

Credit Source and Consumption in Mongolia: Do Microloans and Informal Loans Impact Consumption Differently?

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Abstract

This paper examines the relative impacts of formal microloans and informal loans on the change in consumption of households in rural Mongolia. Many economic development studies evaluate the impact of one loan source on consumption. This study makes important contributions to the literature by simultaneously considering how formal and informal loans impact change in household consumption. I test two models, an unrestricted model with formal and informal loan amounts as separate variables and a restricted model of total loan amounts. I find no statistically significant difference between the two models regardless of consumption type. The majority of loan coefficients in both models are statistically insignificant. However, I find some statistically significant loan coefficients in the food and durable consumption models. Total loans and formal loans coefficients are both positive and statistically significant with respect to percentage change in durable consumption. In addition, informal loans coefficient is statistically significant and positive with respect to percentage change in food consumption.

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1 Introduction

Prior to the rise of microfinance institutions (MFIs), credit-constrained individuals often relied on informal money-lending networks to get the necessary funds for consumption smoothing. Unlike the small business loans MFIs offer, informal loans from friends or family can generally be used however the borrower desires. In reality, microloans intended for business activities are used for a variety of investment, savings, and consumption activities just like their informal counterparts (Banerjee et al., 2013; Attanasio et al., 2015). A 2015 survey of 40 Mongolian villages find that around 75 percent of all microloans were partially used for consumption rather than the business investment they were intended for (Attanasio et al., 2015). Despite the many rules MFIs may have, some lending requirements are easier to enforce than others. Ensuring that loans are spent on their stated business purposes and not consumption is notoriously difficult. With low enforcement of loan use on business activities, I hypothesize that formal loans (microloans) and informal loans have the same impact on borrowers' change in consumption.

Most research on microcredit and informal lending studies whether crowding out of informal lending occurs when an MFI starts lending in a region (Banerjee et al., 2020; McKernan, Pitt, and Moskowitz, 2005; Tarozi, Desai, and Johnson, 2015). These studies consider how formal and informal networks impact each other, but not how they may work together. I contribute to the literature by examining the relative impact of formal and informal loans on changes in consumption rather than studying them separately. Furthermore, I examine different types of consumption in addition to total consumption. I expect loan impacts to be larger for changes in food, durable, and non-durable consumption compared to total consumption.

Even if borrowers use formal and informal loans for similar purchases, there

are non-trivial differences between the two types of loans. While microcredit has the potential to fill in for credit-constrained markets, its main disadvantage is the time it takes to acquire and its rigid repayment schedule. When a household experiences an unanticipated shock, microcredit may not be an easily accessible form of credit when immediate access to funds is necessary. Informal loans often do not face this time constraint and may be used for consumption smoothing more often than microloans. However, in the event of an aggregated shock, informal credit markets may be unable to meet the increased demand that a formal MFI could (Rabanni and Hassan, 2021). In this scenario, microloans may be the more readily accessible option to borrowers and have a larger impact on consumption as a result.

I investigate the relative impacts of formal and informal loans on consumption using panel data from Attanasio et al.'s (2015) 2008 Randomized Control Trial conducted in Mongolia. The data consists of two panels, a baseline survey just prior to formal loan disbursement and a follow-up survey 19 months later. I compare two Difference in Difference models, an unrestricted model where formal and informal loans' impact on consumption can be different, and a restricted model where the impact of the formal and informal loan on consumption is constrained to be the same. Finally, I perform an F-test to determine whether the restricted or unrestricted model is preferred.

I find that regardless of consumption type (total, food, durable, and non-durable), there is no statistically significant difference between the restricted and unrestricted models. The percentage change in durable and food consumption are the only regressions with statistically significant loan coefficients. The total loans coefficient in the restricted model and formal loans coefficient in the unrestricted model are both positive. This suggests that every 1000 MNT of total loans (formal loans) is associated with a 0.054 percent (0.059 percent) in-

crease in durable consumption. The informal loan coefficient in the unrestricted model is also positive and statistically significant, but total loans remain insignificant in the restricted model. Thus, for every 1000 MNT of informal loans, food consumption increases by 0.152 percent. All other loan coefficients are statistically insignificant regardless of consumption type or model. My results remain unchanged with the inclusion of robustness checks that include additional variables, outliers, and different model specifications.

The rest of my paper is structured as follows. Section 2 provides some institutional background on microfinance institutions and lending in Mongolia. Section 3 summarizes the current literature surrounding microfinance, informal loans, and consumption smoothing. Section 4 provides the economic theory behind positive and negative relationships between loans and changes in consumption. Section 5 presents my regression models and data. Section 6 presents my results. Section 7 discusses my findings, and section 8 concludes.

2 Institutional and Regional Background

In the decades since Muhammad Yunus's 2006 Nobel peace prize, the success of Bangladesh's Grameen Bank became the standard for many microfinance institutions lending operations. While MFIs offer a variety of services including savings and insurance, they are most well known for microloans. Grameen's average loan amount is equivalent to a mere 100 USD. Loans can be used for a variety of purposes, but are often required to be used for buying the necessary investments to start a small business, such as sewing machines, livestock, or other equipment (Grameen Bank, 2021). In theory, micro-entrepreneurs should receive high returns on capital, making them more likely to repay their business loans than borrowers who take out personal loans (Field et al., 2013). Thus, many MFIs attempt to restrict borrowers from using loans for personal use.

To be eligible for loans, borrowers must first join a small lending group within the village. Typically, loans are given out and repaid each lending period in public group settings. This joint-liability model is thought to encourage loan repayment both through the benefit of shared information from group members and the potential social costs of default (Grameen Bank, 2021). As more research is done, the lending practices of some MFIs are beginning to move away from Grameen’s original joint-liability model (Armendariz de Aghion and Morduch, 2000). New and existing MFIs are starting to lend in more urban areas, require collateral, offer individual-liability loans, and allow loans for private purchases (Banerjee et al., 2015). These changes in lending may be due to the results of economic research on the efficacy of microloans (Banerjee et al., 2013; Banerjee et al 2015; Karlan, Zinman, 2008; Field et al., 2013).

2.1 Mongolia

Like most research in development economics, regional and cultural contexts are important factors when examining economies. Mongolia’s main economic activity is centered around agriculture and mining with a GDP per capita of 2,137 USD in 2008 (World Bank, 2020).¹ Around 25 percent of Mongolians are nomadic herders, who account for a large percentage of those living in poverty in Mongolia (Hiraga, Uochi, and Doyle, 2020). Unlike the densely populated countries of India and Bangladesh where microfinance started, the population density of Mongolia is only 2 people per square kilometer (World Bank, 2020).

Due to these regional differences, MFIs in Mongolia operate slightly differently than the microlending programs in India or Bangladesh. The low population density coupled with the nomadic lifestyle of many Mongolians makes group-lending somewhat difficult. The MFI that I study, XacBank, of-

¹Tugrik is the official currency of Mongolia, and I use it’s abbreviation MNT when referring to values in the local currency.

fers individual-liability or group-liability loans at random to different villages but does not rely on public repayments common in most joint-liability programs. With these regional nuances in mind, my results are more pertinent to low-income, rural, and nomadic countries similar to Mongolia rather than the densely populated countries where microfinance originated.

3 Literature Review

Most microcredit research aims to answer the question, do microloans help lift people out of poverty? Researchers look at microcredit's effects on informal lending networks, income, health, education, and consumption (Banerjee et al. 2015). However, an ongoing debate exists around the efficacy of microloans and the general impact credit has on poor people's livelihoods.

3.1 Microcredit and Poverty Alleviation

Proponents of microcredit argue that access to credit is a fundamental human right (Grameen Bank, 2021). Microloans may help bring people out of poverty by reducing their credit constraints in two ways: First, microloans may allow households to invest in business activities and gradually increase their income as their business grows. Second, access to credit may allow households to consumption smooth when they experience negative shocks such as natural disasters or illness (Grameen Bank, 2021). If households are borrowing to compensate for loss in consumption, this creates a difficult empirical dilemma because we can not determine how much worse off households would be if they had no access to credit. Therefore, studies that find neutral or even negative effects of microcredit on income or consumption may not necessarily be an indicator of microcredit failing to perform (Attanasio et al., 2015; Banerjee et al., 2015).

However, not everyone views ubiquitous access to credit as positive. Critics

of microfinance suggest that most borrowers will not see significant changes in their income and will instead get trapped in debt cycles (McIntosh and Wydick, 2005; Rahman, 1999; Schicks, 2013). These debt cycles are likely caused by two key factors common in microlending: high interest rates and short turnaround in repayment periods. MFI's are known for notoriously high-interest rates on microloans. For example, the average APR of Grameen bank is around 20 percent and XacBank is around 26 percent. These high interest rates are fairly typical of other microfinance institutions around the world and make it difficult for micro-entrepreneurs to turn a profit (Banerjee et al. 2015). Loan repayment schedules often begin within the first month of acquiring a business loan and may not allow for the necessary time needed to make profitable business investments. Field et al. (2013) find that the addition of a grace period results in more profitable business investments for borrowers, but simultaneously higher rates of default. This suggests an undesirable trade-off between the success of borrowers' businesses and the viability of MFI lending operations.

Empirically, most research indicates that microcredit has neutral or insignificant effects on total consumption, health, education, and measures of women's empowerment (Attanasio et al., 2015; Banerjee et al., 2015; Crepon et al., 2015; Tarozzi, Desai, and Johnson 2015). This suggests that microcredit is neither completely uplifting nor as harmful as its proponents and critics might imply. For the few studies that do find significant non-negligible results, there does seem to be a mildly positive relationship between microloans and increased food consumption and short-term income (Attanasio et al., 2015; Banerjee et al., 2015; Kaboski, Townsend, 2012). Negative relationships include decreases in asset growth, reduced income from casual labor, and decreased work hours for teenagers when the adults in their family start a business (Attanasio et al., 2015; Kaboski, Townsend, 2012; Banerjee et al 2015) These mixed and insignificant

results, while perhaps disappointing, are not entirely surprising. As I explain in later sections, economic theory indicates a variety of relationships between credit and changes in consumption.

3.2 Intersection of Formal and Informal Lending

Any discussion of poor households' access to formal credit must also acknowledge the informal credit networks in place. The consequences of both sudden increases and decreases in formal credit access can have spillover effects in the informal credit market (Banerjee et al., 2020; McKernan, Pitt, and Moskowitz, 2005; Saxena, Bindal, LeMay-Boucher, 2020). Researchers are mainly concerned with whether increased access to formal credit crowds out informal lending networks. Depending on the relative accessibility of formal loans and the motives of informal lenders, access to formal credit can increase or decrease informal lending (Banerjee et al., 2020; McKernan, Pitt, and Moskowitz, 2005). However, it is difficult to empirically determine the mechanism driving these trends.

If formal credit is easily accessible, then crowding out may occur if borrowers view informal loans as easily substitutable for formal loans. Where borrowers previously relied on family or friends for access to informal loans, they may now seek out formal loans as an alternative. However, if formal credit is not accessible to the general population, informal lending may increase. If lenders in informal networks have increased access to credit, they may be able to lend or transfer more funds to households who are denied formal loans. Because of differences in experiment design and cultural norms, it is difficult to determine what the dominant theory is.

For the studies that do attempt to determine MFIs impact on the informal market, there is no clear trend on how informal lending changes. In Ethiopia, Tarozzi, Desai, and Johnson (2015) find no change in informal lending after

the randomized introduction of MFIs. In northern Mongolia, Attanasio et al. (2015) find that increased access to formal credit is associated with increases in informal transfers, but do not evaluate informal lending. In rural Morocco, Crepon et al. (2015) find a small but insignificant substitution of informal loans when an MFI starts lending. In India, Banerjee et al. (2020) find that increased access to credit from MFIs generally decreases informal networks. However, this reduction in informal networks occurs even among households who did not (or were unlikely to) borrow from MFIs. These households, in particular, lost more in informal loans than they were able to make up for from microloans, and saw a decrease in overall access to credit.

3.3 Credit and Consumption Smoothing

Although many of the world’s poorest regions lack formal credit, households still find ways to smooth their income and consumption. Some research finds that informal markets can account for a substantial proportion of household income and consumption smoothing ability (Morduch, 1995). Relatively better-off poor households may even see little-to-no gaps in their desired and actual ability to consumption smooth (Morduch 1995). However, a household’s ability to smooth consumption is also dependent upon the social structure of regions. In India, Saxena, Bindal, and LeMay-Boucher (2020) find that marginalized groups, such as lower castes and Muslims, experience larger negative impacts on consumption when there is a sudden restriction in access to credit.

Most studies find no change in consumption with the introduction of MFI lending (Attanasio et al. 2015; Banerjee et al., 2013; Crepon et al. 2015). However, some recent studies find different theoretical and empirical results when considering different types of consumption (Attanasio et al. 2015; Banerjee et al, 2015). In a model presented by Banerjee et al. (2015), they theorize

that more credit should (slightly) increase borrowers' incentives to buy durable goods. However, they note that this increase in durable consumption will likely come at the expense of reduced non-durable or even total consumption. Attanasio et al. (2015) also find mixed results of microloans' impact on consumption depending on the type of consumption examined. They find that while microloans have a negligible impact on total consumption, they do have a positive impact on food consumption.

Motivated by the findings of Attanasio et al. (2015), I evaluate the relative impact that microloans and informal loans have on various measures of consumption, not just total consumption. I hypothesize that microloans obtained in a limited liability setting (inability to enforce how loans are used) will have similar positive effects as informal loans when households attempt to smooth their consumption. The findings of my research could have implications for MFIs lending in regions similar to Mongolia, as requiring loans be used only for entrepreneurial activities may be ineffective and in some cases unnecessary.

4 Economic Theory

To examine the relationship between formal and informal loans' impact on consumption, consider a two-period model of household consumption with credit constraints. Households attempt to maximize utility (U) by choosing optimal present (C_0) and future consumption (C_1), subject to the following constraints:

$$\begin{aligned}
 &MaxU\{U(C_0) + U(\beta C_1)\} \\
 &C_0 \leq Y_0 + (1 - \delta)L_0 \\
 &C_1 \leq Y_1 + P(\delta L_0) - (1 + r)L_0 \\
 &L_0 \leq L_{max} \\
 &\delta \leq 1
 \end{aligned}$$

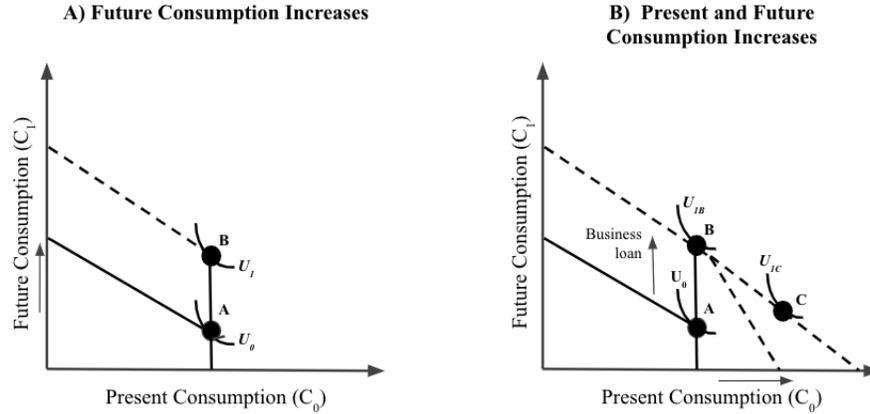
where Y_0 and Y_1 are income in the present and future periods, respectively. L_0 is the formal or informal loan amount in the present period with an associated interest rate r . Households are credit constrained, meaning L_0 is less than the desired loan amount L_{max} . δ is the fraction of loans used for business purposes and $(1 - \delta)$ is the fraction used explicitly for consumption purposes. If formal business loans have high enforcement high, δ will be close to 1. $P()$ any business profits a household may have and is a function of the loan amount. Finally, β is a discount factor. Many factors go into a household's decision of when and where to look for credit. Time frames, accessibility, loan use, and household shocks all inform the kinds of loans households seek and whether those loans impact consumption positively or negatively.

4.1 Loan Relationships to Changes in Consumption

Empirically, microloans' impacts on consumption tend to be mildly positive (Banerjee et al. 2015). Economic theory presents a few possible mechanisms behind this result. Figure 1a shows a classic story of income effects as increased access to credit expands a household's future budget constraint. Assuming both types of consumption are normal goods, this expanded budget constraint allows households to increase consumption tomorrow without having to decrease consumption today (point B) resulting in a positive change in future consumption. Alternatively, if the budget constraint were to expand in both periods, both current and future consumption would increase resulting in a positive change in overall consumption.

Figure 1b considers the consequences of different abilities to monitor and enforce loan use. The figure shows three possible levels of loan enforcement and their associated optimal bundles. The stricter the loan enforcement, the harder and more costly it is to increase even one unit of current consumption. If loans

Figure 1: Positive Changes in Consumption

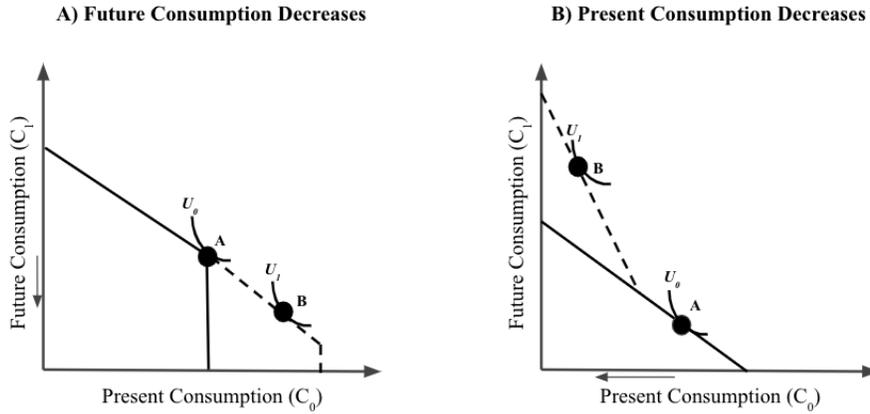


are perfectly enforceable, then the entirety of the loan must be spent on business expenses (point B) so there is no change in current consumption. However, if the costs (and thus enforcement ability) are low enough, it might be utility-maximizing to use some of the loan money towards increased consumption (point C) resulting in a positive change in consumption.

In addition to these positive relationships, there are a few scenarios where loan relationships may be negative with respect to changes in consumption. One such scenario is consumption loss due to a major household shock, such as job loss or illness of a family member. Households may borrow in order to prevent further serious drops in consumption, but loans alone might not be able to recover the full loss. Change in consumption may be negatively impacted as a result, but not to the extent it would have suffered if the household did not borrow.

Another possible relationship can be seen in figure 2a when the introduction of MFIs or informal networks expands a credit-constrained household's budget constraint in the present period. This would allow households to borrow their desired loan amount and move past the "kink" in their original budget con-

Figure 2: Negative Changes in Consumption



straint (point A) and reach their optimal consumption bundle (point B). By borrowing, households trade more consumption today for less consumption tomorrow, resulting in a negative change in consumption from the present to the future period.

Figure 2b depicts the case where credit markets are able to expand a household's budget constraint for consumption in the future period. Households can increase future consumption by using loans for consumption goods or by investing in their business now to increase future profit. When households want to make expensive business investments, loans might not always cover the full fixed cost. To afford the investment, households may temporarily reduce their present consumption (point B) to get the additional funds needed to make the purchase. This results in a negative change in present consumption, but a positive change in future consumption. Alternatively, households could have an ambiguous change in total consumption if they decrease other forms of consumption, such as non-durable goods, to buy durable goods. In this instance, a household's future total consumption may go unchanged, but different components of future consumption may see positive or negative changes.

Empirically determining which of these mechanisms represents reality is a difficult task. The following section discusses the econometric model and methodology I use to add to this framework.

5 Regression Models

My basic research question is: do microloans and informal loans have the same effect on change in consumption? To test this, I construct two difference-in-difference (DID) models and run an F-test to determine whether the restricted or unrestricted model is preferred. Equations (1) and (2) build off of models presented by Attanasio et al. (2015). Equation 1 is the unrestricted model that allows for the size of the effect of formal microloans and informal loans on change in consumption to be different. Model 2 restricts the size of the effect formal and informal loans have on change in consumption to be the same.

$$(1) \% \Delta C_{iv} = \beta_0 + \beta_1 MFI_{iv} + \beta_2 INF_{iv} + \beta_3 P_v + \beta_4 \% \Delta Y_{iv} + \beta_5 S_{iv} + \beta_6 H_v + \epsilon_i$$

$$(2) \% \Delta C_{iv} = \alpha_0 + \alpha_1 (MFI_{iv} + INF_{iv}) + \alpha_2 P_v + \alpha_3 \% \Delta Y_{iv} + \alpha_4 S_{iv} + \alpha_5 H_v + \epsilon_i$$

where $\% \Delta C_{iv}$ is the percentage change in consumption for individual i in village v .² MFI_{iv} is the loan amount taken from microfinance institutions. INF_{iv} is the loan amount taken from informal sources such as a friend or family member. P_v is a dummy variable for each province. $\% \Delta Y_{iv}$ is the percentage change in household income. S_{iv} is a vector of dummy variables indicating whether a household experienced a shock in a certain time period, such as illness, death, job loss, robbery, or natural disaster. A shock takes the value 1 if a shock was experienced in the follow-up period but not the baseline, -1 if experienced in the

²In addition to total consumption, I also run regression on durable, non-durable, and food consumption.

baseline but not the follow-up, and 0 if never experienced. H_v is a control vector of household characteristics including age (and age squared) of the respondent, household size, religion, ethnicity, marital status, and education level. ϵ_i is the error term. β and α are the regression coefficients associated with each variable and I am primarily interested in how β_1 and β_2 compare to α_1 .

5.1 Limitations

In regards to model specification, there are some concerns in using a difference-in-difference approach as opposed to using post-treatment data. This is primarily due to DID's power being limited in cases of high autocorrelation. However, this is infrequently an issue for the micro-level data I use. In line with Attanasio et al. (2015), I use the DID approach, as they find autocorrelation to be below the 0.5 benchmark.

One limitation of my analysis is the small number of panels in the dataset. Typically, for a panel regression using micro-level data, the fixed effects are placed at the individual or household level (Attanasio et al., 2015). However, due to the nearly 1200 households surveyed and only two observations per household, the least squares dummy variable (LSDV) method of household fixed effects would produce over 1000 dummy variables with only two observations per household. Instead of placing the fixed effects at the household level, I follow Attanasio et al. (2015) and place fixed effects at the province level and cluster at the village level to obtain robust standard errors.

One of the main data issues faced by microfinance research is measurement error and selection bias. Measurement error occurs when households inaccurately report survey information. For my research, measurement error may be present in the dependent variable, consumption. The consequence of this is inflated standard errors for the explanatory variables and a lower significance level

on their coefficients as a result. I am not concerned about measurement error in the explanatory variables. Selection bias concerning MFI loan uptake should be less of an issue for analysis due to the randomized design of the dataset I use. Having data for borrowers both with and without access to microfinance allows for some level of control of borrower selection bias.

5.2 Data Source

The data I use comes from Attanasio et al.'s (2015) 2008 Randomized Controlled Trial (RCT) in rural Mongolia. Working in conjunction with the MFI XacBank, 40 villages were chosen as potential regions to start micro-lending programs. 15 villages were randomly selected to have group-lending programs, 15 villages were randomly selected to have individual-lending programs, and the remaining 10 villages were left as controls. Prior to XacBank's entrance to these villages, there was limited access to formal banking. XacBank offered progressive trait loans with monthly interest rates ranging from 1.5 to 3.5 percent. Unlike most MFIs, XacBank did not hold public repayment meetings and offered a one to two-month grace period on loans depending on their maturity.

Data was collected over 19 months and consists of two panels. The baseline survey was conducted in February 2008 prior to the randomized entrance of XacBank the following month. The follow-up survey was conducted in September 2009, a year and a half after initial loan disbursement. While the data contains informal loan history from 2002 to 2008, I only analyze loans acquired in the first half of 2008 when MFI XacBank started lending. In both surveys, households were asked a variety of questions concerning income, consumption, living conditions, business ventures, household shocks, debt, and more. My variable of interest, consumption, includes the total goods and services households have access to and is not just a measure of consumption expenditures.³

³For example, a household may buy eggs in addition to the eggs their chickens produce. I

In total, 1,148 households were surveyed on over 1,000 variables. Between the two surveys, there was an 84 percent attrition rate for a total of 964 respondents re-interviewed. Attanasio et al. (2015) estimate the probability of attrition as a function of group treatment and other household controls to ensure that the selection was not systematic. They find no statistically significant difference in attrition levels between treatment and control villages.

5.3 Summary Statistics

Table 1 provides a brief summary of household characteristics broken down by borrower type and reports average household characteristics, income, and consumption. All income, consumption, and loan amounts are reported in 1000s of the local currency, MNT.⁴ The average household has five members including two children under the age of 16. At the time of the baseline survey, around 70 percent of households with one type of loan and 80 percent of households with both types of loans had an existing business. I find no statistically significant difference at the 0.05 level between the different borrower types and their average income or consumption levels.⁵

Table 2 provides a summary of average loan amounts and monthly interest rates regardless of borrower or village lending type. While some households have multiple loans, I restrict the data to include only loans acquired in the first half of 2008 when XacBank started lending operations. The average loan size and interest rate differ considerably with loan source. The average formal loan amount is 534,000 MNT with an average monthly interest rate of 2.03 percent. The average informal loan is a mere 143,000 MNT with an average monthly interest rate of 0.42 percent.

examine the total number of eggs a household consumes regardless of how they were acquired.

⁴The current exchange rates of MNT to USD is 0.00035

⁵See table 6 in the appendix for the associated t-tests

Table 1: Household Summary Statistics by Borrower Type

	Formal		Informal		Both		None	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Characteristics								
Observations	372	NA	28	NA	29	NA	542	NA
Household size	5	2	5	2	5	2	5	2
Children under 16	2	1	2	1	2	1	2	1
Age of respondent	41	8	42	8	40	7	42	10
Married/Cohab. (%)	69	46	64	49	74	45	63	48
High Education (%)	67	47	61	50	84	37	65	48
Buddhist (%)	73	45	68	48	89	32	74	44
Income								
Total Income	1286	1945	963	1301	854	2336	1374	2046
Wage Income	221	471	180	341	110	228	377	1904
Existing Business (%)	70	46	68	48	79	42	53	50
Business Revenue	46	51	48	48	62	62	32	45
Current Debt	440	873	220	389	215	208	394	860
Consumption								
Total Consumption	303	329	254	106	240	144	286	406
Food Consumption	36	65	28	13	28	15	35	86
Non-durable Consumption	58	84	66	50	46	52	59	79
Durable Consumption	88	122	68	51	73	72	76	97

Data Source: Baseline Survey

All income and consumption amounts are in 1000s of MN

Table 2: Loan Summary Statistics

	Mean	SD
Formal loans amount	533.94	400.81
Informal loans amount	142.81	150.21
Formal Interest Rates	2.03	0.3
Informal Interest Rates	0.42	1.95

Data Source: Baseline Survey

All loan amounts are in 1000s of MN

While all formal loans were intended for business use, as seen in Figure 3, on average households reported the majority of both formal and informal loans were spent on non-business expenses. Many borrowers used their loans for a variety of private purchases including food, education, and other household expenses. Informal loans are used almost exclusively for private expenditures. Despite a large percentage of formal loans being used for private expenses, repayment rates remain high as 95 percent of borrowers repaid their loans.⁶ While it is clear that both types of loans are used in some capacity for consumption purposes, households may have incentives to under report the percentage of formal loans used for non-business purchases. Due to potential measurement error around private expenditures and lack of detailed consumption measures, this figure simply motivates my research question. I am concerned with the relative impact of formal and informal loans on actual changes in consumption rather than relying on household-reported loan usage.

⁶Attanasio et al. (2015) also find no significant difference in loan repayment between individual or group lending villages.

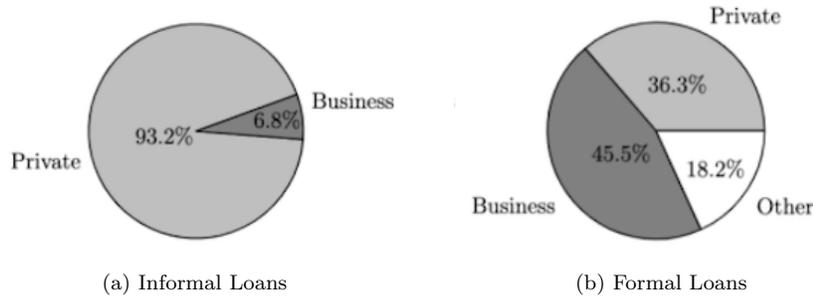


Figure 3: Average Percentage of Loan Expenditures

6 Results

The results of the unrestricted model are presented in Table 3 and the restricted model in Table 4. All regressions estimates use ordinary least squares and include robust standard errors. The dependent variables of each unrestricted and restricted regression are the percentage change in total, food, durable, and non-durable consumption.⁷ Percentage change in food consumption and durable consumption is the only regression with statistically significant loan coefficients. There are no statistically significant loan coefficients for regressions on total and non-durable consumption in either the restricted or unrestricted models.

Despite the statistical significance of loans in the durable consumption regressions, I find no statistically significant difference between the restricted and unrestricted consumption models.⁸ As seen in the Table 5, the F-test results return a p-value greater than 0.9 for every consumption type. Thus, I can not reject the null hypothesis that formal and informal loans have different impacts on the percentage change in consumption, regardless of consumption type.

⁷All regressions were run on the full list of household controls. I exclude controls from the tables, but their coefficients can be found in appendix tables 10 and 11.

⁸In addition to F-tests, I also run a Wald test on the difference of formal and informal loan coefficients. The Wald-test results are consistent with the F-test as I am not able to reject the null hypothesis for both tests. The Wald test results can be found in appendix table 7.

6.1 Coefficient Interpretations

In durable consumption's unrestricted model, formal loan's coefficient is positive and statistically significant at the 0.05 level. For every 1000 MNT of formal loans, durable consumption increases by 0.056 percent. For the associated restricted model, total loans' coefficient is also positive and statistically significant at the 0.05 level. The interpretation of this coefficient is similar to the unrestricted model— for any 1000 MNT loan durable consumption increases by 0.050 percent. In food consumption's unrestricted model, informal loan's coefficient is positive and statistically significant at only the 0.01 level. For every 1000 MNT of informal loans, food consumption increases by 0.152 percent. Unlike durable consumption, only the unrestricted model has a significant loan coefficient. While the remaining loan coefficients are all statistically insignificant, it is important to note their relative signs. Informal loans coefficients are negative with respect to percentage change in total, durable, and non-durable consumption. Formal loan coefficients are negative with respect to the percentage change in food and non-durable consumption, but positive for total consumption. The restricted model's total loan coefficients follow the same pattern as the formal loans in the unrestricted model in both significance and sign.

Household income's coefficient is statistically significant and positive for both the restricted and unrestricted models of total and durable consumption. For every 1 percent increase in household income, total consumption increases by 0.01 percent in both the restricted and unrestricted models. For every 1 percent increase in household income, durable consumption increases by 0.027 percent in the unrestricted model and by 0.025 percent in the unrestricted model. The majority of other coefficients remain statistically insignificant for all models with the exception of some household shocks.⁹

⁹The only statistically significant household control is Hahl. The coefficient is positive for both models of total consumption, but is insignificant for all other models.

Table 3: Unrestricted Model - Percentage Change in Consumption

	Total	Food	Durable	Non-Durable
Constant	68.153**	60.513	188.941*	68.36
	(-33.701)	(-43.953)	(-96.62)	(-205.689)
Total Formal Loans	0.002	-0.004	0.056**	-0.075
	(-0.009)	(-0.012)	(-0.025)	(-0.054)
Total Informal Loans	-0.006	0.152*	-0.252	-0.131
	(-0.064)	(-0.083)	(-0.183)	(-0.387)
Household Income	0.010**	0.008	0.027*	-0.003
	(-0.005)	(-0.007)	(-0.014)	(-0.03)
Death: Follow up	-23.713	-38.104	-13.165	-86.147
	(-19.679)	(-25.666)	(-56.35)	(-119.487)
Death: Baseline	13.051	43.907**	-51.196	-76.923
	(-16.289)	(-21.245)	(-47.277)	(-98.95)
Illness: Follow up	-17.943*	-28.957**	6.636	-56.193
	(-9.667)	(-12.608)	(-27.751)	(-58.871)
Illness: Baseline	-7.257	-12.16	39.379	-46.738
	(-9.194)	(-11.995)	(-26.33)	(-56.429)
Doctor Visit: Follow up	34.438***	31.691**	32.581	128.136*
	(-10.873)	(-14.181)	(-31.18)	(-66.618)
Doctor Visit: Baseline	-16.863**	-12.56	-36.590*	-25.255
	(-7.725)	(-10.083)	(-22.14)	(-47.165)
Jobloss: Follow up	21.151	0.641	32.049	35.799
	(-20.861)	(-27.207)	(-61.226)	(-126.636)
Jobloss: Baseline	-38.751	-16.138	-79.596	-219.814
	(-29.43)	(-38.383)	(-84.27)	(-178.637)
Disaster: Follow up	7.762	0.206	42.796	-24.09
	(-11.191)	(-14.595)	(-32.049)	(-68.362)
Disaster: Baseline	-24.554	-33.485*	-7.929	43.708
	(-14.986)	(-19.545)	(-42.916)	(-91.069)
Robbery: Follow up	-17.92	-20.853	-40.484	-97.338
	(-15.349)	(-20.018)	(-43.976)	(-93.233)
Robbery: Baseline	1.81	11.447	-73.898**	108.487
	(-12.961)	(-16.905)	(-37.121)	(-80.204)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	781	780	778	772
R2	0.089	0.073	0.052	0.036
F	2.85	2.281	1.583	1.057

Note: * p<0.1, ** p<0.05, *** p<0.01

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity.

Fixed Effects dummy variables are at the province level. Standard errors are robust and clustered at the village level

Table 4: Restricted Model - Percentage Change in Consumption

	Total	Food	Durable	Non-Durable
Constant	67.961**	64.004	181.946*	67.073
	(-33.648)	(-43.984)	(-96.644)	(-205.361)
Total Loans (Formal + Informal)	0.002	-0.001	0.050**	-0.076
	(-0.009)	(-0.011)	(-0.025)	(-0.053)
Household Income	0.010**	0.009	0.025*	-0.003
	(-0.005)	(-0.007)	(-0.014)	(-0.03)
Death: Follow up	-23.976	-33.308	-22.643	-87.876
	(-19.567)	(-25.577)	(-56.13)	(-118.807)
Death: Baseline	13.093	43.137**	-49.581	-76.638
	(-16.276)	(-21.275)	(-47.324)	(-98.866)
Illness: Follow up	-17.878*	-30.136**	8.992	-55.765
	(-9.648)	(-12.612)	(-27.748)	(-58.757)
Illness: Baseline	-7.24	-12.465	39.976	-46.627
	(-9.187)	(-12.013)	(-26.359)	(-56.386)
Doctor Visit: Follow up	34.436***	31.735**	32.476	128.105*
	(-10.866)	(-14.204)	(-31.217)	(-66.573)
Doctor Visit: Baseline	-16.851**	-12.781	-36.139	-25.174
	(-7.719)	(-10.099)	(-22.165)	(-47.131)
Jobloss: Follow up	21.177	0.165	33.006	35.973
	(-20.846)	(-27.25)	(-61.297)	(-126.547)
Jobloss: Baseline	-38.655	-17.891	-76.138	-219.18
	(-29.402)	(-38.434)	(-84.344)	(-178.465)
Disaster: Follow up	7.757	0.301	42.612	-24.132
	(-11.184)	(-14.619)	(-32.087)	(-68.316)
Disaster: Baseline	-24.531	-33.903*	-7.104	43.867
	(-14.976)	(-19.576)	(-42.964)	(-91.003)
Robbery: Follow up	-17.871	-21.746	-38.728	-97.005
	(-15.334)	(-20.045)	(-44.016)	(-93.143)
Robbery: Baseline	1.894	9.916	-70.873*	109.051
	(-12.937)	(-16.912)	(-37.121)	(-80.056)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	781	780	778	772
R2	0.089	0.069	0.048	0.036
F	2.967	2.228	1.531	1.1

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity.

Fixed Effects dummy variables are at the Province level. Standard errors are robust and clustered at the village level

In regards to household shocks, the restricted and unrestricted models largely have the same instances of statistically significant shocks coefficients. Total consumption models have statistically significant coefficients on doctor visits in both the baseline period (negative) and follow-up period (positive) as well as illness in the follow-up (negative) period. Food consumption models have statistically significant coefficients for death in the baseline period (positive), illness in follow-up periods (negative), doctors visits in the follow-up period (positive), and disaster in the baseline period (negative). Durable consumption's only statistically significant shock coefficient in both models is robbery in the baseline period (negative), but in the unrestricted model, the coefficient on doctor visits in the baseline period is statistically significant and positive. Finally, non-durable consumption's coefficient on doctor visits in the follow-up period is statistically significant and positive for both the restricted and unrestricted models.

6.2 Robustness Checks

I run a series of robustness checks to further validate my results. Overall, the significance and signs of the coefficients of my variables of interest go unchanged. I run regressions adding or removing potentially influential variables, including households with exceptionally high income, and testing different model specifications.¹⁰ Due to the nature of my research question and the randomization of my data, I do not include separate regressions of change in consumption by different borrower types.

As seen in Table 5, the difference between the restricted and unrestricted models remains insignificant for all regressions. I find that a few households with exceptionally high income (top 5 percent of the sample) influence the magnitude of household shock coefficients in all models and the loan coefficients for food

¹⁰See Tables 12 through 17 in the appendix for regressions results

consumption. However, outliers do not influence the results of the F-test. For the purposes of my analysis, I continue to exclude these households as I am interested in lower-income households' consumption changes.

Table 5: Restricted vs. Unrestricted Model F-tests

	Total	Food	Durable	Non-Durable
Main models shown in Tables 3 and 4				
F-Statistic	0.999	1.003	1.002	0.999
p-value	0.986	0.964	0.974	0.986
Main models including number children and adults instead of household size				
F-Statistic	0.999	1.003	1.002	0.999
p-value	0.985	0.964	0.977	0.987
Main models including formal and informal Loan Dummy				
F-Statistic	0.999	1.004	1.000	0.998
p-value	0.987	0.961	0.996	0.985
Main models including formal interest rate				
F-Statistic	0.999	1.003	1.003	0.999
p-value	0.986	0.968	0.973	0.985
Main model including high income outliers				
F-Statistic	0.999	1.001	1.002	0.999
p-value	0.987	0.987	0.979	0.987

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Additional influential variables that I include or exclude from regressions are the number of children and adults, formal loan and informal loan dummies, and interest rates. Due to the high correlation between household size and the number of children, male adults, and female adults, I run regressions including either the aggregated or individual family member counts. I find no additional statistically significant coefficients and no change in the results of my main regression. Similarly, formal and informal loans dummy coefficients have no statistical significance and do not impact the results of my main regression.

While there was data available for informal interest rates, there were many

missing values and less than ten non-zero observations, so I do not run regressions with informal interest rates. The inclusion of formal interest rates does not impact the statistical significance of the various loan amounts. However, the signs of the insignificant formal loans and all loans change from marginally negative to marginally positive for total and food consumption. However, formal interest rates have a relatively high correlation with formal loan amounts. Due to the high correlation with my explanatory variables and lack of complementary informal interest rate data I choose not to include any interest rates in my final regression.

I run VIF and Breuch-pagan tests to check for issues of multicollinearity and heteroskedasticity, respectively.¹¹ The majority of my VIF values are below three and I find no issues of multicollinearity among my variables of interest. Age and age squared have relatively high VIF values, but I continue to include age squared as it is not correlated with my variables of interest and is a standard control within the literature (Banerjee et al., 2015). The results of the Breuch-pagan test indicate some presence of heteroskedasticity in the total consumption models, but not in the food, durable, or non-durable consumption models. Regardless, all reported standard errors are robust due to village-level clusters.

7 Discussion

The findings of my paper are largely in line with existing research on micro-credit. Most of my regressions' loan coefficients are statistically insignificant regardless of model specification. Ultimately, I find I can not reject the null hypothesis that formal and informal loans have similar impacts on the percentage change in consumption, regardless of consumption type. Due to the statistical

¹¹The results of these Breuch-pagan and VIF tests can be found in appendix tables 8 and 9

insignificance of most loan coefficients, it is difficult to determine whether this result is driven by formal and informal loans having the same coefficient or by the inability to reject the possibility of loan coefficients being zero. However, I can rule out the latter possibility in the case of food and durable consumption. These two regressions each have a statistically significant loan coefficient and I am still unable to reject the null hypothesis.

While I can not determine that formal and informal loans impact consumption differently, it is interesting which types of consumption have significant formal or informal loan coefficients. In the case of informal loans, they are only statistically significant and positive with respect to food consumption. On the other hand, formal loan coefficients are not statistically significant for food consumption but are significant for durable consumption. Suppose households experience strict loan enforcement. In that case, as described in figure 1a, it may be harder to use formal loans for something like food consumption that can not be passed off as a business investment. Durable goods, however, might be able to pass as business investments and are. Informal loans may be significantly smaller than formal loans, but they have the advantage of lower interest rates and easier accessibility. For a household in need of increased consumption, this potentially makes informal loans the more attractive options.

Recent studies on microcredit also find varying impacts on loans when analyzing different aspects of consumption (Attanasio et al. 2015; Banerjee et al., 2015; Crepon et al, 2015; Field et al, 2013; Tarozzi, Desai, and Johnson 2015). In particular, Baerjee et al. (2015) suggest that microloans increase household incentives to purchase durable goods. The results of my regressions add support to this theory as durable consumption has statistically significant and positive formal loan coefficients. Although statistically insignificant, formal loans coefficients are negative for food and non-durable consumption. This result aligns

with the model presented in figure 2b which suggests consumption may increase in certain areas at the expense of other forms of consumption. This situation may occur when loans cannot cover the full cost of what a household wishes to purchase, so households sacrifice other forms of consumption to be able to make the purchase. In the case of Mongolia, it appears that durable consumption may be increasing potentially at the expense of non-durable or food consumption.

Despite many MFIs' requirements that loans be used for business activities, in practice, we see many households use their loans for consumption. Even with loans being used for consumption, most MFIs still experience profitable loan repayment rates (Banerjee et al., 2013). The policy implications of this observation are twofold. First, suppose microloans used for consumption are still being repaid. In that case, it may actually be more beneficial for MFIs to expand their lending services more broadly rather than just offering business loans. Second, this action may be particularly beneficial if microloans have a larger impact on consumption than informal loans. In the case of Mongolia, my results may support this interpretation with respect to durable consumption. Formal loans coefficients were associated with a slightly positive and statistically significant increase in durable consumption. Borrowers managed to use their formal business loans for non-business purchases and still maintained a 96 percent repayment rate. Formal loans' positive relationship with consumption and simultaneously high repayment rates suggests that borrowers can repay non-business loans. Therefore, flexible loan use may be more profitable for MFIs while simultaneously allowing households more discretion in their monetary decisions.

While the coefficients are statistically insignificant, I find microloans are negatively correlated with food and non-durable consumption. Some critics of microfinance may interpret the negative relationship between microloans and

consumption as evidence of loans having a harmful effect on people's livelihoods. However, this reduced consumption could be evidence of consumption smoothing or an indication of a community facing credit constraints where the informal lending market can not meet the full market demand.

When households experience negative shocks, formal and informal loans may allow them to consumption smooth. I find the majority of household shocks coefficients are negative. As anticipated, when a household experiences a disaster, robbery, or illness of a family member, their consumption suffers. The two exceptions to this, however, are the death of a family member and doctor's visits. The positive coefficient on baseline death may be a result of households reallocating resources that were previously being consumed by the passed family member to increased food consumption. Interestingly, the coefficients on doctor's visits change sign depending on which period the visit occurred. Baseline doctor visits are associated with decreases in consumption, while follow-up doctor visits are associated with increases in consumption. This sign change may be due to the introduction of formal credit; however, as I do not formally investigate the relationships between loans and household shocks, I can not draw any strong conclusions.

8 Conclusion

This paper evaluates the relative impact of formal microloans and informal loans on rural Mongolian household consumption. I find no difference in the impact of formal and informal loans on the percentage change in total, food, durable, or non-durable consumption. However, I find loans with statistically significant coefficients for regressions on food and durable consumption. Every 1000 MNT of formal loans is associated with a 0.056 percent increase in durable consumption. Similarly, any 1000 MNT loan is associated with a 0.050 percent increase

in durable consumption. Every 1000 MNT of informal loans is associated with a 0.152 percent increase in food consumption. The majority of loan coefficients, formal and informal, remaining statistically insignificant is consistent within the majority of microfinance literature (Attanasio et al., 2015; Banerjee et al., 2013; Banerjee et al. 2015)

I add to the growing literature on microcredit by incorporating informal loans' impact on consumption and formal loans' impact rather than studying them separately. Due to the lack of additional panels, I cannot determine whether the randomized entrance of an MFI impacted informal lending in Mongolian villages. Areas for additional research include expanding the time frames of studies and comparing results across countries. Most research on microfinance, including my research, has a relatively short time frame with only a few available panels in the data (Banerjee et al. 2015). Future studies may look at consumption smoothing patterns over longer periods to get a more accurate picture of formal and informal loans' relative effects. Additionally, due to countries' different economic and cultural structures, it would be interesting to see if the relationship I find between formal and informal loans remains the same within and across different countries. Further research may consider the relationship between formal and informal loans in more densely populated or urban regions and countries with higher levels of industrialization.

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9 Appendix

Table 6: Borrower t-test's p-values

	Formal	Informal	Both	None
Income				
Formal	NA	0.358	0.628	0.57
Informal	0.358	NA	0.947	0.221
Both	0.628	0.947	NA	0.539
None	0.57	0.221	0.539	NA
Total Consumption				
Formal	NA	0.099*	0.215	0.645
Informal	0.099*	NA	0.891	0.224
Both	0.215	0.891	NA	0.339
None	0.645	0.224	0.339	NA
Food Consumption				
Formal	NA	0.072*	0.199	0.886
Informal	0.072*	NA	0.785	0.123
Both	0.199	0.785	NA	0.273
None	0.886	0.123	0.273	NA
Durable Consumption				
Formal	NA	0.056*	0.471	0.137
Informal	0.056*	NA	0.681	0.308
Both	0.471	0.681	NA	0.903
None	0.137	0.308	0.903	NA
Non-Durable Consumption				
Formal	NA	0.276	0.563	0.553
Informal	0.276	NA	0.233	0.425
Both	0.563	0.233	NA	0.409
None	0.553	0.425	0.409	NA

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Wald test

	Total	Food	Durable	Non-Durable
P-value	0.19	0.2	0.32	0.66

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Breuch-pagan test for heteroskedasticity

	Total	Food	Durable	Non-Durable
Unrestricted	0.03404**	0.1832	0.8712	0.6854
Restricted	0.02567**	0.1534	0.8659	0.6365

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Variance Inflation Factor

	GVI	Df
Formal Loans	1.06363	1
Informal Loans	1.03903	1
Change in Household Income	1.04879	1
Death	1.10294	2
Illness	1.19077	2
Doctor Visit	1.24592	2
Jobless	1.04964	2
Disaster	1.15298	2
Robbery	1.10078	2
Age	13.1859	1
Age Squared	13.295	1
Married/Cohabiting	1.12323	1
Household Size	1.11629	1
High Education	1.06935	1
Budhhist	1.06851	1
Hahl	2.47789	1
Province	3.49444	4

Table 10: Main Unrestricted Model Controls

	Total	Food	Durable	Non-Durable
Age of respondent	-0.592 (-1.299)	-0.217 (-1.695)	-3.069 (-3.723)	-1.961 (-7.903)
Age squared	-0.002 (-0.016)	0.007 (-0.021)	0.017 (-0.045)	0.004 (-0.096)
Household size	-1.805 (-2.041)	-2.745 (-2.662)	-4.857 (-5.852)	14.953 (-12.415)
Married/Cohab.	2.311 (-7.438)	-12.274 (-9.715)	19.076 (-21.343)	50.026 (-45.461)
High education	-4.774 (-7.134)	-1.214 (-9.317)	-23.406 (-20.446)	-40.727 (-43.528)
Buddhist	2.967 (-7.645)	9.559 (-9.972)	5.046 (-21.911)	43.471 (-46.808)
Hahl Ethnicity	19.191* (-11.15)	8.807 (-14.547)	26.874 (-31.946)	13.979 (-67.716)
Province 2	-17.232 (-13.549)	-26.529 (-17.673)	-47.415 (-38.806)	65.524 (-82.519)
Province 3	6.443 (-14.747)	15.821 (-19.235)	12.68 (-42.242)	94.849 (-89.817)
Province 4	4.504 (-15.966)	0.938 (-20.826)	-8.482 (-45.745)	161.245* (-97.155)
Province 5	-21.741 (-15.579)	-28.529 (-20.32)	-10.44 (-44.629)	53.527 (-94.985)
Num.Obs.	781	780	778	772
R2	0.089	0.073	0.052	0.036
F	2.85	2.281	1.583	1.057

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Main Restricted Model Controls

	Total	Food	Durable	Non-Durable
Age of respondent	-0.59	-0.247	-3.005	-1.95
	(-1.298)	(-1.698)	(-3.727)	(-7.897)
Age squared	-0.002	0.007	0.017	0.004
	(-0.016)	(-0.021)	(-0.045)	(-0.096)
Household size	-1.812	-2.625	-5.089	14.911
	(-2.039)	(-2.666)	(-5.858)	(-12.403)
Married/Cohab.	2.315	-12.345	19.182	50.051
	(-7.433)	(-9.731)	(-21.368)	(-45.43)
High education	-4.759	-1.486	-22.874	-40.635
	(-7.128)	(-9.331)	(-20.467)	(-43.495)
Buddhist	3.002	8.913	6.328	43.701
	(-7.635)	(-9.982)	(-21.924)	(-46.75)
Hahl Ethnicity	19.210*	8.455	27.581	14.103
	(-11.142)	(-14.57)	(-31.981)	(-67.666)
Province 2	-17.233	-26.518	-47.441	65.533
	(-13.54)	(-17.701)	(-38.853)	(-82.465)
Province 3	6.51	14.596	15.109	95.303
	(-14.729)	(-19.255)	(-42.267)	(-89.703)
Province 4	4.571	-0.288	-6.067	161.701*
	(-15.947)	(-20.849)	(-45.777)	(-97.04)
Province 5	-21.671	-29.808	-7.919	53.996
	-15.56	-20.341	-44.657	-94.867
Num.Obs.	781	780	778	772
R2	0.089	0.069	0.048	0.036
F	2.967	2.228	1.531	1.1

Note: * p<0.1, ** p<0.05, *** p<0.01

Table 12: Unrestricted model including formal interest rates

	Total	Food	Durable	Non-Durable
Constant	68.187** (-33.748)	61.672 (-44.002)	190.579** (-96.742)	63.254 (-205.941)
Total Formal Loans	0.003 (-0.012)	0.004 (-0.016)	0.066* (-0.034)	-0.106 (-0.073)
Total Informal Loans	-0.006 (-0.064)	0.155* (-0.083)	-0.248 (-0.183)	-0.143 (-0.388)
Formal Loan Interest Rate	-0.113 (-4.429)	-3.940 (-5.776)	-5.612 (-12.689)	16.685 (-27.045)
Household Income	0.010** (-0.005)	0.008 (-0.007)	0.026* (-0.014)	-0.002 (-0.031)
Death: Follow up	-23.703 (-19.696)	-37.760 (-25.68)	-12.679 (-56.391)	-87.689 (-119.562)
Death: Baseline	13.054 (-16.3)	43.992** (-21.253)	-50.999 (-47.305)	-77.428 (-98.995)
Illness: Follow up	-17.949* (-9.676)	-29.172** (-12.616)	6.344 (-27.774)	-55.263 (-58.914)
Illness: Baseline	-7.261 (-9.201)	-12.294 (-12.001)	39.186 (-26.348)	-46.158 (-56.46)
Doctor Visit: Follow up	34.438*** (-10.88)	31.689** (-14.186)	32.554 (-31.197)	128.366* (-66.646)
Doctor Visit: Baseline	-16.861** (-7.73)	-12.472 (-10.088)	-36.486* (-22.153)	-25.581 (-47.188)
Jobloss: Follow up	21.126 (-20.898)	-0.232 (-27.247)	30.88 (-61.316)	39.385 (-126.821)
Jobloss: Baseline	-38.746 (-29.45)	-15.971 (-38.398)	-79.358 (-84.316)	-220.560 (-178.715)
Disaster: Follow up	7.763 (-11.199)	0.226 (-14.601)	42.816 (-32.066)	-24.129 (-68.39)
Disaster: Baseline	-24.566 (-15.003)	-33.882* (-19.561)	-8.503 (-42.959)	45.391 (-91.148)
Robbery: Follow up	-17.923 (-15.359)	-20.970 (-20.026)	-40.670 (-44.002)	-96.977 (-93.274)
Robbery: Baseline	1.805 (-12.971)	11.263 (-16.913)	-74.167** (-37.146)	109.459 (-80.253)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	781	780	778	772
R2	0.089	0.074	0.052	0.036
F	2.741	2.213	1.53	1.031

Note: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity

Fixed Effects are placed at the Province level

Table 13: Restricted model including formal interest rates

	Total	Food	Durable	Non-Durable
Constant	67.980** (-33.691)	65.28 (-44.021)	183.002* (-96.761)	62.332 (-205.584)
Total Loans (Formal + Informal)	0.002 (-0.012)	0.008 (-0.016)	0.057* (-0.034)	-0.107 (-0.072)
Formal Loan Interest Rate	-0.068 (-4.413)	-4.737 (-5.767)	-3.961 (-12.668)	16.885 (-26.948)
Household Income	0.010** (-0.005)	0.009 (-0.007)	0.025* (-0.014)	-0.003 (-0.03)
Death: Follow up	-23.973 (-19.581)	-33.058 (-25.584)	-22.436 (-56.168)	-88.864 (-118.865)
Death: Baseline	13.095 (-16.287)	43.266** (-21.281)	-49.419 (-47.355)	-77.243 (-98.911)
Illness: Follow up	-17.881* (-9.657)	-30.355** (-12.618)	8.819 (-27.77)	-54.965 (-58.795)
Illness: Baseline	-7.242 (-9.194)	-12.616 (-12.017)	39.848 (-26.378)	-46.077 (-56.416)
Doctor Visit: Follow up	34.436*** (-10.873)	31.732** (-14.207)	32.455 (-31.236)	128.348* (-66.602)
Doctor Visit: Baseline	-16.849** (-7.725)	-12.667 (-10.102)	-36.059 (-22.18)	-25.531 (-47.154)
Jobloss: Follow up	21.162 (-20.882)	-0.869 (-27.285)	32.195 (-61.388)	39.544 (-126.726)
Jobloss: Baseline	-38.651 (-29.423)	-17.631 (-38.444)	-75.92 (-84.398)	-220.142 (-178.545)
Disaster: Follow up	7.757 (-11.191)	0.321 (-14.622)	42.623 (-32.106)	-24.158 (-68.344)
Disaster: Baseline	-24.538 (-14.992)	-34.366* (-19.588)	-7.498 (-43.009)	45.517 (-91.078)
Robbery: Follow up	-17.872 (-15.345)	-21.857 (-20.05)	-38.833 (-44.043)	-96.75 (-93.182)
Robbery: Baseline	1.892 (-12.946)	9.747 (-16.917)	-71.019* (-37.146)	109.849 (-80.099)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	781	780	778	772
R2	0.089	0.07	0.049	0.036
F	2.849	2.167	1.474	1.072

Note: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity

Fixed Effects are placed at the Province level

Table 14: Unrestricted model including formal and informal loan dummy

	Total	Food	Durable	Non-Durable
Constant	69.556** (-33.785)	63.702 (-44.031)	193.119** (-96.868)	66.504 (-206.325)
Total Formal Loans	0.007 (-0.013)	0.008 (-0.016)	0.074** (-0.036)	-0.089 (-0.076)
Total Informal Loans	0.032 (-0.085)	0.221** (-0.111)	-0.205 (-0.243)	-0.062 (-0.516)
Formal Loan dummy	-4.947 (-9.543)	-12.558 (-12.439)	-19.71 (-27.353)	15.051 (-58.267)
Informal Loan dummy	-11.564 (-17.873)	-20.802 (-23.294)	-13.108 (-51.185)	-23.762 (-108.586)
Household Income	0.010** (-0.005)	0.008 (-0.007)	0.026* (-0.014)	-0.003 (-0.031)
Death: Follow up	-24.624 (-19.748)	-39.74 (-25.736)	-14.184 (-56.55)	-88.106 (-119.958)
Death: Baseline	12.969 (-16.304)	43.722** (-21.249)	-51.31 (-47.323)	-76.925 (-99.078)
Illness: Follow up	-18.126* (-9.678)	-29.365** (-12.613)	6.149 (-27.785)	-56.037 (-58.962)
Illness: Baseline	-6.795 (-9.222)	-11.285 (-12.023)	40.098 (-26.413)	-46.124 (-56.638)
Doctor Visit: Follow up	34.384*** (-10.886)	31.496** (-14.187)	32.098 (-31.222)	128.706* (-66.724)
Doctor Visit: Baseline	-16.818** (-7.732)	-12.446 (-10.085)	-36.497 (-22.162)	-25.279 (-47.226)
Jobloss: Follow up	21.118 (-20.881)	0.487 (-27.213)	31.898 (-61.287)	36.286 (-126.804)
Jobloss: Baseline	-39.046 (-29.462)	-16.614 (-38.397)	-79.704 (-84.367)	-220.849 (-178.902)
Disaster: Follow up	(7.132) (-11.234)	(-0.991) (-14.64)	(41.813) (-32.174)	(-24.985) (-68.651)
Disaster: Baseline	-24.24 (-15.05)	-33.185* (-19.614)	-8.609 (-43.102)	46.153 (-91.488)
Robbery: Follow up	-17.731 (-15.389)	-20.729 (-20.056)	-41.136 (-44.097)	-95.524 (-93.511)
Robbery: Baseline	1.524 (-12.981)	10.739 (-16.92)	-74.968** (-37.184)	109.347 (-80.373)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	781	780	778	772
R2	0.09	0.075	0.053	0.036
F	2.666	2.182	1.488	0.983

Note: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity

Fixed Effects are placed at the Province level

Table 15: Restricted model including formal and informal loan dummy

	Total	Food	Durable	Non-Durable
Constant	69.756** (-33.758)	65.448 -44.099	190.823** -96.867	66.722 -206.144
Total Loans (Formal + Informal)	0.008 (-0.012)	0.012 -0.016	0.070** -0.036	-0.088 -0.076
Formal Loan dummy	-5.106 (-9.521)	-13.941 (-12.44)	-17.901 (-27.312)	14.874 (-58.128)
Informal Loan dummy	-8.224 (-13.541)	8.289 (-17.691)	-51.246 (-38.812)	-20.078 (-82.259)
Household Income	0.010** (-0.005)	0.009 (-0.007)	0.025* (-0.014)	-0.003 (-0.03)
Death: Follow up	-23.929 (-19.586)	-33.685 (-25.587)	-22.123 (-56.133)	-87.337 (-118.965)
Death: Baseline	12.91 (-16.293)	43.208** (-21.285)	-50.611 (-47.328)	-76.987 (-99.004)
Illness: Follow up	-18.211* (-9.668)	-30.111** (-12.63)	7.133 (-27.778)	-56.134 (-58.893)
Illness: Baseline	-6.931 (-9.205)	-12.471 (-12.029)	41.652 (-26.384)	-46.282 (-56.519)
Doctor Visit: Follow up	34.361*** (-10.879)	31.301** (-14.212)	32.347 (-31.227)	128.683* (-66.678)
Doctor Visit: Baseline	-16.843** (-7.726)	-12.665 (-10.102)	-36.214 (-22.165)	-25.306 (-47.191)
Jobloss: Follow up	21.047 (-20.867)	-0.133 (-27.26)	32.716 (-61.295)	36.209 (-126.711)
Jobloss: Baseline	-39.091 (-29.444)	-17.009 (-38.464)	-79.187 (-84.383)	-220.897 (-178.78)
Disaster: Follow up	7.294 (-11.213)	0.42 (-14.648)	39.961 (-32.139)	-24.801 (-68.513)
Disaster: Baseline	-24.483 (-15.017)	-35.294* (-19.618)	-5.846 (-43.043)	45.887 (-91.283)
Robbery: Follow up	-17.957 (-15.36)	-22.701 (-20.065)	-38.555 (-44.048)	-95.775 (-93.324)
Robbery: Baseline	1.389 (-12.965)	9.562 (-16.939)	-73.427** (-37.167)	109.181 (-80.255)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	781	780	778	772
R2	0.09	0.071	0.051	0.036
F	2.765	2.119	1.494	1.021

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity

Fixed Effects are placed at the Province level

Table 16: Unrestricted model including high income outliers

	Total	Food	Durable	Non-Durable
Constant	78.195 (-59.779)	82.496 (-86.885)	167.319* (-92.594)	33.835 (-216.1)
Total Formal Loans	-0.003 (-0.015)	-0.013 (-0.023)	0.059** (-0.024)	-0.074 (-0.056)
Total Informal Loans	0.025 (-0.111)	0.211 (-0.162)	-0.214 (-0.172)	-0.18 (-0.4)
Household Income	0.008** (-0.003)	0.014*** (-0.005)	0.004 (-0.005)	0.003 (-0.012)
Death: Follow up	-29.768 (-33.446)	-30.086 (-48.61)	-11.335 (-51.746)	-69.048 (-120.321)
Death: Baseline	-0.977 (-29.079)	23.987 (-42.264)	-48.438 (-45.58)	-101.025 (-104.655)
Illness: Follow up	-29.853* (-17.113)	-44.647* (-24.873)	8.119 (-26.542)	-42.952 (-61.744)
Illness: Baseline	-5.478 (-16.061)	-5.728 (-23.351)	41.449* (-24.852)	-58.646 (-58.34)
Doctor Visit: Follow up	43.776** (-18.592)	40.027 (-27.021)	27.427 (-28.806)	126.666* (-67.398)
Doctor Visit: Baseline	-18.214 (-13.534)	-16.95 (-19.686)	-37.889* (-20.96)	18.039 (-48.945)
Jobloss: Follow up	29.873 (-36.835)	-25.084 (-53.537)	29.421 (-58.344)	361.864*** (-132.487)
Jobloss: Baseline	-32.663 (-50.85)	9.728 (-73.906)	-81.182 (-78.672)	-228.204 (-182.889)
Disaster: Follow up	8.665 (-19.09)	1.354 (-27.746)	28.247 (-29.539)	-2.349 (-69.04)
Disaster: Baseline	-23.752 (-25.918)	-42.715 (-37.67)	-7.376 (-40.101)	49.934 (-93.322)
Robbery: Follow up	-0.625 (-26.002)	16.324 (-37.793)	-48.825 (-40.252)	-96.625 (-93.576)
Robbery: Baseline	60.846*** (-22.497)	90.619*** (-32.701)	-65.033* (-34.813)	130.534 (-82.305)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	839	838	836	830
R2	0.067	0.064	0.045	0.04
F	2.246	2.142	1.467	1.285

Note: * p<0.1, ** p<0.05, *** p<0.01

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity

Fixed Effects are placed at the Province level

Table 17: Restricted model including high income outliers

	Total	Food	Durable	Non-Durable
Constant	78.952 (-59.668)	88.525 (-86.822)	159.888* (-92.557)	30.924 (-215.69)
Total Loans (Formal + Informal)	-0.003 (-0.015)	-0.009 (-0.022)	0.054** (-0.024)	-0.076 (-0.055)
Household Income	0.008** (-0.003)	0.013*** (-0.005)	0.005 (-0.005)	0.003 (-0.012)
Death: Follow up	-29.004 (-33.287)	-23.993 (-48.434)	-18.76 (-51.577)	-71.917 (-119.754)
Death: Baseline	-1.108 (-29.057)	22.933 (-42.281)	-47.077 (-45.613)	-100.513 (-104.576)
Illness: Follow up	-30.091* (-17.077)	-46.553* (-24.848)	10.462 (-26.524)	-42.048 (-61.613)
Illness: Baseline	-5.544 (-16.049)	-6.26 (-23.361)	42.091* (-24.871)	-58.398 (-58.299)
Doctor Visit: Follow up	43.770** (-18.581)	39.982 (-27.036)	27.469 (-28.832)	126.662* (-67.359)
Doctor Visit: Baseline	-18.283 (-13.523)	-17.5 (-19.693)	-37.205* (-20.974)	18.303 (-48.907)
Jobloss: Follow up	29.753 (-36.81)	-26.042 (-53.562)	30.605 (-58.392)	362.322*** (-132.399)
Jobloss: Baseline	-32.929 (-50.81)	7.612 (-73.93)	-78.609 (-78.726)	-227.195 (-182.742)
Disaster: Follow up	8.613 (-19.078)	0.937 (-27.759)	28.758 (-29.564)	-2.164 (-68.996)
Disaster: Baseline	-23.819 (-25.902)	-43.253 (-37.688)	-6.722 (-40.135)	50.201 (-93.263)
Robbery: Follow up	-0.754 (-25.982)	15.297 (-37.806)	-47.58 (-40.281)	-96.122 (-93.502)
Robbery: Baseline	60.586*** (-22.46)	88.546*** (-32.685)	-62.508* (-34.808)	131.522 (-82.172)
Household Controls	Yes	Yes	Yes	Yes
Num.Obs.	839	838	836	830
R2	0.067	0.062	0.042	0.04
F	2.336	2.149	1.424	1.336

Note: * p<0.1, ** p<0.05, *** p<0.01

All loan amounts are in 1000s of MN

Household Controls Include: Household size, Age, Age Squared, High Education Level, Married/Cohabiting, Buddhist, Hahl Ethnicity

Fixed Effects are placed at the Province level