	100		47.29	52.71	100	
Pearson chi2(1) = 1.1965 Pr = 0.274				Pearson chi2(1) = 7.2872 Pr = 0.007					
LR chi2(1) = 1.1733 Pr = 0.279				LR chi2(1) = 7.6554 Pr = 0.006					

**5.2. Perception towards Entrepreneurship Development**

Table 3 shows the association between perception towards entrepreneurship development, performance, and borrowing. As in the previous case, we test the following two hypotheses:

**Hypothesis 3: There is no association between performance and entrepreneurship perception**

**Hypothesis 4: There is no association between borrower and entrepreneurship perception**

The test statistics fail to reject the null hypothesis of no association between performance and positive perception towards entrepreneurship development. However, the test statistics reject the null hypothesis of no association between the borrowing of a loan and the positive perception towards entrepreneurship development.

**Table-3.** Frequency and row percentage for entrepreneurship development perception.

		Performance			Total		Borrower		Total
		0	1				0	1	
Perception towards Entrepreneurship Development	0	4	5	9	0	8	1	9	
		44.44	55.56	100		88.89	11.11	100	
	1	48	72	120	1	53	67	120	
		40	60	100		44.17	55.83	100	
	Total	52	77	129	Total	61	68	129	
		40.31	59.69	100		47.29	52.71	100	
Pearson chi2(1) = 0.0687 Pr = 0.793				Pearson chi2(1) = 7.2872 Pr = 0.010					
LR chi2(1) = 0.0681 Pr = 0.794				LR chi2(1) = 7.6554 Pr = 0.006					

**5.3. Perception towards Employment Generation**

Similarly, the association between perception towards employment generation, performance, and borrowing can be seen from Table 4. Again, we get similar results when we test the following two hypotheses:

*Hypothesis 5: There is no association between performance and employment perception*

*Hypothesis 6: There is no association between borrower and employment perception*

**Table-4.** Frequency and row percentage for employment generation perception.

	Performance			Total	Borrower			Total
	0	1			0	1		
Perception towards Employment Generation	0	15	14	29	0	20	9	29
		51.72	48.28	100		68.97	31.03	100
	1	37	63	100	1	41	59	100
		37	61	100		41	59	100
	Total	52	77	129	Total	61	68	129
		40.31	59.69	100		47.29	52.71	100
Pearson $\chi^2(1) = 2.0256$ Pr = 0.155				Pearson $\chi^2(1) = 7.0533$ Pr = 0.008				
LR $\chi^2(1) = 1.9970$ Pr = 0.158				LR $\chi^2(1) = 7.1564$ Pr = 0.007				

**5.4. Firth's Logistic Regression**

The Firth logistic regression results presented in Table 5 validate the results obtained from the Pearson and LR tests. We see that borrower status is the primary variable that significantly predicts the likelihood of someone expressing a positive perception towards MFIs across all three regressions. The results show that, everything else being equal, a borrower is more likely than a non-borrower to report positive perceptions towards the MFIs' role in business growth, entrepreneurship development, and employment generation.

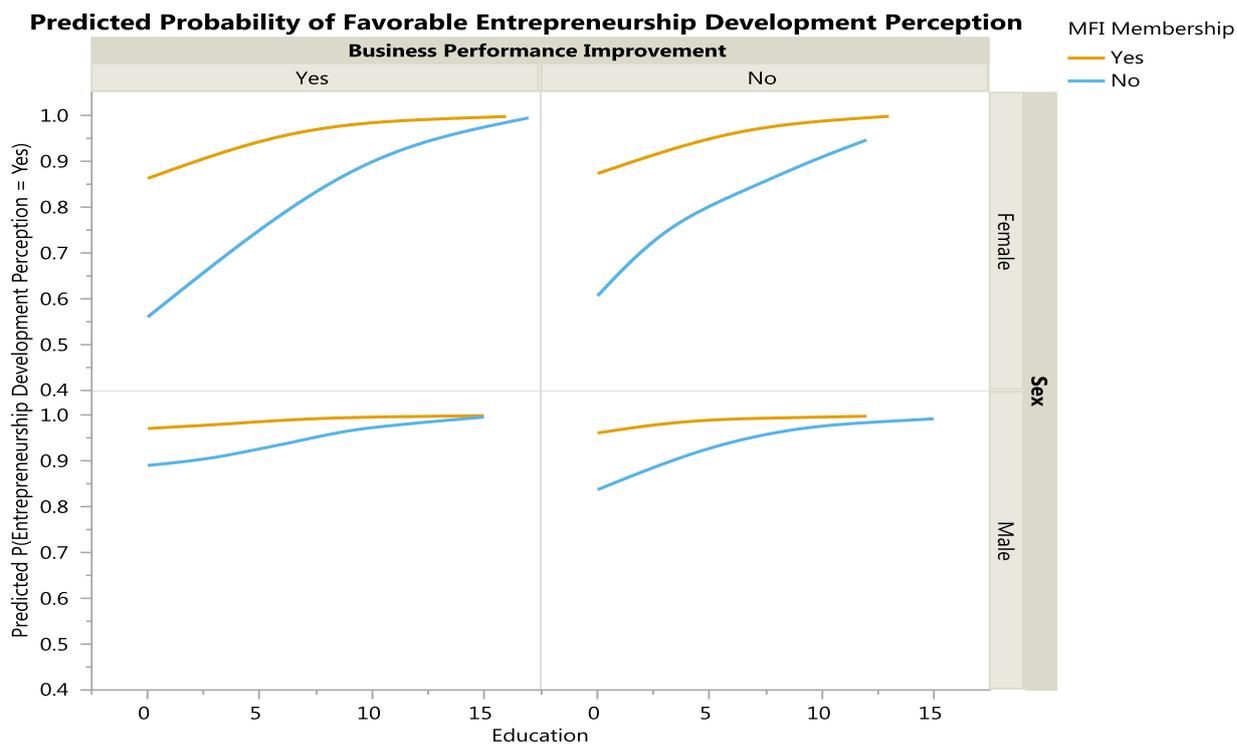
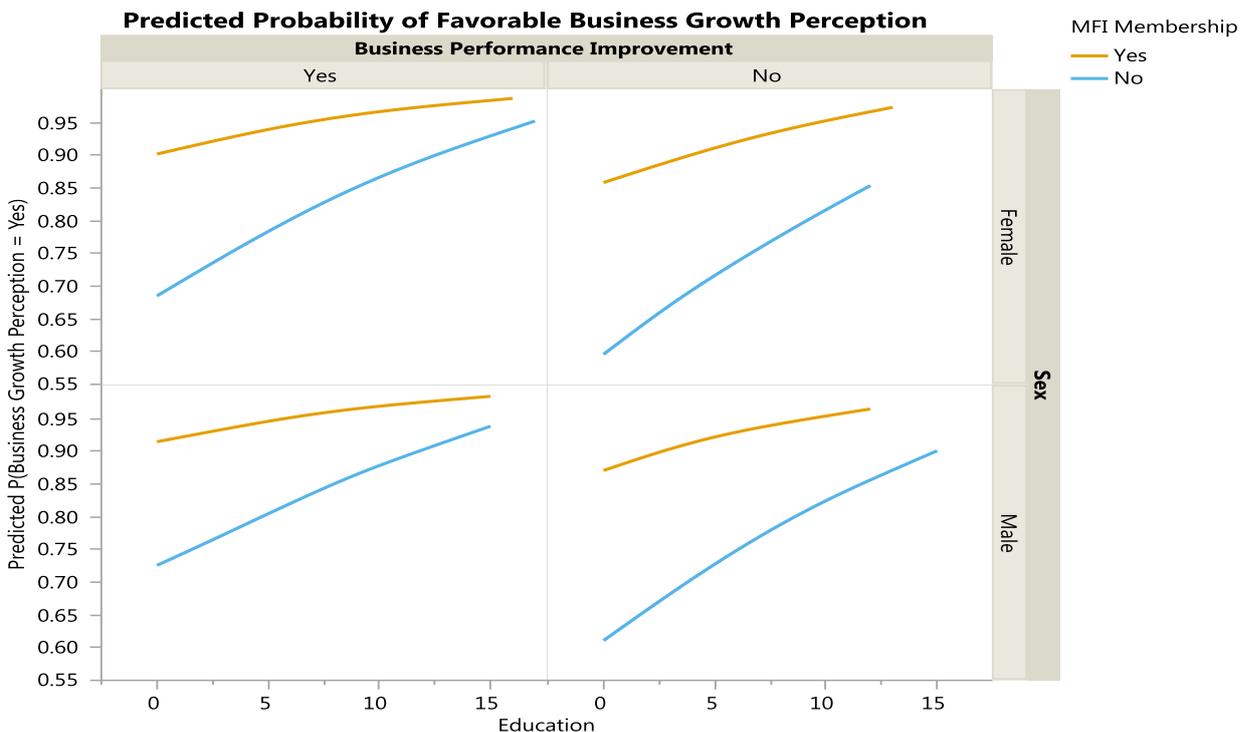
The other variable that is significant in the analysis is education. This means, everything else being equal, better educated people are more likely to speak highly of the MFIs' role in rural development. If we interpret more education as a proxy for financial education, we see that people with financial education are more likely than those with less financial education to report a positive perception towards MFIs.

**Table-5.** Firth logistic regression (penalized maximum likelihood).

Variables	Perception towards Business Growth	Perception towards Entrepreneurship Development	Perception towards Employment Generation
Borrower	1.477** (0.647)	1.786** (0.951)	1.178** (0.459)
Performance	0.412 (0.556)	-0.0984 (0.727)	0.505 (0.434)
Education	0.128* (0.0791)	0.261** (0.112)	0.0871 (0.0609)
Age	0.00747 (0.0261)	0.0310 (0.0368)	0.000582 (0.0199)
Sex	0.00821 (0.634)	1.037 (0.994)	-0.518 (0.496)
Constant	0.0146 (1.320)	-1.064 (1.887)	0.0476 (1.035)
Observations	129	129	129

Note: Standard errors in parentheses.  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Overall, the results show business owners' favorable perception of MFIs' role in economic development strongly associated with MFI membership and education, and not with their business performance or other personal characteristics such as age and sex. In Figure 3 we visualize the predicted probability of favorable perception estimated by the logistic regression models presented in Table 5.



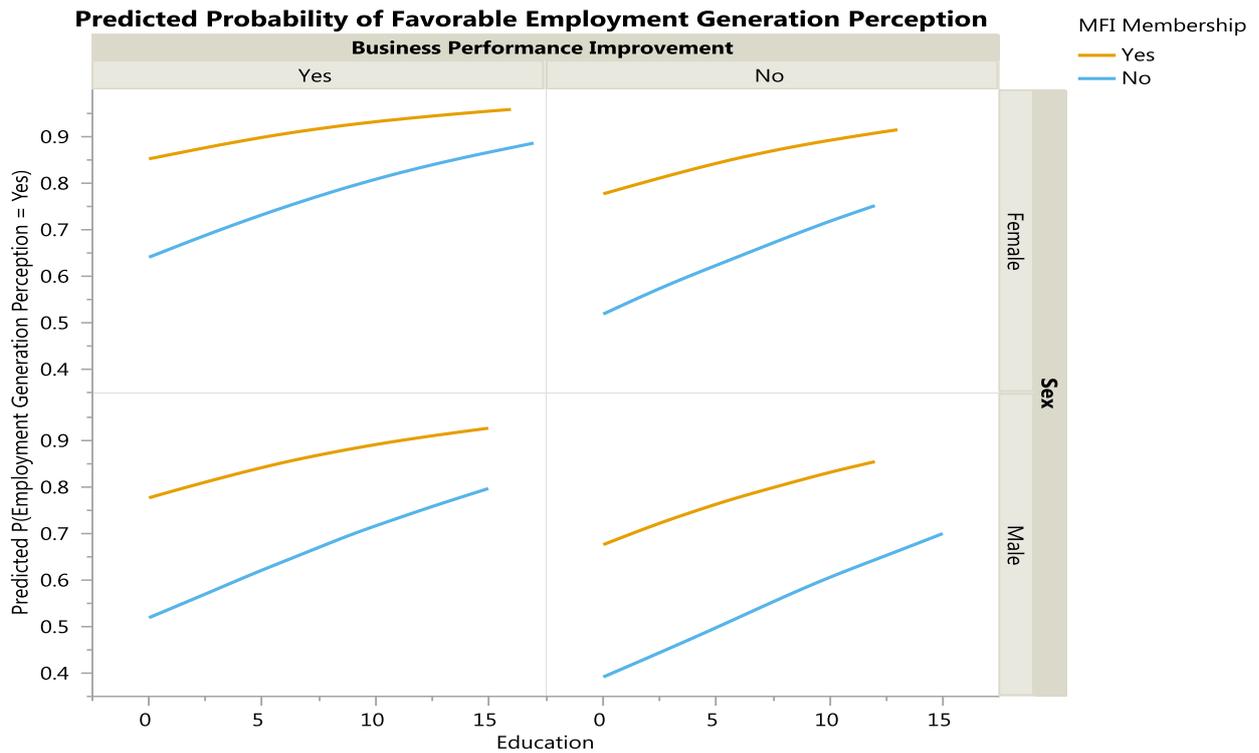


Figure-3. Visualizing the predicted probability of favorable perception towards MFIs' role in aspects of economic development. Predicted probabilities are based on the models presented in Table 5.

## 6. DISCUSSION

The analysis presented in this paper shows that borrowers are more likely to report a positive perception towards the role of MFIs in business growth, entrepreneurship development, and employment generation. What could be the reasons for membership having a strong influence on the small businesses' perception towards MFIs rather than their actual performance? To answer this question, we need to think of the non-business related benefits and opportunities these businesses can access just because they are enterprises. First, let's consider the case of those businesses that borrowed to establish a business. According to the survey, among those who borrowed a start-up capital, two-thirds of the businesses would not have been able to start a business. MFIs were the only source of capital. This alone is an important motivation and a reason for the businesses to speak highly of the institutions they belong to. After they become business owners, doors open to many other opportunities that are available to those who don't have financial constraints, like those who didn't need to borrow to start a business.

Those who started a business with their own savings or with loans from relatives may also have a positive perception towards microfinance institutions because they get access to funds that they would not have been able to if they didn't have a business for various reasons. Having a business makes them more credible because the MFIs are not worried about loan default. This tells a lot about why our survey results show an overwhelmingly positive response in favor of the MFIs. Regardless of whether they borrowed the start-up capital or not, businesses are regarded as safe borrowers by MFIs. They are trusted and can easily get other financing opportunities such as a loan for land, house, vehicle, education, etc. The positive perception reflects their hopefulness and positivity rather than the impacts they experienced.

The way MFIs are providing their services does not necessarily help with business growth or act as the only solution to solve poverty in developing countries. The findings suggest that the poor shouldn't be given empty promises. The policymakers should consider these stories as an opportunity to make this the right time to think critically about microfinance programs before certain sectors keep benefitting from the empty promises. The MFI managers and operators should utilize the findings to generate ideas and procure resources to steer economic development outcomes in a positive direction. These issues are important from the managerial perspective of

making MFIs more effective in fulfilling their stated goals. While developing countries are working hard to serve every village, their efforts need to be expanded to every little business that does not have access to finances and contribute to meeting the aspirations of those businesses that would like to see MFIs helping with business expansion, entrepreneurship development, and employment generation.

## 7. CONCLUSIONS

This paper identifies the factors behind the overwhelmingly positive response towards microfinance institutions. The analysis is based on a village level data from a rural area in Nepal. In the particular case of our data, respondents express an overwhelmingly positive perception towards the impact of microfinance institutions on entrepreneurship development, business growth, and employment generation. Such a response begs the question of whether MFIs have received such a huge fanfare because of their long-lasting positive effect on their members or there is something else to it. We explore the association between the overwhelmingly positive perceptions towards MFIs and borrowing a loan vs. the actual business performance using Firth's logistic regression algorithm, which adjusts for the estimation bias in the context of a small sample.

We find that it is the membership with the MFIs that explains the overwhelmingly positive response instead of the actual business performance. This is consistent with the findings which suggest that while microfinance succeeds in lending some of the businesses to expand their operations, it does not appear to fuel an escape from poverty based on those small businesses (Banerjee et al., 2015). Indeed, Banerjee (2013) indicates that there are several areas in microfinance whose exploration is only beginning. But, what could be the possible reasons behind membership that makes the borrowers happier? Is it the characteristics of the beneficiaries such as the women, the poor, the marginalized, and the landless that would not have been served by traditional banks that now have access to a financial institution that makes them happy? Or, is it the service itself that makes them feel better about these institutions because they are providing products other than the credit, such as the savings, insurance, training, and other business services? Such positive perception reflects the members' hopefulness and positivity, rather than the impacts they might have experienced. Future research should focus on these issues. Another extension of this research would be to understand the perceptions of non-business clients. These are important issues that would help us understand the impact of the microfinance industry and provide guidance in policy formation, both for successful MFI management and from the perspective of governing bodies in the recipient developing communities.

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