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Full Length Research Paper

Determinants of Loan Utilization and Repayment Behaviour among Small Farmers in North Kordofan of Sudan

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This paper aimed at investigating the interaction effect of loan use and repayment behaviour of farm households. We use primary data collected from the field survey that is conducted in North Kordofan of Sudan, namely Shiekan and Enuhud localities during the season 2014, using structured questionnaire. It surveyed 200 farm households (defaulter and non-defaulters), which were selected through a multi-stage stratified random sampling technique. The data gathered were analyzed using descriptive statistics and bivariate probit model. The results of descriptive analysis showed that 89 percent of rural households repayed their loans on time, while 52 percent of rural households have used their loans for investment activities. Interestingly, about 82 percent of households decided to invest in agricultural activities, of which 23 percent did so in livestock rearing. While, only 18 percent of households have used their loans for non agricultural activities.We find evidence that the borrowers who have received loans and invested in livestock activities had less default compared to those who invested otherwise. We also provide evidence that the loan utilization mechanism adopted by microcredit institutions in the study areas is somehow linked to the repayment behaviour of the borrowers. Although, Our findings confirmed that application fees, value of assets, frequency of repayment period, punishment expected and group lending collateral required were significant variables that influencing the outcome equations (loan utilization and loan repayment), yet lenders do not put emphasis on the age and education level of borrowers during the process of contract formation. This implies the conclusion that linking of bad repayment records with less knowledge and skills of clients is not always sufficient to identify the defaulters.

Keywords: Loan utilization, agricultural activities, repayment behaviour, bivariate probit model.

INTRODUCTION

The economy of Sudan is highly dominated by the agricultural sector, which contributes about 31 percent of Gross Domestic Product (GDP) and employs over 80 percent of the population (CBOS, 2013). At the same time, 70 percent of farm households obtain their livelihoods from agricultural earnings (ABDELATEIF, 2013). Besides, the Sudanese agricultural sector is characterized by resource poor small farmers who lack sufficient capital to attain their production potential. Therefore, the government of the Sudan has been pursuing a microcredit policy that seeks to provide essential business that improves the livelihood of poor people. To do so, many microcredit institutions such as

banks, social funds and other special programs were established. The main objective of the government intervention in the provision of credit for rural farmers is to promote rural financial institutions with the purpose of reaching the poor in remote areas who are mostly excluded from the formal financial system. It is for this reason that Sudan's agricultural policy for the past two decades has concentrated on agricultural investment by setting flexible policies that encouraging the banks to channel 12 percent of their loan portfolios to be invested in microcredit activities. It is believed that, accessing to credit at reasonable interest rates give poor people an opportunity to set up their own small business and consequently increase their incomes on sustainable basis. Unfortunately, the government's efforts in implementing the microcredit policies remain limited and poorly coordinated, especially in North Kordofan, which is the area in which this study was conducted. Apparently, there is policy failure in the rural finance market, as the government for the past ten years has done little in executing the above policies (CBOS AND UNICONS, 2006). This can be attributed to several factors including: bureaucratic procedures, lack of sincerity of purpose, and the unwillingness of lenders to grant loans to the poor due to lack of collateral security (ADEBAJO, 2010). Although, loan taken from microcredit institutions vary from region to region, sector to sector. But most credits offered in the study area were found to share common characteristics: suffer from small loan size, high interest rates and a considerable problem of default. Most poor people in the State cannot get good financial services that meet their needs because there are not enough strong institutions that provide such services. Strong institutions need to charge enough to cover their costs so that they can continue and expand its services over the long term. According to SADEGH (2006) the sustainability of MFIs can be achieved by lowering transaction costs and offering services that are more useful to the clients. It is worth mentioning that rural farmers with low income need other kinds of support before they can make good use of loans. Thus, this requires strong MFIs that not only provide affordable credit services to their clients but also to do so in a sustainable manner. Against this general background, this study raised the core question, whether utilization of small loans would translate into convenient improvement in the livelihood of households. This question and many others were the source of my inspiration to accomplish this study.

The paper is organized as follows. In section 2, we describe our data collection source, sampling procedure and analytical tool. Section 3, presents the descriptive statistical results of farm households. The results from the empirical analysis are presented in section 4. In the model empirical analysis we distinguish between credit users and non- users, moreover credit users was categorized into defaulter farmers and non-defaulters using bivariate probit model for the determinants of factors influencing repayment behaviour and loan utilization. Lastly, we conclude in section 5.

Statement of the problem

In spite of the potential contribution of microcredit institutions (MFIs) to reducing the poverty of poor and relieve their financial constraints, its acquisition is fraught with a number of problems (OKWOCHE *et al*, 2012). Lack of access to formal credit and adequate finance remains the most limiting problem of the rural small-holder farmers (ABDELATEIF, 2013). This is because capital is the most important input in agricultural production and its accessibility has remained a major instrument to develop the agricultural sector. Recent studies conducted in Sudan revealed that, gaining access to credit is a challenge for rural farmers, they require tangible collateral to be present as a condition for giving loans, so the poor and needy are denied institutional credit since they have no access to inherited property (ABDELATEIF, 2013). The rural farmers are forced sometimes to seek for capital from relatives, friends and money lenders. Although relatives and friends sources is more popular among rural farmers in rural Sudan due to the simplicity of procedures in obtaining credit and non-existence of collateral, yet known to be ineffective in providing capital needs especially in agricultural investment. Similarly, the village money lenders are interested more in earning high interest or taking hold of the debtor’s property rather than financing people in need.

Therefore, microcredit institutions that offered formal credit to the poor is a hope for the farmers in terms of loan amount and interest rate charged (ALUFOHAI, 2006). Each of these MFIs tries to maximize its repayment performance through different approaches and mechanisms. The most effective indicator of successful MFIs is the loan repayment performance and loan usage in intended purpose (SENGUPTA AND AUBUCHON, 2008). High repayment rates always associated with sustainability of MFIs and benefits of the borrowers (GODQUIN, 2004). Likewise, high repayment rate helps borrowers to obtain the next higher amount of loan and other financial services (BOND AND RAI, 2009 and RETA, 2011). On the other hand, if there is low repayment rate, borrowers will not be able to get the next higher loan and the lenders will also lose their clients. It was reported in empirical studies that a substantial rate of default has been a permanent problem in most agricultural credit schemes supported by governments. Most of the defaults arose from poor management procedures, loan diversion and unwillingness to repay loans (KOHANSAL AND MANSOORI, 2009). According to OLADEEBO (2008) the amount of loan obtained by farmers; years of farming experience with credit use and level of education were

the most important factors that positively and significantly influenced loan repayment in Nigeria. KOOPAHI AND BAKHSHI (2002) examined credit repayment performance among defaulter farmers and non-defaulters in Iran. His findings indicated that use of machinery, length of repayment period, bank supervision on the use of loan had significant and positive effect on the agricultural credit repayment performance. Similar results confirmed by Oke, *et al*, (2007) who stated that repayment rates manipulated very much with size and maturity of loan, interest rate charged and timing of loan disbursement.

Despite the considerable effort that has been given by government to MFIs proliferation in recent years, majority of them are weak and unsustainable. The weak financial performance of these institutions and the low repayment rate are a source of concern in the North Kordofan State (ABDELATEIF, 2013). Unfortunately, many recent studies conducted in the study area stress the activities of microcredit institutions ignoring the important factors which affect access and utilization of small loans in investment purposes. As a result, most MFIs in the Stateare experiencing default problems and consequently low repayment rates. Accordingly, one would expect that, as much as the MFI's goals have not been properly achieved, MFIs cannot fulfill their tasks properly unless they offer loans where they are most needed. Although these and many other issues remain to be sufficiently attended to and adequately explained, MFIs in Sudan, particularly in North Kordofan will continue to grow through a process of learning by doing. The focus of this study therefore, is to investigate the interaction effect between loan utilization and repayment performance taken into account the major challenges facing MFIs in North Kordofan State of Sudan. In addition, it tries to analyze the socio-economic characteristics of farm households in the study area.

METHODOLOGY

Data collection source

The survey was conducted between July and October 2014 in North Kordofan State of Sudan taking Shiekan and Enuhud localities as case in point. During this time both primary and secondary were collected. Secondary data was obtained from references, annual reports, published and unpublished materials and previous studies from relevant institutions. In order to determine the loan utilization and repayment performance, primary data were collecteded by direct interview with the respondents using structured questionnaire. The questionnaire was designed to provide statistical information on household participation in different microcredit institutions activities, group lending, loan utilization, repayment process, the perception of clients towards the microcredit institutions and challenges faced as whole. Moreover, group discussions with the loan officers and key informants in the village communities were also conducted. Basic information derived from an interviewed-based sample survey includes:

- Borrower socioeconomic characteristics like age, level of education, household size, sex, marital status, etc,
- loan volume, purpose and utilization of loan, etc,
- group lending responsibility and activities,
- savings and business training,
- perception of borrowers on credit services and cost of default,
- information on loan repayment, loan term and loan disbursement.

Sampling procedure

The surveyed sample consists of 200 farm households, which were selected through stratified random sampling technique based on proportionality with the size of the community. Currently, North Kordofan State was divided into nine localities including twenty nine administrative units. In each stage stratified random sampling selection were applied. To ensure the validity of the local lists, control lists of loan clients was obtained from microcredit institutions for comparison. For the purpose of the study, the respondents were classified into two categories, credit users amd non-credit users. Afterwards, credit users were divided into defaulters and non-defaulters. All clients that have repaid their loans on time were classified as non-defaulters while those who delay their loan repayment three months after the due date were classified as defaulters. Conditional to this study, a total of 100 clients (defaulters and non-defaulters) were sampled in both localities (Shiekan and Enuhud). For simplicity purpose clients in this study are classified into two:
individual and group lending. The data collected were analyzed using descriptive statistics and bivariate probit model.

The study area

The study area is located in North Kordofan State, central-west Sudan, which has a population of 2.9 million inhabitants, of them, 79 percent can be classified as peasant farmers (CENSUS, 2008)), of which 13 percent are urban, 24 percent are nomads, and 63 percent are sedentary rural (IFAD, 2004). It has an area of about 245,000 km². The economic activities in North Kordofan

are diverse. According to ABDELATEIF (2013) local farm produce is often sold to local traders, and the presence of the traders encourages off-farm business and income diversification among farmers.
Farm enterprises are generally small, so that in spite of own production, most households are net buyers of food, at least during the off season period.

Figure 1: The Study Area

The survey mainly considers two localities namely, Shiekan and Enuhud. These two localities were selected due to number of microcredit institutions and clients. In fact, the majority of microcredit institutions are located in Shiekan, which hosts the capital of the state while Enuhud locality reported the highest number of clients. The population in both localities is engaged in business activities including small scale enterprise. The area covered by both localities is 32623 km² (WEDAD AND GWAHIR, 2015).

Analytical tool

large amount of existing literature has linked access and loan use or access and loan repayment performance (see, GEBEYEHU, 2002; BHATT and TANG (2002); GODQUIN, (2004); HERMES and LENSINK, 2007; HAINZ and NABOKIN, 2010). However, few studies have considered the influence of loan usage on loan repayment behaviour (NDUATI, 2012). According to NDUATI, (2012) loan utilization is critical because it affects the loan repayment. He pointed out if the loanee diverts the funds to other purposes it means that he/she will not generate sufficient revenue to repay the loan. Given the fact that there is a knowledge gap in the reviewed literature, the impact of loan utilization on loan repayment of farm households remains a critical area of study. This inspired the study of the factors influencing the loan utilization and loan repayment, in particular, and whether the factors determining use and repayment, respectively, are the same. Based on literature and field survey results we select the relevant factors that are found to be significant as we assume in our prior expectations. Thus, the nature of such study calls for a model belonging to the family of simultaneous equations. Therefore, a bivariate probit model was adopted in this study in which loan repayment and loan utilization are dummy variables in the probability equations. The two dependent variables used to analyze the binary outcomes are loan use and loan repayment. In this research, the preliminary decision denotes "1" if someone is reporting having used the loan in investment activity and "0" otherwise y_1^*, and the second binary outcome decision takes the value "1" if someone reports repaying on time and "0" otherwise y_2^*. The second is dependent on the outcome of the first. Each of the latent variables is assumed to be a linear function of a set of explanatory variables, which may or may not be the same for the two equations, and each equation contains an error term.
The contingent nature of the second decision requires that coefficients not only reflect the probability of continuous repayment, but also the factors that affect the conditional probability that the household will continue to repay, given that the household has already invested the loan in business activity.

$$\rho\left(y_2^* = 1\right)\left(y_1^* = 1\right)$$

ρ represents the probability of a household being able to continue repayment $(y_2^* = 1)$ if a decision of using a loan in investment activity has been made at the beginning $(y_1^* = 1)$. Having known that the second decision depends on the first one, the disturbance terms of the two equations are likely to be correlated as some unobservable factors, used in the error terms of the first decision equation can influence the error terms in the second one.
The bivariate probit model is useful for the analysis because it provides a correlation error term ρ that explains how the unobserved factors affecting the first decision are related to the second. As a sample selection problem is always implicit in the decision of such a model, it is therefore not possible for households to repay loans on time unless he/she has first used the loan in investment activity. Therefore, we assumed that y_2 is observed only if y_1 is equal to 1. In the specification of the model we assigned $y_1 = 1$ to use the loan in investment activity, hence $y_1 = 0$ indicates the loan

being used in home consumption. Similarly, $y_2 = 1$ if household continued to repay on time and $y_2 = 0$ if he/she defaulted. These equations can be estimated independently to assess the impact of loan usage on repayment behaviour. The truncation resulting from the selection rule can, however, lead to biased parameter estimates in equation (2) if the loan utilization decision is not deterministically governed by borrower attributes such that the error terms of the two equations are correlated (KUHN *et al*, 2000; GREENE, 1990). According to MENG and SCHMIDT (1985) the joint estimation of two equations is efficient and appropriate for the potential sample selection bias control. Given that the partial observability of the model is handled and the β_1 and β_2 vectors are estimated by maximum likelihood, then the level of significance and the signs of parameters estimated in equation (1) can be compared to the level of significance and signs of the parameter estimates in equation (2). Thus, for this study, significant and positive signs for coefficients of the same variables in both equations imply that the loan utilization decision runs counter to a default minimization lending policy, while negative coefficients indicate that the lender considered the variable in a manner that is consistent with a strategy to minimize loan default. Thus, the general specification form of two equation bivariate probit model with sample selection is expressed in the following way:

$$y_1^* = xi_1'\beta_1 + \varepsilon_{1,} \text{ ..... (1)}$$

$$y_2^* = xi_2'\beta_2 + \varepsilon_{2,} \text{ ..... (2)}$$

Where y_1^* and y_2^* indicate an unobserved latent variable, β_1 and β_2 are vectors of model coefficients to be estimated, x_{ij} are vectors of explanatory variables affecting the i^{th} household decision, and ε_1 and ε_2 are vectors of disturbance errors terms that are jointly normally distributed with mean of 0, variances of 1 and correlations of ρ (CAMERON and TRIVEDI, 2009; GREENE, 2003).

$$y_1 = \begin{cases} 1 \text{ if } y_2^* > 0 \\ 0 \text{ if } y_2^* > 0 \end{cases} \text{ and } y_2 = \begin{cases} 1 \text{ if } y_2^* > 0 \\ 0 \text{ if } y_2^* > 0 \end{cases}$$

..... (3)

$$E\left[\varepsilon_1 \middle| x_{1,} x_2\right] = E\left[\varepsilon_2 \middle| x_{1,} x_2\right] = 0,$$

$$Var\left[\varepsilon_1 \middle| x_{1,} x_2\right] = Var\left[\varepsilon_2 \middle| x_{1,} x_2\right] = 1,$$

$$Cov\left[\varepsilon_{1,} \varepsilon_2 \middle| x_{1,} x_2\right] = \rho.$$

If the value of $\rho = 0$, the model collapses to two separated probit models for y_1 and y_2. Probably, if the two variables (or errors) are correlated, $Cov(\varepsilon_{1,} \varepsilon_2) \neq 0$ then, for each individual i^{th}, the equation will take the following specification:

$$\varepsilon_{1i} = \eta_i + u_{1i}$$

$$\varepsilon_{1i} = \eta_i + u_{2i.}$$

In other words, the errors in each model consist of a part (εi) that is unique to that model, and a second part (η_i) that is common to both.

If we assume that all three types of error are normally distributed, then ε_{si} will also be normal. However, each εi depends on the value of η_i and this in turn means that ε_{1i} and ε_{2i} are related to one another (KUHN *et al*, 2000; DAVIS, 2006). To find the joint probabilities between y_1 and y_2 from the standard model:

$$Pr(y_{1i} = 1) = Pr(u_{1i} > -x_{1i}\beta_1) =$$

$$Pr(\varepsilon_{1i} + \eta_i > -x_{1i}\beta_1)$$

and

$$Pr(y_{2i} = 1) = Pr(u_{2i} > -x_{2i}\beta_2) =$$

$$Pr(\varepsilon_{2i} + \eta_i > -x_{2i}\beta_2)$$

If y_1 and y_2 are independent

$$Pr(y_1 = 1, y_2 = 1) = F(y_1) \times (y_2)$$

$$Pr(y_0 = 1, y_2 = 1) = [1 - F(y_1)] \times F(y_2)$$

$$Pr(y_0 = 1, y_2 = 0) = [1 - F(y_1)] \times [1 - F(y_2)].$$

However, in this study, the two probabilities are not independent, since they both depend on the value of η_i. Therefore, we calculate joint probabilities of non-independent events based on the following probability of y_1 and y_2:

$$\Pr(y_1=1, y_2=1)=\Pr(y_1=1|y_2=1)\times\Pr(y_2=1)$$
…….. (4)

or $\Pr(y_1=1)\times\Pr(y_2=1|y_1=1)$

Considering the equation above, the effect of explanatory variables X_{ij} on three probabilities in the model was derived as follows:

Firstly, the probability that a household has used the loan in investment activity and started to repay on time

$$\rho(y_1=1, y_2=1)=\rho(y_1^*>0, y_2^*>0)=\varphi_2(x_{i1}'\beta_1, x_{i1}'\beta_2, \rho)$$
……..…….... (5)

Secondly, the probability that a household has used the loan in investment activity and later defaulted.

$$\rho(y_1=1, y_2=0)=\rho(y_1^*>0, y_2^*<0)=\varphi_2(x_{i1}'\beta_1, -x_{i1}'\beta_2, -\rho)$$
…….. (6)

Thirdly, the probability that a household has not used the loan in investment activity. It means he/she used the loan for home consumption purposes.

$$\rho(y_1=0, y_2 \text{ unobsed})=\rho(y_1^*<0)=\varphi_1(-x_{i1}'\beta_1)$$
…….....…..... (7)

Where

φ_1 is the univariate normal cumulative distribution function

φ_2 is the bivariate normal cumulative distribution function

Furthermore, the probability density functions for each individual in the sample gives the log-likelihood function as follows:

$$\ln L = \sum_{y_1=1, y_2=1} \ln\varphi_2[x_{i1}\beta_1, x_{i2}\beta_2, \rho] + \sum_{y_1=1, y_2=0} \ln\varphi_2[x_{i1}\beta_1, x_{i2}\beta_2, -\rho] + \sum_{y_1=0} \ln\varphi_1[-x_{i1}\beta_1]$$
……..... (8)

The parameters and correction terms are estimated using Maximum Likelihood estimation, which is a derivative of the log likelihood function. Then, we set them simultaneously equal to zero.

$$\frac{\partial \ln L}{\partial \beta_1}=\frac{\partial \ln L}{\partial \beta_2}=\frac{\partial \ln L}{\partial \rho}=0 \text{ ..... (9)}$$

Typically, we use a bivariate normal distribution; for two standard-normally distributed ε_{si}, their joint density will be:

$$\varphi(\varepsilon_1, \varepsilon_2)=\frac{1}{2\pi\sigma_{\varepsilon_1}\sigma_{\varepsilon_2}\sqrt{1-\sigma^2}}\exp\left[-\frac{1}{2}\left(\frac{\varepsilon_1^2+\varepsilon_2^2-2\rho\varepsilon_1\varepsilon_2}{1-\rho^2}\right)\right]...$$
…….. (10)

Where ρ is a "correction parameter between binary decisions"

RESULTS AND DISCUSSION

Descriptive statistics result

Farm household's characteristics

The comparison and description of the household characteristics is presented in Tables 1. The descriptive result of the two localities under study indicates that the average household family members and educational level were significant at the level 5 percent respectively. Although the descriptive statistics showed that, the average age is much higher in Shiekan (49 years) compared to Enuhud locality (45 years), the mean difference between the two localities were not significant with the (t = 1.47). The effect of age of head of the households is considered important in terms of experience and responsibility. Households headed by older individuals are more likely to have more experience in agricultural production accumulated over the years. However, the households headed by younger individuals are often associated with more risk taking behavior than the elderly. Normally, older farmers have a tendency to stick to their old production techniques and are usually unwilling to accept change. Another characteristic is the average family size of farm households. In the two localities under study the average family size was found to be statistically significant at 5 percent, the average family size for Shiekan and Enuhud were 6.4 and 7.7 persons respectively. This result is approximately resonant with the national census of 2008 which found that households in Sudan had 7 persons. Furthermore, education level of head of households was measured by years of schooling. The analysis indicates that the average education level for household in Shiekan and Enuhud were 6.7 and 4.8 years respectively. The mean difference between the two categories is statistically significant at 5 percent (t = 2.12**).

Utilization of Loans

HAINZ and NABOKIN (2010) stated that studying the access to loans by studying the use of loans may be misleading. Therefore, our study tries to link between loan usage and repayment performance, rather than

Table 1: Selected household characteristics categorized by locality

Household characteristics	Shiekan N = 100		Enuhud N = 100		
	Mean	Std	Mean	Std	T-statistics
Age of Household (Yrs)	48.9	15.5	45.2	13.1	1.47
Household size (persons)	6.4	3.3	7.7	3.3	2.32**
Education level (Yrs)	6.7	5.5	4.8	3.8	2.12**

Source: own data, 2014. ** indicates significant level at 5%.

access and use of loans to avoid mixing up the evaluation of firms. In this respect, our empirical analysis in Figure 2 shows that about 52 percent of the sampled households have used their loans for investment activities. These activities include petty trade, food processing services, animal raising and other manufactured commodities. However, about 48 percent use the loans for family purposes such as covering food shortages, school fees and medical expenses. For the specification of the model this variable is coded as a binary dummy variable to identify the factors influencing the investment activities and consumption purposes.

Business type

Although agricultural loans are generally viewed by members of the commercial bank consortium (CBC) as risky, costly to administer and less rewarding as they do not allow quick circulation of funds, agricultural loans have been increasing rapidly in the last years. In this study, it was found that 59 percent of the households sampled received loans for agricultural inputs, such as improved seeds, fertilizers, pesticides, working labour and industrial agriculture (Figure 3). Typically, about 23 percent of the households obtained loans for animal rearing or fattening. At the time of survey, it was observed that most households that have received loans and invested in livestock activities had less default. This implies that households in the study have good experience in animal breeding, bearing in mind that this state is considered to be the main source of livestock in the country, supplying almost 30 percent of the estimated national livestock count. Another interesting result is presented in Figure 3, that very few, about (9, 3 and 6 percent) of sampled households received loans to be invested in local trade, handicraft and food processing services, respectively.

Household labour distribution

The abundance of labour endowment depends initially on the number of household members and its socio-cultural structure, which reflect the various responsibilities among household categories in the areas under study. In Sudan, most of the rural household members above 7 years of age have certain responsibilities in the household's daily activities. For example the young members of family are mostly involved in caring for younger children, fetching water and fuel wood, collecting grass for livestock feeding etc. For comparison purpose, the family members are converted to adult equivalent and the findings are stated in Table 2. In the two areas under study, the total adult labour and family labour, is higher in Enuhud compared to Shiekan and the difference is statistically significant at 1 percent. While the hired labour in both localities is equally distributed, and the mean difference was not statistically significant. Details are given in Table 2.

Land tenure and property rights

The Land tenure system in Sudan and specifically in Kordofan has experienced considerable changes over time. After independence, the new laws of land tenure were developed on the principle, introduced by the British, that unregistered land is assumed to be owned by the government unless the contrary is proven.

Despite the fact that land laws have improved after reinstatement of a native administration in 1986, the native administration and local tribal chiefs are still customarily entrusted with the management of rights to land ownership and use, especially in rural areas. Under such a customary system, land is viewed as collective property and the customary hierarchical institution of *Sheikhs* (village headman-ship), *Oumdas* (chieftainship) and *Amirs* are responsible for maintaining customary law, including the allocation and management of land. Accordingly, many traditional farmers, particularly in Kordofan saw their land expropriated or assimilated into mechanized farming schemes or simply registered in someone else's name. The grabbing of land led to massive displacement and remains at the heart of all conflicts in Sudan (PANTULIANO, 2007). Lack of land ownership limits access to credit for the vast majority of farmers, who cannot use land as collateral. The discouraging land laws, land use and the weak infrastructure do not encourage the private sector to invest in remote areas or in areas with unresolved land tenancy problems.

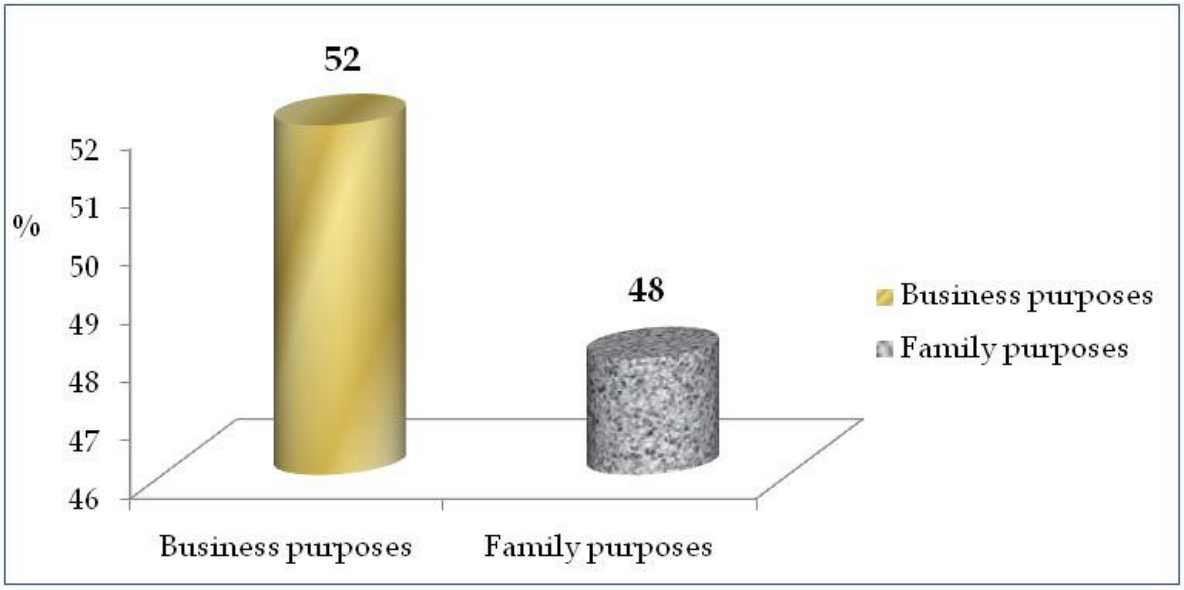

Figure 2: Purposes of loan use

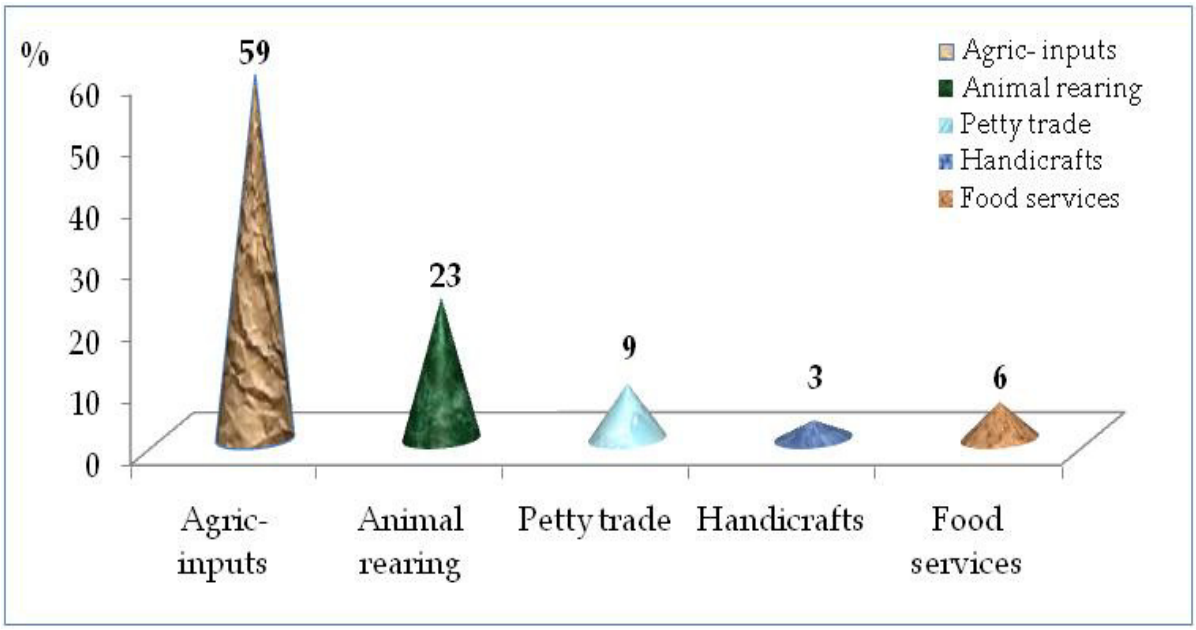

Figure 3: Businesses financed

Table 2: Labour use in adult equivalent in man-days categorized by locality

Households division of labour		Households labour category		
		Shiekan N = 100	Enuhud N = 100	T-statistics
Total adult labor in man-days	Mean	45	65	3.18***
	Std	39	34	
Family labour in man-days	Mean	25	27	0.615
	Std	17	14	
Hired labour in man-days	Mean	42	42	0.001
	Std	25	23	

Source: own data, 2014. ***indicates significant level at 1%.

Table 3: Tenure and property rights of land categorized by locality

Descriptive statistics		Farm households land category		
		Shiekan N = 100	Enuhud N = 100	T-statistics
Land owned in hectares	Mean	23	26	0.739
	Std	16	24	
Farm area in hectares	Mean	20	17.4	0.653
	Std	13	16.7	
Rent- in area in hectares	Mean	5.6	10.4	0.849
	Std	4.9	13	
Rent-out area in hectares	Mean	7.4	9.4	0.740
	Std	4.6	4.9	
Nr. of farms owned in hectares	Mean	2.6	2.2	1.62
	Std	1.2	1.2	

Source: own data, 2014.

With reference to the study area, farms are always fragmented and distributed in different directions from the village. It is common to observe a farmer owning 2-2.6 farms with an average area ranging between 17-20 hectares, as shown in Table 3. In the two localities under study, farmers in Enuhud appear to own the most land, more than 25 hectares, however, households living in Shiekan hold an average of 23 hectares. It is observable that most households in both localities are interested in renting out their land rather than rent more land (Table 3). This may be attributed to the availability of land in the study area, since the average land rented-out ranged between7-9 hectares. Another explanation could be the low productivity of cultivated crops in the last 10 years.

Challenges and Constraints to Borrowers

In this study, most challenges and constraints encountered by respondents and microcredit institutions (MFIs) are credit risk and high transaction cost per loan amount. This result agrees with the earlier findings of RETA, (2011). According to the responses of rural households the critical constraints faced by borrowers can be listed as follows:

- small loan size
- high interest rates
- long bureaucratic procedures
- short frequency of repayment period
- lack of business training
- lack of necessary information
- no grace period
- lack of follow up and supervision

Similarly, the most challenges faced by microcredit institutions in the study area were the followings:

- unwilling of some MFIs to invest in microcredit (forced by government)
- limited financial capacity of the institutions
- insufficient employees especially loan officers

Table 4: Variables used in bivariate model and expected signs

Explanatory variable	Description	Expected sign in Model (1)	Expected sign in Model (2)
AGE_H	Age of household head (Years)	+/-	+/-
EDU_LEV	Education level of household head (Yrs)	+	+
APPL_FEE	Total cost of loan procedures (SDG)	-	-
ASSET_VAL	Value of assets by household (SDG)	+	+
FREQ_REP	If the period of household repayment is on Monthly basis = 1; 0 = otherwise	-	-
PUNCH_EXP	If the punishment expected by household is prison = 1; 0 = otherwise	+	+
COLL_REQ	If the collateral required by lender is group lending membership = 1; 0 = otherwise	-	+
LOCALITY	If the household lives in Shiekan = 1; 0 = otherwise	+	+
P	Correlation term between decisions	?	?

- insufficient working place
- poor documentation
- limited coordination between organizations with different mandates

Explanatory variables

In accordance with the objective of the study, a set of relevant explanatory variables were chosen to reflect household behaviour towards loan repayment and investment activities. Most of these variables are either in continuous or dummy form and measured using appropriate techniques. Table 4 summarized the explanatory variables and their expected signs, which include: age of household, education level of household, application fees, value of assets owned by household, frequency of repayment period, punishment expected by household, collateral required for obtaining a loan, and regional localities of the study. The determination of the expected signs of these variables is based on consistent evidence from previous relevant studies. For more specification, a brief explanation of the explanatory variables and their influence on the loan use and loan repayment performance is presented below.

Age of household head: is considered as a proxy of experience and decision making. Presence of an experienced household head would have great impact on investment activities and consequently on repayment behaviour. Moreover, elder borrowers may accumulate more wealth than youngsters and they feel responsibility for the loan. According to GIRISH and MEHTA (2003) and ASANOY (2004) age of household head and family size were an important factor for economic decisions such as production and consumption. Therefore, the variable is expected to have a positive or negative impact on repayment behaviour and investment activities.

Education level of household head: is a continuous variable measured in years of schooling. The education level of the household head is always associated with enhanced opportunities and economic prospects of the person. A study conducted by ASANOY (2004) indicated that educated borrowers had higher levels of knowledge and skills compared to illiterate ones. Thus, for this study it is hypothesized that household heads with a higher level of education are more likely to run their institutions effectively and allocate their resources efficiently. Therefore, one would expect education of the household head to be positively associated with both equations.

Application fee: refers to the total amount of money that a household is required to pay as cost for obtaining loans. These costs include transport, and cost of important documents needed to obtain a loan. Other costs that are not incorporated in the analysis due to estimation problems are opportunity cost of the time lost during the application procedures. This continuous variable is measured in Sudanese guineas per household. The variable is expected to have a negative impact on both repayment behaviour and investment activities. Thus, for this study it is assumed that if farm households have paid higher application costs they may refrain from running a business in the future.

Value of assets owned by household: This variable refers to the value of total assets owned by a household such as radios, furniture, televisions and other moveable assets. The assets were estimated by the current equivalent market value. Households having higher values of assets can be considered having better economic status and consumer repayment patterns (DUCA and WHITESELL, 1995). Therefore, this variable

is hypothesized to have a positive impact on both repayment behaviour and investment performance.

Frequency of repayment period:

This dummy variable describes the frequency of repayment period followed by farm households in the study area. This variable takes a value of "1" if the household's repayment period is on a monthly basis; and it is "0", otherwise. Short periods of repayment usually affect very much the decision of farm household credit demand in the future. Research has shown that there is significant influence by repayment period and amount of loan on repayment rate (NJOKU and ODII, 1991). Thus, for this study the variable is expected to have a negative impact on both loan repayment and loan utilization.

Punishment expected by household: This is a dummy variable that represents the punishment expected by a household if it does not repay on time. The variable takes a value of "1" if a household is expecting to be imprisoned; and it is "0", otherwise. In existing literature there is strong linkage between punishment expected and repayment behaviour on one side and credit rationing on the other side. According to BOLTON and ROSENTHAL (2005) credit rationing can be attributed to restricted collateral and hard punishment expected. Conditional to this study, one could therefore expect punishment expected by household to be positively associated with loan repayment and loan usage.

Collateral required for obtaining loan: This is a dummy variable that reflects the security against a loan for the future business performance. The variable value assigned is "1" if a household belongs to lending group, otherwise, it is "0". It is hypothesized that if farm household belongs to lending group he/she will have priority in getting loan as the microcredit policy aim to facilitate loan procedures for borrowers in groups rather than individuals. Therefore, this variable is expected to have positive impact on loan repayment but may have negative impact on loan utilization.

Locality: is a dummy variable associated with the distribution of farm households in different districts of the study area. The variable takes a value of "1" if a farm household is living in Shiekan; otherwise, it is "0". It is hypothesized that, households living in Shiekan are more likely to perform their business successfully and consequently their ability to repay on time is higher. This is due to

the fact that the access to information and markets is easier in Shiekan, which hosts the capital of the state. For this study, one would expect a positive impact by this variable on both repayment behaviour and performance of business.

Some variables such as age of household head, education level, application fee and value of assets owned by household are converted to their natural log form to control the expected variations in the variables. Description of explanatory variables used in Bivariate Probit Model and expected signs are presented in Table 4.

EMPIRICAL RESULTS AND DISCUSSION

The interaction effect between loan use and loan repayment of farm households appears to be very strong as indicated by the robustness of the signs and size of the coefficients across specifications. The signs of the parameters for both equation decisions meet *a priori* expectations. To avoid duplication and misleading results, a test of multicollinearity for variables is carried out using commands "vif" and "corr" in Stata software package version 10.1. As a general rule, if the correlation coefficient between the two variables is greater than 0.5, one can conclude that there is a serious problem of multicollinearity. Based on the multicollinearity test some variables such as household occupation, household size and household income were replaced in both loan utilization and loan repayment equations. While variables like loan reputation and distance of microcredit institutions were dropped out due to their insignificance in the estimation process. Conditional to this study, the correlation coefficient between all variables considered is less than 0.5, implying that the explanatory variables can separately contribute to the variation in the dependent variable. In addition to multicollinearity tests some other important tests such as normality and heteroscedasticity were also conducted and the appropriate remedies were taken. From the hypothesis testing of the bivariate probit model, the result is significantly different from zero. The Rho value is equal to 0.57 and a chi-square test is equal to 5.52. This means that there is some covariance of error terms between the probability of using a loan and of having loan default. This result can be considered as an indicator for the linkage of the simultaneous decisions that should be adopted by decision makers in setting policy for the development of the financial sector in Sudan.

The estimations of the bivariate probit model are shown in Table 5. A total of eight explanatory variables were considered in the model. Out of these, six variables were found to be significantly influencing the probability of binary outcome equations (loan utilization and loan repayment) at different significance levels. Being resident in Shiekan and five other business variables included in the model were found to be statistically significant. e.g.; application fees, value of assets, frequency of repayment period, the punishment expected and group lending collateral required. However, the remaining two explanatory variables, namely, age of household head and education level were found to have insignificant effects on loan utilization and loan repayment performance of farm households. As presented in Table 5, the cost of an application fee was found to have a positive effect on loan utilization, which

Table 5: Bivariate Probit coefficients for repayment and loan utilization

Dependent variable	Loan utilization (investment activity)		Loan repayment		
Explanatory variables	**Coefficient**	**Std. Err.**	**Coefficient**	**Std. Err.**	**Marginal Effect**
Log_age (Yrs)	- 0.9304	0.6387	0.0983	0.7558	- 0.3362
Log_education (Yrs)	0.14400	0.2053	0.1458	0.2314	0.0591
Log_ appl_ fees (SDG)	1.0719***	0.3183	- 0.8910***	0.3264	0.3531
Log_ value of assets (SDG)	- 0.4001***	0.1432	0.1923*	0.1146	- 0.1380
Freq_ rep (Monthly 1, 0)	- 0.6289***	0.1893	- 0.0998	0.2578	- 0.2346
Punish_ exp (Prison 1, 0)	0.0626	0.3315	1.2424***	0.4105	0.1138
Collateral_group (1, 0)	- 0.7023**	0.3480	- 0.2029	0.3986	- 0.2581
Locality_shiekan (1, 0)	0.7091*	0.3940	- 1.5417***	0.4477	0.0564
_cons	3.7743	2.7988	2.8997	3.4182	-
/athrho	0.6420**	0.3171	2.02	0.043	-
Rho	0.5662	0.2154	0.0203	0.8520	
Wald chi2 (8)	50.04***				
Number of observations	100				
Predicted ratio	52.5%				
Log likelihood	-80.328				
LR test of rho = 0	Chi (1) = 5.519			Prob > 0.0188	

***, ** and *Significant at 1%, 5% and 10% respectively

means as cost of application fees increased, the probability of using loans in investment activity increases. This result it is not consistent with prior expectations, as higher cost of application fees is usually associated with higher risk of business. Business risk is uncertainty about future operations and it is determined by uncertainty of demand, output prices, costs and also price sensitivity of customers (SADGROVE, 2005). This variable was significantly influential on the loan utilization at 1 percent significant level. As expected, the sign of application fees was also significant (at 1 percent significance) having negative influence on loan repayment. This result implies that as loan application fees increased, the probability of borrowers being worse payers also increased. It could be explained by the fact that borrowers might be more engaged in risk and uncertainty due to the higher cost and at the same time are required by lenders to repay the principal of capital plus interest rate at the scheduled time.

Moreover, the coefficient of value of assets owned by a household as a proxy of better economic status is negative and significant at the 1 percent level in the first decision (loan utilization). The implication is that households having higher value of assets are less likely to use a loan in investment activity. This result indicates that borrowers are looking for better economic investment options which are not recommended by microfinance institutions and the diversion of a loan to personal use should not be strictly related to loan misuse, instead it has to be understood in the light that the loan amount given to borrowers is too small to effectively establish their businesses. On the other hand, the value of assets positively and significantly influences loan repayment at the 10 percent level of significance. This implies that increases in the amount of assets value of a household will have a positive effect on increasing the loan repayment performance. This result agreed with expectations and supported by the results of AFAF (2006) who also stated that households with more assets under ownership always have better chances for entering markets and earning alternative income from such things as running an entrepreneurial business which subsequently enhances their loan repayment performance.

Results reported in Table 5 show that frequency repayment had a negative and significant effect on a household's decision on loan utilization and repayment performance. These results imply that households with short periods of repayment are more likely to use the loan in home consumption rather than investment activity. Similarly, borrowers under short repayment frequency may not be able to repay on time. It was observed during the field survey that most households who received loans with shorter period repayment (monthly repayment) had experienced prison due to loan default or loan diversion. This result is in line with the

finding of RETA (2011) who found that clients could perform their business better if lenders provide a suitable repayment period, particularly if there is a grace period for some months after the loan disbursement, the borrowers can run their business without shortage of working capital. Experience indicates that longer term investments are always associated with clients' long run repayment capacity. Another explanation could be that households who received loans with longer repayment periods were expected to pay better since they could have enough time to generate income. In contrast, one would expect that loans with long term repayment periods are mostly associated to risk. This result is in line with the finding of GEBEYEHU (2002) who reported that as the repayment period of a loan provided gets longer, the probability that the loan is subject to risk and uncertainty will increase. Moreover, if there is continuous follow up and supervision made by a loan officer, besides suitable frequency of repayment period, the clients could efficiently utilize their loan for the intended purpose. Existing literature has shown that quick follow-up and visits are useful in preventing default (NORELL, 2001).

Furthermore, the result indicates that borrowers who expected tight punishment such as prison are more likely to repay on time. This variable was significant at the 1 percent level in loan repayment only. However, the signs are consistent with prior expectations in both binary equations. The implication of that could be that borrowers will feel and behave responsibly in financial management if they expect to be imprisoned. Practical experience indicates that expected punishment forces borrowers to exert more efforts to the success of the investment. In group lending for instance, expected punishment encourages the members to impose social sanctions on the defaulters within the group and force them to repay on time. Moreover, at the time of the survey most of the households have indicated that they are less likely to apply for a loan if they know before receiving the loan that they will be committed to civil prison. On the other hand, one would argue that tight punishment is necessary sometimes to reduce the moral hazard of the borrowers. According to ARMENDARIZ and MORDUCH (2010) moral hazard increases when borrowers try to abscond with lender money. When borrowers apply for a loan they usually promise the lender to work hard in their intended business in order to repay on time. However, once the loan is disbursed the borrowers may not maintain their promise and drastically change their behaviour which leads to higher chances of default. Yet mismanagement and diversion of loans by borrowers from the original purpose of the loans are common phenomena in the areas under study. For this reason, lenders are obligated to aggressively impose tight punishment during the contract procedures to control the moral hazard of the borrowers. The findings of this study support the argument that strict punishment is always associated with effectiveness of loan utilization and higher rates of repayment.

As the estimation results in Table 5 depict, collateral of a lending group is one variable that significantly affects the loan utilization behaviour of borrowers. Its relation with loan utilization is negative and significant. It indicates that other things being the same, the more the collateral of group lending is used, the more likelihood that the borrowers use the loan in investment activity decreases. This negative association implies that the amount of loan released for borrowers under group lending collateral is too small to effectively be used for the intended purpose. This result is consonant with the finding of VIGANO (1993) and (NORELL, 2001) who found that under- and over-finance of specific purpose more likely encourages borrowers to divert the loan to other purposes such as personal use, thereby undermining repayment performance. Moreover, the loan usage also affects the repayment rate. If the entire loan is used for the intended activities, the repayment will be enhanced. By devoting the whole loan for running a business, it is possible to generate income and perform the business in a better way. But, if the loan is used for unintended purpose like home consumption, it will hinder the repayment performance of the clients. According to BESLEY (1995) the advantage of group lending in terms of repayment behaviour is that a group member with really high project returns can pay off the loan of a partner whose project does very badly. In line with this, our findings support the argument that group lending collateral is important insurance for the loan procedures of the borrowers, bearing in mind that our results clearly confirmed that group lending collateral discourages loan use and loan repayment performance.

According to the result of the bivariate model, borrowers who live in Shiekan are more likely to use the loan in investment activity and consequently perform their business effectively. This variable was positively and significantly (at 10 percent) related to probability of using a loan in business and negatively and significantly (at 1 percent) influences the probability of being a defaulter. The intuitive interpretation for this result is that access to information and market facilities is easier in Shiekan, which hosts the capital of the state. Additionally, the possibility of households living in Shiekan to diversify their income sources and have some hedging against the risk is much higher compared to those who live in other regional localities. In fact, borrowers in Shiekan are able to get the necessary information, they can produce and sell based on customer needs. Moreover, they have enough information about the market situation of the product, they can try to predict the future prospects of the business. Therefore, this might be the reason for the positive significance of this locality for the loan utilization of those clients. On the other hand, the results showed that residents in Shiekan are less likely to repay on time.

This result is not in line with expectations, that households who established their business efficiently should be capable and willing to facilitate their repayment rates. This result contradicts the findings of RETA (2011), BREHANU and FUFA (2008) and agrees with the results of VIGANO (1993) and (NORELL, 2001).

Although the other remaining variables such as age and education level of household head were found to be insignificant, they had positive signs on both the dichotomous decision of loan utilization and loan repayment behaviour. The findings indicate that borrowers have the advantage of loan use and loan repayment rates along with age increases and years of education. The coefficient signs of the variables were consistent with expectations. From practical experience, elder borrowers always gain experience in running a business or may feel more sense of responsibility and hence could be positively related to loan recovery GEBEYEHU (2002). On the other hand, educated borrowers have a tendency to acquire better knowledge in choosing a profitable business, better book keeping records, better information about the existing investment opportunities and could achieve more success, thus they could be preferable in terms of proper utilization of loan and repayment performance. This argument agreed with the findings of BREHANU and FUFA (2008), ASSEFA, *et al*, (2002) and NORELL (2001) who reported that the education and training experience of borrowers has a positive contribution to the efficiency of the business and money utilization and consequently determining repayment rates.

CONCLUSION

Microcredit is considered one of the most important tools for poverty reduction. It has attracted the attention of governments and international donors all over the world. In Sudan microcredit has enjoyed rapid growth over the last two decades. The development of the microcredit sector in Sudan also coincides with significant progress in the country's effort to reduce poverty. However, loan default and inefficiency of loan use is becoming a serious problem for most microcredit institutions, significantly eroded their liquidity positions. Therefore, it is with this challenging problem the bivariate probit model was used to identify the factors behind the loan default and loan utilization in rural areas of North Kordofan.

The evidence of econometric analysis shows that loan utilization is significantly influenced by application fees, value of assets, repayment period, group lending collateral and finally the locality of Shiekan. While variables such as punishment expected, application fees, value of assets and finally the locality of Shiekan were found to be significant factors in determining loan repayment performance. High application fees are found to have a positive effect on the efficiency of loan utilization. In other words, as loan application fees increase, the probability of borrowers giving more attention to their businesses also increases. The results also indicate that being a member in group lending in Shiekan with a long repayment period and much accumulated assets value is more likely encouraging borrowers to divert the loan to other purposes such as personal use. Consequently, borrowers who live in Shiekan are more likely to perform their business effectively. Other variables that affect loan utilization of the borrowers but are not significant are age and the education level. Education and training experience of borrowers have an advantage in the efficiency of the business and money utilization. With regards to the loan repayment behaviour, borrowers who have assets of value (proxy of economic welfare status) are found to show better loan repayment records. Similarly, borrowers who expect tight punishment such as prison are more likely to repay on time. Expected penalties always force borrowers to exert more effort to the success of their businesses. On the other hand, application fees adversely influence loan repayment behaviour of borrowers. As loan application fees increase, the probability of default also increases. The finding also indicates that the borrowers who live in Shiekan have poor repayment records compared to those who live in other localities within the state. Moreover, borrowers who have extensive experience and education in businesses implementation show better repayment records while those who have less knowledge and skills in the financed business show bad repayment records.

When we compare the results in both loan utilization and loan repayment equations it is found that lenders do not put emphasis on the age and education level of borrowers during the process of contract formation as it has no significant effect on loan repayment behaviour of the borrowers. Variables such as frequency of repayments and group lending collateral were not given much concern during repayment performance but they are found to be significant determinants of loan utilization of the borrowers. Similarly, businesses with tight punishment expectations are discouraged during the loan utilization investigation. However it is found to be positively and significantly influential on loan repayment behaviour of the borrowers.

Looking at the expected signs of variables employed in the two outcome equations most of them were consistent with prior expectations which implies that the loan utilization mechanism adopted by microcredit institutions (banks) in the areas under study is somehow linked to the repayment behaviour of the borrowers.

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