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EFFECTIVENESS OF MICROFINANCE BASED ON RATIONAL MECHANISMS

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ABSTRACT

This study examines the factors that determine whether microfinance borrowers borrow after being allocated individual and group loans through randomization in Mongolia. Efficiently increasing income and consumption through microfinance requires knowledge of the attributes that lead to borrowing and that increase income and consumption, by type of microfinance. The use of MTE reveals the heterogeneity of the borrowers. The results of MTE can help to design effective microfinance policies. The examined outcomes were the impacts on household income, business income, business expenditure, consumption, and food consumption. Furthermore, we investigated the impact on the poorest borrowers and obtained results that took into account the borrowing ratio instead of the borrowed amount. The analysis revealed the following results: first, there are borrowers who actively borrow and those who do not, and their characteristics are shown by microfinance type; second, there are different types of microfinance suitable for different borrowing purposes; third, a comparison between the poorest and less poor borrowers reveals different types of suitable microfinance; fourth, the attributes that increase income and consumption through borrowing differ for different groups. Group lending increases business income and business spending but reduces consumption. It was confirmed that when narrowing the sample to the poorest, the effect of increasing group lending was lost, but consumption increased. There are many cases in which the outcome increases in individual lending, but decreases in group lending, and vice versa.

Contribution/ Originality: This study contributes to the existing literature by examining the characteristics of borrowers, which can have a considerable impact on the most suitable type of microfinance (group lending or individual lending). The examined outcomes are household income, business income, business expenditure, consumption, and food consumption.

1. INTRODUCTION

Microfinance has been introduced in many developing countries. One objective of microfinance is to increase consumption, such as household and business consumption, through borrowing; the second is to increase business and business income; the third is to increase the number of households and businesses that can access microfinance services. However, the effects of microfinance on income and consumption have yet to be definitively determined. Existing evidence varies across time and countries. In many papers, the effect on income growth is small, and the effect on consumption growth is small or not statistically significant. There are two types of microfinance: individual lending and group lending. Many previous studies have shown that the effects of each are different.

A certain number of borrowers do not borrow from microfinance institutions, even if they are allocated to an area where they can borrow. Furthermore, some borrowers use their borrowing for consumption while other borrowers invest to increase their income. Even when borrowers do invest, some borrowers purchase factors of production, such as the purchase of seeds in agriculture or livestock in pastoralism, while others borrow for purposes that do not necessarily increase, but also do not decrease, their income, such as equipment maintenance. Some investments have the potential to significantly increase income, such as the purchase of equipment to produce new goods or to increase production efficiency. In other words, borrowers have the choice to either borrow or not borrow. This study explores the factors that lead to borrowing or not borrowing. No studies have yet been conducted on the factors that lead to borrowing or not borrowing in different types of microfinance. By showing the characteristics of individuals who borrow and the characteristics of individuals for whom borrowing produces policy effects, the targeting of real-life microfinance lending could be made more effective.

When borrowing, borrowers have the option of borrowing for consumption purposes or investment purposes, as well as for the repayment of loans from non-microfinance lenders such as banks. There are several reasons why poor people who could borrow from microfinance choose not to borrow. First, they may be unable to make regular repayments. If they are engaged in agriculture and there is only one harvest season per year, the time of year when they earn cash may be limited to just after the harvest season. Without a regular daily or weekly income, savings would be needed to make regular repayments. If savings are available, it is reasonable to borrow microfinance with interest rates only after the savings have been used up. The second case is where there is neither consumption demand nor investment demand. The investment will not occur unless profits are expected to exceed interest rates. A situation can also be envisaged where produce is not sold on the market. In Mongolia, many households are engaged in pastoralism, and their consumption of eggs, butter, and meat from the pastoral industry is sufficient. Third, there may be an increase in the amount and number of loans taken out. If a borrower has already borrowed a sufficient amount from non-microfinance sources, using their house or livestock as collateral, some borrowers may decide against taking out new microfinance loans to reduce the amount they have to repay. While some borrowers borrow from microfinance to repay non-microfinance lenders, others do not. The fourth option is that there is a lack of sufficient income to repay the loan; the fifth is that the borrower's income may not be sufficient to cover the repayment of the loan. The poorest borrowers may choose not to borrow from microfinance, even if it has a low-interest rate, because of the interest burden.

One case where microfinance increases business income is where there is an opportunity for investment but borrowing from existing financial institutions does not provide a sufficient amount of resources, and by borrowing from microfinance the investment will be sufficient to increase business income. Borrowing from microfinance may increase consumption in the short term and increase income in the long term through increased investment. In other words, the demand for microfinance varies from borrower to borrower. The effects also vary from borrower to borrower, which means that the treatment effects of microfinance are heterogeneous across borrowers. As long as the supply of funds from microfinance does not fully meet the investment demand of all borrowers in the country, borrower effectiveness will vary depending on the business and consumption and investment environment faced by each borrower.

The poorest borrowers have high consumption demand, but investment demand may be small, especially if the borrowing does not generate sufficient production and sales. The poorest borrowers may also have high interest costs, and even their consumption demand may be small. They are also less willing to borrow if it concerns group lending, but more willing to borrow in cases of individual lending. Conversely, they may be more willing to borrow for group lending but less for individual lending. Group lending reduces risk because all members of the group share the burden in the event of default. Because of this risk reduction, some borrowers are willing to borrow more.

Conversely, there are also reasons for wanting to limit borrowing and the amount borrowed. For example, in the case of group lending, there is pressure from other members to monitor the borrowing and to keep the amount

borrowed close to the amount borrowed by the other members of the group. Depending on the purpose of microfinance borrowing, the effectiveness may vary, or there may be a minimum income or consumption level for borrowing, and the possibility exists that microfinance may not be effective for borrowers below that level. If the effectiveness varies by borrower, the effectiveness of microfinance may differ significantly for different proportions of several types of borrowers.

In such cases, the effect of microfinance may be small. This may explain why many previous studies have found microfinance to have only a small effect. This study aims to measure the heterogeneous treatment effects of microfinance on outcomes such as household income, business income, household consumption, and business consumption of borrowers.

By applying the marginal treatment effect (MTE) framework developed by Bjorklund and Moffitt (1987) and Heckman and Vytlacil (2007) we allow treatment effects to vary with the propensity to use microfinance. MTE allows us to determine which borrowers have the highest income and which are more likely to change their consumption and use microfinance, which can help in designing effective microfinance policies. We analysed the microfinance data from Attanasio, Augsburg, De Haas, Fitzsimons, and Harmgart (2015); Attanasio., Augsburg, De Haas, Fitzsimons, and Harmgart (2018) in Mongolia to identify the causal relationships.

2. PREVIOUS RESEARCH

Microfinance programs provide small loans to very poor people to generate income. The programs are a substitute for informal credit and do not require collateral, which is a key feature that differentiates microfinance institutions (MFIs) from other commercial institutions. Microfinance loans can be individual or group loans. Moral hazard due to risk-taking has been noted when borrowers know the investment strategy of their members and when borrowers can self-select which projects to invest in (Giné, Jakiela, Karlan, and Morduch, 2010). Fischer (2013) found that when information on each other's projects is restricted, group lending increases incentives for free-riding. Xavier Giné and Karlan (2014) found a relationship between joint and several liability and repayment rates. Carpena, Cole, Shapiro, and Zia (2013) showed that switching from individual to joint and several liability significantly improves repayment rates.

Imai and Azam (2012) examined whether loans from microfinance institutions reduced poverty in Bangladesh. A 100% net increase in borrowing raised household income per capita by 0.51% to 0.54% on average. However, a 100% net increase in productivity loans (loans for productive activities such as agriculture) raised household income per capita by between 0.69% and 1.09%. It also has a significant and positive impact on food consumption. Income poverty tends to be alleviated by providing productive loans to households, highlighting that consumption poverty is likely to be reduced by unproductive loans.

Khandker & Samad (2013) found that microfinance interventions in Bangladesh have reduced the number of extremely poor by 9% over the past decade. They also showed that households with continuous participation were more effective in reducing poverty than households with irregular participation. Furthermore, non-farm income as a percentage of total income increased significantly. However, non-participants experienced greater growth in household consumption than participants. Schroeder (2014) found that borrowing from microfinance institutions in Bangladesh had a positive and significant impact on per capita household consumption. At the average level, he predicted that an additional loan of USD 100 would increase per capita household consumption by about 20%. Microfinance institutions in Bangladesh provide productive loans for income-generating activities and unproductive loans for consumption smoothing; Muhumed (2016) showed that microfinance increases consumption and in turn reduces poverty. Thus, studies such as Imai and Azam (2012); Khandker and Samad (2013); Schroeder (2014), and Muhumed (2016) also showed that microfinance increases consumption. They concluded that it has a positive impact on poverty reduction and contributes to improved living conditions. On the other hand, Chowdhury (2009) critically assessed the effectiveness of microfinance. He attributed its success to group lending, as the poor had

traditionally borrowed. Group lending overcomes collateral and adverse selection problems caused by information asymmetry through peer monitoring. The majority of borrowers also stated that they already had some assets, business skills, and education.

Attanasio et al. (2015) conducted an analysis using a randomized field experiment in rural Mongolia. Group lending had a positive impact on women's entrepreneurship and household food consumption, but not on total hours worked or household income. Individual lending also had no significant impact on poverty. The results suggest that group lending may deter borrowers from using loans for non-investment purposes. The analysis found no difference in repayment rates for individual and group lending. Ishii (2022) analyzed the presence of borrower heterogeneity using Mongolian data from Attanasio et al. (2015) and Attanasio et al. (2018) using a causal forest methodology. They found that to maximize the effectiveness of simple measures, it is important to understand the factors that contribute to heterogeneity and the effective level of heterogeneity.

3. DATA

This study uses data from Attanasio et al. (2015) and Attanasio et al. (2018) on women from poor households in Mongolia. The effects of group and individual borrowing are tested among 40 poor rural villages. A follow-up survey is conducted 19 months after the baseline survey. Group borrowing is jointly and severally liable, with the entire group of borrowers responsible for repayment. If one or more members do not repay and the others do not make up the difference, all members are denied further borrowing. Members act as guarantors to screen and monitor each other. Joint and several liability lending increase the probability of repayment through frequent information-sharing meetings among members and strong social pressure to prevent default. Although the borrowing in this study was intended to finance businesses, about half was used for household consumption. The borrowers were not informed at the borrowing stage whether the loan would be an individual or group loan.

As nomads in Mongolia, the respondents accumulate social capital outside the family, and there are collective self-help groups (Nukhurlul). The existence of organizations that operate as informal savings and credit unions and are historically similar to collective group lending may have implications for the current state of MFI group lending in Mongolia. Both individual and group loans in the current study were primarily for small-scale entrepreneurial activities and business creation, with repayment periods ranging from a minimum of a few weeks to a maximum of six months or more. Group loans have a maturity of approximately three years and an average interest rate of 2%. They have a dynamic incentive structure, with the interest rate decreasing by 0.1% for each successful loan cycle, as well as the possibility of increasing the loan amount and lengthening the repayment period. The loan briefing was organized by the NPO, the Mongolian Women's Federation (MWF).

Fifteen of the 40 villages were allocated to group loans, 15 to individual loans, and 10 to control groups. The groups consisted of 7-15 people, and loans were made to individuals on the list of the poor who had around MNT 1 million at the time of joining the group and whose monthly income was less than MNT 200,000. The average household over the period earned only MNT 1,100,000. The target population was also selected by taking into account livestock ownership. Groups were formed in 15 villages, with leaders elected and group rules signed, with members living in the same village and knowing each other. The study confirms that there are no significant differences in poverty levels between the group and individual loan groups and that they are similar in terms of household composition, employment and consumption patterns, and asset size. The majority of borrowing households had taken out one or more loans at the time of the baseline survey.

4. ANALYSIS

Table 1 shows the number of people who borrowed by type of microfinance and the number of people who did not borrow despite being able to borrow from MFIs, for individual and group lending respectively. This study examines the differences between those who borrowed and those who chose not to borrow.

Table 1. The number that borrowed and did not borrow by type of microfinance.

	Did Not Borrow	Borrowed	Total
Ind. Loan	722	1536	2258
Group Loan	542	1679	2221
Total	1264	3215	4479

Table 2 shows the regression analysis on borrowing. The dependent variable is the presence or absence of borrowing by individual or group lending allocation. *per_hhincome* is per capita income, *per_rev_r* is per capita business income, *per_totalexp_r* is per capita business expenditure, *per_consump_mth* is per capita household consumption, *per_ consump_food* is household food consumption per capita, *age* is age, *loanno* is number of loans, *soum* is area dummy, *f_source* is number of sources of income, *edulow* is a dummy for persons with low levels of education, *purp2* is a dummy for investments where the purpose of borrowing is related to the processing industry, *purp1* is a dummy for agriculture where the investments are for the purchase of production factors in the pastoral industry, *poor* is a dummy for perceived poverty.

The regression analysis shows that for all outcomes, age is positive and significant only for individual loans. The older people are, the more they borrow in individual lending. The number of loans is positive and significant only for group lending. The higher the number of borrowers, the more they borrow in group lending. The region dummies are significant for all variables. The income source is positive and significant only for group lending. The more the income sources, the more they borrow in group lending. Education level is negative and significant only for individual lending. This indicates that the higher the level of education, the more people borrow in individual lending. No significant variables were identified in the purchase factors of production. For processing industry-related borrowing, it is positive and significant only for group lending. Perceived poverty is positive and significant only for individual lending. Those who perceive themselves to be poorer are more likely to borrow in individual lending.

Outcome variables were checked. Per capita household income and business income have opposite signs for individual and group lending. The higher the per capita household income and business income, the less they borrow through individual lending, but the more they borrow through group lending. Furthermore, household consumption per capita is negative and significant, while food consumption per capita is positive. The higher the per capita food consumption, the more people borrow, and the lower the per capita household consumption, the more people borrow.

Table 2. Regression analysis on borrowing.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MF type	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**
Dep.var	noloan_mf	noloan_mf	noloan_mf	noloan_mf	noloan_mf	noloan_mf	noloan_mf	noloan_mf	noloan_mf	noloan_mf
age	0.00**	0.00	0.00**	0.00	0.00**	0.00	0.00**	0.00	0.00**	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
loanno	0.02	0.09***	0.02	0.10***	0.02	0.09***	0.02	0.10***	0.02	0.10***
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)
soum	-0.00***	0.00***	-0.00**	0.00***	-0.00**	0.00***	-0.00***	0.00***	-0.00**	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
f_ysource	0.01	0.08***	0.01	0.08***	0.01	0.08***	0.02	0.08***	0.02	0.08***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
edulow	-0.13*	-0.11	-0.13*	-0.11	-0.13*	-0.11	-0.13**	-0.12	-0.11	-0.11
	(0.06)	(0.13)	(0.06)	(0.13)	(0.06)	(0.13)	(0.06)	(0.13)	(0.07)	(0.13)
purp2	0.01	0.07**	0.02	0.06**	0.02	0.06*	0.03	0.09**	-0.05	0.06*
	(0.17)	(0.03)	(0.18)	(0.03)	(0.18)	(0.03)	(0.18)	(0.03)	(0.18)	(0.03)
purp1	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.05	0.02
	(0.17)	(0.04)	(0.18)	(0.04)	(0.18)	(0.04)	(0.18)	(0.04)	(0.18)	(0.04)
poor	0.21***	0.01	0.21***	0.01	0.21***	0.01	0.21***	0.00	0.21***	0.01
	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.05)
per_hhincome	-0.00	0.00								
	(0.00)	(0.00)								
per_rev_r			-0.00	0.00						
			(0.00)	(0.00)						
per_totalexp_r					0.00	0.00*				
					(0.00)	(0.00)				
per_consump_mth							-0.00	-0.00		
							(0.00)	(0.00)		
per_consump_food									0.01**	0.00
									(0.00)	(0.00)
Constant	0.45**	0.44***	0.39*	0.46***	0.38*	0.45***	0.40**	0.47***	0.32	0.45***
	(0.18)	(0.09)	(0.19)	(0.09)	(0.19)	(0.09)	(0.18)	(0.09)	(0.18)	(0.09)
Observations	2,257	2,221	2,257	2,221	2,257	2,221	2,257	2,221	2,257	2,221
R-squared	0.11	0.08	0.11	0.08	0.11	0.08	0.11	0.08	0.12	0.08

Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table 3. Probit analysis on borrowing.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MF type	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**
Dep.var	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**	**noloan_mf**
age	0.00**	0.00	0.00***	0.00	0.00***	0.00	0.00***	-0.00	0.01***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
loanno	0.06	0.33***	0.06	0.33***	0.06	0.32***	0.06*	0.35***	0.06	0.33***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
soum	-0.00***	0.00***	-0.00***	0.00***	-0.00***	0.00***	-0.00***	0.00***	-0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
f_ysource	0.03	0.32***	0.04	0.31***	0.04	0.32***	0.05	0.32***	0.06	0.32***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
edulow	-0.35***	-0.30***	-0.36***	-0.31***	-0.36***	-0.30***	-0.38***	-0.33***	-0.29***	-0.31***
	(0.08)	(0.09)	(0.08)	(0.09)	(0.08)	(0.09)	(0.08)	(0.09)	(0.08)	(0.09)
purp2	0.05	0.31**	0.09	0.31**	0.09	0.30**	0.10	0.38**	-0.17	0.28*
	(0.40)	(0.15)	(0.41)	(0.15)	(0.41)	(0.15)	(0.41)	(0.15)	(0.42)	(0.15)
purp1	0.04	0.11	0.08	0.10	0.08	0.09	0.08	0.16	0.16	0.09
	(0.40)	(0.13)	(0.40)	(0.13)	(0.40)	(0.13)	(0.40)	(0.13)	(0.41)	(0.13)
poor	0.60***	0.05	0.60***	0.05	0.60***	0.05	0.60***	0.03	0.61***	0.05
	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)
per_hhincome	-0.00***	0.00								
	(0.00)	(0.00)								
per_rev_r			-0.00	0.00						
			(0.00)	(0.00)						
per_totalexp_r					0.00	0.00				
					(0.00)	(0.00)				
per_consump_mth							-0.00	-0.00***		
							(0.00)	(0.00)		
per_consump_food									0.03***	0.00
									(0.00)	(0.00)
Constant	-0.21	-0.34*	-0.37	-0.30*	-0.38	-0.33*	-0.35	-0.27	-0.61	-0.33*
	(0.42)	(0.19)	(0.42)	(0.18)	(0.42)	(0.18)	(0.42)	(0.18)	(0.43)	(0.18)
Observations	2,257	2,221	2,257	2,221	2,257	2,221	2,257	2,221	2,257	2,221

Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table 3 compares the results from the probit analysis. The results of the analysis are almost identical to those of the OLS. The difference is that the education level is negative and significant for group lending as well as for individual lending. The results are found to be robust.

4.1. MTE for Impact of Microfinance

Figures 1-5 show the change in MTE for various outcomes. It shows how MTE varies by microfinance lending, with MTE being the mean of the observed characteristics, together with 90% confidence intervals. Figure 1 shows the MTE curves for household income per capita for microfinance borrowing, with curves for individual and group lending. The vertical axis is the marginal treatment effect and the horizontal axis is the resistance to treatment. Both are near zero but decrease with greater resistance to treatment, i.e. individual lending by microfinance institutions. It increases with greater resistance to group lending. Group lending implies an adverse selection of the treatment effect. The upward-sloping MTE curve implies that more people with characteristics that increase household income per capita are less likely to borrow. Individual lending falls to the right and group lending rises to the right. In Figures 2 and 3 business income and business expenditure fall to the right, regardless of the type of microfinance. In Figure 4, per capita consumption and per capita food consumption rise to the right, regardless of microfinance type. The more the type of microfinance falls to the right, the more people who increase their outcomes through microfinance allocation will borrow, indicating that business income and business expenditure are meaningful to introduce, regardless of the type of microfinance. Also, individual and group lending differs between up-right and down-right, but the slope is very small, indicating that the type of microfinance does not necessarily have an impact on increasing per capita income. However, it can be read that the attributes that bring about an increase in per capita food consumption in Figure 5 tend not to want to borrow from either individual or group lending.

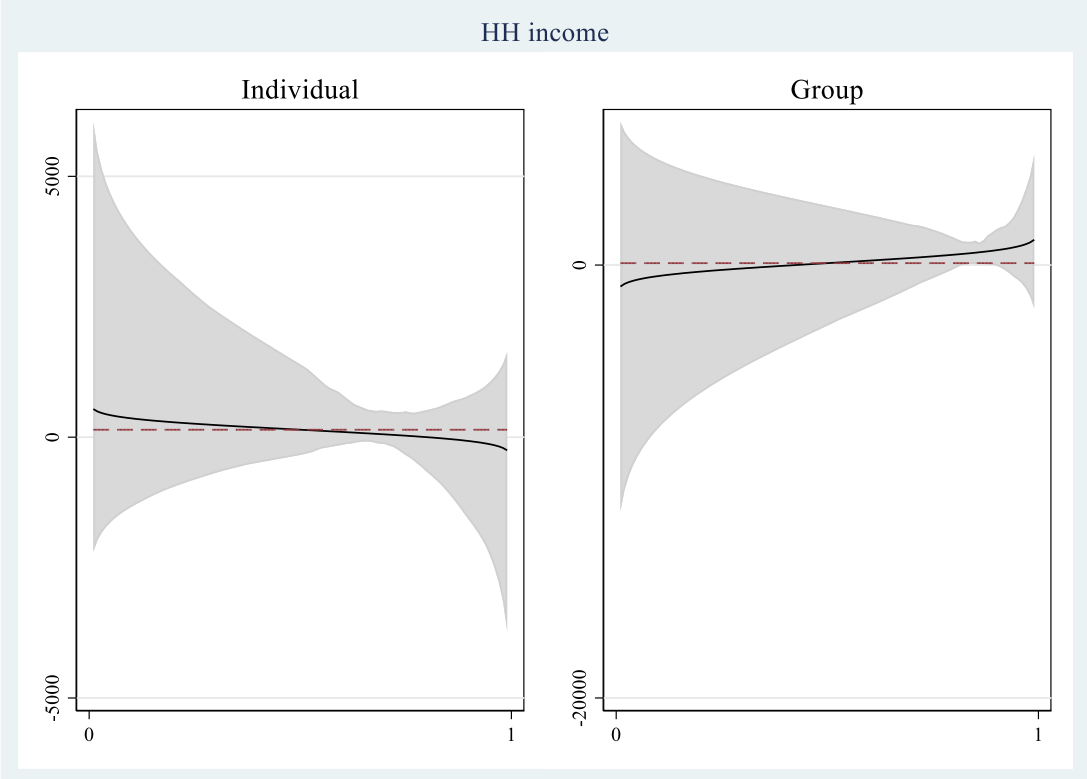

Figure 1. Distribution of the MTE for impact on household income.

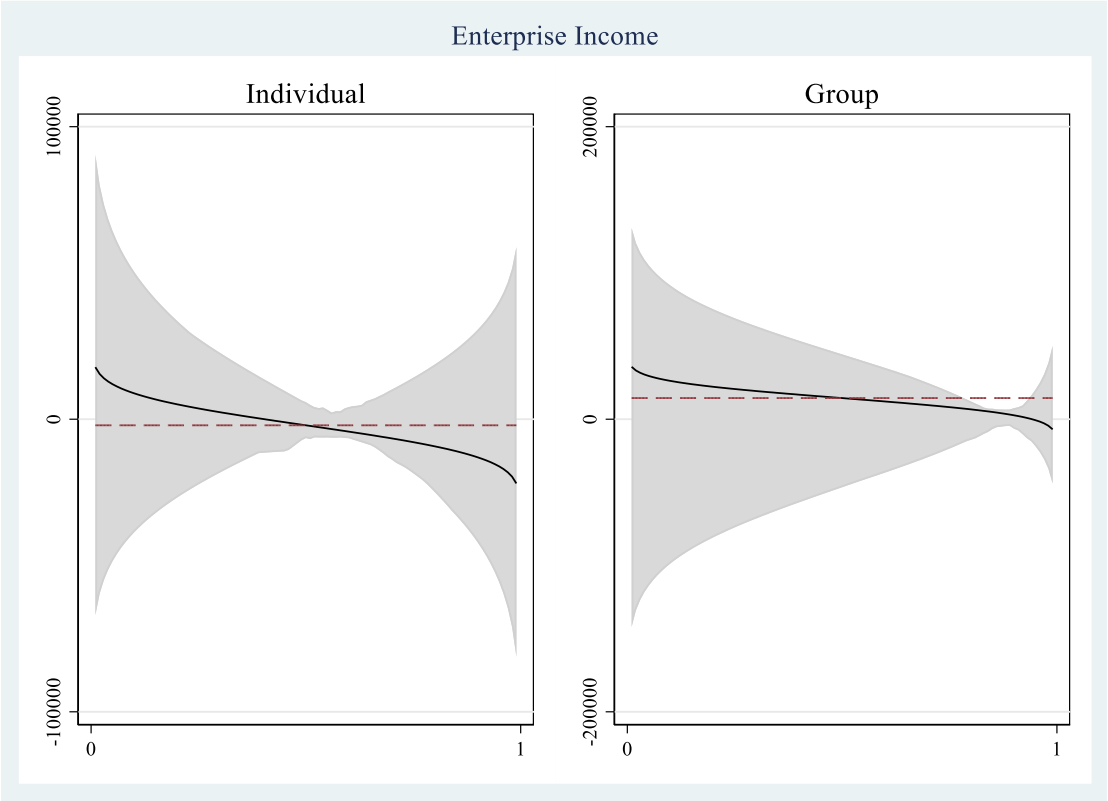

Figure 2. Distribution of the MTE for impact on enterprise income.

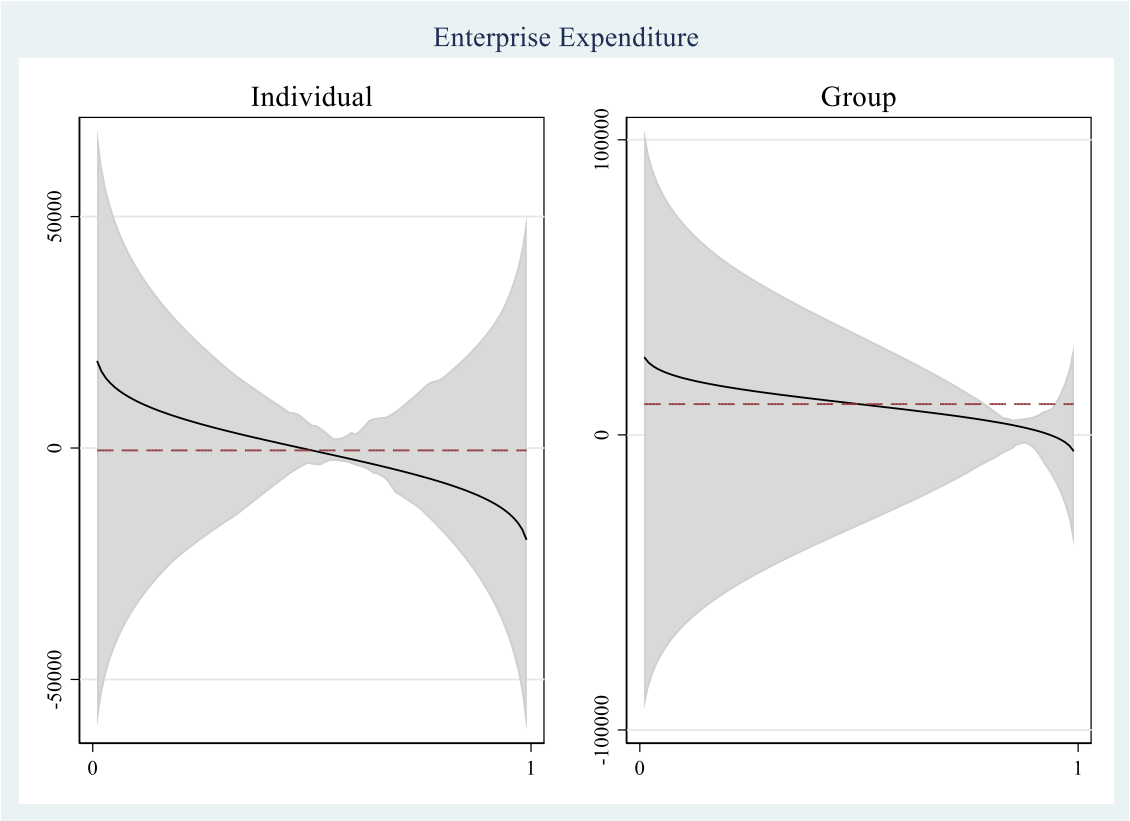

Figure 3. Distribution of the MTE for impact on enterprise expenditure.

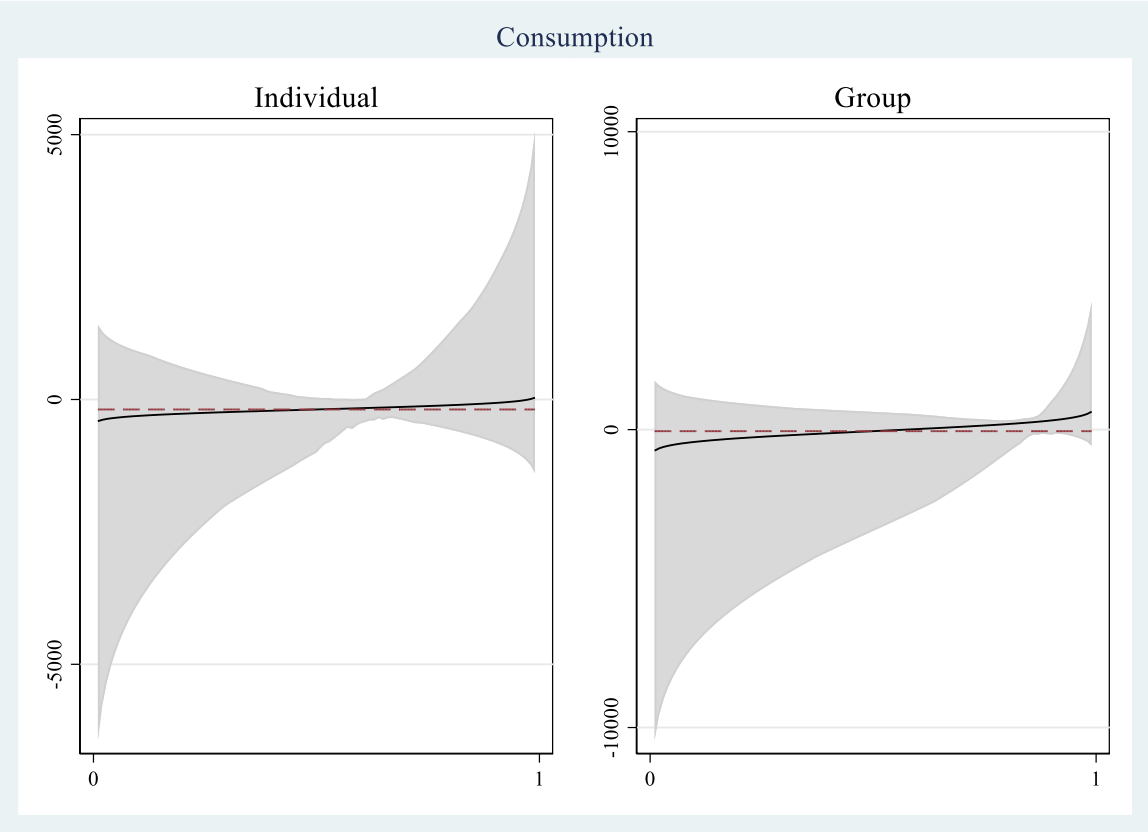

Figure 4. Distribution of the MTE for impact on consumption.

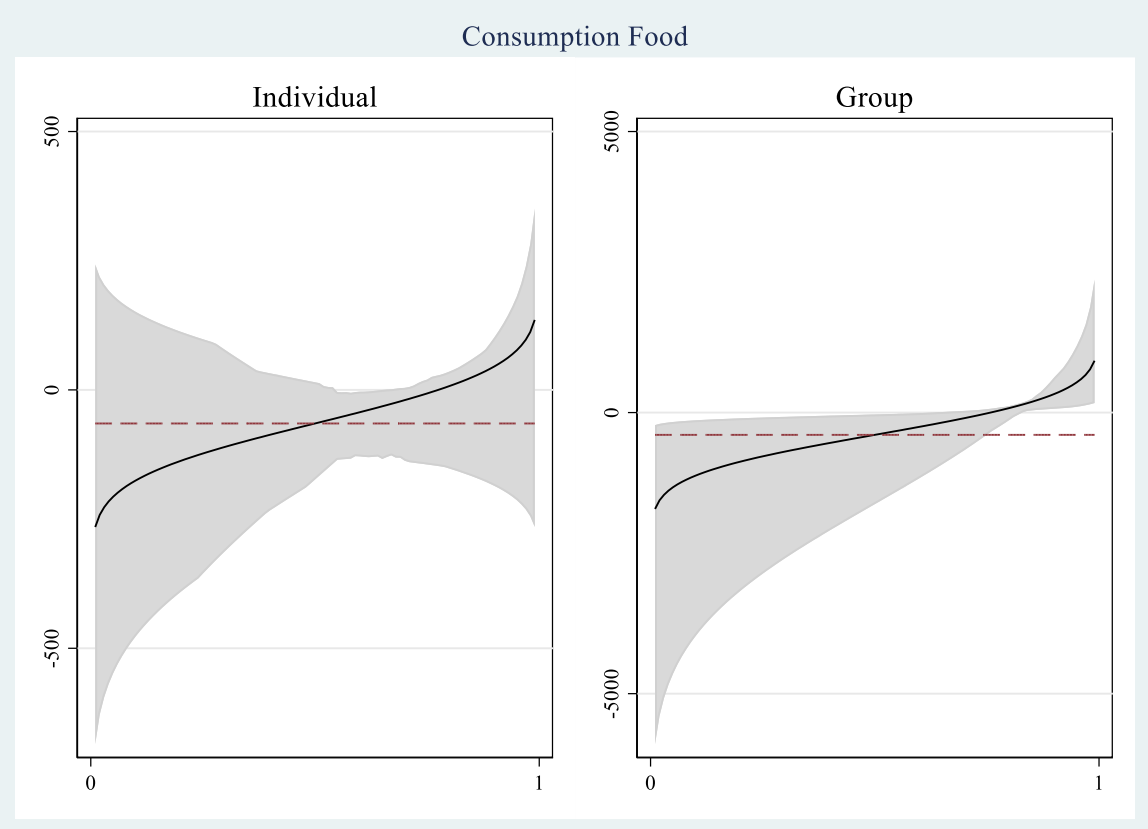

Figure 5. Distribution of the MTE for impact on consumption of food.

Table 4. MTE of microfinance on different outcomes by microfinance type (total sample).

	Income		Enterprise Income		Enterprise Expenditure		Consumption		Consumption Food	
	Indi.	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**
age	-0.13	-1.35	8.79**	-12.28***	9.04***	-9.05***	-0.45	0.63	-0.19*	0.80***
	(0.90)	(0.94)	(3.66)	(4.26)	(2.82)	(3.47)	(0.64)	(0.64)	(0.10)	(0.13)
loanno	-25.16	-61.07	163.72*	2,329.49***	185.04**	1,652.15***	-10.41	-14.04	-2.70	-70.78***
	(23.69)	(111.10)	(96.69)	(503.13)	(74.65)	(409.52)	(16.96)	(75.35)	(2.63)	(14.89)
soum	-0.74	-0.31	-13.98***	11.61***	-13.28***	8.10***	-0.31	-0.39	0.07	-0.41***
	(0.97)	(0.66)	(3.97)	(2.98)	(3.06)	(2.43)	(0.70)	(0.45)	(0.11)	(0.09)
f_ysource	23.89	29.49	138.69*	2,466.76***	153.08**	1,741.51***	-11.72	-31.44	-3.26	-80.09***
	(19.83)	(103.85)	(80.93)	(470.29)	(62.48)	(382.80)	(14.20)	(70.44)	(2.20)	(13.92)
edulow	-57.37	106.97	-1,379.85***	-1,695.85***	-1,346.14***	-1,241.29***	7.97	10.11	12.32	99.35***
	(112.18)	(117.31)	(457.86)	(531.28)	(353.46)	(432.44)	(80.33)	(79.57)	(12.44)	(15.73)
purp2	17.91	-52.50	-390.55	2,812.07***	-272.69	1,844.97***	64.32	101.91	17.46	-23.89
	(214.54)	(128.76)	(875.63)	(583.11)	(675.98)	(474.62)	(153.63)	(87.33)	(23.80)	(17.26)
purp1	86.43	119.35	139.23	673.12*	108.25	331.57	11.89	-9.92	28.67	-16.36
	(210.13)	(78.58)	(857.62)	(355.85)	(662.08)	(289.65)	(150.47)	(53.30)	(23.31)	(10.53)
poor	51.70	-61.94*	2,130.70***	399.77***	2,227.85***	335.35***	-97.39	19.87	-36.07	-25.92***
	(199.58)	(32.87)	(814.56)	(148.87)	(628.84)	(121.17)	(142.92)	(22.30)	(22.14)	(4.41)
Constant	96.50	138.37	-3,255.77***	9,228.52***	-1,832.31**	6,843.73***	-95.04	-37.36	-61.72**	-250.43***
	(272.38)	(321.36)	(1,111.68)	(1,455.36)	(858.21)	(1,184.60)	(195.04)	(217.97)	(30.21)	(43.08)
Observations	2,258	2,221	2,258	2,221	2,258	2,221	2,258	2,221	2,258	2,221

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

4.2. MTE by Variable

Table 4 shows the MTE of microfinance on different outcomes. The MTE also varies with the observed characteristics. For per capita income, the variable is not significant for individual lending, but when looking at group lending, household income is increased for those who are not perceived as poor. The purpose of borrowing was not significant for per capita income. For business income, the variable was more significant for individual lending with older age, a higher number of loans, a higher source of income, a higher level of education, and perceived poverty. The region dummies were also significant. Furthermore, the same variables were significant for group lending but were positive and significant whether the purpose of borrowing was to purchase factors of production or for use in the processing industry. This can be assumed to indicate that borrowers spend on their business according to their borrowing purpose and thus increase their business income. Also significant but with a different sign than individual lending is age. Younger age increases business income in group lending. Concerning expenditure, business expenditure is significant for individual lending with the same variable as business income and with the same sign. The same results are obtained for group lending and business income. Also, regarding food consumption, the younger the borrower, the more food consumption is increased by individual lending. Group lending increases food consumption with older age, less borrowing, fewer sources of income, lower level of education, and lower perceived poverty.

4.3. Impact of microfinance

Table 5 shows the aggregate values of the parameters. The ATE on borrowing from MFIs on per capita income is not significant, but the effect of individual lending on per capita income is larger, as individual lending has a larger value than group lending. Individual lending shows a positive selection towards microfinance borrowing as TT is greater than TUT. Group lending shows negative selection. Group lending, however, shows a positive selection to increase per capita income from microfinance, as a negative selection for borrowing can be confirmed. This result is consistent with the upward sloping MTE curve shown in Figure 3. The present analysis takes into account observed as well as unobserved heterogeneity, thus providing a complete picture of the relationship between treatment effects and selection. Negative selection implies that there are people who do not want to borrow.

The ATE for business income is negative for individual lending but positive for group lending. Group lending has a positive effect on business income. TT is greater than TUT for both individual and group lending, confirming a positive choice. The ATE for business expenditure is also negative for individual lending and positive for group lending. Group lending is valid for business expenditure. Business income and business expenditure are highly relevant as they have similar signs. On the other hand, individual lending shows a negative selection, and group lending a positive selection. The ATE for per capita consumption is negative, although not significant. Microfinance is not effective in increasing consumption. Both are also negative selections; the size of the difference between TT and TUT indicates that group lending is more negatively selected than individual lending.

This trend is also observed in food consumption. The ATE is negative for both individual and group lending. Both individual and group lending are negatively selected. Due to the size of the difference between TT and TUT, group lending has a stronger tendency towards negative selection than individual lending. Business-related ATE is significant, but not for per capita income or consumption, except for food consumption.

Table 5. Impact estimates of microfinance on different outcomes by type (total sample).

	Income		Enterprise Income		Enterprise Expenditure		Consumption		Consumption Food	
	Indi.	group	Indi.	group	Indi.	group	Indi.	group	Indi.	group
ATE	143.07	88.48	-2,070.01*	14,467.85***	-507.44	10,435.16***	-188.27	-51.43	-64.98*	-396.04***
	(301.04)	(541.37)	(1,228.64)	(2,451.73)	(948.50)	(1,995.60)	(215.57)	(367.20)	(33.39)	(72.58)
ATT	230.70	-91.61	2,220.53	18,349.40***	3,686.91*	13,316.00***	-239.69	-157.80	-109.67	-621.15***
	(614.51)	(794.58)	(2,508.03)	(3,598.48)	(1,936.19)	(2,929.01)	(440.04)	(538.95)	(68.16)	(106.53)
ATUT	-42.92	647.45*	-11,178.26***	2,431.39	-9,411.24***	1,501.25	-79.18	278.83	29.88	302.51***
	(439.60)	(334.98)	(1,794.19)	(1,517.05)	(1,385.10)	(1,234.82)	(314.79)	(227.21)	(48.76)	(44.91)
LATE	36.54	340.31	-7,349.28***	16,236.62***	-5,802.68***	11,471.03***	-63.98	105.62	2.31	-211.16***
	(199.57)	(448.57)	(814.51)	(2,031.47)	(628.80)	(1,653.53)	(142.91)	(304.26)	(22.14)	(60.14)
MPRTE1	63.43	401.11**	-6,060.13***	7,784.86***	-4,401.63***	5,474.33***	-140.68	132.77	-23.71*	-6.82
	(128.43)	(174.35)	(524.18)	(789.58)	(404.66)	(642.68)	(91.97)	(118.26)	(14.25)	(23.37)
MPRTE2	58.96	435.51**	-6,299.78***	7,610.65***	-4,623.17***	5,317.46***	-141.05	158.48	-22.31	27.27
	(133.34)	(171.80)	(544.20)	(778.04)	(420.12)	(633.29)	(95.48)	(116.53)	(14.79)	(23.03)
MPRTE3	44.79	462.19***	-7,012.96***	7,083.24***	-5,316.99***	4,923.85***	-133.10	174.61	-15.13	59.82***
	(159.56)	(169.50)	(651.21)	(767.61)	(502.73)	(624.80)	(114.26)	(114.97)	(17.70)	(22.72)
Observations	2,258	2,221	2,258	2,221	2,258	2,221	2,258	2,221	2,258	2,221

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Other parameters – LATEs and MPRTEs – are also shown. Carneiro, Heckman, and Vytlacil (2010) recently introduced policy-relevant treatment effects (PRTEs). We can use the estimated MTEs to calculate marginal policy-relevant treatment effects (MPRTEs), which can be interpreted as the average effect of making marginal shifts to the propensity scores. MPRTEs are fundamentally easier to identify than PRTEs (Carneiro et al., 2010) particularly because they do not require full support; marginal changes to propensity scores will not drive the scores outside the common support. There are three ways to define the distance to the margin. The first MPRTE, MPRTE1, corresponds to a marginal change in a variable entering the first stage, such as an instrument. MPRTE2 corresponds to a policy that would increase all propensity scores by a small amount, while MPRTE3 corresponds to a policy that increases all propensity scores by a small fraction. LATE is positive and significant for business income and business expenditure. This implies that microfinance borrowing increases business income. It is also negative and significant for group lending in food consumption. Group lending reduces food consumption.

Similarly, MPRTE1, meaning policy measures that change the propensity score, also has a positive impact. It has a positive impact on per capita income, business income, and business expenditure. For those who do not borrow, lending increased business income, business expenditure, and income per capita significantly. Policy measures that increase the probability of adoption as much as possible also increase yield.

4.4. The Poorest Segment of the Population

Figures 6-10 show the MTE curves for the poorest group below the median for each variable. As in the sample as a whole, there is a tendency for individual lending to fall to the right and group lending to rise to the right. However, the slope is greater for the poorest group. Individual lending is positively selected for the poorest, while group lending is negatively selected for this group. Figures 6-8 show that business income and business expenditure also fall to the right for individual lending and rise to the right for group lending. Per capita consumption in Figure 9 shows a negative selection, with both individual and group lending falling to the right. Group lending has a larger slope and is more likely to be a positive selection. Per capita food consumption in Figure 10 shows a rise to the right for individual lending and a fall to the right for group lending.

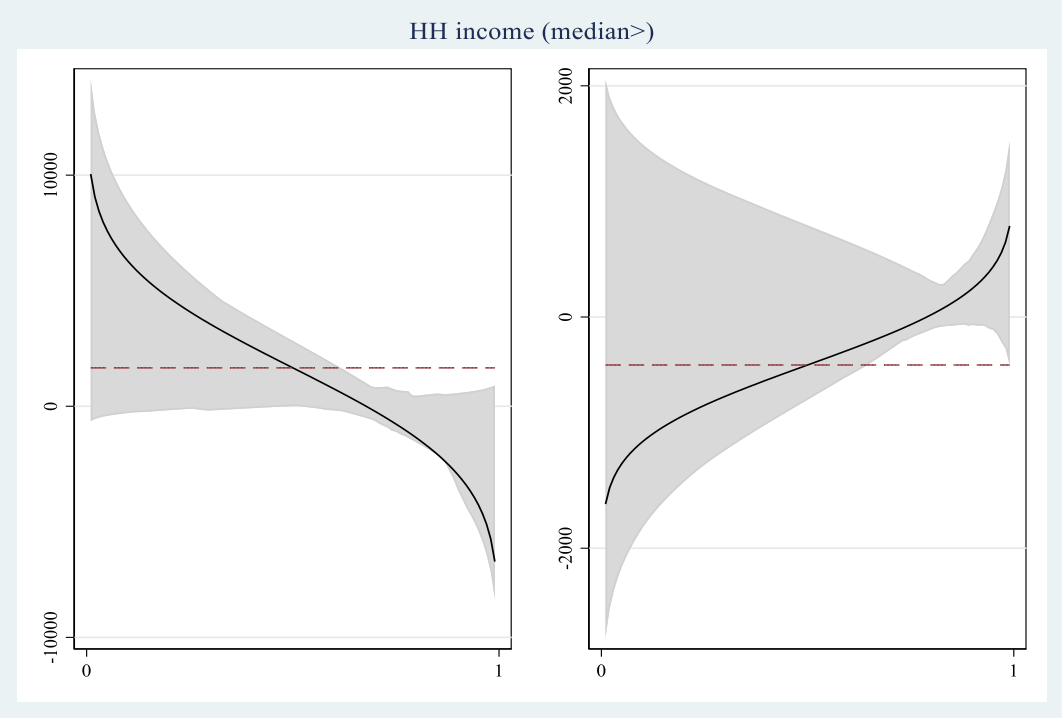

Figure 6. Distribution of the MTE for impact on household income (poorest).

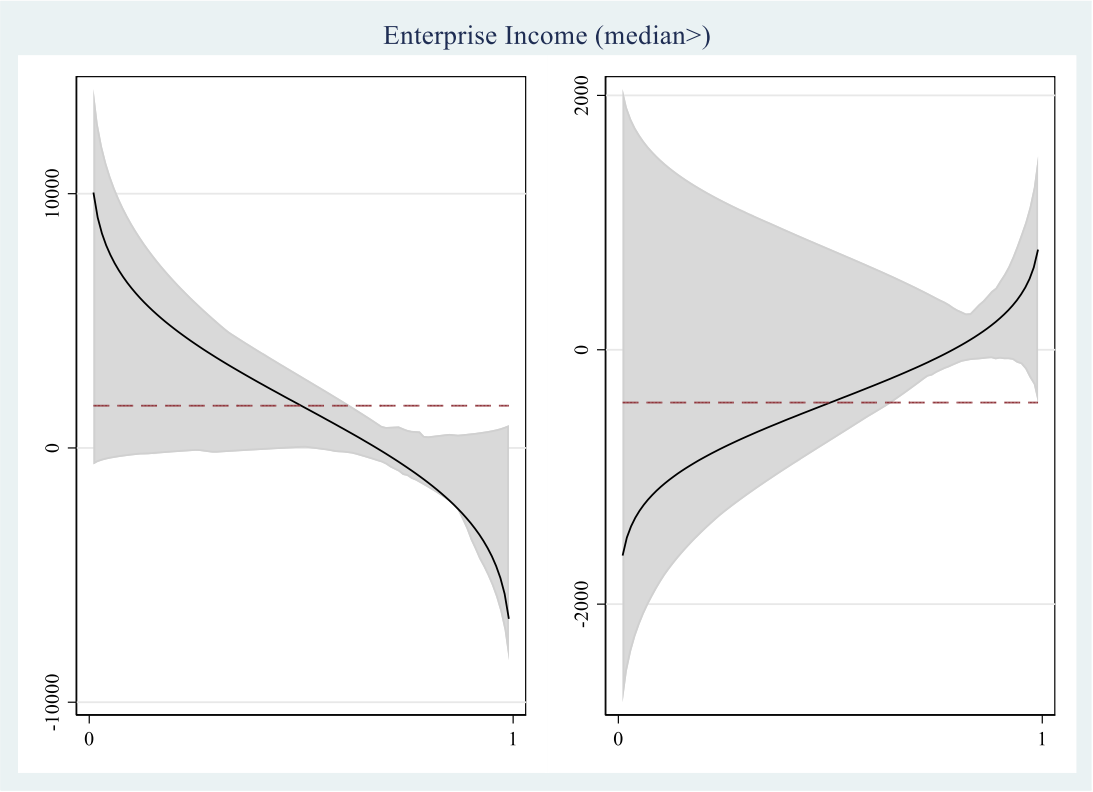

Figure 7. Distribution of the MTE for impact on enterprise income (poorest).

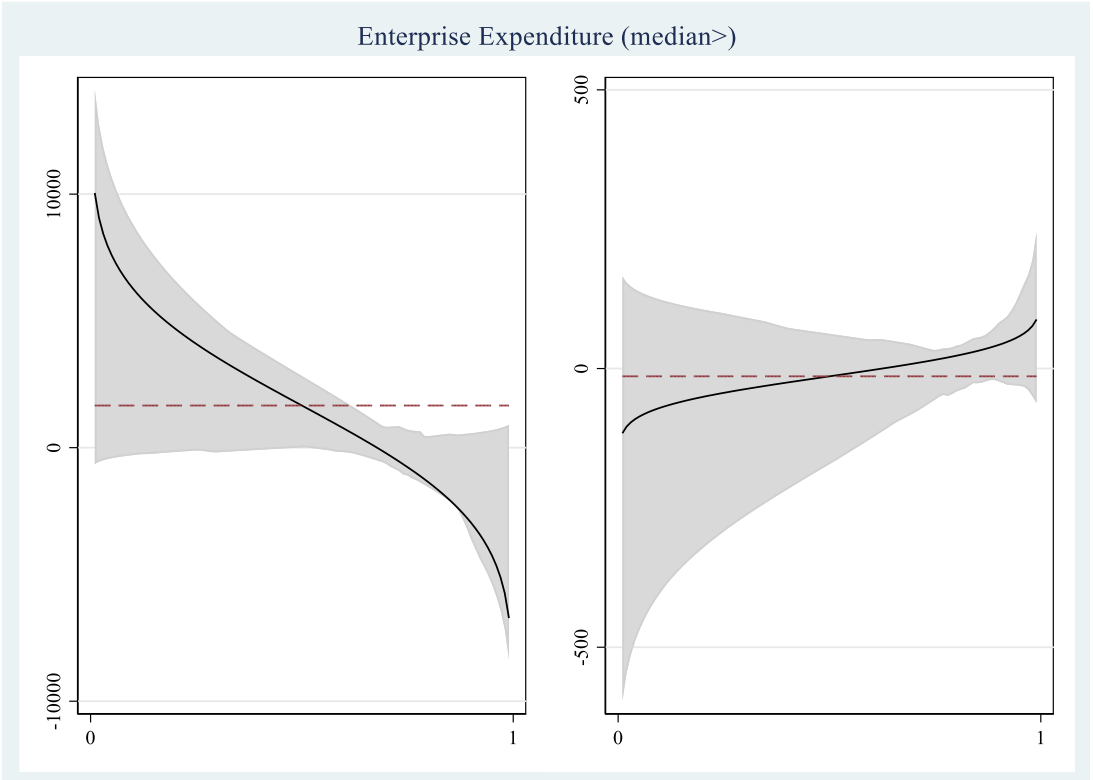

Figure 8. Distribution of the MTE for impact on enterprise expenditure (poorest).

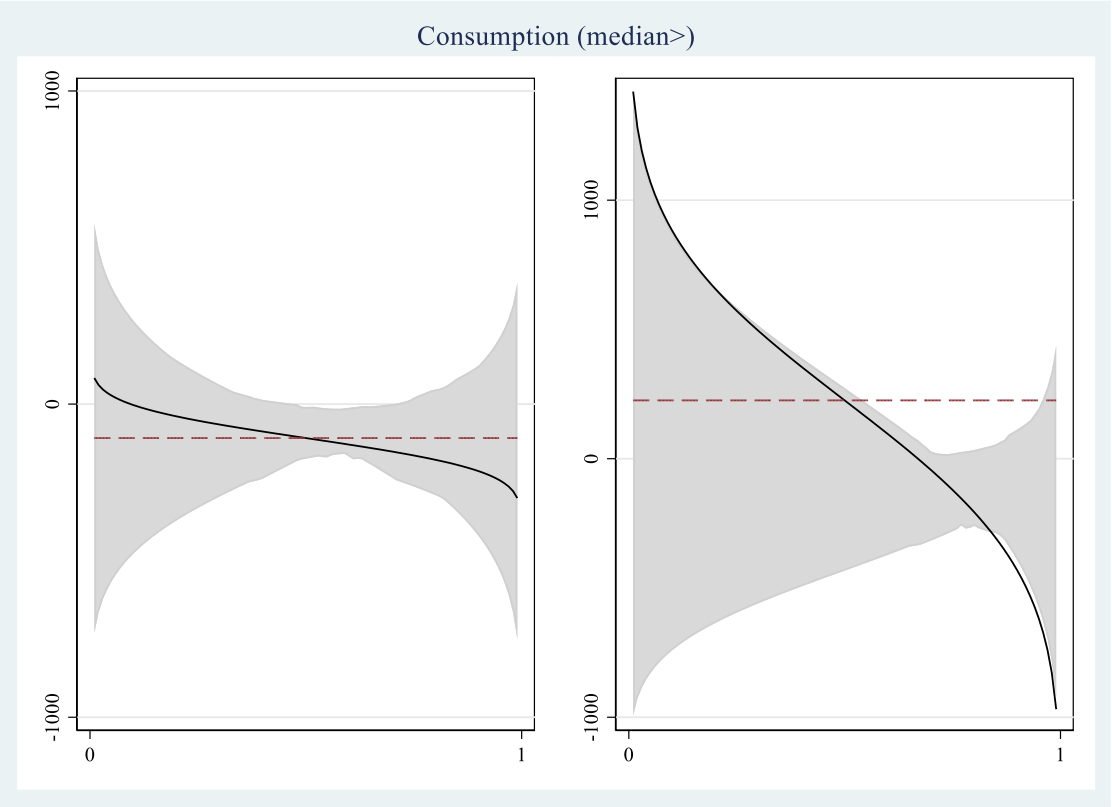

Figure 9. Distribution of the MTE for impact on consumption (poorest).

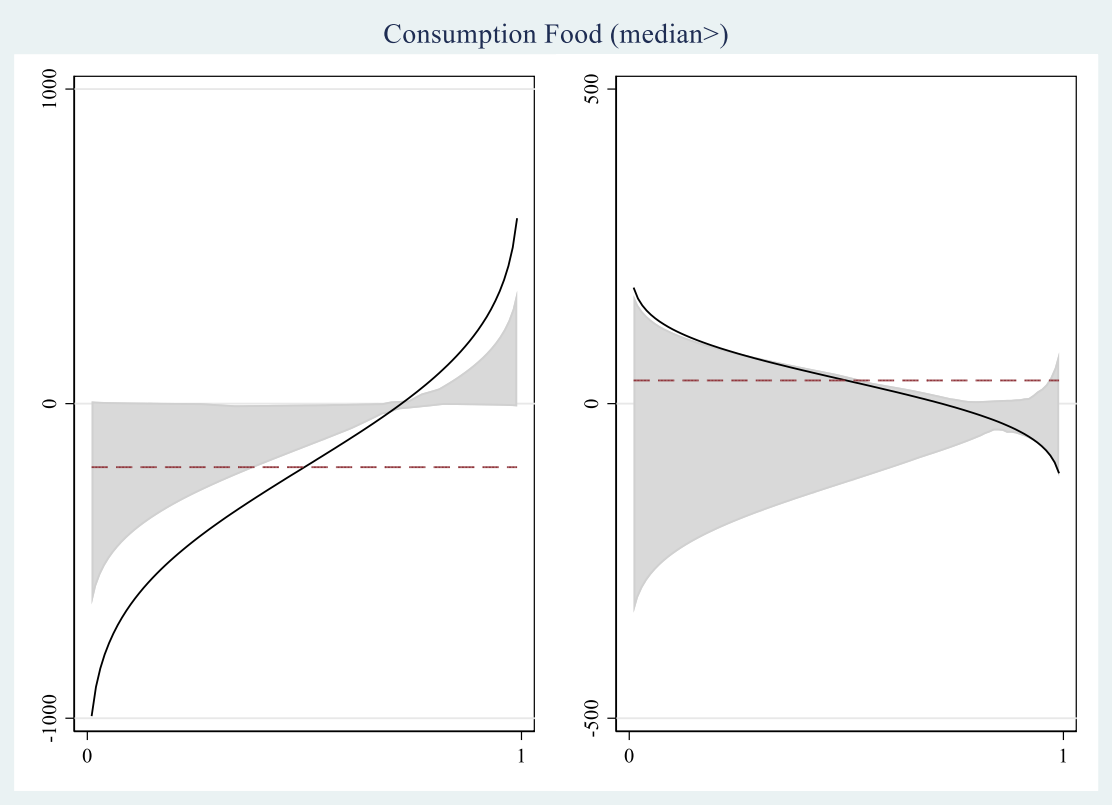

Figure 10. Distribution of the MTE for impact on food consumption (poorest).

Table 6. MTE of microfinance on different outcomes by microfinance type (poorest).

	Income		Enterprise Income		Enterprise Expenditure		Consumption		Consumption Food	
	Indi.	group	Indi.	group	Indi.	group	Indi.	group	Indi.	group
age	3.00	1.10**	3.00	1.10**	3.00	-0.01	-0.25**	0.10	-0.56***	-0.18*
	(1.83)	(0.56)	(1.83)	(0.56)	(1.83)	(0.07)	(0.12)	(0.13)	(0.14)	(0.10)
male	-54.20	-168.11***	-54.20	-168.11***	-54.20	-0.95	-1.28	65.46***	-7.71***	14.78**
	(36.93)	(54.64)	(36.93)	(54.64)	(36.93)	(9.16)	(11.49)	(21.85)	(2.32)	(7.15)
loanno	-1.73***	-1.45***	-1.73***	-1.45***	-1.73***	-0.02	-0.11	0.57***	0.75***	0.10
	(0.24)	(0.53)	(0.24)	(0.53)	(0.24)	(0.08)	(0.07)	(0.16)	(0.21)	(0.09)
soum	265.76	-124.13**	265.76	-124.13**	265.76	-6.69	-7.42	73.04**	-31.56***	8.26*
	(199.17)	(48.30)	(199.17)	(48.30)	(199.17)	(11.81)	(10.40)	(29.76)	(8.02)	(4.78)
f_ysource	-334.22	280.21***	-334.22	280.21***	-334.22	18.13	-31.82	-3.14	-24.88***	5.19**
	(214.38)	(92.66)	(214.38)	(92.66)	(214.38)	(16.53)	(36.44)	(7.48)	(5.87)	(2.11)
edulow	-909.74	-48.39	-909.74	-48.39	-909.74	18.80**	-12.51	130.41***	113.29***	11.01
	(654.32)	(63.33)	(654.32)	(63.33)	(654.32)	(9.34)	(67.54)	(40.76)	(31.27)	(7.38)
purp2	-321.72	-93.82*	-321.72	-93.82*	-321.72	16.40***	0.29	69.16***	51.36***	4.82
	(477.68)	(51.12)	(477.68)	(51.12)	(477.68)	(6.04)	(48.87)	(15.00)	(15.78)	(9.54)
purp1	1,409.89**	64.85	1,409.89**	64.85	1,409.89**	5.60	22.23	57.76**	-77.20***	-4.55**
	(642.02)	(47.03)	(642.02)	(47.03)	(642.02)	(3.68)	(36.01)	(26.95)	(19.12)	(2.02)
poor	1,023.51	-82.49	1,023.51	-82.49	1,023.51	-27.77	-96.78	-23.89	-193.13***	13.14
	(1,060.58)	(137.14)	(1,060.58)	(137.14)	(1,060.58)	(29.95)	(61.05)	(51.50)	(40.45)	(23.86)
Observations	1,171	1,064	1,171	1,064	1,171	1,547	1,150	1,113	1,160	994

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table 6 shows the MTE of microfinance on different outcomes by microfinance type. The results are presented for the poorest below the median for each dependent variable. For per capita income, borrowing to purchase factors of production was significant for individual loans, as was borrowing to purchase factors of production for fewer loans. For group lending, the higher the age, the lower the number of loans, the higher the source of income, and the more significant the purpose of borrowing was to purchase factors of production. The region dummies were also significant. Most importantly, there was a significant increase in variables that were not significant in the full sample but became significant when the sample was restricted to the poorest. If the aim is to increase incomes, the sample should be more narrowly focused on the poor and loans should be offered to those with the characteristics of the results of the analysis. In addition, since the sign of individual and group lending is the same, but the significant variables are different, loans should be offered to those who meet the conditions with significant variables. For business income, we obtained nearly significant variables for the whole sample, but the number of significant variables decreased when we narrowed the sample down to the poorest group. For individual lending, the variable for borrowing to purchase factors of production was more significant the lower the number of loans. In group lending, the variables for borrowing for processing purposes, but not for borrowing, increased with age; the smaller the number of borrowings and the greater the source of income, the greater the business income.

Business expenditure also yielded largely significant variables in the full sample, but narrowing it down to the poorest group reduced the number of significant variables. In individual lending, the smaller the number of borrowings, the more the borrowing was for the purchase of factors of production, and the more it increased. In group lending, the lower the level of education and the more the borrowing was for processing purposes, the more business expenditure increased. Concerning per capita consumption, individual lending increased with lower age. For group lending, consumption increased with the number of loans, with the source of income, with lower levels of education, with borrowing for the purchase of factors of production, and with borrowing for the processing industry. Regional dummies were also significant. The characteristics of those who increased their consumption differed significantly between group and individual lending. An important aspect of per capita consumption is that there were no significant variables in the total sample, but the number of significant variables increased significantly by focusing on the poorest groups. This information suggests the importance of targeting in maximizing the effectiveness of microfinance. Also, regarding food consumption, individual lending increased with lower age, a higher number of loans, lower source of income, lower level of education, borrowing for processing purposes, and not borrowing for the purchase of factors of production. Group lending increased with food consumption, the younger the age and the less the borrowing was to purchase factors of production. Regional dummies were also significant. It is important to note that focusing on the poorest not only changes the significant variables between income and consumption but also that group lending and individual lending have different significant variables and reversed signs. This is useful for targeting.

4.5. Impact of Microfinance on the Poorest

The results in Table 7 are those for the poorest below the median for each dependent variable. While business-related ATE was significant in the total sample, narrowing it down to the poorest group increased the number of variables for which business-related ATE was not significant, whereas per capita income and consumption were significant. The signs of individual and group lending are also often reversed compared to the full sample. This is very significant, as the sign of the ATE variable is more significant in the case of the group lending variable. Both business income and business expenditure were positively selected for individual lending and negatively selected for group lending. This trend is similar for per capita income and per capita consumption. Only for food consumption is there a negative selection for individual lending and a positive selection for group lending. If the preference for microfinance borrowing is different for each of the poorest groups, this means that different types of microfinance should be introduced at different income levels.

Table 7. Impact estimates of microfinance on different outcomes by type (poorest).

	Income		Enterprise Income		Enterprise Expenditure		Consumption		Consumption Food	
	Indi.	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**	**Indi.**	**group**
ATE	1,663.19	-415.04**	1,663.19	-415.04**	1,663.19	-13.98	-108.32***	225.66*	-201.93***	36.89
	(1,269.49)	(175.65)	(1,269.49)	(175.65)	(1,269.49)	(46.58)	(33.99)	(121.44)	(40.57)	(28.61)
ATT	3,515.45	-638.89**	3,515.45	-638.89**	3,515.45	-32.63	-61.90	460.45**	-381.61***	62.05
	(2,197.73)	(262.01)	(2,197.73)	(262.01)	(2,197.73)	(69.67)	(97.37)	(200.53)	(87.06)	(40.96)
ATUT	-2,256.32***	223.85**	-2,256.32***	223.85**	-2,256.32***	36.86	-189.74*	-365.47***	159.32***	-39.61***
	(837.94)	(109.48)	(837.94)	(109.48)	(837.94)	(25.06)	(102.17)	(99.23)	(59.51)	(13.50)
LATE	6,050.18*	-71.35	6,050.18*	-71.35	6,050.18*	-5.16	-189.06	-308.48***	245.23***	362.21
	(3,456.56)	(67.94)	(3,456.56)	(67.94)	(3,456.56)	(120.12)	(158.33)	(85.71)	(81.87)	(328.05)
MPRTE1	-21.56	-75.19	-21.56	-75.19	-21.56	12.36	-137.28***	-65.18	-53.07***	-4.89
	(488.85)	(66.27)	(488.85)	(66.27)	(488.85)	(17.76)	(31.36)	(41.87)	(13.82)	(10.02)
MPRTE2	-127.18	-28.40	-127.18	-28.40	-127.18	16.27	-139.37***	-83.95**	-47.46***	-11.24
	(454.12)	(65.02)	(454.12)	(65.02)	(454.12)	(16.58)	(33.11)	(41.29)	(14.15)	(9.35)
MPRTE3	-400.62	38.71	-400.62	38.71	-400.62	20.52	-150.93***	-109.03***	-25.46	-16.38*
	(371.82)	(68.58)	(371.82)	(68.58)	(371.82)	(15.23)	(46.75)	(40.67)	(16.43)	(8.62)
Observations	1,171	1,064	1,171	1,064	1,171	1,547	1,150	1,113	1,160	994

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

4.6. Using the Borrowing Ratio: The Amount of Microfinance Borrowing Divided by Each Variable

This section describes the use of the borrowing ratio, which is the amount of microfinance borrowing divided by the outcome. The reason for using borrowing ratios is that a very high borrowing ratio is more likely to lead to increased income and consumption. In addition, as many people have experience with borrowing, they know the repayment mechanism and are less likely to resist further microfinance borrowing. The ability of even those with sufficiently low borrowing ratios to influence outcome variables is an important perspective. Whether a borrower has a low borrowing ratio is an important indicator for normal financial institutions' lending decisions. The ability to borrow without offering collateral is a feature of microfinance; however, without collateral, the borrowing ratio can be considered even more important as a factor in ensuring repayment and success than in normal lending.

Figure 11 shows that per capita income falls to the right for both individual and group lending. Borrowers with higher borrowing ratios to per capita income are borrowing more, irrespective of the type of microfinance. Borrowers who can reduce their borrowing ratios, i.e. increase their per capita household (Figure 11) or business income (Figure 12) relative to the amount borrowed, are more reluctant to borrow. The ratio of borrowing to business income rises to the right for individual borrowers, whereas for group borrowers, ATE and MTE follow roughly the same line. Borrowers with higher borrowing ratios are less likely to borrow in individual lending, while in group lending, borrowing ratios do not affect whether or not a borrower borrows. The borrowing to business expenditure ratios in Figure 13 were found to have different trends, falling to the right for individual lending and rising to the right for group lending. This indicates a negative selection for group lending. Per capita consumption (Figure 14) and per capita food consumption (Figure 15) both rise to the right, regardless of the type of microfinance, and are positive choices. Group lending has a larger slope and a larger positive selection effect than individual lending.

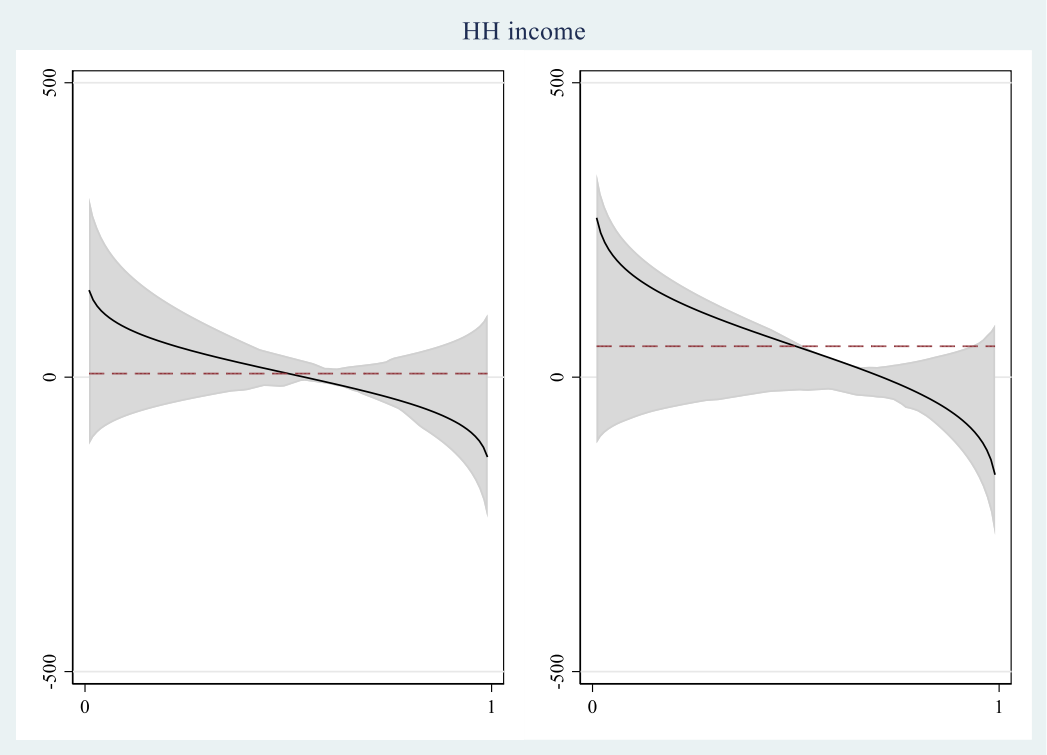

Figure 11. Distribution of the MTE for impact on household income (borrowing ratio).

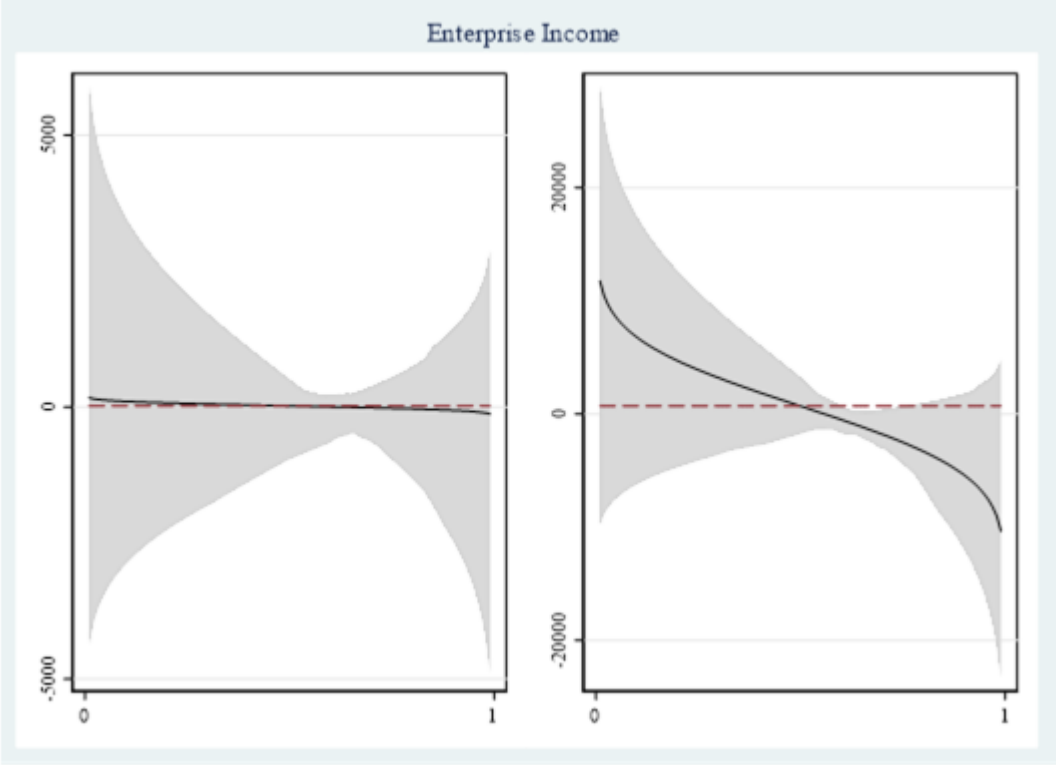

Figure 12. Distribution of the MTE for impact on enterprise income (borrowing ratio).

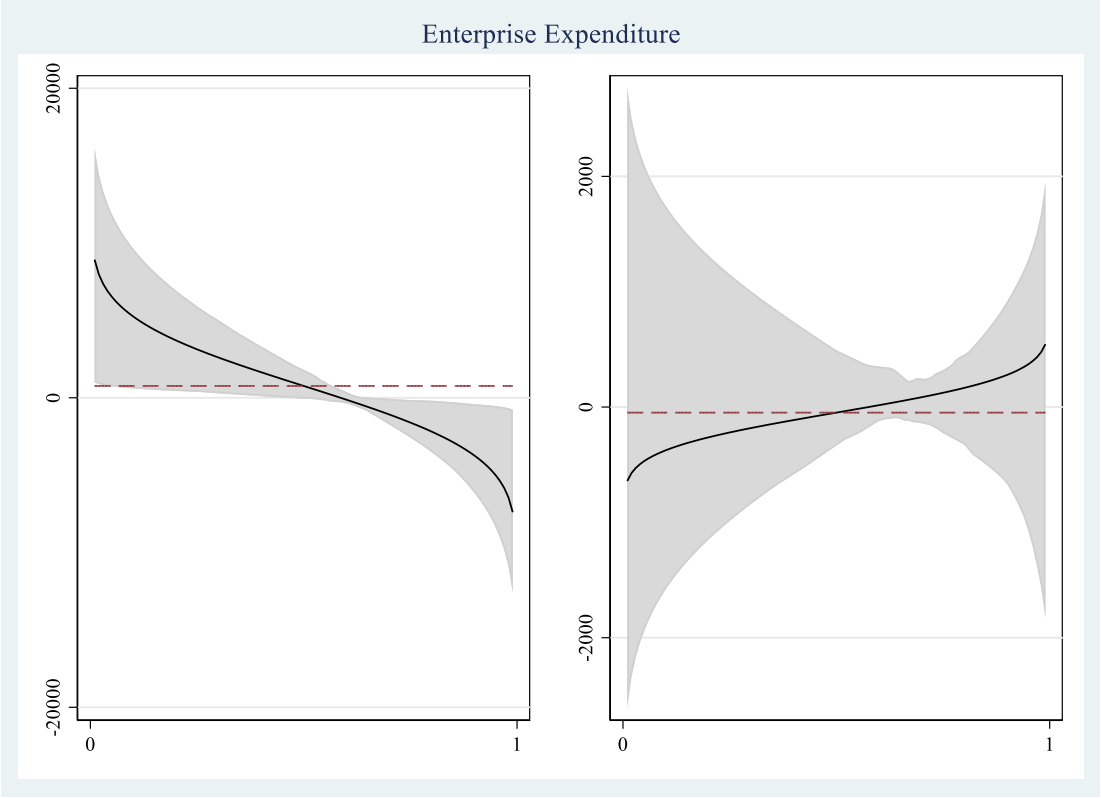

Figure 13. Distribution of the MTE for impact on enterprise expenditure (borrowing ratio).

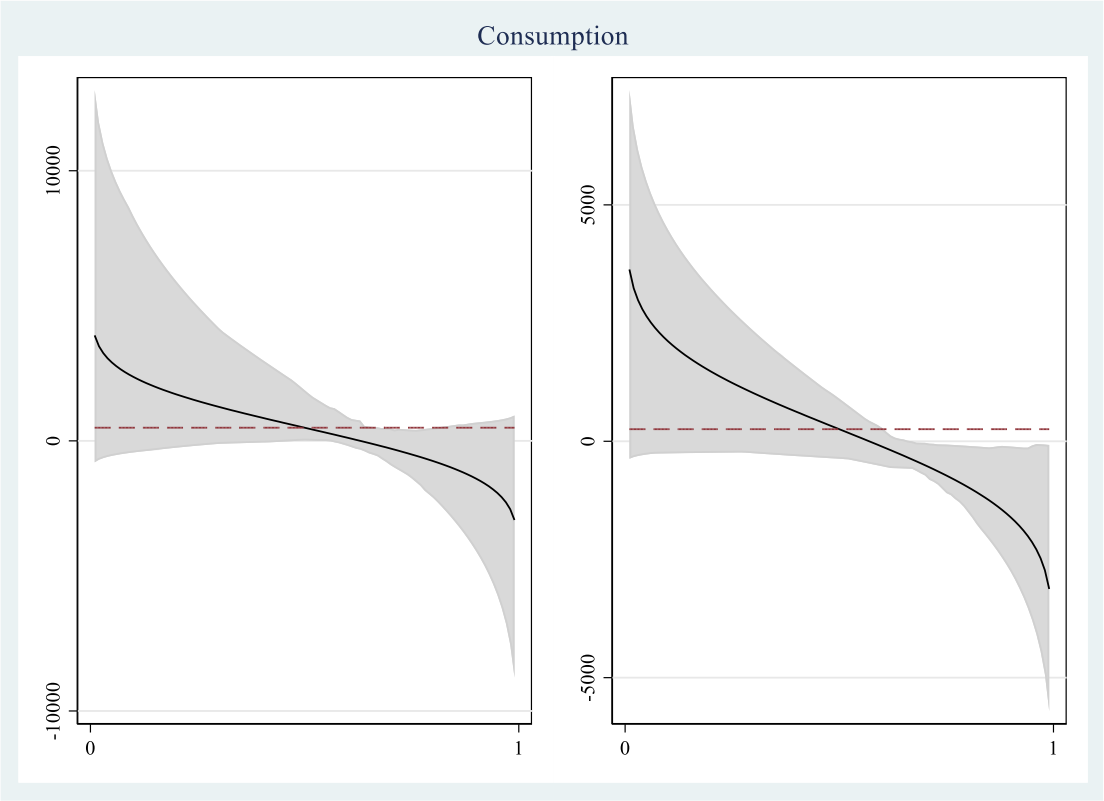

Figure 14. Distribution of the MTE for impact on consumption (borrowing ratio).

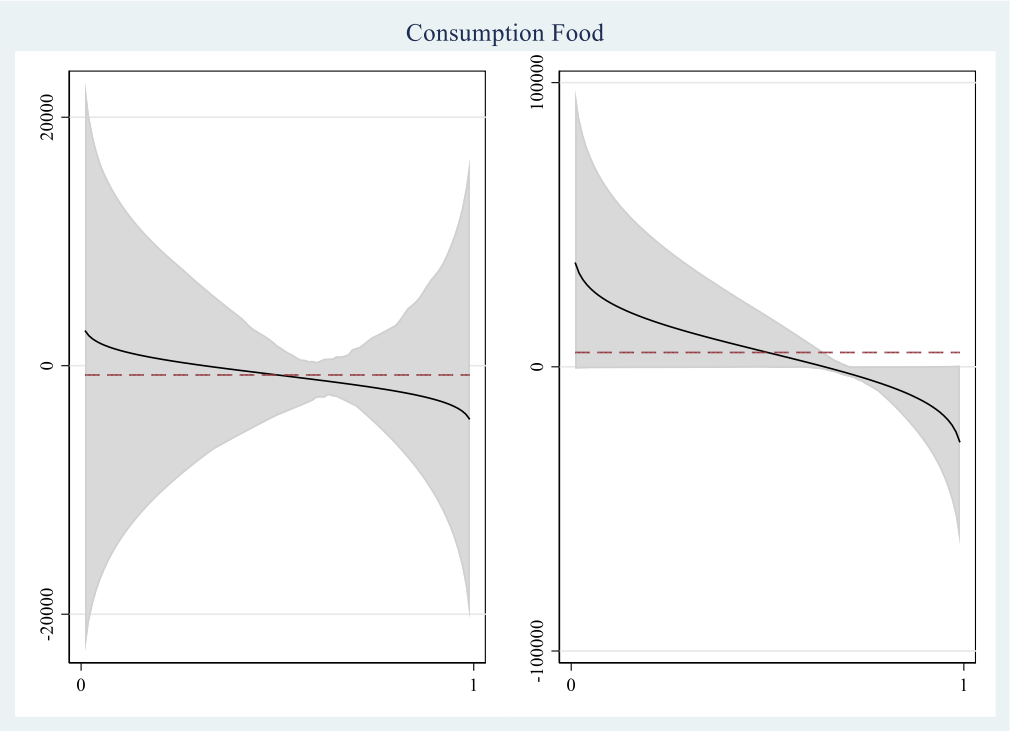

Figure 15. Distribution of the MTE for impact on food consumption (borrowing ratio).

Table 8. MTE of microfinance on different outcomes by microfinance type (borrowing ratio).

	Income		Enterprise Income		Enterprise Expenditure		Consumption		Consumption Food	
	Indi.	group	Indi.	group	Indi.	group	Indi.	group	Indi.	group
age	0.08*	0.07***	0.10	5.45*	3.73**	0.02	0.99	0.42	-0.11	7.20***
	(0.04)	(0.02)	(1.41)	(3.12)	(1.47)	(0.38)	(0.81)	(0.34)	(3.67)	(2.05)
loanno	5.39	23.16**	1.85	1,102.65	466.14***	-33.64	260.51***	283.88*	167.02	2,997.80***
	(5.33)	(10.51)	(173.53)	(1,366.18)	(180.27)	(165.60)	(99.14)	(150.77)	(451.20)	(896.62)
soum	0.00	0.08**	-0.19	3.46	0.58*	-0.46	0.30*	1.18**	0.15	10.75***
	(0.01)	(0.03)	(0.31)	(4.55)	(0.32)	(0.55)	(0.18)	(0.50)	(0.80)	(2.98)
f_ysource	0.86**	6.63***	3.53	259.50	-13.91	-8.51	4.07	75.03***	-5.56	586.43***
	(0.35)	(1.93)	(11.41)	(251.07)	(11.85)	(30.43)	(6.52)	(27.71)	(29.66)	(164.78)
edulow	-8.66	-16.12**	36.17	-783.70	-612.83***	58.33	-112.89	-203.70**	-243.35	-2,230.31***
	(6.29)	(6.29)	(204.62)	(817.92)	(212.56)	(99.14)	(116.90)	(90.26)	(532.04)	(536.80)
purp2	15.48**	7.50**	536.21***	870.66*	11.54	352.04***	61.28	246.48***	628.02	83.81
	(6.38)	(3.50)	(207.48)	(454.70)	(215.54)	(55.12)	(118.54)	(50.18)	(539.48)	(298.42)
purp1	13.90**	17.26***	456.25**	1,425.27*	185.17	330.35***	194.90*	353.65***	879.04	1,298.60***
	(6.36)	(5.68)	(207.02)	(737.69)	(215.06)	(89.42)	(118.27)	(81.41)	(538.27)	(484.14)
poor	15.67**	1.96*	115.56	190.76	631.63***	-1.36	299.53**	41.69***	460.49	384.25***
	(6.62)	(1.01)	(215.56)	(131.34)	(223.92)	(15.92)	(123.15)	(14.49)	(560.47)	(86.20)
Constant	-24.61***	11.86	-523.43*	-1,889.09	-227.53	-322.11*	-123.32	-387.73**	-1,991.99***	782.97
	(8.54)	(10.71)	(277.87)	(1,391.71)	(288.65)	(168.70)	(158.75)	(153.59)	(722.49)	(913.38)
Observations	3,930	3,893	3,930	3,893	3,930	3,893	3,930	3,893	3,930	3,893

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Table 8 shows the MTE of microfinance on different outcomes using borrowing ratios. For per capita income, the higher the age and the higher the source of income for individual loans, the more significant the purpose of borrowing was, both for processing and for the purchase of factors of production. It was also more significant for regional dummies and those who perceived themselves as poor. Group lending was more significant for older age, with a higher number of loans, a higher source of income, and a higher level of education, as well as for both borrowing for processing and borrowing to purchase factors of production. Most importantly, there was no significant variable for the usual variables, but dealing with borrowing ratios significantly increased the number of significant variables, which was also important to business income. For individual lending, only the borrowing purpose variable was significant. For group lending, in addition to the borrowing purpose variable, higher age increased business income. Business expenditure was also not a significant variable in the initial analysis, but using the borrowing ratio significantly increased the number of significant variables. In individual lending, higher age, higher number of loans, higher level of education, and perceived poverty increased. Both borrowing purpose variables were significant in group lending, but not in individual lending. It is possible that group loans were used for the indicated borrowing purpose, but individual loans were not necessarily used for business expenditures. In terms of per capita consumption, in individual lending, consumption increased with the number of loans, with borrowing to purchase factors of production, and among those perceived to be poor. For group lending, the higher the number of loans, the higher the source of income, the higher the level of education, and when borrowing for the purchase of factors of production or processing, the more consumption increased for those who perceived themselves as poor.

Importantly, the use of borrowing ratios significantly increased the number of significant variables. This information suggests the importance of targeting to maximize the effectiveness of microfinance. Concerning food consumption, group lending increased with age, the number of loans, the source of income, the level of education, borrowing to purchase factors of production, and perceived poverty. This reveals that it is not the usual income and consumption variables, but whether the borrowing is in accordance with the individual's level of income and consumption that is important.

4.7. Impact of Microfinance with the Borrowing Ratio as the Dependent Variable

Table 9 shows the impact of microfinance on different outcomes using the borrowing ratio. For business expenditure, ATE is positive for individual lending and negative for group lending. There is positive selection for individual lending and negative selection for group lending, while the ATE for consumption per capita is positive and significant.

The ATE for food consumption per capita is negative for individual lending and positive and opposite for group lending. As with per capita consumption, the choice was positive for individual lending and negative for group lending. Also, the lower the ratio of borrowing to per capita consumption, the more people borrowed. This indicates that the more experienced the borrower, the more they borrow. Individual lending is a negative choice, while group lending is a positive choice; the microfinance borrowing type influences preferences for per capita consumption. Per capita income and business income are associated with positive ATE and positive selection regardless of microfinance type. The other variables have positive and negative selections depending on the type of microfinance. Business expenditure and food consumption also have different ATE signs.

Table 9. Impact estimates of microfinance on different outcomes by type (borrowing ratio).

	Income		Enterprise Income		Enterprise Expenditure		Consumption		Consumption Food	
	Indi.	group	Indi.	group	Indi.	group	Indi.	group	Indi.	group
ATE	6.15	52.50**	23.25	704.11	766.11	-48.39	487.85*	255.40	-744.23	5,061.52**
	(13.88)	(23.10)	(451.72)	(3,001.74)	(469.25)	(363.86)	(258.07)	(331.27)	(1,174.51)	(1,970.05)
ATT	44.17	105.46**	68.05	3,362.64	2,961.07**	-192.67	1,411.76**	1,060.71*	217.36	12,681.12***
	(35.95)	(44.37)	(1,169.81)	(5,767.12)	(1,215.22)	(699.06)	(668.32)	(636.45)	(3,041.64)	(3,784.97)
ATUT	-50.73**	-42.52**	-43.74	-4,065.70	-2,517.44***	210.46	-894.25**	-1,189.55***	-2,182.70	-8,609.18***
	(22.98)	(19.66)	(747.69)	(2,555.65)	(776.71)	(309.78)	(427.16)	(282.04)	(1,944.06)	(1,677.28)
LATE	-26.13***	-1.65	-36.26	-1,714.60*	-957.01***	-14.99	-297.66*	-501.47***	-1,626.19**	-2,195.56***
	(8.59)	(7.16)	(279.48)	(930.20)	(290.33)	(112.75)	(159.67)	(102.66)	(726.68)	(610.49)
MPRTE1	-9.00	18.67*	5.84	-993.90	-112.46	43.56	115.83	-257.17	-1,128.74*	199.94
	(7.05)	(11.07)	(229.44)	(1,439.12)	(238.34)	(174.44)	(131.08)	(158.82)	(596.56)	(944.49)
MPRTE2	-10.05	15.15	6.17	-1,188.27	-166.95	53.19	97.26	-323.10**	-1,152.81**	-354.85
	(6.86)	(10.35)	(223.15)	(1,345.16)	(231.81)	(163.05)	(127.48)	(148.45)	(580.20)	(882.83)
MPRTE3	-14.18**	6.90	1.81	-1,605.97	-404.99*	75.61	-2.42	-450.79***	-1,256.83**	-1,550.57**
	(6.36)	(8.79)	(206.85)	(1,142.87)	(214.88)	(138.53)	(118.17)	(126.12)	(537.83)	(750.07)
Observations	3,930	3,893	3,930	3,893	3,930	3,893	3,930	3,893	3,930	3,893

Note: Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

5. CONCLUSION

This study has examined the factors that determine whether people borrow after being allocated individual and group microfinance loans through randomization. Efficiently increasing income and consumption through microfinance requires knowledge of the characteristics of individuals who choose to borrow and which allow their income and consumption to increase, by type of microfinance. Using MTE, results can be obtained that reflect the heterogeneity of the borrowers. The analysis has shown that the test of intrinsic heterogeneity is highly significant. Evidence of the existence of intrinsic heterogeneity in the data was obtained, confirming the validity of the MTE framework. Specifically, the following results were obtained: first, there are types of borrowers who actively borrow and those who do not borrow, and these characteristics are reflected in the type of microfinance; second, there are different types of microfinance suitable for different borrowing purposes; third, a comparison between the poorest and the less poor borrowers reveals different types of suitable microfinance; fourth, the attributes that increase income and consumption through borrowing differ for different groups.

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