

A Test of Portfolio Risk in Microfinance Institutions

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Abstract

A significant challenge facing microfinance institutions is the battle for financial self-sufficiency. This includes controlling the risks in the loan portfolio - ensuring the timely repayment of loans. In addition to adequate collection, timely payments provide for a greater extension of funds to other poor people in the region, resulting in further outreach and development. This large cross-sectional study looks at microfinance institutions around the world to test the factors that contribute to the risk in the loan portfolio. The results show that group-lending methodologies reduce the risk in MFI portfolios although the effect may be small.

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I. Introduction

Currently there are over 7000 microfinance institutions (MFIs) serving over 25 million clients throughout the world. This method of serving the worlds' poor was popularized in the 1970s with the establishment of the Grameen Bank by Muhammad Yunus. Since then, many organizations have formed to raise funds in developed nations and lend those funds in developing countries. One such organization is the Opportunity International Network (OI). OI's mission "is to provide opportunities for people in chronic poverty to transform their lives." This organization has been able to establish partner institutions that can lend funds to impoverished people at a very low, but effective rate. To date, OI's partners have loaned more than \$127 million. However, for each partner institution to continue aiding their clients the institutions must reach a level of self-sufficiency

In the effort to achieve self-sufficiency, many MFIs have become commercial institutions. If successful at this change, MFIs will no longer be reliant on government grants or below market-rate loans. But like all commercial lending institutions, commercial MFIs must manage risk. This study examines portfolio risk in MFIs. Microlending is inherently risky and a purpose here is to identify existing practices and contributing factors to a low rate of payment default. In particular, the disaggregated nature of the data used for this study allows for a test of lending methodologies as a factor in risk of the portfolio, while controlling for other micro and macro economic variables.

Previous empirical work of microfinance institutions is limited primarily to case studies and small sample reviews of financial conditions. The data for this study is a large cross section of institutions, from many parts of the world, segregated by the types of loans made, and measured over a significant period of time. The panel data collected here provides a unique

opportunity to identify key risk factors and in an effort to provide for better management, and therefore sustainability, of microfinance lending portfolios.

The following section reviews key lending issues in microfinance. Section III reviews previous work on risks in the loan portfolios of microfinance institutions, section IV presents an empirical model, section V reviews the data used in this study, section VI presents the empirical findings, and section VI concludes.

II. Review of Lending Issues

A. MFI Lending Methodologies

Several different types of microfinance lending are employed throughout the world. Despite the different approaches, all of the institutions work toward the same goal: the reduction of poverty and the promotion of economic growth.

The first approach is individual lending. It is “the provision of credit to individuals who are not members of a group that is jointly responsible for loan repayment” (Ledgerwood, 1999, p.83). Each loan is specifically tailored to the individual and business involved. This approach tends to work best when used with larger urban businesses or small rural farmers, since collateral is generally required. Also, the personal nature of the relationship between the bank and the borrower often results in repeated transactions over a long period of time.

A second microfinance model is group lending – a strategy initially developed by the Grameen Bank of Bangladesh. It was designed to serve rural and landless women who wish to finance income-generating activities. The general approach is as follows: Small groups of four to seven unrelated individuals are formed. Before receiving any loans, each member is required to contribute savings for 1-2 months and continue saving throughout the duration of the loan. Additional requirements for loans include prompt repayment, mandatory weekly meetings, and

pre-credit orientation and assistance. After these conditions are satisfied, the credit officer loans money to two individuals. No further lending occurs until the initial loans are repaid. The same process occurs for the remaining members of the group.

This model is especially effective at reaching out to women from low-income groups, since borrowers do not need collateral. Instead, the other members of the group guarantee and are responsible for the loans to all members of the group. In addition, the savings of the group is managed by the group and can be loaned.

A third, but similar group approach, is village banking. Village banks are “community-managed credit and savings associations established to provide access to financial services in rural areas, build a community self-help group, and help members accumulate savings” (Ledgerwood, 1999, p. 85). The bank is financed in two ways: by the mobilization of members’ funds and by loans from microfinance institutions.

Saving is tied to loan amounts in two ways. The minimum amount of saving required is based on the size of the loan. Also, the maximum loan size is based on the amount of savings that has been deposited into the bank. The deposited funds act as collateral for the loan. An unusual aspect of the village bank approach is that no interest is paid on savings. Instead, profits from lending are used to finance new loans or activities that will generate income for the bank. Each member receives a proportional share of the bank’s profits.

The above review suggests that institutions have placed a heavy importance on the lending methodologies in the success of the microfinance institution. That is, the success of the institution, its sustainability and low level of risk in the loan portfolio, are likely determined by the extent that group lending methodologies are employed. In this study we control for the lending methodology in order to determine its ability to mitigate risk.

B. Gender

The objective of many microfinance institutions is to “empower women by increasing their economic position in society” (Ledgerwood, 1999, p. 37). Women in the poorest groups have special barriers that men do not face. They are the primary caregiver for children and the family. So, they tend to be especially concerned about issues such as education, health, nutrition, and food preparation. In some countries, women do not have the same economic opportunities as men because of societal, cultural, and religious bias. Even in countries where women do have access to economic opportunities, there is discrimination. In most developing countries, women typically earn only 40 to 50 cents for every dollar men earn (UNDP, 2003, p. 314-17).

The United Nations Human Development Report 2003 outlines the progress that has been made on the “millennium goals” set forth in the UN Millennium Declaration. The stated intention is to “eradicate poverty, promote human dignity and quality, and achieve peace, democracy and environmental sustainability” (UNDP, 2002, p. 1). One of these goals is to promote gender equality. Some progress has been made, but not enough. While there is now more equality, the report states, “women in poor areas tend to be excluded from overall progress toward the goals” (UNDP, 2003, p.4). Growth in microfinance will continue to promote equality by giving women economic opportunities and freedom. For the institutions in this study, the extent to which funds are loaned to women is identified. As in the Grameen model, group-lending is the approach most widely used when the MFI is lending to women. If the group-lending is considered less risky than it may be that more loans to women also reduces risk in the portfolio- a hypothesis tested in this study.

C. Savings and Normative Values in Lending

Of the models presented, group lending has many normative benefits. One benefit of this model is that the saving requirements lead to further economic growth and also help to guarantee the loans. This means that more funds can be loaned. Second, since collateral is not necessary, more of the poor—especially women and those without property—can borrow. Instead, the loan is partly guaranteed by the requisite savings and partly by the other members of the group. The social dimension of the group leads to higher repayment rates and further lending, both to the original borrowers and to others in the community. Another advantage this model has is that extensive training is not needed. Also, because each credit officer deals with a group of borrowers instead of individuals, each officer can reach more people. But, each officer still maintains personal contact with each borrower, leading to close relationships over a period of time.

This model is particularly relevant for Christian organizations because of the ability to link social services through group meetings. An important goal of many institutions is to improve the spiritual well-being of the people by preaching the Gospel. Microfinance enables this goal in two ways. First, improving economic status allows the poor to reduce their focus on the temporal and immediate and turn instead to the spiritual and eternal. Second, social services and personal contact allow for direct evangelism and witnessing. The weekly group meetings provide an avenue of contact through which relationships start, ultimately leading to a sharing of the Gospel. (See for example, Mugabi, 2003). The control for group lending in this study lends some guidance as to the extent institutions can achieve these goals.

III. Previous Work on Risks in Microfinance

A review of the literature surrounding financial risks facing MFIs provide many different articles and books. However, no specific theoretical model or any detailed empirical study was found on the determinants of risk in the loan portfolios of MFIs. At the same time, several reviews of the success or failure of different institutions were located. For example, Bhatt and Shui-Yan (2001) report on the studies of the Grameen Bank, widely considered the first MFI. The authors point to recent studies showing that the bank has helped to increase significantly household incomes, productivity, labor force participation, and rural wages, and that the level of absolute poverty is 75% lower where the bank operates than in villages without such a program. The authors also point out that the Grameen Bank is not entirely financially self-sufficient. Therefore, despite success at reducing poverty through the employment of a group-lending methodology, MFIs face considerable risks if they are to continue operations since they may not always be able to rely on government or donor assistance.

Zeller (1998) looked at the determinants of repayment performance for group lending in Madagascar using data from a random sample of 146 groups in six different lending programs. The study's key findings are that groups consisting of members facing homogenous risk exposure do not have higher repayment rates, but that repayment rates significantly improve when groups have some type of social cohesion, informal or not. This result suggests that group lending can significantly improve repayments and therefore reduce risks in loan portfolios. The large cross-sectional study here seeks a stronger test of this hypothesis.

Two studies on MFIs that directly reflect on the questions under study here look at factors affecting financial sustainability and macroeconomic risks facing MFIs. First, Woller (2000) reviews the financial viability of village banking using data for nine institutions by

studying the relationship between the return on the institution's loan portfolio and various operation cost measurements. Despite the difficulty of making strong conclusions from the small sample, the study found three strong indicators of financial health – portfolio yield (return), the interest spread, and number of borrowers. A clear implication of this result is that MFIs must charge a reasonable rate of interest on their loans to insure continuing operations and that scaling up operations will protect the institution in the long-term. A key finding in the study is that many efficiency variables were uncorrelated with the return on the portfolio.

Second, a case study by Opportunity International shows that high or hyper-inflation economic conditions severely reduce the ability of microenterprises to repay loans. Weele and Markowich (2001) study the experience of two different microfinance institutions. In both cases, the loans to clients were indexed to the U.S. Dollar and as the countries experienced high inflation, and the resulting devaluation of their currencies, most, if not all clients were unable to make complete payments on their results. This case study shows, not surprisingly, that macroeconomic conditions affect the risks in the portfolio. In the study conducted here macroeconomic factors are controlled for when looking at the determinants of risk in MFI loan portfolios.

IV. Empirical Model

The above review suggests that the level of risk in a loan portfolio is influenced by the choice of lending methodologies and gender issues. Of course other institutional factors (microeconomic) and macroeconomic issues affect the ability of the borrower to repay loans. Lacking sufficient theoretical work in this area of research, determination of independent variables in this study is guided by the anecdotal evidence and case studies described above.

This section presents the empirical model used in this study and the expected signs on each coefficient.

This study seeks to test the contribution to risk of loss in the loan portfolios of MFI from two key factors, the lending methodology and the extent of lending to women. A general model to study these two issues takes the form

$$Y_{it} = \alpha + \beta_1 \cdot X_{1it} + \beta_2 \cdot X_{2it} + \gamma \cdot V_{ijt} + \varepsilon_{it} \quad (1)$$

where Y_{it} is a measure of the risk in the portfolio of MFI i in period t . Two separate measures of portfolio risk are used in this study. The first dependent variable, X_{1it} is a measure of the lending methodology used for MFI i in period t ; X_{2it} is a measure of the portion of the portfolio lent to women by MFI i in period t ; and V_{ijt} is a vector of control variables for institution i in country j for period t . If group-lending methodologies control risk the coefficient on X_{1it} will be positive – individual lending increases risk in the portfolio. The sign on the coefficient for X_{2it} is ambiguous, the lack of access to capital for women suggests greater risk. However, it is expected in many MFIs that lending to women, which is primarily done through group programs or village banking, will reduce risk (negative sign).

The vector of control variables includes both microeconomic and macroeconomic factors affecting the risk in a portfolio. First, at the micro, or institutional level, the size and number of loans made are known to impact risk in portfolios of microloans. Institutions that lack sufficient scale have will have higher risks. Also, the rate of return on the portfolio is a factor - the lending rate on the portfolio is likely to affect the ability of the borrower to make repayment. MFIs that seek a high return should face a higher risk of loss.

At the macroeconomic level, this study controls for overall performance of the economy in each institutions country. Measures of real gross domestic product and the GDP deflator are

included as independent variables. If the overall economy rises, the risk of the portfolio will decline. On the other hand, the direction of the effect from inflation is ambiguous. If the inflation rate rises, particularly to hyper-inflation levels, the risk of the portfolio rises. Conversely, higher inflation may help the borrower if they originally obtained fixed rate loans dominated in local currency. Using the case study evidence of microfinance institutions during inflationary times, and the fact that the countries represented in the data have experienced high rates of inflation, the coefficient on the inflation rate variable should be positive – higher inflation increases the risk of default in the loan portfolio.

Thus, the empirical model estimated in this study is

$$Y_{it} = a + b_1 X_{1it} + b_2 X_{2it} + b_3 X_{3it} + b_4 X_{4it} + b_5 X_{5jt} + b_6 X_{6jt} + b_7 X_{7it} + e_{it} \quad (2)$$

where Y_{it} is portfolio in arrears or portfolio at risk for MFI i in period t ; X_{1it} is an indicator variable that takes the value of 1 if the portfolio contains loans made to individuals and 0 otherwise; the expected sign is positive. X_{2it} is the percent of portfolio by lending methodology lent to women by MFI i in period t ; the expected sign is negative. X_{3it} is the number of outstanding clients by lending methodology for MFI i in period t ; the expected sign is negative - when the institution increases its scale of operations, risks fall. X_{4it} average loan size by lending methodology for MFI i in period t ; the expected sign is negative.

The macroeconomic variables are items five and six. X_{5jt} is the percent change in GDP for country j in year t ; the expected sign is negative. X_{6jt} is the index value of the GDP deflator for country j in year t ; the expected sign is positive. The final variable is institutional. X_{7it} is the return on the overall loan portfolio for MFI i in period t ; the expected sign is positive – a higher return suggests higher risk clients.

V. Data

Data for this study was provided by Opportunity International (OI). Each quarter OI reports the Year-to-date Income Statement, Balance Sheet, and Portfolio information for each of its member institutions. The OI institutions are located in developing countries throughout world – Eastern Europe, Africa, Asia, and Latin America. In total there are 37 different microfinance institutions studied. (For more information on OI visit their website at www.opportunity.org).

The appendix to this text lists each of the variables in the data set. All values are converted to U.S. dollars using market rates in each period. One key measurement problem is the lack of quarterly reports on gross domestic product and inflation. These macroeconomic variables are available for the developing countries in this study on annual basis only. However, this is not expected to significantly bias the results because a great deal of cross-sectional variation exists.

VI. Results

A. Summary Statistics

Table 1 reports summary statistics for the sample used in this study. There are a large number of quarterly observations (857) available for study and the approximately 68% of all observations involve group-lending loan portfolios. The wide range of values for three variables - average loan size, number of outstanding clients, and value of outstanding portfolio - suggest heteroscedasticity in the data. Tests of the dependent variables against these three variables (not reported) confirm this condition. To correct for heteroscedasticity the estimates of the model that follow use weighted least squares regression. Table 2 presents correlation coefficients and their corresponding p-values. The variables portfolio at risk and portfolio in arrears are positively

and significantly correlated. Both of these variables are used as the dependent variable in the estimates that follow. The other correlations in Table 2 reflect a high amount of multicollinearity in the data. Possible bias from multicollinearity is discussed in the following review of the results.

B. Estimation of the model

Table 3 presents estimates of the model in equation 2 for 37 microfinance institutions over the period of the first quarter of 2001 through the last quarter of 2003. The dependent variable is portfolio in arrears. All but one independent variable has the expected sign and the model is significant as shown by the F-test. The indicator variable for lending methodology, however, is not significant – suggesting that an individual lending portfolio does not have consistently higher risk than one with a group lending methodology. This result changes when we use the alternative measure of risk in the portfolio.

Table 4 presents estimates of the model in equation 2 for the same microfinance institutions over the same period. The dependent variable in this regression is portfolio at risk. Again, all but one independent variable has the expected sign and the model is significant as shown by the F-test. The indicator variable for lending methodology is now significant – suggesting that an individual lending portfolio has consistently higher risk than one with a group lending methodology.

In each case, the variable with the unexpected sign is the percent of loans in the portfolio that is made to women. The previously mentioned multicollinearity problem could cause bias in this variable. The indicator variable for lending methodology and this variable are negatively and significantly correlated. The majority of all group-lending in the OI network of institutions involves loans to women as originally modeled by the Grameen Bank. To test this condition the

model was estimated without the indicator variable. In this new regression (not reported), the coefficient on the percent of loans to women remains positive and significant, and qualitatively similar results remain for all other factors.

The difference in the two models (different dependent variables) is significant. Portfolio in Arrears measures the percent of the total loan portfolio that is overdue by more than 30 days, by methodology, while Portfolio at Risk measures the percent of the total loan portfolio that has at least one payment overdue by more than 30 days, by methodology. The former measure indicates value at risk while the latter measure looks at the number of overdue payments. It would be possible for a loan portfolio to have few dollars at risk, but multiple late payments. Therefore, since lending methodology is not statistically significant in these tests, the extent to which the methodology contributes to risk is marginal at best.

The marginal effects of many variables are small in each estimate of the model. The key contributors to risk as measured by the coefficient estimates are the percent of loans made to women, portfolio return, and finally the macroeconomic factors. The significance of portfolio return is consistent with earlier studies reviewed above. Together with the substantial contribution of size (value of outstanding portfolio) the rate of return significantly contributes to the risk in the portfolio. MFIs operating on a small scale face large challenges and a difficult task of finding the best rate of return to meet the goal of serving poor women, those least able to pay market rates, while not charging too much so as to create excessive risk. Finally, the significance of the macroeconomic variables suggests that a key part of the risk in the portfolio is uncontrollable at the institutional level. This suggests that MFIs could benefit by organizing in such a way as to diversify their risks across many countries and regions.

VII. Conclusions and Suggestions for Further Research

Much of the previous empirical work on microfinance institutions includes only case studies and small sample reviews of their financial conditions. This study used a large cross-section of institutions, from many parts of the world, segregated by the types of loans made, and measured over a significant period of time. The results identified key risk factors in loan portfolios - institutional size, rates of return, and macroeconomic factors. The lending methodology used by the MFI is thought to be a major factor for both positive and normative reasons, but appears to negligibly affect the risk in the loan portfolio. Greater lending to women consistently raises the risk of the portfolio, but this activity is in many ways why the institution exists. In total, this evidence suggests that if MFIs are to continue with their stated missions of meeting the needs of the most impoverished they should continue to explore both individual and group lending, scale up their operations, charge a rate of return that provides financial stability without undue risk, and diversify to mitigate the effects of changes in the economy.

In the future, empirical studies such as these will benefit from more theoretical models on the development and operations of MFIs. Additionally, further empirical research should look at more disaggregated data to more closely examine risk factors. For example, this study does not directly control for the extent of savings by the borrowers. While group-lending generally includes a savings component, more tests using the actual level of savings on the part of the borrowers for each MFI may show any contribution to lower risk that exists. Controlling for savings on the part of the borrower may also help with the normative benefits of teaching financial stewardship. Finally, further research should be conducted on how MFIs can coordinate their activities, including their financial operations, to controlling the significant economic factors affecting their success.

Appendix

The following data is provided for each institution by Opportunity International.

Variable Name	Description
Number of Outstanding Clients	The total number of clients with loans outstanding, by methodology.
Value of Outstanding Portfolio	The total value of loans outstanding, by methodology.
Portfolio in Arrears	The percent of the total loan portfolio that is overdue by more than 30 days, by methodology.
Portfolio at Risk	The percent of the total loan portfolio that has at least one payment overdue by more than 30 days, by methodology.
Average Loan Size	The average loan size made to clients, by methodology.
Percent of Loans to Women	The percent of the total number of loans made that were made to women, by methodology.
Portfolio Return	This indicator shows the rate of return on the assets, and is calculated by dividing the net income from lending operations by the period average assets.

The following data for each country is from the International Monetary Fund, World Economic Outlook Database, April 2004

Variable Name	Description
GDP %	Gross domestic product, constant prices, annual percent change
GDP Deflator	Gross domestic product, deflator

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Table 1.

Descriptive Statistics					
Variable	N	Minimum	Maximum	Mean	Std. Deviation
Average Loan Size	962	10	46281	854.875	2465.564
GDP %	969	0.3	13.2	4.208	2.013
GDP Deflator	969	100	30753.48	1498.607	4209.188
Individual Dummy	990	0	1	0.419	0.494
Number of Outstanding Clients	978	1	69320	4,382	8,028
Percent of Loans to Women	955	0	1	0.695	0.257
Portfolio at Risk >30 days	914	0	1	0.139	0.163
Portfolio in Arrears > 30 days	923	0	1	0.090	0.137
Porfolio Return	986	0.0001	49.7176	0.384	2.083
Value of Outstanding Portfolio	990	29	9828071	662,632.60	1,135,518.67
Valid N (listwise)	857				

Table 2.

		Correlations									
Variables		1	2	3	4	5	6	7	8	9	10
1	Individual Dummy	1.000									
2	Number of Outstanding Clients	-0.252	1.000								
3	Value of Outstanding Portfolio	0.138	0.363	1.000							
4	Portfolio in Arrears > 30 days	0.032	-0.123	-0.230	1.000						
5	Portfolio at Risk >30 days	0.086	-0.177	-0.244	0.916	1.000					
6	Average Loan Size	0.106	-0.133	0.333	-0.134	-0.101	1.000				
7	Percent of Loans to Women	-0.437	0.343	-0.214	0.140	0.062	-0.347	1.000			
8	GDP %	-0.009	0.028	0.005	-0.070	-0.072	-0.022	0.040	1.000		
9	GDP Deflator	-0.066	0.001	-0.082	-0.005	0.025	-0.047	0.071	0.440	1.000	
10	Porfolio Return	-0.039	-0.042	-0.070	0.092	0.074	-0.031	0.012	-0.044	0.086	1.000

Correlations in bold are significant at standard levels

Table 3.

Estimates of the Risk in the portfolios of Microfinance Institutions

Dependent Variable: Portfolio in Arrears > 30 Days			
Variables	Coefficient	Standard Error	<i>p-value</i>
(Constant)	0.016133	0.0102367	0.115
Individual Dummy	0.009138	0.0050571	0.071
Percent of Loans to Women	0.085097	0.0105585	0.000
Number of Outstanding Clients	-0.000001	0.0000002	0.000
Average Loan Size	-0.000001	0.0000005	0.009
GDP %	-0.005820	0.0010636	0.000
GDP Deflator	0.000001	0.0000008	0.277
Porfolio Return	0.031937	0.0084700	0.000
F-Statistic	27.648		
<i>p-value</i>	0.0000		
N	867		

Weighted Least Squares Regression - weighted by Value of Outstanding Portfolio. Standard errors are corrected for heteroskedasticity.

Table 4.

Estimates of the Risk in the portfolios of Microfinance Institutions

Dependent Variable: Portfolio at Risk > 30 Days			
Variables	Coefficient	Standard Error	<i>p-value</i>
(Constant)	0.056408	0.0152997	0.000
Individual Dummy	0.026494	0.0075566	0.000
Percent of Loans to Women	0.092332	0.0157767	0.000
Number of Outstanding Clients	-0.000002	0.0000002	0.000
Average Loan Size	-0.000001	0.0000008	0.056
GDP %	-0.009477	0.0015911	0.000
GDP Deflator	0.000003	0.0000012	0.008
Porfolio Return	0.033342	0.0126768	0.009
F-Statistic	23.371		
<i>p-value</i>	0.0000		
N	858		

Weighted Least Squares Regression - weighted by Value of Outstanding Portfolio. Standard errors are corrected for heteroskedasticity.