3. Model, data and estimation methods

3.1 Introductory remarks

The literature presented in the second chapter indicates that, although efforts have been made by some financial institutions to provide credit to women, the issue of differences in gender may still interfere with the supply of credit to borrowers by banks, as well as the extent to which borrowers use credit successfully.

In this chapter, some terms used in the study are defined and some of the factors that may influence the creditworthiness of borrowers are discussed. Also, some institutional factors that may affect loan size and repayment behaviour are presented. The nature of the data set, the models for analysing the size of loan and repayment performance relationships, and the *a priori* expectations are presented. Finally, the analytical methods to be used in the study are outlined.

3.2 Definition of some terms

In order to investigate the effect of gender and other factors on the size of loans given to borrowers and on their repayment performance, three effects have been considered, i.e., the 'direct gender effect', the 'gender interaction effect' and the 'socioeconomic effect'

The 'direct gender effect' refers to the impact that is due purely to the gender of the borrower. Hilhorst and Oppenoorth (1992, p. 91) defined gender as 'learned culturally, determined (as opposed to biologically determined) differences in the behaviour patterns of women and men in relation to each other and to their social context'.

The 'gender interaction effect' is a combination of two effects, namely gender and another socioeconomic variable such as land area, on either the size of loan allocated to, or the loan repayment performance of, the borrower. For example, in the case where gender interacts with land area, a financial institution may award larger loan increments to women than men borrowers for a marginal increase in land area, or a marginal increase in land area may result in a greater increase in loan repayment for women borrowers than men.

The 'socioeconomic effect' refers to the factors other than gender that may influence the size of loan that the borrower is given or the repayment performance of that borrower.

3.3 Some factors affecting the creditworthiness of borrowers

Creditworthiness can be defined as the willingness and or the ability of a borrower to repay promptly (Bourke and Shanmugam 1990). The factors that banks consider when making the decision to lend are also used when deciding on loan size (B. Shanmugam 1995, pers. comm.).

In assessing the creditworthiness of borrowers, banks are interested in minimising credit risks so as to maintain their loan portfolio. According to Eisenreich (1990), the risks comprise (i) cash insolvency, i.e., where cash inflows are not sufficient to meet necessary cash outflows, leading to default, and (ii) cash inadequacy, i.e., where cash inflows are not sufficient to meet necessary cash outflows on schedule, resulting in slow repayment. Consequently, banks are interested in awarding loans to borrowers who will be able to repay, and who have some form of security which can be seized in the event of default.

White (1990) outlined the Cs of lending that a rational lender would use to determine the creditworthiness of a borrower. Some of the Cs that are relevant to the study are character, capacity, capital, conditions, customer relationships and collateral. Apart from the use of the Cs to select borrowers, they are also employed as guidelines to decide on the size of loan that borrowers should receive and their expected repayment (B. Shanmugam 1995, pers. comm.). It is therefore assumed in this study, that the factors that affect loan size are those that affect loan repayment. Although gender is not stated explicitly as one of the factors determining bank lending, it is implicit in the requirements of banks.

3.3.1 Character

Character refers to the willingness or commitment of the applicant to repay the loan (White 1990). As Bourke and Shanmugam (1990) pointed out, it is possible for a borrower of poor character to decline to repay despite having the money to repay, or to use funds for purposes other than those for which the funds were granted. Therefore, a bank is likely to refuse to lend to borrowers of poor character and to award smaller loans to those for whom the character assessment is not positive. Also, the poorer a borrower's character, the worse may be his or her repayment behaviour. Tilahun

(1994) found that unwillingness to repay was the major cause of poor loan repayment amongst Ethiopian farmers.

There is evidence of some relationship between gender and the character of borrowers. In the case of rural women, there has been an increasing realisation that, on the whole, poor women are of good character in that they are willing to repay, and fear being in debt. As mentioned in section 2.6.3, financial institutions such as the Grameen Bank in Bangladesh report excellent repayments and recoveries from poor women borrowers (Hilhorst and Oppenoorth 1992).

The age of a borrower may be related to loan size and to repayment behaviour. Culturally, the status and image associated with older borrowers may be interpreted to mean that they are more willing to repay.

Married people are considered to have many obligations, such as larger extended families to support and more cultural obligations than single people. Thus, one may say that married people are less likely to repay than those who are single.

Donald (1976) reported that borrowers with some political affiliation had high default rates. Sengaati (1993) found that, for the case of Tanzania, borrowers with higher social status and political connections had relatively poorer repayment rates than those without such status or connections.

Culture may promote the unwillingness to repay. For instance, Ellis (1992) and Tapsoba (1981) asserted that, in cultures where the concept of loan repayment is unfamiliar, credit from the government may be mistaken for a gift, resulting in unwillingness to repay. Fry (1988) reported that, in Brazil, subsidised interest rates and expectations of government bail-outs provided a strong incentive for postponing loan repayment. Also, where the legal systems are weak and the penalties due to default are not harsh, repayment may be poor.

3.3.2 Capacity

Capacity pertains to the applicant's ability to repay, indicated usually by the expected net cash flow of the borrower being greater than the repayment requirement (White 1990). To hedge against risk, a bank is likely to give smaller loans to borrowers whose characteristics may impede their net cash flows.

Cash inflows are largely determined by the profitability of the income-generating activity or activities the borrower is engaged in. Profits may go into investments on

farms, such as more cattle, not into cash flow. The degree to which the small business operators and their workers have the relevant experience, literacy, numeracy, and technical and business management skills is critical to the success of the business. Marketing aspects, such as demand for the product, marketing infrastructures, location of the enterprise and the price and quality of the product, all influence sales revenues and hence the profitability of the enterprise. The availability of support services, such as agricultural and veterinary extension, is important especially where modern technologies are being used in the production process.

Borrowers may benefit from membership of farmers' organisations such as agricultural societies (Oxfam 1990). For instance, members may gain access to business information. Also, production costs per unit may be reduced through, for example, bulk purchasing of inputs, joint renting of equipment, building of dips and sharing transport for marketing produce (Neck and Nelson 1987).

In the case of married borrowers, husbands and wives may both contribute to household expenditures. The capacity to repay may therefore be higher for married than for single borrowers. For the latter, especially if they have children, the capacity to repay may be much lower, due to the burden of maintaining their households. In the case of female-headed households, the burden may be greater due to the combination of the gender roles and their limited access to resources, as mentioned in section 2.4.6. However, there is evidence that single women may have a higher capacity to repay than married women. In a study in Burkina Faso, single women were found to be more economically active than married women, i.e., 60 per cent for single women, 42 per cent for monogamously married women and 38 per cent to 50 per cent for polygamously married women (Dijkman and Dijk 1993). Also, single women may have more decision-making power and control of their income and thus have a higher capacity to repay than their married counterparts.

Vyarma (1993) found that women loan recipients in the Integrated Rural Development Project in India failed to meet loan repayment due primarily to inadequate income and high household expenditures.

A borrower who has another occupation, apart from that for which the loan was granted, could have another source of cash inflow for repayment in case the enterprise is not performing well. Also, although a borrower who has some other occupation is likely to face greater time constraints (than one with no other occupation), the increased cash flow may permit the borrower to hire labour or purchase labour-saving devices. Consequently, the capacity of such a borrower to repay may be higher than that of a borrower who has no other occupation.

The level of education may be taken as an indication of the literacy and numeracy skills possessed by the borrower. According to Gittinger et al. (1990), 'education appears to increase the ability and willingness to reallocate resources efficiently'. Therefore the level of education may affect the performance of a business and thence the capacity of the borrower to repay.

3.3.3 Capital

Bourke and Shanmugam (1990) refer to capital as the ability of the borrower to repay, measured by the net worth of the business. Capital indicates the borrower's accumulated wealth and past successes.

In most developing countries, many income-generating activities require some use of land (UNICEF 1994). Land may be considered as a form of capital, or wealth, by the bank. Consequently, it is likely that a bank will award larger loans to borrowers with larger land areas.

The size of the herd could also indicate the financial worth of the applicant, i.e., capital. It may be viewed as a reflection of the borrower's past success in farming. Also, culturally, the size of the herd represents status, wealth and prestige. Since the larger the herd size, the more capital a borrower may have at stake if the business does not succeed, the bank may consider borrowers with larger herd sizes to be relatively more creditworthy than those with smaller sizes.

3.3.4 Collateral

Collateral reduces the risk to the lender in case of default. Collateral may be in the form of either reputation or assets. The latter are preferred by most formal institutions (Gittinger et al. 1990). The assets can be liquidated to cover the losses accruing from default. In cases where guarantors are used as collateral, the guarantors can be approached to repay the loans (Bourke and Shanmugam 1990).

3.3.5 Condition

Condition pertains to the economic, industry, business or other environment in which the enterprise is to be operated, during the life of the loan, and how the conditions may affect the capacity to repay. The economic environment refers to, for example, inflation, taxation, and or regulation (Bourke and Shanmugam 1990). The sensitivity of the cash flow to changes in the external environment may determine the ability of

the borrower to repay (White 1990). In agriculture, the inability of borrowers to repay may be due to environmental conditions, such as crop failure, disease incidence or other vagaries of weather (Tilahun 1994).

3.3.6 Customer relationships

Customer relationships refer to the amount of information and experience that the lender has about borrowers. The information may assist the bank in making a clearer assessment of the character of borrowers and their willingness to repay (White 1990). Donald (1976) argued that maintaining customer relationships encourages borrowers to feel that they are part of the bank, thereby motivating them to repay. According to Chenery and Srinivasan (1988), asymmetric information about borrowers is one of the major causes of poor repayment rates.

3.4 Some institutional factors that affect loan size and repayment behaviour

Tilahun (1994) reported that institutional and policy problems are major causes of non-repayment. As mentioned in section 2.6.1, Fry (1988) claimed that many banks in developing countries adopt inefficient lending criteria and monitoring procedures. Also, some banks lack clear rules on delinquency and defaults. Many credit officers lack expertise in loan appraisal and project evaluation techniques. According to Morris (1985), in the case of formal financial institutions in India, poor repayments were caused by, for example, defective loan policies such as delayed loan disbursement, inappropriate loan sizes, unrealistic repayment schedules, ineffective supervision and indifference of bank management with respect to recovering loans. Such institutional factors may affect the allocation of funds and the capacity or willingness of a borrower to repay.

3.5 The data set

The data used in this study were secondary data obtained from the Uganda Commercial Bank Rural Farmers' Scheme (UCB RFS). These data comprised social and economic information on men and women borrowers, as filled in on their loan application forms. The names were not provided by the bank, to preserve the confidentiality of the information. The background of the UCB RFS was discussed in section 2.13.

All the borrowers were given loans for a three-year term to run dairy enterprises. The data were obtained from the successful applications from two districts in the central region of Uganda, namely Mpigi and Mukono. These districts were chosen because they were the only districts where enough data on borrowers who operate dairy enterprises could be obtained. Dairying was chosen amongst other enterprises because the enterprise has a long repayment period (3 years), compared with other enterprises, such as poultry, piggery and horticulture, which have shorter repayment periods. Hence, a more appropriate number of observations could be obtained to permit the study of the repayment behaviour of borrowers. The number of loans used in the study was 105, 51 loans for men and 54 loans for women.

3.5.1 Composition of the raw data

The socioeconomic data on borrowers comprised:

- distance from the branch in kilometres;
- gender;
- marital status;
- household size;
- occupation;
- number of years of experience in farming;
- age;
- whether or not borrowers belonged to any society;
- ownership of land and buildings;
- types of tools and equipment owned;
- level of education;
- land area in hectares allocated to the dairy enterprise;
- numbers of indigenous and exotic stock owned;
- marketed surplus in terms of litres of milk;

- whether or not security was offered;
- nature of security;
- ownership of security;
- year of disbursement;
- amount disbursed of loan;
- interest rate;
- repayment in first, second and third years; and
- outstanding balance at the end of the third year.

3.5.2 The variables used in the study

Amongst the variables in the original data set obtained from the UCB RFS, only gender, marital status, society membership, collateral, other occupation, age, household size, experience, education, land area, herd-size, the percentage of exotic cattle in total herd and distance from the branch were used in the analysis. Society membership, marital status, ownership of collateral and other occupation were incorporated as dummy variables. The data set is presented in Appendix 1.

The variable for ownership of land and buildings could be indicated by the variable for ownership of collateral since all the security was in the form of land. Therefore the variable for ownership of land was dropped. Since each of the borrowers had some tools and equipment and no monetary value was attached to them, the variable could not be used in the analysis. The variable for the number of indigenous cattle was added to that for the number of exotic cattle to obtain the total herd size for each borrower. Since the prime reason for maintaining large indigenous herd sizes is prestige, i.e., to indicate wealth (UNICEF 1994), the latter could be better expressed by the herd size as a whole. So the variable for number of indigenous cattle was dropped. The bank reported the marketed surplus in terms of litres of milk as 'income'. However, since the variable did not reflect the disposable income from which the borrower would have funds to repay the loan or to reinvest, the variable was not considered to be useful for the analysis. The number of exotic cattle in a herd was incorporated as a percentage of the total herd. The variable was incorporated to capture the productivity of the herds since the exotic breeds yield more milk, on average, than the indigenous ones. The percentage of exotic cattle in the herd

indicated the productivity of the herd, and so profitability per cow. Since a uniform rate of interest was charged for all borrowers, the variable interest rate was dropped.

3.5.3 Descriptive characteristics of some of the data

Some descriptive statistics were computed to give a general overview of the data. In this section, the arithmetic means and standard deviations, and the characteristics of the basic and dummy variables based on the differences in gender are presented.

The arithmetic means and the standard deviations

The arithmetic means and the standard deviations were computed for distance from the branch, age, household size, experience, education, herd size, land area, proportion of exotic cattle, loan size and repayment rate, in order to show the central tendency and the spread of the data around the means. The results are summarised in Table 3.1.

Table 3.1: Summary characteristics of the whole data set (n = 105)

Variable	Abbreviation	Mean	Standard deviation
Distance from branch (km)	KM	36.62	20.04
Age (y)	AGE	41.23	11.28
Household size (no.)	HSZ	9.56	5.79
Experience (y)	EXP	7.64	9.62
Education (y)	EDU	9.94	4.02
Herd size (no.)	HER	8.48	14.49
Land area (ha)	LAN	11.28	25.85
Exotic (%)	PEXO	84.17	29.38
Loan size (U Shs '000)	SIZE	527.27	486.86
Repayment rate (%)	RATE	41.6	38.0

Characteristics of the basic variables based on differences in gender

The characteristics of the basic variables based on differences in gender were computed, in support of the objective of the study which is to look at the differences in the sizes of loans allocated to borrowers and the loan repayment rates of the latter due to gender.

Table 3.2 gives the means and standard deviations (in columns 2 and 3) for different variables for men and women borrowers. The values were used to construct a bar chart, presented as Figure 3.1, to exhibit the differences between the genders. The differences that were outstanding in the chart were that women stayed further away from the branches, were less experienced in dairy farming, had smaller land areas and herd sizes, kept a higher percentage of exotic breeds and repaid worse than the men borrowers.

The differences between the means by gender were statistically tested using the t-test. The formulae used are in Appendix 3. Table 3.2 presents the t-values (column 5) used to test the hypothesis that there is no difference between the means of the variables for men and women.

From Table 3.2 and at the 5% level of significance, it was concluded that, on average, women lived further away from the branch; were less experienced in dairy farming and had smaller herd sizes, than the men. However, differences between women and men borrowers in terms of age, household sizes, education, land areas allocated to dairy enterprises, proportion of exotic cattle in herds, sizes of loans and repayment performance, were not significant at the 5% level.

Frequency distribution of the dummy variables

The frequencies of the dummy variables, based on gender, are presented in Table 3.3. A chi-square (χ^2) test of independence was conducted to investigate whether there was any independence between gender and each of the dummy variables. The method used is presented in Appendix 4. The critical χ^2 value at one degree of freedom and 5% level of significance is 3.84. The results of the chi-square test indicated that, at the 5% level of significance, women borrowers were less likely to be society members, more likely to be single, less likely to own collateral, and less likely to have some other occupation.

Table 3.2: Summary of characteristics of men and women borrowers

Variable	Means		Degrees of freedom	t-value	Critical t-value (5%)
	Men	Women			
(1)	(2)	(3)	(4)	(5)	(6)
KM	30.43	42.47	101	-3.23	1.984
	(17.19)	(20.91)			
AGE	42.84	39.06	102	1.64	1.983
	(110.77)	(11.64)			
HSZ	9.65	9.48	80	0.14	1.990
	(7.15)	(4.20)			
EXP	10.78	4.67	85	3.38	1.988
	(10.93)	(7.09)			
EDU	10.26	9.65	102	0.77	1.983
	(4.13)	(3.93)			
LAN	14.18	8.54	83	1.11	1.989
	(31.08)	(19.59)			
HER	12.04	5.11	58	2.45	1.987
	(19.46)	(5.58)			
PEXO	81.04	87.13	102	-1.06	1.984
	(29.83)	(28.90)			
SIZE	513.13	540.62	100	-0.29	1.984
	(519.15)	(458.79)			
RATE	47.43	36.00	99	1.55	1.984
	(40.0)	(35.00)			

Figure 3.1: Differences in the arithmetic mean values of non-dummy variables for men and women borrowers

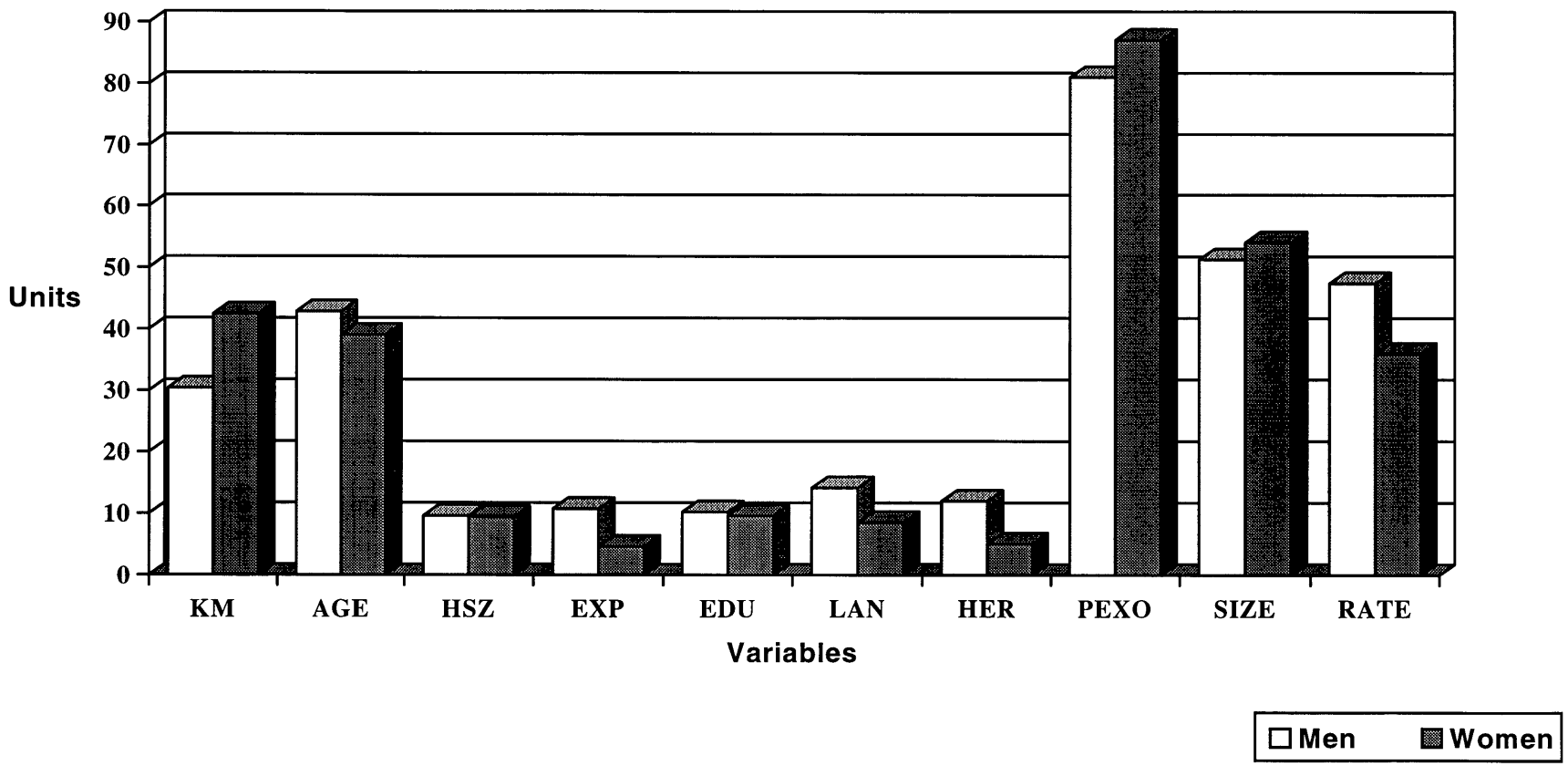

Table 3.3: Summary of the frequency of the dummy variables

Variable			Men (n=51)	Women (n=54)	Total (n=105)	χ^2 value
Society membership	(SOC):	No (0)	38 (75%)	45 (83%)	83	75.78
		Yes (1)	13 (25%)	9 (17%)	22	
Marital status	(MAR):	Single (0)	0 (0%)	12 (22%)	12	30.75
		Married (1)	51 (100%)	42 (78%)	93	
Ownership of collateral	(COL):	No (0)	36 (71%)	45 (83%)	81	27.52
		Yes (1)	15 (29%)	9 (17%)	24	
Other occupation	(OCC):	No (0)	24 (47%)	22 (41%)	46	3.52
		Yes (1)	27 (53%)	32 (59%)	59	

A correlation analysis was conducted to check whether there was any relationship between any of the dependent variables, so that multicollinearity, if any, could be corrected. The correlation matrix is displayed in Table 3.4. Based on the correlation coefficients, multicollinearity problems were judged to be unlikely.

3.6 The model for the size of loan

The variables used in the model were as outlined in section 3.5.2. Further, it was necessary to capture the effect on the size of loan of the borrower's gender, society membership, marital status, having collateral and having other occupation. These variables, as already mentioned, were incorporated as dummy variables. For gender, it was reasonable to hypothesise that the effect on the size of loan is not only due to the differences in gender (intercept) but also to the change of the size of loan according to the change in the other variable (slope). Therefore, it was assumed that the effect of gender (Dx) was on both the intercept and response coefficients. The effect through the intercept was referred to as the 'direct gender effect', and that through the response

Table 3.4: The correlation matrix

X	1.000														
SOC	-0.084	1.000													
MAR	-0.350	0.190	1.000												
COL	-0.038	0.191	0.060	1.000											
OCC	0.064	0.050	0.045	0.043	1.000										
EDU	-0.076	0.105	-0.072	0.343	0.218	1.000									
HER	-0.240	0.078	0.070	0.013	-0.145	-0.177	1.000								
EXP	-0.319	0.205	0.130	-0.046	-0.176	-0.085	0.438	1.000							
AGE	-0.159	0.069	-0.061	0.669	-0.179	-0.076	0.214	0.296	1.000						
HSZ	-0.014	0.060	0.134	-0.101	0.159	0.275	0.291	0.007	0.001	1.000					
LAN	-0.110	-0.013	-0.121	0.010	-0.199	0.005	0.563	0.431	0.315	-0.046	1.000				
PEXO	-0.309	0.271	0.025	0.190	0.182	0.260	-0.405	0.215	0.248	0.065	0.317	1.000			
KM	0.302	-0.201	0.030	-0.274	0.035	-0.272	-0.038	-0.055	-0.040	0.179	0.160	-0.156	1.000		
SIZE	0.028	-0.022	-0.101	0.319	0.125	0.068	0.379	0.015	0.089	0.246	0.321	0.288	-0.01	1.000	
RATE	-0.151	-0.0363	-0.010	0.031	0.096	-0.143	0.118	0.279	0.220	0.118	0.157	0.143	-0.040	0.042	1.000
	X	**SOC**	**MAR**	**COL**	**OCC**	**EDU**	**HER**	**EXP**	**AGE**	**HSZ**	**LAN**	**PEXO**	**KM**	**SIZE**	**RATE**

coefficient as 'the gender interaction effect'. These effects were defined in section 3.2. In the case of the other dummy variables, it was assumed that the effect on size of loan was only through the intercept term.

The model for the loan allocation was specified as follows:

$$SIZE_i = (\alpha_{S1} + \alpha_{S2}Dx_i + \alpha_{S3}DSOC_i + \alpha_{S4}DMAR_i + \alpha_{S5}DCOL_i + \alpha_{S6}DOCC_i) +$$
$$(\beta_{S1} + \beta_{S2}Dx_i)\, EDU_i + (\gamma_{S1} + \gamma_{S2}Dx_i)\, HER_i + (\theta_{S1} + \theta_{S2}Dx_i)\, EXP_i +$$
$$(\varepsilon_{S1} + \varepsilon_{S2}Dx_i)\, logAGE_i + (\lambda_{S1} + \lambda_{S2}Dx_i)\, HSZ + (\eta_{S1} + \eta_{S2}Dx_i)\, LAN_i +$$
$$(\rho_{S1} + \rho_{S2}Dx_i)\, PEXO_i + (\varphi_{S1} + \varphi_{S2}Dx_i)\, KM_i + e_i \qquad (3.1)$$

where

SIZE = the size of loan disbursed to borrowers reported in thousands of Uganda shillings (1000 Uganda shillings ≅1 US dollar).

α_{S1} = the constant intercept coefficient.

Dx = dummy variable for gender, with 0 = man and 1 = woman.

α_{S2} = the intercept coefficient for gender. A positive sign was expected, since the scheme claims to favour women (see section 2.13).

DSOC = whether or not the borrower is a member of a group, such as a farmers' union or cooperative. It is a dummy variable where 0 = not a society member and 1 = is a society member.

α_{S3} = the intercept coefficient for society membership. A positive sign was expected since society members may have a higher capacity to repay (see section 3.3.2).

DMAR = the dummy variable for the marital status of the borrower with 0 = single and 1 = married. Since each borrower had at least one child (see data set in Appendix 1), single borrowers were assumed to be heads of households.

α_{S4} = the intercept coefficient for marital status. A negative sign was expected, meaning that single people receive larger sizes of loans than married people since the latter may have a lower capacity to repay (see section 3.3.2).

DCOL = the dummy variable for collateral, where 0 = has no collateral, that is she or he used guarantors to secure the loan, and 1 = has collateral. Since there is the option of using guarantors, having no collateral does not necessary mean that the

borrower owns no assets to present as collateral. The borrowers may choose to use guarantors as a matter of preference.

α_{S5} = the intercept coefficient for collateral. A positive sign was expected, implying that the bank awards larger loans to borrowers with collateral since such loans are seen as less risky than those where there is no collateral (see section 3.3.4).

DOCC = the dummy variable for other occupation, with 0 = borrower has no other occupation and 1 = borrower has some other occupation. The latter could be in the form of farm, non-farm and off-farm activities. Other farm activities could include other livestock activities such as sheep or poultry farming, or cultivation of cash and or food crops. Off-farm activities may entail retail trade, tailoring, local brewing and honey collecting. Non-farm activities reported include carpentry, engineering, manufacturing, crafts, voluntary work, accountancy, transport, lawyer, civil servants, secretaries, teaching, nursing and brick making.

α_{S6} = the intercept coefficient for other occupation. A positive sign was expected since borrowers with other occupation are likely to have a higher capacity to repay due to other sources of financial inflows apart from the dairy enterprise.

EDU = education in years. The education levels of the borrowers were initially reported according to the highest grade they attended. In order to use this variable in the analysis, the total number of years of education received by each borrower were estimated, based on the Uganda education system, that is, 16 years for university level, 15 years for post advanced level, 13 years for advanced level, 11 years for ordinary level, 8 years for junior secondary level and 7 years for primary level.

β_{S1} = the slope coefficient for education. A positive sign was expected since the level of education was expected to enhance business performance (see section 3.3.2).

β_{S2} = the coefficient for the interaction between gender and education. There was no *a priori* expectation for this coefficient.

HER = herd size. Herd size comprised the total indigenous stock and the exotic livestock owned.

γ_{S1} = the coefficient for herd size. Borrowers with larger herds are likely to need more money, and to be considered as more creditworthy than those with smaller herds (see section 3.3.3). Thus a positive sign was expected, to indicate a positive relationship between loan size and herd size.

γ_{S2} = the coefficient for the interaction between gender and herd size. There was no *a priori* expectation for this coefficient.

EXP = experience of the borrower in dairy farming, in years.

θ_{S1} = the slope coefficient for experience. A positive sign was expected, to imply that the more experienced a borrower is in a project, the more cash inflows and therefore the more successful will the business be. One would expect an experienced borrower to have a higher capacity to repay.

θ_{S2} = the coefficient for the interaction between gender and experience. There was no *a priori* expectation for this coefficient.

logAGE = the age of the borrower was expressed in years. The relationship between age and size was not expected to be linear. The variable was expected to enter non-linearly. However, a number of non-linear formulations were tried and the log form was found to give best results. Therefore, the log form was retained.

ε_{S1} = the coefficient for the log of age. A positive sign was expected, to mean that the size of loan increases with age but at a decreasing rate.

ε_{S2} = the coefficient for the interaction between gender and log of age. There was no *a priori* expectation for this coefficient.

HSZ = the total number of members in the household including the borrower.

λ_{S1} = the slope coefficient for household size. A positive sign was expected. There is evidence that farmers with larger household sizes may benefit from having more family labour (Hilhorst and Oppenoorth 1992). Moreover, the larger the household size, the more serious a borrower may be to succeed in an enterprise and to repay.

λ_{S2} = the coefficient for the interaction between gender and household size. There was no *a priori* expectation for this coefficient.

LAN = the area of the land in hectares that the borrower allocated to the dairy enterprise.

η_{S1} = the slope coefficient for land area. Land may be considered as capital by the bank (see section 3.3.3). Therefore, the size of loans may increase with marginal increases in the land allocated to dairy enterprises by borrowers. A positive sign was expected between land area and loan size.

η_{S2} = the coefficient for the interaction between gender and land area. There was no *a priori* expectation for this coefficient.

PEXO = refers to the percentage of exotic cattle in the herd.

ρ_{S1} = the slope coefficient for the percentage of exotic cattle in the herd. A positive sign was expected. Since exotic breeds are high yielders, it was assumed that the higher the percentage of exotic cattle in the total herd, the greater the cash inflows from the enterprise, other factors (including herd size) constant, and therefore the higher the capacity of the borrower.

ρ_{S2} = the coefficient for the interaction between gender and percentage of exotic cattle in the herd. There was no *a priori* expectation for this coefficient.

KM = distance of a borrower's household in kilometres from the nearest UCB branch. The location of the borrower's household was assumed to be the same location for the dairy enterprise.

φ_{S1} = the slope coefficient for distance from the nearest branch. A negative sign was expected. Bank branches are usually located in the townships. The further away borrowers are from the branch, the harder they may be to monitor. Also, borrowers further from the townships may have more difficulty in getting business information. The bank may therefore feel safer to award smaller loans to borrowers who stay far from the branch.

φ_{S2} = the coefficient for the interaction between gender and distance from the nearest branch. There was no *a priori* expectation for this coefficient.

e_i = error term.

Several combinations can be derived from model 4.1, depending on the characteristics of the borrower, for example for a man who is not a society member, is single and has no security, Dx = 0; DSOC = 0; DMAR = 0; DCOL = 0 and DOCC = 0. The relevant model would therefore be :

$$SIZE_i = \alpha_{S1} + \beta_{S1}EDU_i + \gamma_{S1}HER_i + \theta_{S1}EXP_i + \varepsilon_{S1}logAGE_i + \lambda_{S1}HSZ_i +$$

$$\eta_{S1}LAN_i + \rho_{S1}PEXO_i + \varphi_{S1}KM_i + e_i \qquad (3.2)$$

For a woman who is a society member, married and has security,

Dx = 1; DSOC = 1; DMAR = 1; DCOL = 1 and DOCC = 1. The relevant model would then be:

$$SIZE_i = (\alpha_{S1} + \alpha_{S2} + \alpha_{S3} + \alpha_{S4} + \alpha_{S5} + \alpha_{S6}) + (\beta_{S1} + \beta_{S2})\, EDU_i + (\gamma_{S1} + \gamma_{S2})\, HER_i + (\theta_{S1} + \theta_{S2})\, EXP_i + (\varepsilon_{S1} + \varepsilon_{S2})\, logAGE_i + (\lambda_{S1} + \lambda_{S2})\, HSZ_i + (\eta_{S1} + \eta_{S2})\, LAN_i + (\rho_{S1} + \rho_{S2})\, PEXO_i + (\varphi_{S1} + \varphi_{S2})\, KM_i + e_i \quad (3.3)$$

3.7 The model for loan repayment

The model for the loan repayment rate was specified as follows:

$$RATE_i = (\alpha_{R1} + \alpha_{R2}Dx_i + \alpha_{R3}DSOC_i + \alpha_{R4}DMAR_i + \alpha_{R5}DCOL_i + \alpha_{R6}DOCC_i) + (\beta_{R1} + \beta_{R2}\, Dx_i)\, EDU_i + (\gamma_{R1} + \gamma_{R2}Dx_i)\, HER_i + (\theta_{R1} + \theta_{R2}Dx_i)\, EXP_i + (\varepsilon_{R1} + \varepsilon_{R2}Dx_i)\, logAGE_i + (\lambda_{R1} + \lambda_{R2}Dx_i)\, HSZ_i + (\eta_{R1} + \eta_{R2}Dx_i)\, LAN + (\rho_{R1} + \rho_{R2}Dx_i)\, PEXO_i + (\varphi_{R1} + \varphi_{R2}Dx_i)\, KM_i + u_i \quad (3.4)$$

where

RATE = the loan repayment rate of the borrower.

The loan repayment rate was calculated as follows:

$$\text{Repayment rate} = \frac{\text{Repayment received}}{\text{Repayment expected}} \times 100 \quad (3.5)$$

where the repayment received is the sum of the amount repaid in years 1, 2 and 3. The repayment expected is the sum of the repayment received and the balance outstanding. The data set included the balance outstanding at the end of the three-year term for each loan, as well as the amount repaid per year for each of the three years.

α_{R1} = the constant intercept coefficient.

Dx, DSOC, DMAR, DCOL, DOCC, EDU, HER, EXP, logAGE, HSZ, LAN, PEXO and KM are as defined for model 3.1

α_{R2} = the intercept coefficient for gender. A positive sign was expected since literature indicates that women are better repayers than men (Berger 1989, Hilhorst and Oppenoorth 1992).

α_{R3} = the intercept coefficient for society membership. A positive sign was expected since society members may have a higher capacity to repay (see section 3.3.2).

α_{R4} = the intercept coefficient for marital status. A negative sign was expected, meaning that single people may repay better than married people (see section 3.3.2).

α_{R5} = the intercept coefficient for collateral. A positive sign was expected implying that borrowers who have staked collateral may repay better than those who have not, to avoid losing assets in the event of default (see section 3.3.4).

α_{R6} = the intercept coefficient for other occupation. A positive sign was expected since borrowers with other occupation are likely to have more sources of cash inflow, and therefore a higher capacity to repay, than those with no other occupation.

β_{R1} = the slope coefficient for education. A positive sign was expected, to indicate that more educated borrowers may repay better than the less educated ones due to the former having the required literacy and numeracy skills to operate a business. Their comparatively higher cash inflows would enhance their capacity to repay.

β_{R2} = the coefficient for the interaction between gender and education. There was no *a priori* expectation for this coefficient.

γ_{R1} = the slope coefficient for herd size. A positive sign was expected indicating that the larger the herd size, the greater would be the net worth of the enterprise, and therefore the ability of the borrower to repay, other things being equal.

γ_{R2} = the coefficient for the interaction between gender and herd size. A negative sign was expected. The expansion in herd sizes would mean that the workload of the women increased, since women would still have to fulfil their reproductive roles. Therefore, the women may not be able to attend optimally to the management demands of the expanding enterprise, unlike the men. One would

therefore expect that, for a marginal increase in herd size, women borrowers will repay less than men borrowers, *ceteris paribus*

θ_{R1} = the slope coefficient for experience. A positive sign was expected since more experience in dairying could transform into higher profitability of an enterprise and therefore higher capacity to repay, other things being constant.

θ_{R2} = the coefficient for the interaction between gender and experience. A positive sign was expected, implying that for a marginal increase in experience, women borrowers repay better than men borrowers, other things being constant. The management of dairy cattle in a household is usually a woman's responsibility, as is the processing of milk into ghee, cheese, and other dairy products. Moreover, women do have hands-on experience in the management of such enterprises since they can not usually afford to hire labour to tend the cattle, unlike the men. Therefore, operations of an enterprise are likely to be enhanced by the experience of women entrepreneurs.

ε_{R1} = the slope coefficient for the log of age.

ε_{R2} = the coefficient for the interaction between gender and log of age. A negative sign was expected. The older a women gets, the more reproductive obligations she may have to meet, for instance with an increasing number of children and extended family, such as grandchildren. Also, older women may have more community roles to fulfil, such as funerals, weddings, village meetings and other requirements.

λ_{R1} = the slope coefficient for household size. There was no *a priori* expectation about the sign of this coefficient. A positive sign would indicate that households save on production costs due to family labour. A negative sign would indicate that families incur high household expenditures due to larger household sizes, therefore finding it hard to repay the loan.

λ_{R2} = the coefficient for the interaction between gender and household size. A positive sign was expected. According to Hilhorst and Oppenoorth (1992), there is close complementarity in the labour of women and children, with mothers sharing tasks with their older offspring. One would therefore expect the marginal labour costs incurred by women borrowers to be lower than those incurred by men, other things being constant.

η_{R1} = the slope coefficient for land area. A positive sign was expected since borrowers with larger land areas are expected to be more willing to repay, due to

status. Also, since they are usually wealthier, they are likely to have a higher capacity to repay.

η_{R2} = the coefficient for the interaction between gender and land area. A negative sign was expected, meaning that for a marginal increase in land area, women borrowers repay worse than men borrowers, *ceteris paribus.* Evidence indicates that the women's land tends to be of poorer quality than that of men (Hilhorst and Oppenoorth). Therefore, the pasture grown on this land may not be as good, resulting in poor milk yields. Further, the larger the land area, the harder it may be for the women to manage the resource, due to the demands of the reproductive sphere.

ρ_{R1} = the slope coefficient for the percentage of exotic cattle in the herd. A positive sign was expected, to indicate that, since exotic breeds are high yielders, the higher the percentage of exotic cattle in the total herd, the greater the cash inflows from the enterprise, other factors constant, and therefore the higher the capacity of the borrower.

ρ_{R2} = the coefficient for the interaction between gender and proportion of exotic cattle. A negative sign was expected, implying that for a marginal increase (decrease) in the proportion of exotic cattle in a herd, women borrowers repay worse (better) than men borrowers, other things being equal. Exotic cattle demand special care, such as tick-control. Failure to perform these activities would reduce the milk yield of these animals, leading to decreased profitability of the enterprise. Women may find it hard to combine these activities with their reproductive activities due to the higher burden associated with managing exotic breeds.

φ_{R1} = the slope coefficient for distance from the nearest branch. A negative sign was expected, meaning that the further away the borrower is from the branch, the poorer the market infrastructure, and therefore the less may be the sales. Consequently, their cash inflows may be reduced and hence their capacity to repay.

φ_{R2} = the coefficient for the interaction between gender and distance from the nearest branch. A negative sign was expected, implying that for a marginal increase (decrease) in the distance the enterprise is from the branch, women borrowers will repay worse (better) than men borrowers, *ceteris paribus.* As already mentioned, the remoteness of an enterprise may affect a woman's business more

than it does a man's due to the physical immobility that women encounter as a result of their reproductive roles.

u_i = error term.

As in the case of the model for the size of loan allocated, several combinations could be derived from model 3.4, depending on the characteristics of the borrower. For example, for a man who is not a society member, is single, has no security, and has no other occupation, Dx = 0; DSOC = 0; DMAR = 0; DCOL = 0 and DOCC = 0. The relevant model would be:

$$RATE_i = \alpha_{R1} + \beta_{R1}EDU_i + \gamma_{R1}HER_i + \theta_{R1}EXP_i + \varepsilon_{R1}logAGE_i + \lambda_{R1}HSZ_i + \eta_{R1}LAN_i + \rho_{R1}PEXO_i + \varphi_{R1}KM_i + u_i \quad (3.6)$$

For a woman who is a society member, married and has security,

Dx = 1; DSOC = 1; DMAR = 1, DCOL = 1 and DOCC = 1. The relevant model would then be:

$$RATE_i = (\alpha_{R1} + \alpha_{R2} + \alpha_{R3} + \alpha_{R4} + \alpha_{R5} + \alpha_{R6}) + (\beta_{R1} + \beta_{R2})\,EDU_i + (\gamma_{R1} + \gamma_{R2})\,HER_i + (\theta_{R1} + \theta_{R2})\,EXP_i + (\varepsilon_{R1} + \varepsilon_{R2})\,logAGE_i + (\lambda_{R1} + \lambda_{R2})\,HSZ_i + (\eta_{R1} + \eta_{R2})\,LAN_i + (\rho_{R1} + \rho_{R2})\,PEXO_i + (\varphi_{R1} + \varphi_{R2})\,KM_i + u_i \quad (3.7)$$

3.8 The methods of analysis

The models 3.1 and 3.4 were both assumed to be linear in all parameters. If the error terms in each of the models were well behaved, that is $e_t \sim N(0, \sigma^2)$, the use of ordinary least squares for each model would have been possible and would have given the best linear unbiased estimator.

For model 3.1, it seemed reasonable to assume that the error term was well-behaved and that the method of ordinary least squares could be used to estimate it. For model 3.4, the range of the dependent variable of loan repayment rate was constrained to be either positive or zero. The observations at zero corresponded to borrowers who do not repay the loan. In cases where the dependent variable is constrained in some way, the use of OLS gives biased estimators (Amemiya 1985, p. 367). A model where the

dependent variable is constrained or limited to some values is called a Tobit model. It is sometimes known as a censored regression model.

Tobit model

Consider the linear regression model

$$y_i^* = x_i' \beta + e_i \qquad e_i \sim N(0, \sigma^2)$$

where

y_i^* = the observed repayment rate when it is positive but unobserved when it is negative. It can be viewed as reflecting the creditworthiness (willingness and ability to repay of a borrower).

In practice, when y_i^* is unobserved, the value zero is assigned. Therefore, the value of y is used instead, where

$$y_i = y_i^* \text{ if } y^* \geq 0$$

$$y_i = 0 \text{ if } y^* < 0$$

The use of y_i instead of y^* implies that only observations for which e_i is greater than $-(x_i' \beta)$ lead to an observed dependent variable. Therefore, the distribution of e_i is a truncated normal distribution and its mean is not zero. This destroys the required assumption on e_i for OLS to give a best linear unbiased estimator.

Among the methods suggested in the literature to estimate the Tobit model, maximum likelihood estimation is the most widely used (Thomas 1993). The likelihood function for the Tobit model is specified as:

$$L = \prod_1 (1/\sigma) f\left(\frac{yi - x_i' \beta}{\sigma}\right) \prod_0 F\left(-\frac{x_i'}{\sigma}\right)$$

where $\prod_1$ is the product over those i for which $y > 0$;

$\prod_0$ is the product over those i for which $y = 0$;

$f(\cdot)$ is the density function; and

$F(\cdot)$ is the distribution function.

The Shazam econometrics package was used for the estimation.

3.9 Concluding remarks

In this chapter, the factors that affect creditworthiness, the data set, the models used in the analysis and the analytical method were outlined. The results of OLS and Tobit estimation of the two models are presented in the following chapter.

4. Empirical results and discussion

4.1 Introduction

In this chapter, the empirical results from the analyses for the loan size and repayment rate relationships are presented and discussed. Predictions of the loan sizes and repayment rates of borrowers with average characteristics are also presented and discussed. Finally, a comparison of the two relationships is provided.

4.2 Analysing the loan size relationship

In section 3.3, some of the variables likely to affect loan size were discussed. In this section, the model for loan size was estimated using some of the variables conceptualised as key determinants of the size of loans allocated to borrowers in section 3.3. Model 3.1 (see section 3.6) was used in this analysis.

4.2.1 Results of estimating the model for loan size

Econometric regression, using ordinary least squares, was used to obtain the values of the coefficients in the model for loan size. The results of estimating the model are reported in Table 4.1.

The t-test (see appendix 5) was used to identify the significant coefficients. According to the results displayed in Table 4.1, five coefficients were significant and seventeen were not significant at the 5% level of significance, with 83 degrees of freedom.

The significant coefficients were for society membership, collateral, herd size, experience and the log of age. The coefficients for the constant, gender, marital status, other occupation, education, household size, land area, percentage of exotic cattle in the herd and the distance from the branch were not significant. Also, all the coefficients for gender interactions were not significant.

The signs of the variables in accordance with the *a priori* expectations (mentioned in section 3.6) were those for gender, marital status, collateral, other occupation, education, herd size, log of age, household size, percentage exotic cattle in the total herd and distance from the nearest branch.

Table 4.1: Coefficient estimate results of the model for loan size

Variable	Abrrev-iation	Coeffi-cient	Estimated Coefficient	Standard error	t-value
Constant		α_{S1}	-2265.60	1258.00	-1.80
Gender	X	α_{S2}	2715.10	1440.00	1.89
Society membership	SOC	α_{S3}	-241.56*	118.80	-2.03
Marital status	MAR	α_{S4}	-125.72	160.10	-0.79
Collateral	COL	α_{S5}	277.68*	111.20	2.50
Other occupation	OCC	α_{S6}	61.57	92.53	0.67
Education	EDU	β_{S1}	10.22	17.51	0.58
Gender and education	DxEDU	β_{S2}	1.21	26.59	0.05
Herd size	HER	γ_{S1}	28.23*	8.57	3.30
Gender and herd size	DxHer	γ_{S2}	-20.50	18.45	-1.11
Experience	EXP	θ_{S1}	-15.04*	7.25	-2.07
Gender and experience	DxEXP	θ_{S2}	20.47	12.66	1.62
Log of age	lAGE	ε_{S1}	676.53*	328.80	2.06
Gender and log of age	DxlAGE	ε_{S2}	-702.81	371.50	-1.89
Household size	HSZ	λ_{S1}	15.15	10.79	1.40
Gender and household size	DxHSZ	λ_{S2}	19.32	19.39	1.00
Land area	LAN	η_{S1}	-5.50	4.13	-1.33
Gender and land area	DxLAN	η_{S2}	10.41	6.12	1.70
% exotic cattle	PEXO	ρ_{S1}	3.21	2.51	1.28
Gender and % exotic cattle	DxPEXO	ρ_{S2}	-5.31	3.63	-1.46
Distance from branch	KM	φ_{S1}	-8.92	5.13	-1.74
Gender and distance from branch	DxKM	φ_{S2}	5.84	5.73	1.02

*Significant t-value at 5% level.

Critical t-value = 1.99 at 83 degrees of freedom.

$R^2 = 0.44$ $\overline{R}^2 = 0.32$

The variables whose signs were different from those stipulated in the *a priori* expectations were those for society membership, experience and land area.

4.2.2 A preferred model for loan size

Model 3.1 included all the explanatory variables possible with the available data, that were suggested by theory or from empirical work and were judged to be relevant for the case of Uganda. It was found from the estimated model (Table 4.1) that some of these variables had no significant effect on the size of loan allocated to borrowers. Efforts were made to improve the model by progressively dropping some of the non-significant variables and re-estimating the model. The constant and the gender dummy variables were retained in all models. The gender dummy variables were kept because they are the core to the study. The results that were obtained for a preferred model for estimating the loan size are displayed in Table 4.2.

Table 4.2: Coefficient estimate results for preferred model for loan size

Variable		Coefficient	Estimated coefficient	Standard error	t-value
Constant		α_1	129.56	95.73	1.353
Gender	X	α_2	55.99	89.57	0.625
Collateral	COL	α_5	346.35*	97.19	3.563
Herd size	HER	γ_1	14.88*	5.42	2.743
Household size	HSZ	λ_1	16.73*	7.69	2.175
Land area	LAN	η_1	-3.19	3.35	-0.952
Gender and land area	DxLAN	η_2	8.28*	4.01	2.066

*Significant t-value at 5% level.

Critical t-value = 1.99 at 98 degrees of freedom.

$R^2 = 0.3181$ $\bar{R}^2 = 0.2793$.

The preferred model for loan size exhibited the existence of significant socioeconomic effects of collateral, herd size and household size, and a gender interaction effect with land area.

The coefficient of the intercept term (α_1) was found to have a positive sign and a value of 129.56. This might be interpreted to mean that the size of loan allocated to borrowers was U Shs 129 560 when all other coefficients were equal to zero. However, Griffiths, Hill and Judge (1993, p. 187) cautioned that intercept estimates should be interpreted with care. They recommended that, if the data set does not include any observations in the region where the independent variable is zero, as in this case, the estimated relationship may not be good approximation to reality in that region. The intercept term was not significant at the 5% level of significance.

The coefficient for gender (α_2) had a positive sign and a value of 55.99. This implies that the size of loan allocated was U Shs 55 990 more when the borrowers were women than men, when other factors were constant. This was consistent with the argument that the scheme gave larger sizes of loans to women than to men, *ceteris paribus*, since the scheme aimed to favour women. However, the coefficient was not significant at the 5% level.

The coefficient for the dummy for collateral (α_5) had a positive sign, with a value of 346.35. This implies that the change in the size of loan was U Shs 346 350 higher for a borrower who had collateral than for one who had no collateral, when all other factors were constant. The sign of this coefficient was consistent with the argument that borrowers with collateral were considered to be less likely to default than those without collateral and, therefore, would be awarded larger loans. The coefficient was significant at the 5% level.

The coefficient for the variable herd size (γ_1) had a positive sign and a value of 14.88. This seemed to suggest that the size of loan allocated to the borrowers increased (decreased) by U Shs 14 880 when the herd size of the borrower increased (decreased) by one head of cattle, *ceteris paribus*. The sign of the coefficient was consistent with the argument that borrowers who had larger herd sizes were considered to require more money and to be more creditworthy than those with smaller herd sizes. The coefficient was significant at the 5% level.

The coefficient for the variable for household size (λ_1) had a positive sign and a value of 16.73. This means that the size of loan allocated to the borrowers increased (decreased) by U Shs 16 730 when the household size increased (decreased) by one member, *ceteris paribus*. The sign of the coefficient was consistent with the argument

that borrowers who had larger household sizes were considered to be better risks than those with smaller ones, due to free family labour. The coefficient was significant at the 5% level.

The coefficient for the variable land area (η_1) had a negative sign and a value of 3.19. This suggests that the size of loan allocated to the borrowers decreased (increased) by U Shs 3190 when the land area on which the borrower operates his or her enterprise increased (decreased) by 1 ha. The sign of the coefficient was inconsistent with argument that owners of larger land areas would require more money than those with relatively smaller land areas. However, the coefficient was insignificant at the 5% level.

The coefficient for the interaction between the land area and gender (η_2) had a positive sign and a value of 8.28. This implies that the change in the size of loan when the land area increased (decreased) by 1 ha was U Shs 8280 higher for women than for men borrowers. The result indicates, therefore, that the size of loan was reduced by U Shs 3190 for every extra 1 ha of land allocated to dairying by a man, but was increased by U Shs 8280 – 3190 = 5090 for every extra 1 ha of land allocated to dairying by women, *ceteris paribus*. The result suggests that, as the land area allocated to dairy increased, the scheme favoured women while disfavouring men borrowers. The results were consistent with one of the objectives of the bank i.e., to supply credit to those women entrepreneurs who had the potential to expand their enterprises. However, since the scheme claims to support small farmers as well (see section 2.13), favouring women farmers with larger areas than those with small was inconsistent with expectations. The coefficient was significant at the 5% level.

4.2.3 Testing the relevance of gender in the loan size model

The results for the preferred model show that the coefficient for gender was not significant whilst that for the interaction between gender and land area was significant. There was need to find out whether the coefficients could both be zero at the same time. This would imply that gender did not affect the size of loans allocated to the borrowers. The F-test was conducted to test the hypothesis H_0: $\alpha_{S2} = \eta_{S2} = 0$ against H_1: at least either α_{S2} or η_{S2} is not zero.

The calculated F-value was 3.133. At 2 and 98 degrees of freedom, and 5% level of significance, the critical F-value is 3.07. Therefore, H_0 was rejected and H_1 accepted. Consequently, it was concluded that there was no evidence to show that $\alpha_2 = \eta_2 = 0$.

Gender was therefore important in determining the sizes of loans allocated to dairy farmers of the UCB RFS.

4.2.4 Predicting the loan size for borrowers with average characteristics

The results described so far indicate that gender was an important determinant of loan size. Other important factors were collateral, herd size, household size and land area. However, gender entered the preferred model for loan size (Table 4.2) in a complicated way, since the relationship between loan size and land area was positive for women whilst being negative for men. Therefore, there was no way, from simply looking at the coefficients, of knowing whether the impact of gender on loan size was either positive of negative. Further, the estimated impact of gender would depend on the levels of other socioeconomic variables. Therefore, in order to make some inferences about the effect of gender on the loan size allocated to borrowers of average characteristics, estimates of point predictions were computed for two categories of borrowers, i.e., those with collateral and those with no collateral. The average values of all the other variables in the data set (as displayed in Table 3.1 i.e., regardless of gender), were used, to enable the comparison between these categories of borrowers. The point estimates were used because, although the estimation of confidence intervals using OLS would have been easy, the estimation of confidence intervals using Tobit analysis was beyond the scope of this study (B. Griffiths 1995, pers. comm.). Consequently, the confidence intervals for both OLS and Tobit estimates were not computed, for consistency. The results are shown in Table 4.3.

Table 4.3: Prediction estimates for loan size of borrowers of average characteristics

Category	Size of loan (U Shs)	
	Men	Women
With collateral	726.0	875.4
Without collateral	379.7	529.1

The results from Table 4.3 indicate that the UCB RFS allocated larger loans to women than to men borrowers in either category. The results are consistent with those displayed for the loan size variable in Table 3.2. In cases where both men and women

had collateral, women borrowers were favoured. The same was true in cases where both genders had no collateral. Both women and men who had no collateral received smaller loans, on average, than those with collateral.

4.3 Analysing the repayment rate relationship

As explained in section 3.3 and 3.5, the model for repayment rate was estimated using the same independent variables as defined for the size of loan, on the assumption that the same variables affect the repayment rate of borrowers. Consequently, the dummy variables including gender, and the variables for gender interactions were also incorporated in the model for the repayment rate. Model 3.4 (see section 3.7) was used in this analysis.

4.3.1 Results of estimating the model for repayment rate

The maximum likelihood estimation applied to the Tobit model, as described in section 3.8, was used to obtain the values for the coefficients in the model for repayment rate. The results of estimating the model are reported in Table 4.4.

From Table 4.4, four coefficients were found to be significant and eighteen not significant, at the 5% level of significance. The significant coefficients were those for the constant, other occupation, the interactions between gender and experience, and gender and household size. The coefficients for gender, society membership, marital status, collateral, education, herd size, experience, log of age, household size, land area, percentage of exotic cattle in the total herd and distance from the branch were not significant. Also, the interactions between gender and education, gender and herd size, gender and log of age, gender and land area, gender and percentage of exotic cattle in the total herd, and gender and distance from the branch were not significant at the 5% level.

The signs of the variables in accordance with the *a priori* expectations (mentioned in section 3.7) were those for marital status, collateral, other occupation, experience, land area, distance from the branch and the interactions between gender and experience, gender and log of age, gender and household size, and gender and land area.

The variables whose signs were different from those stipulated in the *a priori* expectations were gender, society membership, education, herd size, log of age,

Table 4.4: Coefficient estimate results for the model for repayment rate

Variable	Abbrevi-ation	Coeff-cient	Estimated Coefficient	Asymptotic standard error	Asymptotic normal statistic (z)
Constant		α_{R1}	4.35*	35.15	2.68
Gender	X	α_{R2}	-144.17	131.73	-1.09
Society membership	SOC	α_{R3}	-11.50	10.43	-1.10
Marital status	MAR	α_{R4}	-25.99	14.16	-1.84
Collateral	COL	α_{R5}	11.55	9.85	1.17
Other occupation	OCC	α_{R6}	21.57*	8.23	2.62
Education	EDU	β_{R1}	-2.37	1.53	-1.55
Gender and education	DxEDU	β_{R2}	1.16	2.34	0.50
Herd size	HER	γ_{R1}	-0.69	0.75	-0.92
Gender and herd size	DxHer	γ_{R2}	0.78	1.67	0.47
Experience	EXP	θ_{R1}	0.50	0.63	0.79
Gender and experience	DxEXP	θ_{R2}	2.71*	1.12	2.42
Log of age	lAGE	ε_{R1}	23.52	28.79	0.82
Gender and log of age	DxlAGE	ε_{R2}	-0.54	33.95	-0.16
Household size	HSZ	λ_{R1}	0.06	0.94	0.06
Gender and household size	DxHSZ	λ_{R2}	3.69*	1.73	2.13
Land area	LAN	η_{R1}	0.52	0.36	1.46
Gender and land area	DxLAN	η_{R2}	-0.59	0.54	-1.09
% exotic cattle	PEXO	ρ_{R1}	-0.10	0.22	-0.44
Gender and % exotic cattle	DxPEXO	ρ_{R2}	0.63	0.34	1.85
Distance from branch	KM	φ_{R1}	-0.15	0.45	-0.34
Gender and distance from branch	DxKM	φ_{R2}	0.35	0.51	0.70

*Significant coefficients at 5% level of significance.

Critical z-value = 1.96.

percentage of exotic cattle in the herd, and the interactions between gender and herd size, gender and percentage of exotic cattle in the herd, and gender and the distance from the branch.

4.3.2 A preferred model for repayment rate

As in the case for selecting a preferred model for loan size, a number of combinations were tried while retaining the relevant gender variables, in an attempt to obtain a preferred model for repayment performance. The model is displayed in Table 4.5.

Table 4.5: Coefficient estimate results for preferred model for repayment rate

Variable		Coeffi - cient	Estimated Coefficient	Asymptotic standard error	Asymptotic normal statistic (z)
Constant		α_{R1}	38.99	2.99	13.040
Gender	X	α_{R2}	-47.90*	17.91	-2.674
Marital status	MAR	α_{R4}	-27.56*	13.51	-2.040
Other occupation	OCC	α_{R6}	12.23	8.06	1.517
Experience	EXP	θ_{R1}	1.40*	0.44	3.196
Household size	HSZ	λ_{R1}	-0.19	0.08	-0.243
Gender and household size	DxHSZ	λ_{R2}	3.73*	1.61	2.321

*Significant coefficients at 5% level of significance.
Critical z-value = 1.96.

The preferred model for repayment rate exhibited the existence of a direct gender effect, socioeconomic effects of marital status, other occupation, experience and household size, and a gender interaction effect with household size.

The coefficient of the intercept term (α_{R1}) had a positive sign and a value of 38.99. Strictly speaking, this result would suggest that the repayment rate of borrowers is 38.99 per cent when all other coefficients are equal to zero. Again, the interpretation of the intercept estimate was treated with caution, for the same reason as given in section 4.2.2. The intercept term was insignificant at the 5% confidence level.

The coefficient for the dummy for gender (α_{R2}) had a negative sign, with a value of 47.90. This appears to imply that the repayment rate of borrowers was 47.90 per cent lower when the borrowers were women than men, *ceteris paribus*. The sign of this coefficient was inconsistent with the claim that women were better in repayment than the men. The coefficient was significant at the 5% level.

The coefficient for marital status (α_{R4}) had a negative sign and a value of 27.56, which implies that the repayment rate of the borrowers was lower by 27.56 per cent for borrowers who were married, compared with those who were single, when all other factors were constant. The sign of the coefficient was consistent with the argument that married borrowers could repay worse than single ones due to the relatively higher commitments of married people which could, in turn, impose constraints on the smooth running of the business, for example, time constraint, funerals and other social obligations. These commitments could also be associated with higher financial costs and hence using the loan funds for consumption instead of repayment. The coefficient was significant at the 5% level.

The coefficient for other occupation (α_{R6}) had a positive sign and a value of 12.23. This seemed to indicate that the repayment rate of the borrowers was higher by 12.23 per cent for borrowers who had some other occupation compared with those who were only involved in dairy farming, *ceteris paribus*. The sign of the coefficient was consistent with assertion that borrowers who had other occupations had other sources of livelihood and therefore were less likely to divert loan funds into consumption. Also, in case of poor performance of the dairy projects, income from these other occupations could be used to repay the loan and or finance the dairy business. The coefficient was insignificant at the 5% level.

The coefficient for experience (θ_{R1}) had a positive sign and a value of 1.40. This implies that the repayment rate of the borrowers increased (decreased) by 1.40 per cent when the experience of the borrower increased (decreased) by one year, when

other factors were constant. The sign of the coefficient was consistent with the argument that borrowers who had more experience in dairy farming would operate their enterprises better than those with less experience, and hence would be likely to repay better than those with relatively less experience. Experienced borrowers could have more business information and contacts, for example with extension agents, veterinary officers and opinion leaders, who would contribute to the profitability of the business directly and or indirectly. The coefficient was significant at the 5% level.

The coefficient for household size (λ_{R1}) had a negative sign and a value of 0.19. This appeared to imply that the repayment rate of the borrowers decreased (increased) by 0.19 per cent when the household size increased (decreased) by one person, *ceteris paribus*. The sign of the coefficient was consistent with the claim that borrowers with larger household sizes had more commitments and were likely to use the credit for purposes other than that for which the credit had been allocated, such as consumption and fees, and so, would have no money for repaying the loan. However, the coefficient was insignificant at the 5% level.

The coefficient for the interaction between household size and gender (λ_{R2}) had a positive sign and a value of 3.73. This seemed to suggest that the change in repayment rate when household size increased by one person was 3.73 per cent higher for women borrowers than for men borrowers, when other factors were constant. The results could be explained by findings from literature (Nalwanga-Sebina and Natukunda 1988). As discussed in section 2.10.2, it is the duty of the women to mobilise household labour. Therefore, their enterprises are likely to benefit more from household labour than those of male borrowers. Also, since dairying is a woman's responsibility, women have hands-on experience in dairy activities. The coefficient was significant at the 5% level. The results therefore indicate that the repayment rate was reduced by 0.19 per cent for every extra increase in household size by one individual for men borrowers whereas the rate increased by 3.73 - 0.19 = 3.54 per cent for every extra increase in household size by one individual for women borrowers, *ceteris paribus.*

4.3.3 Testing the importance of gender in the repayment rate model

Given the results of the preferred model for the rate relationship displayed in Table 4.5, the coefficients for gender and the interaction between gender and household size were both significant. However, since one of the objective of our study was to investigate the effects of gender on repayment rate, it was necessary to find out whether the coefficients for gender could both be zero at the same time. Therefore,

the Wald test was conducted to test the hypothesis H_O: $\alpha_{R1} = \lambda_{R2} = 0$ against H_1: at least either α_{R1} or λ_{R2} is not zero.

The calculated Wald statistic value was 7.022. At 2 degrees of freedom and 5% level of significance, the χ^2 value is 5.99. Therefore H_O was rejected and it was concluded that gender had an effect on the repayment rate of borrowers.

4.3.4 Predicting the repayment rate for borrowers with average characteristics

The results from the analysis of the repayment rate relationship indicate that, again, gender was an important factor in repayment performance. Other important factors were marital status, other occupation, experience and household size. As in the case for the loan size relationship, gender entered the repayment rate (Table 4.5) in a complicated manner. The relationship between household size and size of loan was positive for women and negative for men.

Predicted values (using point estimates) for repayment rates of borrowers with average characteristics were computed. The average values were obtained from Table 3.1. Predictions were computed for eight categories of borrowers i.e., for both women and men: single with other occupation, single with no other occupation, married with other occupation and, married with no other occupation. The predicted values for each category are summarised in Table 4.6.

Table 4.6: Prediction estimates for repayment rate of borrowers of average characteristics

	Category of borrower with average characteristics	Repayment rate (%)	
		Men	**Women**
1.	Single, other occupation	60.1	47.9
2.	Single, no other occupation	47.9	35.6
3.	Married, other occupation	32.5	20.3
4.	Married, no other occupation	20.3	8.1

The results from Table 4.6 indicate that in all categories, women repaid worse than men borrowers. Generally, the poor performance of women was consistent with the general view that Ugandan rural women encounter constraints that may impede the performance of their income-generating activities. Such constraints may include, for example, strenuous reproductive responsibilities, inadequate business managerial skills, poor marketing infrastructure and lack of business information and support (discussed in section 2.10.2).

The results further indicate that borrowers with some other occupation (apart from dairy enterprise) repaid better than those with no other occupation. However, women borrowers who had some other occupation repaid worse than men in the same category. The findings were consistent with the evidence that, although both men and women may have some other occupation, the cash inflows of women may be less than those of men due to the low profitability of the women's occupations (see section 2.10.2).

The results suggest that, single borrowers repaid better than married borrowers. Implications of this result have already been discussed in section 4.3.2. However, single women borrowers (female heads of households [see section 3.6]) repaid worse than single men borrowers (male heads of households). This result was consistent with the evidence that single men had helpers, such as relatives and or hired servants to conduct the reproductive activities (UNICEF 1994). Consequently, compared with their women counterparts, single men borrowers could have a less onerous reproductive burden than women and therefore more time to commit to dairying. As discussed in section 2.10.6, female heads of households face comparatively heavier reproductive burdens.

From the results, it was found that, on average, married women repaid worse than married men. This finding was consistent with the literature that husbands may contribute less to household expenditures when wives start income-generating activities (UNICEF 1994). Such women may divert funds into consumption, thereby reducing the capacity to repay. Also, there is evidence that women may not control their income (see 2.10.1 and 2.10.2).

The results also indicate that single women borrowers repaid better than married ones. Evidence indicates that female heads of households are poorer than marrieds (see 2.10.6). That the former are better repayers than the latter is consistent with the findings that poorer women are better repayers than those who are not as poor (Berger 1989). Another argument could be that married women have greater social-cultural obligations, since they, on average, may have larger extended families, than single

women. The obligations could reduce the time the women devote to their enterprises (see section 2.10.2). Also, the poorer performance may be due to the increased financial obligations that married women encounter, in cases where husbands stop contributing to household expenses (see section 2.10.3).

4.4 The comparison of the two preferred models

In comparing the preferred model for size of loan allocated to borrowers (Table 4.2) with that for the repayment rate (Table 4.5), it is clear that, apart from household size, the factors that the bank focused on when allocating the sizes of loans were different from those that determined repayment rate amongst borrowers. While the bank focused on collateral, herd size, household size and land area in determining the size of loan to allocate to borrowers, the repayment rate was determined by the gender of the borrower, marital status, other occupation, experience and household size.

4.5 Concluding remarks

The results of the study showed that, for the case of the UCB RFS, gender was significant in the performance of the scheme. Marital status, other occupation, experience and household size were also important in repayment performance, while collateral, herd size, household size, land area and gender were important in determining the size of loan given to borrowers. On the whole, the scheme favoured women by giving them larger loans, especially as they allotted more land area to dairy enterprise. However, women were not repaying as well as men borrowers. Further, the bank's loan size policy was not conducive to loan repayment performance, since it did not focus on the factors that were important for loan repayment. The results were used to suggest some policies, outlined in the next chapter.

5. Summary, policy implications and conclusions

5.1 Introduction

This chapter begins with an overview of the results of the study, outlined in the last chapter. The findings are summarised, the results of testing the hypotheses are reported and possible explanations of the results are discussed. Policies are recommended for improving loan repayment performance of women borrowers and the sustainability of lending of the UCB RFS. The need to incorporate gender issues in policy formulation, in general, is also highlighted. The limitations of the study and areas for further research are also presented. Finally, the conclusions from the study are outlined.

5.2 Overview of the results

5.2.1 Summary of the findings

In this study, two estimation procedures were employed to test the hypotheses stated in section 1.5. The OLS technique was used to estimate the relationship between various factors, including gender, and the size of loans allocated to dairy farmers of the UCB RFS. The maximum likelihood method of estimation was applied to the Tobit analysis to estimate the relationship between various factors, including gender, and the loan repayment performance of those farmers. In both estimation procedures, gender and gender interaction variables were included.

Results from the size of loan model indicated that more money is lent to borrowers who are women, have collateral and have larger-sized households. The effect of gender was not significant. The relationship between land area and the size of loan was found to be negative for men farmers and positive for the women farmers.

Results from the loan repayment model indicated that women repaid less well than men. Single borrowers, those with other occupation(s) and those with more experience were found to repay better. The relationship between repayment rate and household size was negative for men borrowers and positive for women borrowers.

The relevance of gender in both models was also assessed, using joint tests (Wald test and F test). It was found that gender is important in determining both the size of loan allocated to dairy farmers of the UCB RFS, and their repayment performance.

Results of the predictions of the size of loans allocated to borrowers of average characteristics indicated that borrowers who are women, or with collateral receive larger loans than those who are men, or who lack collateral. Results of the predictions for loan repayment rate indicated that borrowers who are women, married or with no other occupation repay worse than those who are men, single, or with other occupation(s).

5.2.2 Testing the hypotheses

In this study, two hypotheses were stated, as outlined in section 1.5. The first hypothesis was: for dairy farmers receiving loans from the UCB RFS, there is no effect of gender on the amounts allocated to borrowers when other factors are taken into account. This hypothesis was rejected because, as explained in section 4.2, the results from the study indicated that, at the 5% level of significance, there was evidence to show that for dairy farmers from the UCB RFS, gender, through interacting with household size, had an effect on the amounts of loans allocated to borrowers when other factors are constant.

The second hypothesis was: for dairy farmers receiving loans from the UCB RFS, there is no effect of gender on the loan repayment performance of borrowers when other factors are taken into account. The hypothesis was rejected since, as outlined in section 4.3, the results from the study indicated that, at the 5% level of significance, gender and the interaction between gender and land area, had an effect on the loan repayment performance of borrowers when other factors are constant.

5.2.3 Comments and possible explanations for the results

Size of loan relationship

The results of this study indicated a positive relationship between size of loan and both herd size and land area allocated to dairying by women borrowers. As mentioned in section 3.3.3, herd size and land area can signify the accumulated wealth of the borrower. It seems rational, therefore, for the bank to allocate larger sizes of loans to wealthier borrowers, other factors being constant. Since the herd size and land area for

women appear not to affect loan repayment, it seems that the UCB RFS is tailoring loans well to the scale of operation of the borrowers.

The results of the study indicated a positive relationship between household size and size of loan (and repayment rate). The UCB RFS apparently does well to give larger loans to borrowers with larger households, since household size enhances repayment, especially amongst women borrowers.

As outlined above, the results of the study indicated that the UCB RFS awards larger loans to borrowers with collateral than to those with no collateral. Also, larger loans are given to borrowers with relatively larger herds and land areas allotted to dairy farming. However, the emphasis that the UCB RFS puts on collateral, herd size and land area may indirectly bias the loan size policy against women. This is because, in this study, a larger proportion of women than men borrowers had collateral (see Table 3.3), and, on average women had smaller herds and land areas than men (see Table 3.2).

Repayment relationship

Results from this study indicated that women repay significantly worse than men, and that single borrowers repay better than married. The data set used for this study had no single men, meaning that all single borrowers were women. As explained in section 3.6, since each borrower had at least one child, all the single women in the data set were assumed to be female heads of households. The results therefore indicate that, among the women, those who are female heads of households repay better than married women. As discussed in section 4.3, the poor repayment evidenced amongst women in general, and married women in particular, may be due to the reproductive roles that women face and the consequent time constraints. Also important may be women's lack of technical and business skills, their inadequate cash flow management and the types of enterprise in which they are engaged. There may also be a problem of men taking the women's income.

Evidence indicates that poverty is a high-ranking problem amongst Ugandan rural women (see section 2.10.6). Therefore, due to poverty, the income generated from the dairy farming may not be sufficient to meet the needs of the women and their households. Further, the dairy enterprises may not be profitable. In such cases, providing credit funds for unviable enterprises would exacerbate the repayment problems faced by the women, leaving them worse off.

Household size especially for women, has a positive relationship with repayment rate. The relationship may be due to the free labour that the family members may contribute to the enterprise. The result could mean that the management of dairy enterprise is very labour intensive and likely to be demanding on the women's time, given the multiple roles that women face. Therefore, women who have relatively smaller household sizes may not have enough family labour to operate the dairy enterprises.

As already explained in section 2.10.3, rural women in Uganda often spend a bigger proportion of their income on consumption than rural men. For such women, the domestic and non-domestic (income-earning) spheres tend to be inseparable (Heyzer 1993). Income may therefore be used for obligations that are considered of a higher priority than repayment, such as medical expenses, food and other welfare expenditures, resulting in poor repayment performance.

5.3 Policy implications

Recommendations for improving the repayment performance of women borrowers and the sustainability of bank lending are suggested in this section, based on the results and possible explanations outlined above. To effect the improvements suggested below, the UCB RFS, other financial institutions, the Government of Uganda (GOU), the donors and the women borrowers may all have roles to play.

5.3.1 The general need for gender policies

As already mentioned, the results indicated that gender is important in the size of loans allocated to borrowers and in loan repayment performance. Therefore, since gender is important, there may be a general need for incorporating gender issues into the policy formulation procedures of the UCB RFS, in particular, and other organisations that assist women in general. The incorporation of gender issues in formulating policies to assist women is well supported in modern literature (Evers 1993; Mayoux 1993b). For instance, Radcliffe (1993) contended that gender issues are crucial to development policies for peasant economies. According to Elson (1993), if government policy does not take gender-relations into account, it is much harder for financial institutions and NGOs offering assistance to women to intervene in the making of economic policy. Elson further argued that gender issues make a difference to many policy recommendations and decisions. According to Moser (1989), since women play different roles and therefore have different needs from men, gender planning should be incorporated into policy formulation.

5.3.2 Implications for repayment performance

As outlined above, the results of this study indicate that, for sample loans of UCB RFS, women repaid worse than men borrowers. The results of the study are contrary to other evidence that women repay better than men (Kuiper 1989) or that gender is insignificant in loan repayment (Sengati 1993). As noted in section 1.5, since gender is significant and women are poorer repayers than men, the results from this study manifest a problem for a policy aimed at increasing the access of women to credit. However, since the need for credit by women is well documented (see section 2.5), the bank's policy of supporting women should not be discarded based on the findings here. Rather, gender-specific policies may be required for financial institutions, donors and the GOU to improve the repayment of women borrowers to at least bring their performance up to par with that of men. Further, more attention may need to be given to which women get loans, and the riskiness of their projects.

Time constraints

In cases where time constraints hamper the repayment performance of the borrowers, (such as explained in section 5.2.3), the bank may need to take the reproductive burden of women borrowers into account, before credit for operating dairy enterprises is granted. Due to the female gender roles, income-generating activities may over-burden women, thereby undermining their reproductive roles and so reducing their overall productive capacity (and hence their capacity to repay). It may therefore be better if credit were to be provided in a package more closely tailored to the needs of women borrowers. Thus, in addition to lending to expand dairy production, the bank may also need to lend for domestic or on-farm labour saving devices. The devices would alleviate women's workloads. Consequently, the women would be able to participate more in the income-generating activities. The bank may need to confirm that women borrowers have easy access to communal child-care facilities, water sources and firewood or energy saving fuel, before granting loans. Such a confirmation may be necessary since lack of the mentioned facilities may exacerbate the reproductive burden that women face, contributing to poor repayment.

Given the possible time constraints that women have and the high and regular labour demand of dairy farming, enterprises that are less demanding in terms of time and labour may be more suited to the women's conditions, such as poultry, goat-keeping and some forms of horticulture.

The government may need to support the establishment of facilities that reduce workloads for women. Projects that reduce women's reproductive burdens, such as

through provision of child-care facilities, accessible water, rural electrification and simple technological improvement in the processing and preparation of food in the house may improve the capacity of women to use and repay credit. The availability of fuel-wood may be improved by maintaining existing fuel-wood resources and adopting appropriate agricultural and agro-forestry strategies as integral parts of rural development programs and projects.

Women borrowers may need to make joint efforts to ease their time constraints. Reproductive burdens, such as child-care, may be reduced through self-help community efforts. Also, women borrowers could improve their skills through participating in women's groups.

Lack of technical and business management skills

If the lack of technical and business management skills are part of the causes of poor repayment by women, the UCB RFS may need to adopt an integrated approach of credit delivery (see section 2.7) so as to enhance the women's skills in these areas. One way would be to provide training in dairy husbandry to women borrowers. The training methods used would need to be practical, participatory and appropriate to the trainees' local situations. The bank would need to consider the women's time and mobility constraints when scheduling such programs. As already explained, the various roles that women play may deter them from participating in the training activities. On-farm training and training during off-peak seasons are possible options.

Training for women borrowers in areas that would improve the productivity and performance of their income-generating activities may be useful. Training in entreprenuership development, time management and marketing may be beneficial to the borrowers.

There is evidence that the government extension services are inefficient (Nalwanga-Sebina and Natukunda 1988). Further, according to Nalwanga-Sebina and Natukunda, rural women in Uganda lack access to such facilities, which constrains the productivity of their enterprises (see section 2.10.2). Therefore, the UCB RFS may need to establish facilities that provide agricultural extension services, business advisory services and information, to supplement those provided by the GOU. Technical, small business management and dairy production units may have to be formed within the UCB RFS, since the development of an effective extension service by GOU may not occur in the short term (UNICEF 1994).

Also, the women could participate in groups that market products of members, and or share production costs.

If the lack of technical and business management skills results in poor repayment by men borrowers as well, training to improve such skills and provision of adequate business advice could improve their repayment performance.

Lack of cash management skills

Evidence indicates that, traditionally in Uganda, cash management is the men's responsibility (see section 2.12.1). Consequently, many women may be incompetent in managing finances. If further investigation shows that cash management problems are a cause of poor repayment amongst women borrowers, the UCB RFS may need to provide training for women, in cash management. In cases where husbands either decline from contributing to household expenses or confiscate their wives' incomes, cooperation from husbands may need to be solicited by the credit officers before loans are granted.

Poverty

If poverty is a cause of poor repayment for borrowers in general and women in particular, then finding a solution is very difficult and provision of credit may not be the best and certainly the only way of overcoming the problem. Probably, equity and property rights may need to be tackled and programs to meet basic needs may need to be put in place.

5.3.3 Implications for sustainability of bank lending

Financial institutions, such as the UCB RFS, that support development activities for women, need to maintain their sustainability in order to be able to assist the women (and men) successfully (Tilahun 1994). Since the UCB RFS is realising poor repayment rates (an average of 36 per cent for women and 47 per cent for men [Table 3.2]), the sustainability of the scheme may well be threatened. Given that one of the objective of the UCB RFS is to provide priority support to women, the UCB RFS would need to consider ways of minimising risks of lending, especially to the women.

Since the UCB RFS is interested, not only in enhancing the repayment performance of borrowers, but also in getting its money back in the event of default, the bank may consider some factors that do not necessarily enhance repayment but safeguard the bank's portfolio against default. The results indicate that the bank focuses on

collateral, herd size, land area for women and household size in determining the size of loan. As explained in section 3.3, factors such as collateral, herd size and land area for women constitute hedges against risk. According to the results of this study, gender, marital status, other occupation, experience and household size are important in loan repayment. When determining the size of loans to give to borrowers, the bank could therefore improve its loan size policy by focusing on factors that enhance loan repayment rate, in addition to those which hedge against risk. Based on the results, the loan size policy should be revised to include gender (thereby addressing the possible gender-related problems mentioned in section 5.2.3), marital status, other occupation and experience in addition to the factors already considered by the bank. The results also reveal that, although experience is important in repayment performance, the bank does not appear to consider experience as important when deciding on the loan size for borrowers. It is therefore recommended that the bank gives more attention to experience in deciding which borrower gets what size of loan. Also, it may be useful for the UCB RFS to focus on building the borrowers' experience in managing dairy enterprises, for example by phasing loans more carefully as borrowers build up their farms.

The results from this study indicate that collateral is considered as a major factor in determining the loan size for borrowers. However, the factor does not seem to enhance repayment. It therefore seems inappropriate to give high priority to collateral when it has no impact on repayment rate. The bank could focus less on collateral in its loan allocation procedures.

The evidence from this study suggests that the bank may need to adopt policies to improve the screening processes for the character of borrowers, that is, their willingness to repay. Although borrowers may fail to repay for genuine reasons, some could be defaulting wilfully. Therefore, more effective and efficient loan appraisal and screening procedures could be adopted by credit officers, to improve their ability to detect strategic defaulters. Failure prediction models, credit scoring and computerised expert systems may be used (Altman 1984). Also, closer supervision of borrowers may be required, so that, in the event of default, credit officers can isolate genuine cases from wilful defaults. Flexible repayment schedules, more credit for working capital to borrowers with genuine repayment difficulties and instalment lending could be considered. However, strict enforcement of sanctions may be necessary in cases of wilful defaults.

Experience with some other developing countries has shown that group lending enhances loan repayment (Hossain 1990; Hilhorst and Oppennoorth 1992). Thus, the

UCB RFS could explore the possibility of improving the repayment performance through group lending, especially to women. The groups could be involved in pre-screening applicants, monitoring projects and effecting recoveries through peer pressure. Care would need to be taken to ensure that the groups are self-selected, since heterogeneity within groups, for example with respect to age, education, status, motivation, may be a problem (Hyma and Nyamwange 1993).

Ideally, any financial institution should reduce its transaction costs so as to promote self-sufficiency and sustainability. However, given the need to improve the performance of women borrowers of the UCB RFS, the cutting down of transaction costs by the bank may not be possible in the short term. Measures such as supervision and training are likely to be costly, yet necessary, if the UCB RFS is to continue to assist poor women. Nevertheless, some strategies to reduce transaction costs may still be employed. For example, more efficient administrative procedures, low-cost innovative experiments, such as mobile credit officers, one-person branches, opening branches on a part-time basis, or agents to work for the bank on commission, may be useful.

Some financial institutions that award credit to women in Uganda have realised good repayment performance (Musoke and Amajo 1989). The UCB RFS could promote networking or coordination with various rural financial agencies endeavouring to help women borrowers, such as CERUDET, the UWFCT and the Cooperative Bank (see section 2.12.2) so that the UCB RFS may learn from those institutions that are doing better. For example, workshops on gender and rural credit may be held to share experiences.

A good knowledge of cultural aspects of the intra-household gender-relations of beneficiaries may be essential in awarding credit. Evidence shows that women may not have any control of their income (see section 2.10). It may therefore be a problem, for instance, to give larger loans to women who allocate more land to dairying (as indicated by this study), without being certain whether the women actually control the proceeds from the enterprises.

Since the poor repayment performance by women may discourage lending, the financial institutions that are committed to the development of women may need government support to sustain their operations. Consequently, the government may need to create an environment where lending to the rural women is financially attractive to financial agencies, so that the banks can provide credit willingly. To that effect, wholesale remission of debt, insistence on very low interest rates and policy statements discouraging farmers from repaying loans may need to be avoided.

Further, the government could provide financial institutions with access to low-cost funds.

Donors may wish to support activities that improve bank sustainability. For instance, funds for training programs and seminars for credit officers, research on rural financial markets, testing of financial innovations, installation of computerised management information systems and development of appropriate screening and credit scoring procedures, may be useful. Donors may also provide technical assistance in appraising, monitoring and evaluating rural credit projects.

5.4 Limitations of the study

The selection of the study sample and the information available could inevitably not be controlled in the research program since the bank had to be relied upon. Consequently, the sample could have been biased in some way. Further, data on variables other than those recorded on the loan application forms and provided by the bank could not be obtained. In particular, information on unsuccessful loan applications was not available. It would have been desirable to have data on the characteristics of unsuccessful applicants. Also, no data could be obtained on the reasons for slow repayment and default. Such information would have been valuable in interpreting the regression results.

The sample size was small. Results might have been better if the sample size had been larger. However, data were provided on all dairy loans in both the districts of study, for the period 1988 to 1991. To increase the sample size, it would have been necessary to collect data from more districts or for more years, which would probably have increased the variability of the sample. Finally, the study was undertaken under conditions of resource and time constraints. More adequate resources and longer time would have permitted a more thorough investigation.

5.5 Areas for further research

There is need to investigate the reasons for poor repayment by the borrowers, especially the women. It would be important to repeat the study for other rural credit schemes and other enterprises to assess whether the relatively poorer repayment performance of women than men is a wide-scale problem in Uganda. Also, it would be useful to extend the study of the size of loan to include those who got no loans, in the sample.

5.6 Conclusion

The main theme of the study was gender issues and the important role that credit might play in improving the status and lives of rural women in Uganda. It is concerning to find out that women (dairy farmers) in the UCB RFS have a poorer repayment record and that which is inferior to men, contrary to some other findings. Evidently, there is a problem and the sustainability of the UCB RFS is obviously under threat. Therefore, some changes have to be made. Unfortunately, it was not possible to identify the reasons for the poor repayment performance of borrowers, especially women, in this study. More investigation of this question is a first priority. Until such evidence has been collected, firm prescriptions for change can not be offered. However, it does seem likely that changes in a number of areas relating to gender that go beyond the scope of the UCB RFS will be necessary, if the goal of raising women and their households is to be attained.