

“Effect of gender participation on determining the maturity of crossed-due loans: Evidence from microfinance companies of Nepal”

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EFFECT OF GENDER PARTICIPATION ON DETERMINING THE MATURITY OF CROSSED-DUE LOANS: EVIDENCE FROM MICROFINANCE COMPANIES OF NEPAL

Abstract

The impact of gender participation on the maturity of crossed-due loans is observed in this study. Furthermore, the associations between maturity of crossed-due loans, their number, and loan issued on physical collateral and collective bail are also monitored using the unbalanced panel data of thirty microfinance companies. The study investigates the short- and long-term link between response and predictor variables. It is founded on an exploratory and descriptive research design. The Hausman test, fixed effect or LSDV model, Pedroni and Kao co-integration test are used to observe the relation and impact. The maturity crossed due loan number, total loan amount, loan issued against physical collateral, and loan allocated on collective bail are jointly significant to determine the maturity of crossed due loan amount of microfinance companies of Nepal. It is found that women are more conscientious in repaying loans on time compared to male borrowers. Per rupee 0.382 rupees, a maturity crossed due loan is found in microfinance companies where only women can borrow, but per rupee 0.404 rupees, a time crossed due loan is found where men and women can borrow. Policymakers of banks are not necessarily hesitant to provide loans to female borrowers.

Keywords

non-performing loan, collective bail, physical collateral, microcredit, passive members

JEL Classification

G20, G21, G29

INTRODUCTION

Microfinance is crucial for reducing poverty and fostering economic growth, especially in developing nations like Nepal. Since women historically had less access to money, there has been an increase in interest in gender and microfinance in recent years. Uncertainty persists on how gender participation affects loan repayment and identifying the maturity of past-due loans. Thanks to microfinance, people can now obtain small business loans from reputable lenders that adhere to moral principles (Bezboruah & Pillai, 2013).

Microfinance can assist people in becoming more self-sufficient. Simply put, microfinance provides financial services to low-income and needy people. Banks, mutual funds, and credit card companies have generally seen the poor as high-risk and underserved (Watkins, 2018). Microfinance institutions (MFIs) provide financial services to communities that lack collateral for loans but have the capacity and incentive to engage in economic activities that generate income and self-employment. Microfinance raises household income, which results in better food security, the accumulation of assets, and a higher possibility of sending kids to school.

When the impoverished increase their income, start their businesses, and lessen their vulnerability, it empowers them to make changes (Adhikari & Shrestha, 2013). Muhammad Yunus, an economist in Bangladesh, developed microfinance (Risal, 2018). In 1983, Muhammad Yunus's effort obtained status after the founding of Grameen Bank, known as the 'Bank of the Poor.' The vision of Microfinance is quite a systemic change in the financial system worldwide (Karna, 2018).

Several private microfinance and non-governmental organizations (NGOs) with microfinance programs emerged in the 2000s. In Nepal, 69 microfinance companies have been founded using Muhammad Yunus Grameen's approach. (NRB, 2021). The maturity date is when a fixed income payment principle must be repaid to creditors. The maturity date is when the debt must be paid, which was determined when the previous loan was provided. The term "maturity date" also refers to the deadline for fully repaying an installment loan. On the other hand, the maturity date refers to the day a borrower must completely repay an installment loan (Chen et al., 2018).

Studies have found that in microfinance programs, women typically have more excellent repayment rates than men (Kabeer, 2001; Pitt & Khandker, 1998). This might result from women's higher social and economic vulnerability, as well as their tighter social networks and more community responsibility. Women are also more likely to employ microloans for income-generating ventures that can aid in debt repayment.

However, some research indicates that gender might not significantly influence loan payback rates (Ahlin & Townsend, 2007; Morduch, 1998). Other variables, such as loan amount, interest rates, and loan duration, may influence loan repayment rates more heavily. In microfinance, determining the maturity of loans that have past due amounts is also crucial. Loans that have not been paid back on time and have beyond their due date are crossed-due loans. Microfinance institutions use different techniques in Nepal to determine the maturity of past-due loans. Some people use the past-due days, while others use the quantity of missed installments.

The maturity of past-due loans may also depend on the participation of women. Women might be more inclined to turn to their social networks or microfinance organizations for assistance in repaying their loans, which could prolong the time before a loan is deemed past due. However, men might be more prone to miss payments on their loans or look for new sources of funding, which would shorten the time before a loan is regarded as past due.

Paying and repaying the habit of a loan depends upon the nature of borrowers and the condition they face in their families. Microfinance companies have male and female members, and some have only females. Most microfinance companies provide loans to both males and females, but only females can borrow from some microfinance companies. The loan issuing process is the same, that is, giving against physical collateral or collective bail. This study explored male and female honesty in paying loans taken from microfinance companies in Nepal.

Most microfinance companies face the problem of passive loans, passive members, and maturity crossed-due loans. Both types of microfinance companies are suffered from maturity-crossed-due loans. Some microfinance companies are only for women, and some are for both women and men. What differences can be observed regarding the maturity crossed-due loans in female-dominated and other microfinance companies?

This study aims to ascertain the influence of total loan volume, loans issued against physical collateral, and loans issued on collective bail on the maturity crossed due loan of microfinance companies of Nepal. It also intends to investigate the effect of gender participation on determining Nepalese microfinance companies' maturity-crossed unpaid loans.

The rest of the paper is structured as follows: Part 1 focuses on academic and pertinent literature. The second segment is about research methods. The third segment discusses the observed findings, while the last discusses the study's conclusion, tactical implications, and limits.

1. LITERATURE REVIEW

Numerous studies have been conducted to examine how microfinance organizations affect women, the reduction of poverty, and rural development. The impact of gender participation on loans in microfinance institutions that are mature, past due, or non-performing has not been thoroughly studied. This literature assessment seeks to determine how gender participation affects the calculation of maturity crossed-due loans in Nepalese microfinance firms. The review presents a summary of pertinent studies that have been done on this subject, emphasizing the crucial findings, restrictions, and research gaps.

There are eleven fundamental principles of microfinance companies. Among various codes, 'motivate clients to repay loans.' According to the statement, they employ character references or group lending with the joint obligation to increase repayments, use incentives to encourage payback, and cultivate a public image that shows seriousness about debt collection (Wilson, 2001). The principle of lending methodology on the unsecured loan cannot be larger than 6250 USD for an individual, or unsecured lending is limited to 30 percent of the regularity capital of any financial institution (BCBS, 2010). Nawai and Shariff (2013), Javid and Abrar (2015), Abubakar et al. (2015), Jote (2018), Risal (2018), and Bardhan et al. (2021) observed the problems of delayed repayment of the loan in microfinance companies.

According to Nawai and Shariff (2013), factors that affect poor loan repayment include borrowers' attitudes toward the loan, the amount borrowed, prior business experience, and family background. According to the analysis, late or delayed payments are the biggest problem for microlending companies. Javid and Abrar (2015) mentioned microfinance organizations for their contribution to reducing poverty. Small loans were discovered to reduce poverty rates significantly. In particular, medium and large credit amounts have produced more pas-

sive and non-performing loans. The increase in active borrowers, particularly women, is directly responsible for decreased poverty.

Abubakar et al. (2015) noticed microfinance companies' delays in loan repayment. Jote (2018) studied the factors that affect loan repayment in Ethiopian microfinance organizations. There was a severe problem with the late payment of the loan. Methods of lending, education level, family size, and occupations are statistically significant in determining the non-performing loans

Risal (2018) observed the position of microfinance companies in Nepal. He discovered that the overall amount of loans distributed by microfinance firms amounts to about 5.14 billion rupees, with approximately 79 percent going to individuals. Of all debt holders, 43000 or so hold loans with a maturity-crossed due rate of 0.15 percent. It has been recovered, as opposed to the remaining 20 percent owed on loan. Bardhan et al. (2021) observed that Indian microfinance companies suffer from the problem of funding sources, borrowing, overhead cost size, end-use of money, depth of outreach, passive members, and non-performing loan.

Glackin (2002), Johnson (2005), D'espallier et al. (2013), Khan and Dewan (2017), Memon et al. (2020), Santandreu et al. (2020), and Shahriar et al. (2020) observed the effect of gender involvement on the repayment of the loan in time. Most studies found more honesty in females on a loan payment on time.

Glackin (2002) noticed that loan distribution to female borrowers has a lower risk of payment loan and its installment in time than males. It minimizes the problem of maturity crossed due loans or non-performing loans. Johnson (2005) observed that women represent a lower risk than men concerning the repayment of debt of microfinance companies. D'espallier et al. (2013) observed that women significantly improved repayment behavior but did not enhance overall financial performance.

Khan and Dewan (2017) noted that women are more profitable when repaying microloans. Women recover loans more often than men do. Except for female officers, Memon et al. (2020) discovered that female borrowers, board members, and managers greatly influence outreach. In addition, the result implies that female participation is financially sustainable, i.e., no outstanding loans or bad debts. Santandreu et al. (2020) found that microcredit repayment behavior is better for females than males. Shahriar et al. (2020) identified that females are more honest than males and are more likely to pay more loans.

Most research focuses on microfinance's function in women's empowerment, poverty reduction, repayment, borrowers' repayment behavior, and delayed microloan repayment. Microfinance company female borrowers have a track record of timely debt repayment. Based on gender participation, this study will identify the problem of maturity crossed-due loans. The differences in the maturity crossed due loan quandary, in which females or both can borrow, are examined. Because of this, there is a considerable study gap between this study and prior ones.

2. METHODS

2.1. Research design

This study uses both descriptive and exploratory research methods. The impact of the number of maturity crossed due loans, total loan issued amount, the loan provided against physical collateral, and loan issued on collective bail on the total maturity crossed due loan amount of Nepalese microfinance enterprises is examined using unbalanced panel data. To conclude, imbalanced panel data from thirty microfinance organizations were evaluated from 2015 to 2021.

2.2. Variables specification

In this study, the total maturity crossed due loan amount, the number of maturity crossed due loans, the total loan issued amount, the loan issued against physical collateral, and the loan issued on collective bail are all variables. The dependent variable is the maturity crossed due loan amount of microfinance organizations, while the independent variable is the

remainder of the factors. This study uses panel data collected semiannually from thirty microfinance institutions by the Nepal Rastra Bank (NRB), the country's central bank.

2.3. Model specification

The Cobb-Douglas production function (C-DPF) is applied to establish a connection between the observed response and the predictor factors. The output level (Y) is determined by plugging in values for labor (L) and capital (K). The general procedure of the C-DPF is as follows:

$$Q_t = AK^\alpha L^\beta. \quad (1)$$

As presented in equation (1), Q_t is the actual production, and L and K are labor and capital factors. A , α , and β are non-negative parameters where both α and β are greater than zero or positive. The total of α and β is constantly one, that is, $\alpha + \beta = 1$. The α and β show the contribution of labor and capital to actual output. They are also called output elasticities of labor and capital, respectively. It is clear that L and K are missing something, and that something is the portion of the output indicated by the letter A . The letter A represents the residual or technical change. Higher values of A suggest that an external factor, other than labor and capital, impacts output more.

The maturity-crossed due loan amount of microfinance companies depends upon the maturity-crossed loan number, total issued loan amount, and types of collateral against the loan. In this sense,

$$MCDL = f(NMCDL, TLA, TLPC, LCB). \quad (2)$$

$MCDL$ stands for maturity crossed due loan amount of microfinance companies, $NMCDL$ stands for several maturities crossed due loans, TLA shows the total issued loan, and $TLPC$ represents the loan issued against physical collateral. LCB means the loan issued on collective bail. Equation (2) can be presented after variables are transformed into their logarithmic forms as

$$\begin{aligned} \ln MCDL = f(\ln NMCDL, \ln TLA, \\ \ln TLPC, \ln LCB). \end{aligned} \quad (3)$$

There is an application of the concept for panel data,

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it}. \tag{4}$$

In equation (4), i signifies several entities involved in the investigation, t positions for some period, Y_{it} is a response variable observed for all cross-sections, over time t . X_{it} is the explanatory variable of various units over a time t , and μ_{it} is the error term. $i =$ indicates multiple units that may be 1, 2, 3 ... n , and t indicates the included period such that $t =$ 1, 2, 3, ... n in the exploration. Following the presentation of the study variables, the study's corresponding equation (4) can be stated as follows:

$$\begin{aligned} LnMCDL_{it} = & \alpha + \beta_1 LnNMCDL_{it} + \\ & + \beta_2 LnTLA_{it} + \beta_3 LnTLPC_{it} + \\ & + \beta_4 LnLCB_{it} + \mu_{it}. \end{aligned} \tag{5}$$

In equation (5), $LnMCDL_{it}$ specifies the maturity crossed-due loan of Nepalese microfinance corporations over time t . The α viewpoints for intercept and β_1 and β_2 signify the coefficients of the matching variables, presenting the pace at which the response variable may adjust to long-run equilibrium (Athanasoglou et al., 2008). Jansen and de Haan (2003) also made a similar calculation to determine how self-governing variables affect the result variable's value.

3. RESULTS

3.1. Descriptive statistics

The variables under study's mean, median, standard deviation, moments, and kurtosis are all revealed by the descriptive statistics together with

their lowest and highest values. It is computed using the log-transformed values of the variables. The standard deviation of all the variables is the smallest for the number of maturities past-due loans. It has a more representative mean value than others as a result. Compared to the other variables, the total loan amount has the lowest coefficient of variation (11.51 percent). It reveals that compared to other factors, the total amount of loans made by 30 microfinance businesses is steadier.

Similarly, among the other factors, the number of maturities crossed due loans has the highest coefficient of variation (i.e., 25.31 percent). Therefore, it is more variable than the total maturity crossed due loan, total loan issued on physical collateral, total loan amount, and loan issued on collective bail. Table 1 is a list of the variables' descriptive statistics.

3.2. Correlation analysis

The strength of the link between two variables is measured through the analysis of correlations. The total number of maturity crossed-due loans and the total amount of maturity crossed-due loans have a 0.89 correlation coefficient. Hence, there is a strong positive association between the number of maturities crossed due loans and the total loan amount provided by microfinance institutions in Nepal. The maturity crossed due loan amount and the total given loan have the same relationship as the total loan granted on the physical collateral. The loan provided on collective bail is more responsible than the loan made against physical collateral to enhance the maturity crossed due loan amount. The numerous correlation coefficients among the relevant variables are exposed in Table 2.

Table 1. Descriptive statistics schedule

Variables	Maximum	Minimum	Standard deviation	Coefficient of variation	Mean	Median	Observation
LnTMCDL	16.27	0.00	2.01	19.26%	10.42	10.41	311
LnTLPC	16.57	3.91	2.18	16.89%	12.93	13.20	310
LnTLA	18.98	7.79	1.80	11.51%	15.63	15.72	328
LnNMCDL	12.44	0.00	1.79	25.31%	7.09	7.09	312
LnLCB	18.89	5.30	1.85	11.97%	15.43	15.49	328

Note: $LnTMCDL$ = total maturity crossed due loan (after taking log); $LnTLPC$ = total loan issued on physical collateral (After taking log). $LnTLA$ – Total loan amount (after taking the log). $LnNMCDL$ = Total number of maturity crossed due loans (after taking log). $LnLCB$ = total loan issued on collective bail (after taking log).

Table 2. Measurement of associations

Variables	LnTMCDL	LnTLPC	LnTLA	LnNMCDL	LnLCB
LnTMCDL	1.00	–	–	–	–
LnTLPC	0.62	1.00	–	–	–
LnTLA	0.67	0.85	1.00	–	–
LnNMCDL	0.89	0.59	0.68	1.00	–
LnLCB	0.63	0.82	0.96	0.63	1.00

3.3. Panel unit root testing

The panel unit root test determines whether the data are predictable. The results of unit root testing show whether the time-series data are stationary or not. The unit root test evaluates the temporal dependence of a time series' mean, variance, and covariance. Static tests can determine whether time-based data is static or not. Non-static data cannot be used to infer conclusions. Table 3 shows the results of the panel stationary or non-stationary checking.

Per the panel unit root test report, the panel data are stationary at the first difference. The panel data for maturity crossed-due loans, total issued loan amounts, number of maturity crossed-due loans, loans issued with physical collateral, and collective bail are stationary after the first difference but non-stationary at the level, according to all panel unit root testing methodologies. The individual intercept is used as a yardstick to fix whether the data are stationary. Under the supposition of a specific intercept, the data are stationary at the first difference. So, we can utilize the data to predict or analyze the influence of the relevant variables.

3.4. Hausman specification test

Regression analysis can be done in three different methods when using panel data. Regression models can be classified into three categories: pooled regression, fixed-effect or LSDV, and random effect. There is no differentiation between the many microfinance institutions in the pooled approach. In other words, the heterogeneity is denied by thirty microfinance companies pooling their resources. It is impractical since each microfinance company is unique; they are not alike. The fixed effect technique considers the intercept value of the thirty microfinance organizations to allow for variability or individuality. The intercept in the random effect model has an expected mean value.

Hausman's test evaluates the efficiency and consistency of fixed and random effect estimators. The fixed-effect model's effectiveness and consistency were validated by accepting the alternative hypothesis ($P < 0.05$), whereas the null hypothesis ($P > 0.05$) was disproved. The Hausman test's probability value is 0.00, which is less than 0.05 ($P < 0.05$). The alternative hypothesis may be accepted, and the null hypothesis rejected. The optimal choice is fixed effect or LSDV because the P-value

Table 3. Values of stationary or non-stationary tests

Methods	LnTMCDL		LnTLPC		LnTLA		LnNMCDL		LnLCB	
	Level	First difference	Level	First difference	Level	First difference	Level	First difference	Level	First difference
Levin, Lin & Chu	0.515 (0.373)	0.00 (-4.82)	0.00 (-6.01)	0.00 (-8.35)	0.00 (-8.92)	0.00 (8.08)	0.33 (-0.44)	0.0001 (-3.09)	0.00 (-5.19)	0.00 (-4.99)
I'm Pesaran, Shin-wat	0.999 (3.65)	0.00 (-4.67)	0.56 (0.154)	0.00 (-4.66)	0.11 (-1.22)	0.00 (-3.78)	0.99 (3.12)	0.00 (-4.12)	0.44 (-0.16)	0.00 (-4.55)
ADF Fisher Chi-square	0.998 (27.83)	0.00 (116.47)	0.295 (59.09)	0.00 (111.22)	0.07 (70.03)	0.00 (100.99)	0.99 (33.18)	0.00 (112.69)	0.15 (64.78)	0.00 (111.98)
PP-Fisher Chi-Square	0.971 (36.13)	0.00 (323.2)	0.002 (88.29)	0.00 (182.71)	0.019 (77.70)	0.00 (62.54)	0.19 (62.54)	0.00 (277.17)	0.0003 (97.09)	0.00 (253.08)

Note: Values in parentheses are t-statistics.

Table 4. Selection of Fixed Effect (FE) or Random Effect (RE) method

H_0 : RE model is suitable		H_1 : FE model is proper		
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		34.053	4	0
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		34.053	4	0
Cross-section random effects test comparisons				
Variables	Fixed	Random	Var (Diff.)	Prob.
LnTLA	0.045	-0.097	0.006	0.079
LnTLPC	0.093	0.104	0.001	0.715
LnLCB	0.465	0.355	0.007	0.207
LnNMCDL	0.876	0.919	0.0001	0.0003

is under 0.05. The outcomes of the Houseman test are shown in Table 4.

Table 4 shows that the P-value for chi-square statistics is 0.00, which is less than 0.05. As a result, one can accept the alternative hypothesis that the fixed effect model is acceptable and reject the null hypothesis that the random effect model is correct. In this aspect, the fixed-effect model can produce useful outcomes.

3.5. Fixed effect or LSDV model

According to econometrics, the fixed-effect model can assess the influence or correlations between response and predictor variables (Blundell & Bond, 2001). The fixed effect approach is appropriate, as determined by Hausman’s specification test, which contrasts fixed effect versus random ef-

fect methods. Table 5 displays the findings of the fixed-effect model.

The fixed effect or LSDV model has anticipated providing a more competent result. The loan issued on physical collateral and the number of maturity crossed due loans are individually significant to explain the maturity crossed due loan amount of microfinance companies of Nepal. A controversial conclusion was also derived: the total loan amount hurts maturity crossed due amount, which is not valid in real life. The fixed effect or LSDV regression model is

$$LnTMCDL = 1.503 + -0,247 \cdot LnTLA + +0.153 \cdot LnTLPC + 0.236 \cdot LnLCB + +0.943 \cdot LnNMCD + 0.382 \cdot DUMMY1 + +0.404 \cdot DUMMY2. \tag{6}$$

Table 5. Outcomes of the FE model or least square dummy variable method

Response variable		LnTMCDL		
Applied		Panel Least Squares technique		
Included maximum data points		12		
Number of MFIs		30		
Number of data points		298		
$LnTMCDL = C(1) + C(2) \cdot LnTLA + C(3) \cdot LnTLPC + C(4) \cdot LnLCB + C(5) \cdot LnNMCDL + C(6) \cdot DUMMY1 + C(7) \cdot DUMMY2$				
Name of coff	Value of coff	S. E.	t-stat	P-value
C(1)	1.503	0.728	2.065	0.039
C(2)	-0.247	0.155	-1.59	0.113
C(3)	0.153	0.051	3.015	0.003
C(4)	0.236	0.137	1.724	0.086
C(5)	0.943	0.042	22.645	0.000
C(6)	0.382	0.274	1.394	0.164
C(7)	0.404	0.280	1.443	0.150
R-square	0.803	F-statistic	197.912	
Adjusted R-squared	0.799	Durbin-Watson stat	1.320	
Prob. (F-statistic)	0.000	-		

The impact of gender participation is also observed by using dummy variables. *DUMMY1* represents the microfinance companies where only female can take a loan. Similarly, *DUMMY2* represents the microfinance companies where both males and females can accept the loan. It is observed that 0.382-rupee maturity crossed due loan per one rupee issued a loan in the microfinance companies where female only can take a loan, but 0.404 maturity crossed due loan is found where both males and females can accept the loan. So, women are more honest in paying the loan than male borrowers. The same type of conclusion was derived by Khan and Dewan (2017), Johnson (2005), Shahriar et al. (2020), and Glackin (2002). Pay on time means using loan amounts in the appropriate and productive sector. It indirectly indicates that female borrowers properly utilized the borrowed amount more than males. F-statistics have a probability value of 0.000, which is 0.05. Hence, the total maturity crossed due loan of microfinance is determined by the number of maturities crossed unpaid loans, total loan amount, loan issued on physical collateral, loan issued on collective bail, and gender participation.

3.6. Panel co-integration test

The co-integration test establishes whether there is a long-standing connection between the variables.

The co-integration techniques of Pedroni and Kao look at the long-term relationship between the variables.

3.6.1. Pedroni (Engle-Granger-based) test for co-integration

In the long run, a co-integration test is performed to determine whether there is a relationship between different time series. The initial concept was made in 1987 by Robert Engle and Clive Granger (Madsen, 1998). The co-integration test identifies cases in which two or more non-stationary time series are combined to avoid long-term divergence from equilibrium. It is used to determine how sensitive two variables are to one another. The residuals of an erroneous regression with I (1) variables are examined using the Pedroni (Engle-Granger-based) co-integrating test. The residuals should be I if the variables are co-integrated (0). In other words, the residuals will be I (1) if the variables are not co-integrated (Padroni, 1999). This approach has three deterministic trend criteria. The outcomes of the three deterministic trend parameters are displayed in Table 6.

“In each deterministic trend specification, the seven methods of panel co-integration analysis are Panel v-statistic, Panel rho-statistics, Panel PP- statistics, Panel ADF statistics, Group rho-statistics, Group PP- statistics, and Group ADF- statistics” (Dahal,

Table 6. Products of Pedroni (E-G-based) test

Series	LnTMCDL, LnTLA, LnTLPC, LnNMCDL, LnLCB			
Analyzed data points	328			
Tentative conclusion	Statistically insignificant			
Methods	Statistic	P-value	Weighted statistic	Probability
Panel v-statistic	-0.557	0.711	-3.272	0.999
Panel rho-statistics	2.621	0.996	2.979	0.998
Panel PP-statistics	-12.154	0.000	-9.104	0.000
Panel ADF-statistics	-8.354	0.000	-4.292	0.000
Group rho-statistics	5.542	1.000	-	-
Group PP-statistics	-15.216	0.000	-	-
Group ADF-statistics	-6.616	0.000	-	-
Individual intercept and individual trend				
Methods	Statistic	P-value	Weighted statistic	Probability
Panel v-statistic	-1.201	0.885	-4.638	1.000
Panel rho-statistics	3.578	0.999	4.204	1.000
Panel PP-statistics	-14.878	0.000	-15.377	0.000
Panel ADF-statistics	-9.615	0.000	-8.173	0.000
Group rho-statistics	6.254	1.000	-	-
Group PP-statistics	-19.451	0.000	-	-
Group ADF-statistics	-6.234	0.000	-	-

Table 6 (cont.). Products of Pedroni (E-G-based) test

No intercept and trend				
Methods	Statistic	P-value	Weighted statistic	Probability
Panel v-statistic	-0.251	0.599	-2.372	0.991
Panel rho-statistics	1.351	0.912	1.784	0.963
Panel PP-statistics	-8.954	0.000	-6.432	0.000
Panel ADF-statistics	-7.349	0.000	-4.476	0.000
Group rho-statistics	4.708	1.000	-	-
Group PP-statistics	-13.912	0.000	-	-
Group ADF-statistics	-6.302	0.000	-	-

Table 7. Co-integrating test, as suggested by Kao

Series	LnTMCDL, LnTLA, LnTLPC, LnNMCDL, LnLCB		
Included observations	328 after adjustments		
Null Hypothesis	Statistically insignificant		
Descriptions	t-statistic	Prob.	
ADF	-14.43778	0.0000	
Residual variance	0.997855		
HAC variance	0.523691		

2022, p. 21). To accept the alternative hypothesis or reject the null hypothesis, the P-value must be less than 0.05. Six of the eleven P-values for the trend of the individual intercept are significant. Most of the results reject the null hypothesis, claiming that the variables do not co-integrate. Thus, the alternative hypothesis that variables are co-integrated can be accepted.

Six out of eleven P-values in individual intercept and trend specification are significant. Similarly, six of the eleven p-values for the no intercept and trend specification of the Pedroni (Engle-Granger-based) model are substantial. Hence, the majority of results suggest that the variables are co-integrated. Also, this indicates that the variables are interconnected.

The Pedroni (Engle-Granger Based) technique of co-integration analysis's three determinants trend specification indicates that the variables are co-integrated or have long-run connections. Every de-

terministic trend specification demonstrates the long-term correlation between the relevant variables. The volume of maturity-crossed-due loans, the number of maturity-crossed-due loans, the loans issued on actual collateral, and the loans issued on collective bail all have a long-term correlation.

3.6.2. Kao residual co-integration test

Like the Pedroni test, the Kao test demands cross-sectional intercepts and homogenous coefficients on the first-stage regressors (Bakucs & Ferto, 2011). The outcome and predictor variables are co-integrated per the Kao residual co-integration test. The P-value is 0.000, which is less than the 0.05 or 5 percent criterion for significance. Because the P-value is less than 0.05, we may reject the null hypothesis that co-integration doesn't exist and accept the alternative hypothesis. Table 7 summarizes the results of the Kao residual co-integration test.

CONCLUSION, POLICY IMPLICATIONS, AND LIMITATIONS

This study has explored the effect of gender participation on determining the maturity of crossed-due loans of microfinance companies in Nepal. Thirty microfinance companies' unbalanced data are used in the study. The standard deviation of the number of maturities of crossed due loans is smaller than other variables. So, the mean number of the maturity-crossed loan is more representative than other variables. The coefficient of variation of the total issued loan amount is more minor (11.51 percent). So, the total allocated loan amount is more consistent or stable than other variables. Likewise, the number

of maturities of crossed due to loans is more variable or inconsistent. A high-degree (0.89) positive relationship exists between the number of maturities crossed due to loans and maturity crossed due loans of microfinance companies in Nepal. The loan issued on collective bail is more responsible for increasing the maturity crossed due loan than the loan issued on physical collateral.

According to the Hausman test, the fixed effect or LSDV model is the best option. The impact of gender participation on taking a loan is also observed. It is found that 0.382 rupees maturity crossed due loan per one rupee issued a loan of microfinance companies where female-only can take a loan but 0.404 rupees maturity crossed due loan per one rupee is found where both male-female can accept the loan. So, women are more honest in paying loans on time than male borrowers. Women use the borrowed amount properly. Therefore, they can pay on time. The maturity of a crossed due loan, the number of maturities of crossed due loans, the total loan amount, total loan issued on physical collateral, and the loan issued on collective bail are jointly correlated. Gender participation, the total given loan amount, the number of maturities of crossed due loans, loans issued on physical collateral, and loans issued against collective bail are jointly significant to determine the maturity crossed due loan amount of microfinance companies of Nepal.

This study indicates the honesty of female borrowers in paying the loan on time compared to male borrowers. So, policymakers must change the mentality of prioritizing males to issue loans. This puts moral pressure to check the honesty of paying loans from commercial banks, development banks, co-operatives, and insurance companies. It is not necessary to hesitate to provide loans to female borrowers. A non-performing loan is not increased due to the female debtors.

This study is grounded on unbalanced panel data from thirty microfinance firms. It is based on secondary information. The analysis of thirty microfinance companies is thought to produce typical results. As a result, additional research is required, including additional microfinance companies, predictor variables, instruments, and approaches. This contributes to the macro-level conclusion.

AUTHOR CONTRIBUTIONS

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REFERENCES

1. Abubakar, L. S., Zainol, F. A., & Abdullahi, M. S. (2015). Lingered challenges of microfinance institutions (MFIs) and the way forward. *International Journal of Academic Research in Economics and Management Sciences*, 4(3), 31-37. <https://doi.org/10.6007/IJAREMS/v4-i3/1815>
2. Adhikari, D. B., & Shrestha, J. (2013). The economic impact of microfinance in Nepal: A case study of the Manamaiju village development committee,

- Kathmandu. *Economic Journal of Development Issues*, 15(1-2), 36-49. <https://doi.org/10.3126/ejdi.v15i1-2.11861>
3. Ahlin, C., & Townsend, R. (2007). Using repayment data to test across models of joint liability lending. *Economic Journal*, 117(517), F11-F51. <https://doi.org/10.1111/j.1468-0297.2007.02014.x>
 4. Athanoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions, and Money*, 18(2), 121-136. <https://doi.org/10.1016/j.intfin.2006.07.001>
 5. Bakucs, Z., & Ferto, I. (2011). Innovation and output in OECD countries: Implications upon emerging economies. *International Journal of Innovation and Learning*, 9(4), 388-400. <https://doi.org/10.1504/IJIL.2011.040537>
 6. Bardhan, A. K., Nag, B., Mishra, C. S., & Tarei, P. K. (2021). An integrated framework for analyzing performance indicators of Indian microfinance institutions: A multi-stakeholder perspective. *Benchmarking: An International Journal*, 28(9), 2711-2740. <https://doi.org/10.1108/BIJ-09-2020-0470>
 7. BCBS. (2010). *Microfinance activities and the core principles for effective banking supervision*. Basel: Basel Committee of Banking Supervision. Retrieved from <https://www.bis.org/publ/bcbs167.pdf>
 8. Bezboruah, K. C., & Pillai, V. (2013). Assessing the Participation of Women in Microfinance Institutions: Evidence from a Multinational Study. *Journal of Social Service Research*, 39(5), 616-628. <https://doi.org/10.1080/01488376.2013.816409>
 9. Bhatt, N., & Tang, S. Y. (2001). Delivering microfinance in developing countries: Controversies and policy perspectives. *Policy Studies Journal*, 29(2), 319-333. <https://doi.org/10.1111/j.1541-0072.2001.tb02095.x>
 10. Blundell, R., & Bond, S. (2000). Initial conditions and moment restrictions in dynamic Panel's data model. *Journal of Econometrics*, 87(1), 115-143. [http://dx.doi.org/10.1016/S0304-4076\(98\)00009-8](http://dx.doi.org/10.1016/S0304-4076(98)00009-8)
 11. Chen, S., Ganum, P., Liu, L., Martinez, L., & Paria, S., M. (2018). *Debt maturity and the use of short-term debt: Evidence from sovereigns and firms* (Departmental Paper No. 2019/001). Washington D.C: International Monetary Fund. Retrieved from <https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2019/02/04/Debt-Maturity-and-the-Use-of-Short-Term-Debt-Evidence-form-Sovereigns-and-Firms-46240>
 12. D'espallier, B., Guerin, I., & Mersland, R. (2013). Focus on women in microfinance institutions. *The Journal of Development Studies*, 49(5), 589-608. <https://doi.org/10.1080/00220388.2012.720364>
 13. Dahal, A. K. (2022). Impact of Interest Income and Joint Income from Commission, Fee, and Discount on Nepalese Commercial Banks' Net Profit. *Adhyayan Journal*, 9(1), 14-25. <https://doi.org/10.3126/aj.v9i1.48726>
 14. Das, S. G., Srinivasan, R. K., & Kodamarty, M. (2010). *Strategies to Counter Microfinance Delivery Challenges*. <https://dx.doi.org/10.2139/ssrn.2116876>
 15. Glackin, C. E. (2002). What does it take to Borrow? A framework for analysis. *Journal of Microfinance/ESR Review*, 4(1), 9. Retrieved from <https://scholarsarchive.byu.edu/esr/vol4/iss1/9>
 16. Goetz, A. M. (1996). *Local heroes: patterns of field worker discretion in implementing GAD policy in Bangladesh* (IDS Discussion Paper). Institute of Development Studies. Retrieved from <https://core.ac.uk/display/29136741>
 17. Hassan, S. M., M., & Islam, M. M., (2018). The Socio-economic impact of microfinance on the poor family: A study from Bangladesh. *Journal of Asian and African Studies*, 54(1), 3-19. <https://doi.org/10.1177%2F0021909618785399>
 18. Jansen, D. J., & De Haan, J. (2003). *Increasing concentration in European banking: A macro-level analysis* (De Nederlandsche Bank Research Memorandum Paper No.743). <https://doi.org/10.2139/ssrn.518422>
 19. Javid, A. Y., & Abrar, A. (2015). Microfinance institutions and poverty reduction: A cross regional analysis. *The Pakistan Development Review*, 54(4), 371-387. Retrieved from <http://www.jstor.org/stable/43831326>
 20. Johnson, S. (2005). Gender relations, empowerment, and microcredit: moving on from a lost decade. *The European Journal of Development Research*, 17(2), 224-248. <https://doi.org/10.1080/09578810500130831>
 21. Jote, G. G. (2018). Determinants of Loan Repayment: The Case of Microfinance Institutions in Gedeo Zone, SNNPRS, Ethiopia. *Universal Journal of Accounting and Finance*, 6(3), 108-122. <https://doi.org/10.13189/ujaf.2018.060303>
 22. Kabeer, N. (2001). Conflicts over credit: Re-evaluating the empowerment potential of loans to women in rural Bangladesh. *World Development*, 29(1), 63-84. [https://doi.org/10.1016/S0305-750X\(00\)00081-4](https://doi.org/10.1016/S0305-750X(00)00081-4)
 23. Karn, S. K. (2018). Challenges and opportunities of microfinance in Nepal. *International Journal of Social Sciences and Management*, 5(3), 72-75. <https://doi.org/10.3126/ijssm.v5i3.20612>
 24. Khan, A. H., & Dewan, H. (2017). Can the availability of informal loans be detrimental to microloan repayment? Some empirical evidence from Bangladesh. *The Journal of Developing Areas*, 51(4), 347-359. Retrieved from <https://www.jstor.org/stable/26416980>
 25. Mabhungu, I., Masamha, B., Mhazo, S., Jaravaza, D., & Chiriseri, L. (2011). Factors

- influencing micro and small enterprises' access to finance since the adoption of the multi-currency system in Zimbabwe. *E3 Journal of Business Management and Economics*, 2(6), 217-222. Retrieved from https://www.e3journals.org/cms/articles/1330778943_Mabhungu%20et%20al.pdf
26. Madsen, J. B. (1998). Review of Basic Econometrics, Damodar N. Gujarati. *Journal of Applied Econometrics*, 13(2), 209-212. Retrieved from <https://research-repository.uwa.edu.au/en/publications/review-of-basic-econometrics-damodar-n-gujarati>
 27. Majorano, F. (2007). *An evaluation of the rural microfinance development center as a wholesale lending institution in Nepal* (Working Paper No. 8). Asian Development Bank. Retrieved from <https://tinyurl.com/2dk49u4u>
 28. Memon, A., Akram, W., & Abbas, G. (2020). Women participation in achieving sustainability of microfinance institutions (MFIs). *Journal of Sustainable Finance Investment*, 12(2), 593-611. <https://doi.org/10.1080/20430795.2020.1790959>
 29. Morduch, J. (1998). *Does microfinance really help the poor? New evidence from flagship programs in Bangladesh* (Working Paper No. 98). Princeton University, Woodrow Wilson School of Public and International Affairs. Retrieved from https://rpd.princeton.edu/sites/g/files/toruqf1956/files/media/morduch_microfinance_poor_0.pdf
 30. Nasir, S. (2013). Microfinance in India: Contemporary issues and challenges. *Middle-East Journal of Scientific Research*, 15(2), 191-199. Retrieved from [https://www.idosi.org/mejsr/mejsr15\(2\)13/4.pdf](https://www.idosi.org/mejsr/mejsr15(2)13/4.pdf)
 31. Nawai, N., & Shariff, M. N. M. (2013). Loan repayment problems in microfinance programs that use individual lending approach: A qualitative analysis. *Journal of Transformative Entrepreneurship*, 1(2), 93-99. Retrieved from https://www.academia.edu/11298303/Loan_Repayment_Problems_in_Microfinance_Programs_that_use_Individual_Lending_Approach_A_Qualitative_Analysis
 32. NRB. (2021). *Interest rate structure of microfinance institutions of Nepal*. Nepal Rastra Bank.
 33. Pedroni, P. (1999). Critical values for co-integration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics*, 61(s1), 653-670. Retrieved from <https://onlinelibrary.wiley.com/doi/10.1111/1468-0084.0610s1653>
 34. Pitt, M. M., & Khandker, S. R. (1998). The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *Journal of Political Economy*, 106(5), 958-996. <https://doi.org/10.1086/250037>
 35. Rankin, K. N. (2002). Social capital, microfinance, and the politics of development. *Feminist Economics*, 8(1), 1-24. <https://doi.org/10.1080/13545700210125167>
 36. Risal, N. (2018). Microfinance position and indebtedness: Empirical evidence from microfinance institutions in Nepal. *Pravaha*, 24(1), 120-136. <https://doi.org/10.3126/pravaha.v24i1.20232>
 37. Shahriar, A. Z. M., Unda, L. A., & Alam, Q. (2020). Gender differences in the repayment of microcredit: The mediating role of trustworthiness. *Journal of Banking & Finance*, 110, 105685. <https://doi.org/10.1016/j.jbankfin.2019.105685>.
 38. Watkins, T. A. (2018). *Introduction to microfinance*. Singapore: World Scientific Publisher. <https://doi.org/10.1142/10054>
 39. Wilson, K. (2001). *Principled practices in microfinance*. Catholic relief services.