Rural Credit Markets in Myanmar: A Study of Formal and Non-Formal Lenders

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ABSTRACT

This paper conducts an empirical investigation of the rural credit market in Myanmar to help guide policy formulation on the microfinance operations in the country. Specifically, it looks into the determinants of credit demand and of rationing loans at the household level, and identifies the similarities, differences and relationships among the various segments of the rural credit market. Data are primarily gathered through a survey covering a total of 301 households among 7 villages in the Dry Zone. The results reveal the characteristics distinguishing the different types of credit sources, implying that the formal and semiformal credit are targeted towards different sets of clientele. The findings also suggest that promoting the semiformal credit sources likewise strengthens the development of formal credit sources.

INTRODUCTION

Microfinance is expected to be one of the most important tools against poverty in rural areas where credit markets tend to be less developed due to information asymmetries and the lack of enforcement (Hoff and Stiglitz 1993; Armendáriz de Aghion and Morduch 2005). Microfinance has become popular all over the world since Dr. Yunus, a Nobel Prize-winning activist and founder of Grameen Bank, lent small amounts of his private money to the rural poor in Bangladesh three decades ago. A lot of researchers have tried to identify the enabling factors for Grameen Bank; high repayment performances in poor areas; and how and to what extent the its microfinance model would be applicable to other countries. However, many developing countries are still having difficulty providing the appropriate financial services at reasonable costs (Morduch 1999).

In Myanmar, a country ranked among the least developed countries in the world, the United Nations Development Program (UNDP) has introduced microfinance projects under its intensive welfare program for poor rural communities since the late 1990s. Despite the urgency of pursuing poverty alleviation in the country and the consequent need to study microfinance, only a few studies have reported on the practices of rural financial institutions in Myanmar (for example, Lwann 2005; Yangon Workshop 2003; and Fukui 2003). It must be mentioned that there are some papers which have looked into the indigenous and informal credit activities in rural areas; however, these documented activities formed only a part of studies which were mainly concerned with rural livelihood (for example, Takahashi 2002).

This paper thus focuses on rural credit and investigates how rural credit markets operate in Myanmar, with the end in view of extracting some policy implications on how to improve microfinance in the country. To achieve this purpose, the paper undertakes an econometric analysis to examine the determinants of credit demand and of rationing loans, and to identify the similarities, differences, and relationships among the various segments of the rural credit market. The data used in this paper were collected during the fieldwork conducted from October to November 2005. The data-gathering activities consisted of: (1) interviews with officials, NGO workers and other lenders; (2) the collection of financial and operational data from financial

institutions; and (3) the conduct of a survey covering a total of 301 households among 7 villages in upper Burma. The extensive data collected were intended to allow a rigorous investigation into the credit activities of rural households who demand for loans and the lending the loan providers. The results point to differences in the targeted clients of the formal and semiformal credit sources as distinguished by such characteristics as loan sizes, and loan purposes, among others. The paper also suggests that promoting semiformal credit sources strengthens as well the development of formal credit sources.

The paper presents the major features of rural credit in Myanmar, specifically the market segmentation. It also describes the data set and provides some characteristics of loans by credit source in the study areas. The latter part of the paper explains the econometric investigation is applied to measure the determinants of credit demand at the household level, using the bivariate probit model to jointly analyze the determinants of borrowing from different sources. Lastly, the paper empirically investigates the determinants of rationing credit demand and suggests the similarities, differences, and relationships among various segments of the rural credit market.

SEGMENTATION OF RURAL CREDIT MARKETS IN MYANMAR

The rural financial market is composed of several distinct sub-sectors consisting of a formal sector, and various segments of a non-formal sector. In rural Myanmar, the financial market may be categorized into three divisions, namely: a formal sector; a semiformal sector; and various segments of an informal sector. Formal financial institutions are defined in this paper as legally authorized institutions, which include a state-owned agricultural development bank (the Myanmar Agricultural Development Bank or MADB), savings and credit cooperatives, public pawnshops, and private licensed pawnshops. The semiformal sector is composed of local NGO-MFIs (non-government organizations – microfinance institutions) and international NGO-MFIs, including NGOs supported by UNDP under its welfare program called the Human Development Initiative. These institutions are not under the control of the central bank and are not operating under certain laws, yet the central government of Myanmar has control over them, for example concerning their operating areas. Thirdly, informal credit refers to activities not under the control of any authority and therefore considered illegal in some cases. This last sector would include the following activities: (a) the use of illegal pawnshops; (b) borrowing from moneylenders who charge usurious rates; (c) the use of advanced payment contracts for agricultural crops between traders and farmers; and (d) lending and borrowing, usually at no interest, among relatives.

Rural credit in Myanmar is characterized by two major features. First, among the formal financial institutions, MADB has the largest reach in terms of both the number of clients and the amount of loan disbursed. In the fiscal year 2004-2005, for instance, the loan amounts disbursed by MADB totaled 27.4 billion kyats (25 million dollars)[1] and its clients numbered 1.3 million. For example, the figures of clients are three times larger than the comparable figures for savings and credit cooperatives which are the second largest formal financial institutions in rural Myanmar. MADB, as the sole state-owned bank for agricultural development in Myanmar, has provided financial services to farm households since 1953. The current structure of MADB was established by the Law of 1990 which states that the aim of MADB is to support rural development through the promotion of rural financial intermediaries (SLORC 1990).

The second feature of rural credit in Myanmar is that semiformal financial institutions—in particular, NGO-MFIs supported by UNDP—have been growing rapidly since the late 1990s. Due to data constraints, this study focuses on a microfinance project in the Dry Zone of upper Burma which is conducted by an international NGO-MFI, namely, Pact Myanmar (or Pact). The Pact microfinance project, originally named the "Sustainable Livelihoods through Microfinance for the Poor", was introduced in 1997 under the UNDP welfare program. Up to 2004, the project

[1] For the calculations in this paper, 1 US dollar is estimated to equal 1,100 kyats (the prevailing rate at the end of October 2005). However, the exchange rate stood at $1 to 5.48 kyats at the end of 2004, according to the ADB (2005).

covers 487 villages out of the targeted 539 villages in the Dry Zone which has been identified as one of the most poverty-stricken areas. The cumulative number of Pact clients since 2001 has reached to 0.26 million at the end of 2004. The total amount of loans disbursed by Pact in 2004 is 6.8 billion kyats (6.2 million dollars). In contrast to MADB, the aim of Pact is to promote income-generating activities among the poor, for instance, stockbreeding and non-agricultural enterprises, in addition to farming.

In this paper, therefore, focus is on two major microfinance institutions (MFIs), namely, MADB which represents the formal financial sector, and Pact which represents the fastest-growing sector of rural credit markets in Myanmar. Both these MFIs use the group lending methods and have achieved good repayment performances, at least during the last decade.

DATA

Survey Data

This data-gathering activities were intended to support the main task of undertaking an econometric analysis of how the credit market operates in rural Myanmar. The data used were collected by the author during the fieldwork conducted in the city of Yangon and the Kyaukpadaung Township in the Dry Zone of upper Burma from October to November 2005. A total of 301 households among 7 villages in the township constituted the sample.

As mentioned earlier, this study seeks mainly to: first, examine the determinants of credit demand and of rationing loans, and second, to identify the similarities, differences and relationships among various segments of the rural credit market. Following these purposes, the household data were collected using structured and semi-structured questionnaires which covered various topics including: 1) general information on family members and assets; 2) the contents of expenditures on farming, stockbreeding, and self-employed business by crop and product; 3) sales incomes by crop and product; 4) monthly incomes from other sources; 5) monthly expenditures on consumption; and 6) details of financial activities, for example, the terms and conditions of loans and satisfaction at loans, among others. The production and consumption data were obtained by asking not only the price but also on which month and how much amounts were purchased, produced, and sold from October 2004 to October 2005 so that we can accurately grasp the monthly cash flows of the sample households during the period.

The villages that formed part of the sample were selected by considering various factors which generally affected both the productive activities of rural households who demanded loans and the lending activities of those who supplied the loans. In every village, all households were first classified by villagers according to wealth into one of five categories, after which around 50 households per village were randomly selected in proportion with the ratio of households at each wealth status.

Characteristics of Sampled Households and Villages

Table 1 shows the profile of the surveyed households. Looking at the main source of household income, the mean value of incomes from agriculture and non-agricultural business is 440 thousand kyats. In these study areas, it must be noted that the rural population has to contend with the difficulty of earning monetary income during the slack season which covers a six-month period from February to July; the harvest seasons of major crops fall during the months of August and December/January. The amount of income during the slack season represents only 37% of the household's annual income. The average size of cultivated land is almost five acres. The average educational attainment level for the head of household corresponds to the graduation level of elementary school; however, about 15% of the sampled households have at least one member who has attended university. Looking at loan size by credit source, the average size of an MADB loan is 14 thousand kyats while that of a Pact loan is 48 thousand kyats, on average.

Table 2 briefly presents the characteristics of the surveyed villages. Appropriate indicators are used to classify the villages in terms of the level of infrastructure, the degree of development, and the structure of labor employment. In the following econometric analyses, the villages are grouped according to the level of their development. Villages 1 and 2 are categorized together as

Table 1. Characteristics of sample households.

	Mean	Standard Deviation	Maximum	Minimum	Obs.
Income					
Income from agricultural and non-agricultural source *	444.69	710.80	6220.00	0.00	301
Agricultural income	313.28	390.60	3505.00	0.00	301
Crop income per acre	46.97	40.65	193.33	0.00	301
Non-agricultural income	131.41	543.90	4800.00	0.00	301
Income during slack season **	201.92	486.78	5550.00	0.00	301
Welfare					
Social status ***	3.49	1.18	5.00	1.00	301
Land size cultivated (acre)	5.07	5.36	50.00	0.00	301
Total assets at present value	657.73	831.76	8250.00	0.00	301
Dummy=1 if female-headed hh	0.09	0.28	1.00	0.00	301
Labor					
Proportion of adult labor to total hh members	0.52	0.24	1.00	0.00	301
the Number of hh members	4.90	1.91	11.00	1.00	301
Education					
Age of the head of hh	49.55	13.93	88.00	21.00	301
Educational attainment level of the head of hh ****	2.06	1.53	8.00	0.00	301
Dummy=1 if hh has a member who has attended university	0.15	0.36	1.00	0.00	301
Dummy=1 if say hh members have sufficient level of production technique	0.25	0.43	1.00	0.00	301
Loans					
Loan amounts from formal and semiformal financial institutions	29.52	2.21	215.00	5.00	180
Amounts of MADB loan	13.97	0.50	40.00	7.00	160
Amounts of Pact loan	47.67	3.56	200.00	10.00	60
the Number of borrowing from MADB	13.74	0.66	50.00	1.00	160
the Number of borrowing from Pact	3.34	0.22	10.00	1.00	65

* Unit of each income, asset, and loan size is in thousand of kyats.

** It means income from February to July, i.e. lower income season.

*** Using the Wealth Ranking method, social status is categorized into the following levels, namely: 1) rich; 2) middle rich; 3) middle; 4) middle poor; and 5) poor.

**** Educational attainment consists of the following categories: 0) none; 1) enrolled in elementary school; 2) completed elementary education; 3) enrolled in junior high; 4) completed junior high; 5) enrolled in high school; 6) completed high school education; 7) enrolled in university; and 8) graduated from university or enrolled in post-graduate studies.

Source: Field survey.

Table 2. Characteristics of sample villages.

	Region 1		Region 2			Region 3	
	village 1	village 2	village 3	village 4	village 5	village 6	village 7
Infrastructure							
Road condition *	4	4	2	3	2	1	1
Dummy=1 if telephone line in village	1	1	0	1	0	0	0
the Level of development							
Value of hh assets at present value (on average; thousand kyats)	1,110.2	975.5	918.7	880.7	1,010.0	421.9	435.9
Proportion of medical, religious, and educational expences to hh total income (on average)	19.9%	38.9%	10.7%	12.1%	32.5%	27.5%	30.4%
Employment composition the Number of exisiting opportunities for investment and employment	6	5	5	5	6	6	8
Proportion of hired-laborer hhs to total village hhs	4.1%	25.0%	31.4%	32.1%	22.0%	38.0%	28.6%

* For road condition: 1) good; 2) not good; 3) not bad; and 4) bad.
Source: Field Survey.

Region 1, representing a relatively high level of development, with favorable conditions of infrastructure. Villages 3 to 5 with middle level of development are categorized as Region 2, and Villages 6 and 7, with lower level of development are categorized as Region 3.

Brief Characteristics of Rural Credit Activities[2]

Table 3 shows that 76% of the sampled households borrow from the formal and/or semiformal credit sources; the former includes MADB (53%) and the latter includes Pact (20%). Clearly, these two institutions play major roles in meeting the credit needs of the population in the study areas. MADB loan is allocated only among farmers who cultivate any one of eight staple crops (e.g. paddy, sesame, etc.) specified by the central government of Myanmar. In addition to the joint liability stipulated under the group-based lending scheme, MADB implicitly requires some form of collateral such as standing crops and non-productive properties (SLORC 1990), whereas Pact requires no collateral except for the joint liabilities. To guard against adverse selection and moral hazard, Pact has instituted such mechanisms as the maintenance of regular repayment schedules, the group-based lending, and the Non-Formal Business Education (NFBE) training which is a five-module program for every applicant.[3] In general, informal sources require no collateral, either. The informal credit sources are used by 7% of the total sample. Nearly one third of sampled households borrow neither from the formal/semiformal sources or the informal sources.

As suggested by Zeller (1994), the reason for market segmentation does not generally appear to be the sticky formal market interest rate but the

[2] Because of the explicit and implicit regulations on interest ceilings, it is generally difficult to encourage and mobilize savings in Myanmar. Thus the following discussion will focus on loans only.

[3] For the effectiveness of group lending methods in theory, see Stiglitz (1990) and Ghatak (1999). For a discussion on other methodsand constraints of group lending in general, see Armendariz de Aghion and Morduch (2000; 2005).

Table 3. Distribution and terms of loan by credit source.

	Formal and Semiformal financial source						Informal financial source				No borrowing	
	Sub total	MADB	Pact	Public pawnshops	Private licensed pawnshops	SRGs *	Sub total	Money lenders contracts	Advanced payment	Relatives		
% of households	76.4%	53.2%	19.9%	0.3%	0.7%	2.3%	6.6%	1.0%	4.0%	1.7%	32.2%	
Average loan size (kyat)	23,100	13,878	47,667	6,000	87,500	7,357	57,055	91,400	42,146	172,600	-	
	(USD)**	21.0	12.6	43.3	5.5	79.5	6.7	51.9	83.1	38.3	156.9	-
Monthly interest rate (%)	-	1.25	1.80	3.00	5.00	3.00	-	5.00-8.00	around 50	0.00	-	
Duration of loan (months)	-	8	12	6	6	3	-	3-12	2	9-13	-	
Loan purposes: (%)												
Crop farming	73%	100%	5%	-	100%	57%	22%	100%	-	-	-	
Stockbreeding	21%	-	80%	-	-	14%	-	-	-	-	-	
Non-agricultural business	4%	-	12%	100%	-	29%	13%	-	-	50%	-	
Consumption	1%	-	3%	-	-	-	65%	-	100%	50%	-	

unique characteristics of different credit services among various segments, reflecting the existence of information asymmetries at different degrees between potential borrowers and lenders. In the following, we try to compare the loans made available to the rural population by the different sub-sectors in terms of the loan interest rate, loan size, duration, and loan purposes.

As shown in Table 3, the monthly lending interest rate of an MADB loan is 1.25% (the new rate of 1.42% has been offered since April 2006) which is the lowest among all sources except for the loans from relatives (who do not charge any interest). Since MADB receives soft loans from a state-owned bank every fiscal year[4], the lending interest rate charged to farmer-borrowers by MADB is very low to be negative in real terms. The monthly interest rate of a Pact loan is 1.8% (the new rate of 1.75% has been offered since January 2008) while pawnshops charge 3% to 5% interest rate in the study areas.[5] The interest rates of the formal and semiformal credit sources are lower than the usurious rates charged by illegal or informal sources such as money lenders (5% to 8% monthly interest) and trader-money lenders (around 50% monthly interest rate).

The average loan size per loan of the informal credit sources (US$52) is much larger than that of the formal and semiformal source (US$21). In particular, the average size of an MADB loan is only 13.9 thousand kyats (US$12.6). The size of a Pact loan is much larger at 47.7 thousand kyats (US$43.3) on average. On the whole, the MADB provides smaller amounts of loan compared with Pact and other credit sources in rural Myanmar. On the other hand, the average loan size from money lenders reaches up to 91 thousand kyats (US$83). Even higher is the loan size among relatives at 173 thousand kyats (US$157) on average. These informal loans are said to be used for both production and consumption purposes. This implies that there exist a number of borrowers with a high demand for credit but are excluded from the formal and semiformal financial system.

The duration of an MADB loan, the monsoon loan in particular, is roughly eight months, yet the cycle of major crops in the study areas (for instance, sesame and groundnuts) is around three to four months in general. This reveals a mismatch between the loan duration terms and the crop cycles. In accordance with its goal to promote various activities of the poor including non-farming enterprises, the duration of a Pact loan is longer (12 months) than that of MADB's farm loan. As shown in Table 3, the duration of informal loans varies from two months to more than a year, depending on their uses.

Looking at the purposes for which debts are incurred, 99% of the formal and semiformal loans appear to be used for productive purposes. In contrast, loans from the informal sources are used for more diverse purposes including daily consumption and school fee payment (65%), as well as agricultural and non-agricultural production (35%).

To sum up, the survey results show that MADB and Pact are the major players in the rural credit market in the study areas. However, the MADB loans and the Pact loans differ widely in terms of the loan size per loan, duration, interest rate and purpose. Notably, the average size of the Pact loan is much larger than that of the MADB loan. Furthermore, while MADB loans finance farm expenses, the Pact loans support various activities of the poor such as stockbreeding and trading, as well as farming. Furthermore, it is also shown that, compared to the formal and semiformal sources, the informal credit sources generally provide bigger loan amounts at higher interest rates for the various purposes.

MEASURING THE DETERMINANTS OF CREDIT DEMAND

Estimation Methods: Bivariate Probit Model

After establishing the basic characteristics of rural households and credit activities in the

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[4] MADB has borrowed from Central Bank of Myanmar since the fiscalyear of 2002-2003, and then changed to borrow from a state-owned bank, Myanmar Economic Bank, following the state decision.

5 Pact receives grant capital from UNDP every year, though income from lending interests is sufficient enough to cover operational costs. Pact might therefore be operationally sustainable.

previous section, an econometric investigation, to measure the determinants of credit demand at the household level is then applied. As suggested by Yadav et al. (1992), the supply and demand curves of credit cannot be separately identified, unless the determinants of credit supply and demand, other than borrower-specific variable, are used for estimation. Note that it is usually difficult to find such variables in field studies. Following the study's objectives, therefore, this paper applies reduced-form equations for the empirical investigation of the determinants of credit demand. Dummy variables of each region are used to control region-specific supply and demand factors affecting credit contracts.

Since rural households make decisions to borrow from various sources in a simultaneous manner, the determinants of borrowing from these sources should be jointly analyzed. Since our data on borrowing from informal sources are limited and not valid for quantitative estimations, a separate descriptive analysis on credit demand for informal sources (and its rationing) was done. The determinants of credit demand for MADB, representing formal credit sources, and for Pact, representing semiformal credit sources, are jointly investigated through a bivariate probit approach for reduced form equations of credit demand. Include din the bivariate probit model a set of dependent variables that would equal one if a rural household borrowed from a specified credit source, MADB or Pact, and zero, otherwise.

Thus, the estimation model can be represented as follows:

$$C_{1i}^{*} = \beta_1 X_{1i} + \varepsilon_{1i}$$

$$C_{1i} = \begin{cases} 1, & \text{if } C_{1i}^{*} \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

$$C_{2i}^{*} = \beta_2 X_{2i} + \varepsilon_{2i}$$

$$C_{2i} = \begin{cases} 1, & \text{if } C_{2i}^{*} \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

$$E[\varepsilon_{1i}] = E[\varepsilon_{2i}] = 0$$

$$var[\varepsilon_{1i}] = var[\varepsilon_{2i}] = 1$$

$$cov[\varepsilon_{1i}, \varepsilon_{2i}] = \rho$$

where C^{*}_{1i} is the probability of having a MADB loan for the *i*th household and C^{*}_{2i} is that of a Pact loan; C_{1i} represents the case with MADB loan and C_{2i} represents that with Pact loan; X_{ji} is a vector of explanatory variables and is a vector of coefficients to be estimated, where j=1, 2; and and indicate error terms of the equations respectively.

As both MADB and Pact provide loans mainly for production activities, it can be supposed that the households with high levels of productive factors, for example, land, quantity and quality of labor, and so forth, have a larger demand for credit than those with lower levels of productive factors. The explanatory variables, therefore, with the expected signs of relationship in parentheses, are as follows: the size of cultivated land (+); the age of the head of household (+); the age of the head squared (-); the educational attainment level of the head of household (+); the dummy for the household that has (a) member(s) who has/have attended university (+); the proportion of adult workers to household members (+); and the dummy variable for Region 1 (+); for Region 2 (+/-); and for Region 3 (-). Since Pact loans are qualified only for those who are not categorized as "rich" through the Wealth Ranking method, the ranked results of social status (+) and the dummy variable for female-headed households (+) that are underprivileged in general are also applied as additional explanatory variables for the estimate of Pact loans. The household income during the slack season which is supposed to reflect the regular repayment schedules charged by Pact is also included among the explanatory variables. The dummy of Region 3 which has no access to Pact projects is excluded in the regression.

Estimation Results: Formal and Semiformal Sectors

The estimation results are shown in Table 4. One major finding is that the estimated coefficient of the land size is positive and significant for MADB loans but insignificant in for Pact loans. This implies that MADB loans benefit mostly farmers, and that Pact loans, which are intended to finance various activities aside from farming, do serve their targeted clients as well.

The coefficient of the educational attainment level of the household head is significant and positive for Pact loans as expected, and is insignificant for

Table 4. Determinants of borrowing: MADB and Pact.

	(1) Borrowing from MADB			(2) Borrowing from Pact		
	Coefficient	Standard	Error	Coefficient	Standard	Error
Constant	-2.342	0.753	***	-1.578	0.780	**
Land size	0.169	0.025	***	-0.021	0.022	
Age of the head of hh	0.046	0.025	*	0.036	0.026	
Age of the head squared	-0.279	0.245		-0.256	0.252	
Educational attainment level of the head of hh	0.049	0.060		0.110	0.062	*
Dummy=1 if hh has a member who has attended university	-0.128	0.245		0.118	0.241	
Proportion of adult labor to total hh members	-0.424	0.368		-1.283	0.427	***
Social status (4: middle poor)				-0.366	0.252	
Social status (5: poor)				-0.359	0.275	
Dummy=1 if female-headed hh				0.396	0.350	
Income during slack season				0.195	0.175	
Region 1	0.452	0.228	**	0.414	0.202	**
Region 2 0.393	0.266		0.057 0.268			
Region 3 0.164	0.251					
ρ 0.347	0.120					
Wald test: ρ=0	chi2(1)	7.469	***			
Log likelihood	-292.54					
Samples 301						

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level.

MADB loans. On the other hand, the coefficient of the age of the head of household is significant and positive for MADB loans as expected, and is insignificant for Pact loans. One unexpected result is that the coefficient of the proportion of adult labor to household members is significantly negative for Pact. This implies that this variable represents one of the characteristics of the poor households which are eligible for the Pact loan.

Finally, to indicate the relationship between the MADB and Pact loans, it must be pointed out that the correlation coefficient of the error term, , is positive and significant, which suggests that the MADB and Pact loan are complements. This implies that promoting the Pact loans strengthens as well the development of MADB loans. The result is consistent with the description in the previous section that the MADB and Pact loans differ widely in terms of many characteristics like the loan size per loan, and the loan purposes, among others. For instance, the average size of a Pact loan is much larger than that of an MADB loan. The MADB loan appears to be mainly allocated to farmers, whereas the Pact loan is used for stockbreeding and trading as well as farming. These results suggest that MADB and Pact have different sets of targeted clientele.

MEASURING THE DETERMINANTS OF CREDIT RATIONING

Analytical Framework for the Determinants of Credit Rationing

As suggested by Feder et al. (1989), the procedure in some studies that use dichotomy between borrowers and non-borrowers assumes that all non-borrowers are credit-constrained. This assumption is not appropriate here since the data collected generally indicate that many of the non-borrowers have sufficient liquidity from their own resources and they had not borrowed precisely

because they did not need additional liquidity.[6] The data used in the study, therefore, were arranged to reveal the extent of credit constraints and to classify every sample household into either of two categories, namely: the household that is credit-constrained, and that which is credit-unconstrained.

All households were first asked whether they were current borrowers or not. Then, the non-borrowing households were asked the reasons why not, while the borrowing households were asked if they were satisfied with the loan terms, including the size of loan obtained, and then asked to explain their answer. Depending on their answers, the credit-constraint status would be determined. For instance, those who do not borrow because they do not need credit at all will be recognized as credit-unconstrained, yet those who borrow credit but want to get more will be categorized as being credit-constrained.

The analytical framework described below is intended to identify the determinants of credit rationing in the formal and semiformal sectors. Following the framework with a sequential decision presented by Zeller (1994), the household decides at stage one whether to apply for credit. At stage two, the lender decides whether to give the applicant all the credit asked for, or partially reduce the credit amount, or to fully reject the demand (there was no applicant in the sample who was fully rejected).

The probit models are used to estimate the determinants of the two variables: APPLY (equal to 0 if the household did not apply for a loan; equal to 1 if the household applied) and RATION (equal to 0 if the applicant was not credit-constrained; equal to 1 if the applicant was credit-constrained). The models are estimated separately for MADB and Pact because the analysis in this section focuses on identifying the differences between the loan rationing of the two MFIs.

The equation Pr(APPLY) = F(H, D) is used for estimating the probability of applying for a loan, where H is the vector of the applicant's household characteristics affecting credit demand and D indicates regional dummies. These household characteristics (with the expected sign of relationship in parentheses) are: the size of cultivated land (+); the age of the head of household (+); the age of the head squared (-); the educational attainment level of the head of household (+); the dummy for the household that has (a) member(s) who has/have attended university (+); and the proportion of adult labor to the total household members (+). As was done in the previous regression, the social status (+) based on the Wealth Ranking method and the dummy variable of female-headed household (+) are also included in the estimation of Pact loans. The household income during the slack season which is supposed to reflect the regular repayment schedules charged by Pact is also included as an explanatory variable in the regression.

In the second stage, the equation Pr(RATION) = G(H, D, R) is used for estimating the probability for an applicant to be rationed a credit by each lender[7], where H is the vector of household characteristics affecting the lender's decision, which consists of the same variables at the first stage but with the opposite signs; D represents regional dummies; and R is the vector of repayment ability variables affecting the lender's decision, namely, the number of borrowing from each lender (-) and the present value of assets (-)[8] which are assumed to reflect repayment histories and the results of peer selection. The value of liquid assets (-) is used as an explanatory variable for the estimation of Pact loans because Pact requires applicants to deposit small amounts of money during the training program conducted before the loan disbursement. In addition, the size of cultivated land by crop (-) as a kind of collateral is added to R for the estimation of the MADB applicants. To correct for sample selection bias in modeling the sequential decision process, the correction term, that is, the inverse Mill's ratio generated by the first-stage probit estimate, is included as an additional variable in the second stage.

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[7] Among the features of the supply for credit in poor rural areas where informational assymetries are critical, it is particularly important to consider rationing analyzed by Stiglitz & Weiss (1981), which may arise if the expected return on a loan does not increase monotonically with the interest rate charged due to the screening and incentive effects of the interest rate.

[8] The variable of the values of household total assets does not include the values of land, since farmers do not have the right to own land, transfer, mortgage, and so forth under the state ownership of farmland in Myanmar.

Table 5. Determinants of application and being credit-constrained: MADB.

	(1) Applying for MADB loan			(2) Being Credit-Constrained		
	Coefficient	Standard	Error	Coefficient	Standard	Error
Constant	-1.317	1.079		0.758	1.856	
H: Household characteristics						
Land size	0.169	0.025	***	-0.052	0.092	
Age of the head of hh	0.008	0.043		0.021	0.056	
Age of the head squared	0.0001	0.0004		-0.0003	0.001	
Educational attainement level of the head of hh	0.053	0.062		-0.018	0.081	
Dummy=1 if hh has a member who has atended university	-0.151	0.246		0.325	0.318	
Proportion of adult labor to total hh members	-0.418	0.370		-1.085	0.566	*
R: Screening factors						
the Number of borrowing from MADB				0.158	0.109	
Total asset				0.226	0.098	**
Sesame (land size)				-0.180	0.089	**
Groundnut (land size)				0.744	0.296	**
Pea (land size)				0.001	0.016	
Paddy (land size)				-0.025	0.136	
D: Control dummy						
Region 1 0.295	0.224			-0.736	0.314	**
Region 2 0.248	0.264			0.167	0.361	
Region 3 -0.079	0.245			-0.344	0.501	
λ□sample-selection correction term				-0.139	0.811	
Log likelihood		-161.4			-90.2	
LR statistic		93.3	***		39.0	***
Pseudo R-squared		0.22			0.18	

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level.

Estimation Results: Determinants of Credit Rationing (Formal and Semiformal Sector)

The estimation results for MADB loans are listed in Table 5. It is found that most of the variables which are assumed to affect the lender's decision to provide loans emerged insignificant or with unexpected sign. On the other hand, looking at the determinants that affect Pact in its decision to ration credit, as shown in the right-hand side of Table 6, the coefficients of the income during a slack season, the social status, and the land size turned out to be significant with the same sign as expected.

These results show that Pact appears to have a better method of screening applicants than MADB. Based on interview with officials and NGO workers, it can be conjectured that this is because UNDP has invested Pact with a certain amount of autonomy and motivated it to maintain good performance levels in terms of sustainability and outreach. In fact, Pact applies several methods to screen out potential borrowers. For instance, it has adopted the regular repayment schedules, the group-based lending scheme, and the five-module training program for applicants. In contrast, MADB is a government bank with little autonomy and

Table 6. Determinants of application and being credit-constrained: Pact.

	(1) Applying for Pact loan (probit estimate)			(2) Being Credit-Constrained (probit estimate)		
	Coefficient	Standard	Error	Coefficient	Standard	Error
Constant	-2.148	1.388		18.428	11.143	*
H: Household characteristics						
Land size	0.015	0.037		-0.196	0.103	*
Age of the head of hh	0.031	0.053		-0.140	0.163	
Age of the head squared	-0.0002	0.001		0.001	0.001	
Educational attainement level of the head of hh	0.208	0.073	***	-0.918	0.670	
Dummy=1 if hh has a member who has attended university	0.321	0.288		-1.294	1.039	
Proportion of adult labor to total hh members	-0.866	0.468	*	4.728	3.008	
R: Screening factors						
Social status (4: middle poor)	-0.362	0.293		1.412	1.231	
Social status (5: poor)	-0.389	0.342		2.377	1.389	*
Dummy=1 if female-headed hh	0.378	0.377				
the Number of borrowing from Pact				-0.055	0.159	
Liquidity assets				-2.590	2.364	
Income during slack season	0.717	0.318	**	-4.661	2.385	*
D: Control dummy						
Region 1	0.583	0.239	**	-2.966	1.750	*
Region 2	-0.015	0.298		0.105	0.820	
λ□sample-selection correction term				-8.152	4.595	*
Log likelihood		-108.7			-28.0	
LR statistic		44.0	***		18.6	
Pseudo R-squared		0.17			0.25	

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level.

incentive, which generally grants loans to most of the farmer-applicants.

Rationing Credit Demand by the Informal Sector

To identify the features of the segmented credit market in rural Myanmar, our discussion will focus on the differences between the formal/semiformal sectors, and the informal sector.

Table 7 presents the mean values of income, assets and other characteristics of borrowers among several credit sources. First, it appears that the borrower-households of informal usurious sources are relatively poor in terms of income and educational levels. For instance, the mean value of the income earned by these borrowers during a slack season is very low (39,000 kyats). Also, the percentage of these households that have at least a member who has attended university is only 6%, as compared to the 20% to 25% for other borrowers. Second, the figures show that the households borrowing from relatives also appear to be poor. The average land size of these borrowers (2.8 acre) is much smaller than that of MADB borrowers (7.2 acre).

Although we did not establish the causality between being poor and having access only to

Table 7. Brief characteristics of borrower-households by credit source.

Credit Source	MADB		Pact		Usurious lenders (trader-lenders, etc.)		Relatives	
Hh Characterisitcs*	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error
Land size owned (acre)	7.2	5.9	5.9	4.2	4.2	3.3	2.8	2.9
Total assets at present value **	844.64	964.91	705.13	555.18	392.96	291.04	339.40	362.21
Liquidity assets	141.35	726.83	81.77	132.60	16.77	24.73	0.59	1.32
Age of the head	52.37	13.42	50.82	12.19	51.59	13.56	51.20	15.64
Educational Attainment level of the head of hh	2.27	1.66	2.58	1.55	1.59	0.80	2.20	0.84
Dummy=1 if hh has a member who has atended university	0.20	0.40	0.25	0.44	0.06	0.24	0.20	0.45
Proportion of adult labor to total hh members	0.50	0.24	0.43	0.20	0.36	0.22	0.56	0.27
Social status	3.14	1.05	3.33	0.93	3.18	1.01	4.40	0.89
Dummy=1 if female-headed hh	0.05	0.22	0.07	0.25	0.00	0.00	0.20	0.45
Income during slack season	224.60	603.78	260.27	493.51	39.38	48.26	295.41	350.62
Region 1	0.25	0.43	0.43	0.50	0.24	0.44	0.40	0.55
Region 2	0.58	0.50	0.57	0.50	0.35	0.49	0.40	0.55
Region 3	0.18	0.38	-	-	0.41	0.51	0.20	0.45
N=301	53%		20%		6%		2%	

*See footnote of Table 1.
** Unit of income and asset is in thousand of kyats.
Source: Field survey.

certain credit sources, our findings imply that the poor are likely to borrow from informal sources. It is consistent with the description in the previous section that the borrowers of informal sources are those who are excluded from the formal and semiformal financial system even though they demand credit.

CONCLUSION

In order to investigate how rural credit markets operate in Myanmar, first, the determinants of credit demand using the bivariate probit estimate was examined. The major finding was that the MADB's farm loan was demanded by farmers, whereas the Pact loan which was targeted to support various activities besides farming appeared to be utilized for farming as well as non-farming enterprises.

Second, the determinants of being credit-constrained at the household level was empirically investigated. The estimation results suggested that Pact would have a better screening method than MADB. The likely explanation for this would be because UNDP has invested upon Pact with a certain amount of autonomy and has motivated it to achieve good results in terms of sustainability and outreach. In contrast to Pact, MADB is a government bank with little autonomy and incentive, which allocates credit to most of the farmers who applied for the loans.

Finally, the results shown in the paper identified the relationships among various segments of the rural credit market in Myanmar. Concerning the relationship between the formal and semiformal

sources, it was empirically shown that the MADB and Pact loan were complements. This implied that the very act of promoting the Pact loans strengthened as well the development of MADB loans. The result was consistent with the observation that the MADB and the Pact targeted different sets of clientele since the loans they granted differed widely in terms of the loan size, duration, interest rate, and purpose.

In addition, the paper suggested that the borrowers of informal sources were underprivileged and were excluded from the formal and semiformal financial system even though they demanded credit. Since credit rationing will constrain income development, the development of the formal and semiformal sector may play an important role to mitigate constraints in liquidity and promote productive activities in rural areas. To develop a consistent policy against poverty, further research should focus on taking a more in-depth investigation analyzing the roles and functions of various credit sources in rural Myanmar.

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