ISSN (Online) = 2707-5218
International Journal of Cotton Research and Technology
Research Manuscript www.sciplatform.com

Loan repayment performance on cotton out grower scheme. Case of Mashonaland West Province in Zimbabwe

Brendon Mvura, Never Mafuse
Bindura University of Science Education, Zimbabwe

Authors' Contribution All the authors have contributed equally.

*Corresponding Author's Email Address peer6000@gmail.com

Review Process: Double-blind peer review
Received: 19 April 2021 Revised: 18 August 2021 Accepted: 09 September 2021 Published Online: 16 September 2021
Digital Object Identifier (DOI) Number: https://dx.doi.org/10.33865/ijcrt.003.01.0411

ABSTRACT

Improving cotton production is undoubtedly one of the greatest challenges facing the Zimbabwean government today. Since cotton is an important cash crop for the country and for individual households, it has important implications for livelihoods of rural people. To achieve this, several interventions in the sector are done to improve production. Some of the strategies include financing the out-grower cotton schemes through private players. However, rural farmers are experiencing challenges in loan repayment to lending organizations. Poor loan repayment performance had become a norm amongst the out-grower farmers and has resulted in institutional failure in the implementation of correct measures and credit policies by the merchants. The study therefore examined factors affecting the poor performance of cotton farmers in loan repayment. A total of 400 respondents were administered with structured questionnaires to provide the relevant information. The information was gathered from respondents in Sanyati District using the multistage sampling technique. A two limit Tobit regression model was applied to analyse the socio-economic factors that influenced loan repayment performance by cotton out grower farmers and the multinomial logistic model was also used to analyse factors that influence loan defaulting among cotton out grower farmers. The results show that farmers did not receive their loans on time and there was no loan supervision for grower farmers. Two limit Tobit model shows that 5 out of 14 variables included in the model were statistically significant at 5% significance. The variables include other loans due, household size, land size and farming experience. It is concluded that, there is serious poor loan repayment performance among cotton out grower farmers in the study area, which discourages private companies in extending credit facilities to cotton farmers.

Keywords: Loan Repayment performance, Cotton out grower, farmers, Tobit, Credit

INTRODUCTION: Agriculture plays a significant role in many countries in the sub Saharan region in terms of the societal well-being and creation of employment in most rural societies. In Zimbabwe, about 70% of the rural population are employed in the agricultural sector, (Masiyandima *et al.*, 2011). Alexander *et al.* (2012), stipulated that, agriculture plays a pivotal role in poverty alleviation, improvement of the standards of living as well as the food security to the nation as a whole which is mainly derived from animal and crop production. Major field crops grown in Zimbabwe by smallholder farmers are maize, cotton, beans, cow peas, and small grains. Of all the field crops produced by the smallholder farmers, cotton is the only cash crop that has maintained reasonably steady volumes of production despite the general decline in word market prices. In Zimbabwe, cotton is a strategic crop for poverty relief and is of major significance to food security to smallholder farmers in marginal areas due to its contribution to their income and employment. Zimbabwe is one of the biggest producers of cotton in sub-Saharan Africa and is the regional standard bearer for quality. Cotton is the country's third cash crop, contributing about 12.5% of national GDP and 22% of the value of agricultural exports. Most cotton lint is exported (70-80%), and is the second-largest agricultural export after tobacco. Cotton is exclusively grown by smallholder farmers and is also a major source of employment both in farms and in the value chain industry (World Bank, 2010). Approximately 99.2% of the cotton crop is produced by about 300,000 small-scale growers, mainly from the drier agro-ecological regions of Zimbabwe.

The Agricultural sector, however, is under performing in Zimbabwe, especially the cotton industry and there are several factors responsible for the situation (Belay, 2002). A host factors like the use of traditional agricultural practices and implements, limited inputs and lack of effective extension services, serious erosion and depletion of soil fertility, lack of adaptive research; and the inadequacy of agricultural credit, have been identified chief factors contributing to under performance of the sector (Belay, 2002). Other factors include; ecological imbalance; inappropriate agricultural policies; poor market integration, political instability and financing (Tibugari *et al.*, 2019).

To boost the cotton production, there is need for investment in financing the smallholder farmers. Most smallholder farmers often face a severe shortage of capital to adopt new agricultural technologies. Short-term funding with favourable terms for periodic inputs such as fertilizers, seeds, pesticides, and herbicides would generally be favoured because may lead to better output within the cropping season. There are various cotton merchants who are financing the cotton production in Zimbabwe. Merchants like Graffax cotton, Zimbabwe Spinners and Weavers Ltd are supporting the smallholder farmers in the form of out grower scheme. Cotton out grower schemes have emanated due to financial challenges that most cotton farmers face such as the purchase of the required agricultural inputs like fertilizers, herbicides, and seeds. Moreover, input prices had increased, resulting in more appetite from most cotton farmers to access funding from commercial banks, private companies, and other public institutions. Liverpool *et al.* (2009) submitted

that, credit helps to bring about the required output and food self-sufficiency through the implementation of new and better technologies in agriculture.

However, most of the out grower farmers have a tendency of neglecting to repay the acquired loan in time or to repay them at all which creates tension between the lending institutions and borrowers. In fact, poor loan repayment performance had become a norm amongst the out-grower farmers, and this has resulted in institutional failures especially in the implementation of correct measures and credit policies. This loan defaulting may force lending institutions to reduce financial aid from financing defaulters which might result in lower productivity, widespread poverty, and persistence food insecurity among the farmers. This study therefore sought to find out socio-economic factors affecting loan repayment performance defaulting among cotton out grower in Zimbabwe.

METHODOLOGY

Description of the study area: The study was carried out in one of the semi-arid region District of Mashonaland West Province in Northern Central Zimbabwe. This location is about 100 kilo meters by road northwest of the city of Kadoma. The district has a total population of 112,897 people. The total number of households in District averages to 4, 5 people per household. The district lies in natural region III receiving an annual total rainfall ranging from a minimum of 500mm to a maximum of 650mm.It is subjected to frequent seasonal droughts and annual temperature ranging from 25˚C to 36˚C (Osterwalder, 2017). The predominant farming system is small holder farming. The major crops grown in the region are maize and cotton which is a major cash crop.

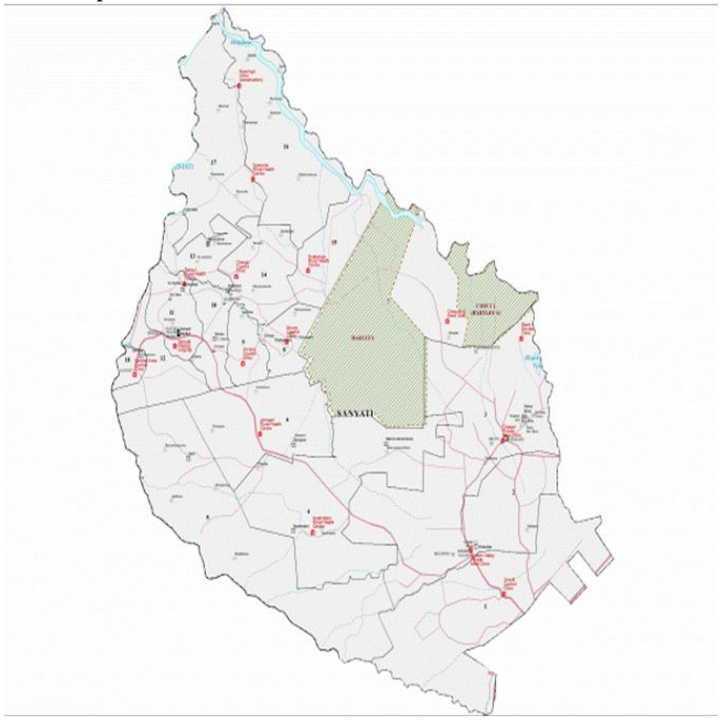

Figure 1: Showing Sanyati District

Sampling: A three stage sampling technique was used in the study. The first stage involved the selection of Sanyati District because of its dominance in cotton production. A ward which grows cotton was purposively sampled from all the other areas in Sanyati District because of its participation in out grower scheme. A list containing a total 7015 of cotton out grower farmers was obtained from Southern Cotton of Zimbabwe which is a contracting company supporting cotton farmer in the study area. Convenience sampling technique was then used to select the respondents. Convenience sampling was used because there was a better possibility of choosing respondents t with very pertinent data.

Sample size: The Slovin's formula was used to calculate the sample size requirement for the study. The Slovin's calculations revealed that the sample size was 400 smallholder farmers. Slovin's Formula for sample size determination (Kothari, 2004).

$$\boldsymbol{n} = \frac{\mathbf{7015}}{\mathbf{1+152(0.95)^2}} =$$

= 400 famers

Where

n= sample size

N= population size

e= confidence level (95%)

Model specification: The two- limit tobit model: The two-limit Tobit model was used to estimate the data collected. Y being a dependent variable on the model which is repayment performance in this case, whereas, (β_0, β_1, β_2, β_3… β_{13}) are descriptive explanatory variables. Haile (2012) indicated that the Tobit model is used to observe censored data. The Tobit model is computed following the classical linear regression equation and can be presented as follows: *Equation (1)*

Y = β0 + β_1LONSIZ + β_2LONINT + β_3AVREV + β_4FAMSIZ + β_5FAMEXP + β_6OLDUE + β_7OSINC + β_8EDU + β_9FMEXPR + β_{10}LONSPV + β_{11}LONTEN + β_{11}SEX+ e.

Equation 2. Tobit Model

$$y^* = \beta^i x_i + \varepsilon_i$$

$$Y_i \begin{cases} L & If\ Y^* \le L \\ Y^* = \beta X + \varepsilon_i & If\ L < Y^* < U \\ U & If\ Y^* \ge L \end{cases}$$

Where,

Y_i is the dependent variable denoting loan repayment performance which is the (ratio of the loan amount repaid to the amount borrowed?).

Y_i^* is the dormant variable (unobserved for values less than 0 and for values larger than 1)

X_i is the independent variable (factors affecting loan repayment performance).

L and U are the lower and upper limits (L=0 and U=1)

β_i= Unknown parameters, ε_i = residuals

There is also the log likelihood function for the two limit Tobit model which is given as following.

Equation 3 Two limit Tobit model

$$\log L = -\frac{1}{2}\sum_{jeL} w_j \left[\left(\frac{y_i = x\beta}{\sigma}\right)^2 + \log 2\pi\sigma^2\right] + \sum_{jeL} w_j \log\phi\left(\frac{Y_{Lj} - x\beta}{\sigma}\right) + \sum_{jeL} w_j \log\left[1 - \phi\left(\frac{Y_{Rj} - x\beta}{\sigma}\right)\right] + \sum_{jeL} w_j \log\left[\phi\left(\frac{y_{2j} - x\beta}{\sigma}\right) - \phi\left(\frac{y_{1j} - x\beta}{\sigma}\right)\right]$$

L represents the left censored observations whilst U represents the right censored variables and I stand for the intervals. ϕ Is the standard cumulative normal distribution and, w_j is the normalized weight of the j[th] observation. The co-efficiencies do not give the direct marginal effects of the independent variable

on the dependent variable. The model does not give the actual marginal effects of the associated independent variables on the loan repayment performance. The signs of the co-efficiencies represent the direction of change in the probability of being either a defaulter or non-defaulter and the marginal intensity of loan recovery. The advantage of the Tobit model is that additional computations can be completed to determine the effect of change of the i^{th} variable on changes in the probability of being either a defaulter or a non-defaulter. Haile (2012) explored the method of identifying the marginal effect of the variables as follows:

1. The change in the probability of repayment as variable X_i changes is given as

Probability of repayment Equation.4

$$\frac{\partial \Phi(\delta)}{\partial Xi} = \Phi(\delta)\frac{\beta_i}{\sigma}$$

2. $\frac{\partial E(\Upsilon_i/U>\Upsilon_i^*>L,X)}{\partial X_i} = \beta_i\left(1+\frac{\delta_L\phi(\delta_L)-\delta_U\phi(\delta_U)}{\Phi(\delta_U)-\Phi(\delta_L)}-\left[\frac{\phi(\delta_L)-\phi(\delta_U)}{\Phi(\delta_U)-\Phi(\delta_L)}\right]^2\right)$
3. The marginal effect of an explanatory variable on the expected value of the dependent variable is :

Equation 5 Marginal effect of an explanatory variable

$$\frac{\partial E(\Upsilon/Xi)}{\partial X} = \beta_i\left(\Phi(\delta_U)-\Phi(\delta_L)\right)$$

Where,

X_i = independent variables

$\Phi(\delta)$= aggregate normal distribution

$\delta = \frac{\beta_i X_i}{\sigma}$ The Z- score for the region under the normal curve

β_i= a vector of maximum possibility estimations

σ= the standard error of the error term (residual value)

$$\delta_L = \frac{L - X_i\beta}{\sigma}$$

$$\delta_U = \frac{U - X_i\beta}{\sigma}$$

L and U are threshold values (L=0 and U=1)

ϕ and Φ are probability density and cumulative density functions and standard normal distribution, respectively.

Multinomial logistic regression

This is used to predict categorical placement on a dependent variable depending on independent variables which could either be continuous or dichotomous (Starkweather and Moske, 2011). The multinomial logit model clarifies the association between dependent outcome variable and one more independent variable. Multinomial logit model is usually considered as a pretty analysis since it does not consider normality, linearity, or homoscedasticity assumptions (Tobin, 1958). However, the model is most appropriate when individuals choose only one outcome from given sets of mutually exclusive and collective exhaustive alternatives.

The choice of the method was since, the level of loan repayment performance by cotton out grower farmers is a dependent variable that can take three levels of classification namely: (i) cotton out grower farmers who have fully paid their loan on what was due (non-defaulters), (ii) Cotton out grower farmers who have partly paid their loans (partly paid), (iii) Cotton out grower farmers who have totally failed to pay their loans on what was due (defaulters). Therefore, the multinomial logistic model was used in this research to put the farmer in the actual category that is default, partially paid or non-default.

In the multinomial logistic model, the dependent variable takes the values of 0, 1 and 2. The probability that the farmer belongs to the repayment group reduces to.

$$P_{io} = \frac{1}{1+\sum_{k=o}^{3} e^{\beta_k X_i}}$$

Equation 6. Multinomial logistic model

$$P_{ij} = \frac{e^{\beta_j X_i}}{1+\sum_{k=o}^{j} e^{\beta_k X_i}}$$

Whereas the probability of being in the base outcome group is expressed as:

Equation 7. Probability outcome

$$P_{io} = \frac{1}{1+\sum_{k=o}^{3} e^{\beta_k X_i}}$$

Where I=1, 2…n variables, k=0…j and B is a factor of parameters that relates X to the probability of being in group j, where there is j+1 groups. The various explanatory variables included in the final model are as follows.

X_1= age of cotton out grower farmers, (yrs), X_2= Gender (1=male, 0=female), X_3=household size, X_4= farm size, X_5=loan size, X_6= loan supervision, X_7= loan disbursement (time of loan release), X_8= interest rate. To estimate the model, the coefficient of the base outcome is normalised to zero. This is because the probabilities of all the choices must sum up to unity. Hence, for three choices (3-1) distinct sets of parameters can be identified and estimated. The natural logarithms of the old ratio of equations (1) and (2) give the estimating equation as:

Equation 8 Natural logarithms

$$\text{Ln } \frac{P_{ij}}{P_{i0}} = BiXi$$

This denotes the comparative chance of each of the other groups to the probability of the base outcome. The projected coefficients for each choice therefore replicate the effects of Xi on the likelihood of the farmers choosing that other relative to the base outcome. The estimation will be done using SPSS software. The final estimates are going to be selected based on the variables that converge during replica. The coefficients of the base outcome were then recovered in line with (Starkweather and Moske, 2011). Where B_3= coefficient of the variable of the base outcome (those who have fully paid their loans or non-defaulters), B_2= coefficient of those who have partly paid their loans due and B_1= coefficient of those who did not pay their loans due (defaulters). However, the partial derivatives or coefficient and quasi elasticity of the model will be obtained from the software.

Description of variables: Loan repayment performance (LONREP): Loan Repayment performance (LONREP) is the dependent variable in the study. It is a restricted variable which denotes the ratio of the amount repaid to the amount of principal loan disbursed. The variable has values which range from 0-1.

Borrowers AGE (BRAG): This is defined as the period from the respondent's birth to the time of loan repayment (LONREP). This is an independent variable in the study. The variable has values which range from 0-1. Basically, with time, family heads or household heads attain knowledge and experience in farming practices and credit and financial literacy. However, older farmers may accrue more wealth than younger farmers. Therefore, this variable is assumed to have direct impact on the loan repayment performance of cotton out grower farmers. In contrast, given that cotton out grower farmers have inadequate labour force within their families, older household heads among cotton out grower farmers, are in an underprivileged situation when it comes to execution of hard labour required in agriculture, then, each additional unit increase in age after some point would thus add less to household income and may even reduce household income leading to low repayment performance. The hypothesis that the age of the borrower does not affect loan repayment will fail to be rejected if the beta (P) of AGE is zero.

Gender of the borrower (GOB): Basically, gender is a dummy variable in the model, which takes a value of 0 and 1 if the household head is male and 0 if the household head is female. Gender differentials in the farm households play an imperative part in the economic performance of a given household. Most people thought that women have less experience in formal credit, therefore, consider them to be defaulters. The conflicting anticipation may be that female borrowers are loyal to the lenders than male borrowers. This may arise from the fact that females are more responsible for childcare and management of family home economics, hence they may be more concerned than males, about the possible undesirable consequences arising from loan defaulting. Therefore, it is expected that the Gender of the household head would have either a positive or a negative impact on the loan repayment performance of the cotton out grower farmers (respondents). The hypothesis that gender of the household head does not affect loan repayment will fail to be rejected if the beta (P) of GENDER is zero.

Household size (HOUSIZ): This variable is estimated as a continuous variable in this study. This variable is correlated to family size. The larger the number of individuals in a household the higher their consumption. This also means that the marginal propensity to consume of the household becomes an expense and consumption becoming another commitment. As the family consumption increases, the chances of loan repayment decrease, therefore in this study family consumption expenditure is expected to have a negative influence on loan repayment capacity of cotton out grower farmers.

Education level (LEDUC): The level of education is a dummy variable, which takes a value of 1 if the household head is literate and 0 if illiterate. Education helps farmers to understand the best managerial practices implemented in cotton production and have a better appreciation with the changes in technology and new innovations brought in cotton production and marketing. The study assumes that, cotton out grower farmers who can read and write, increase their ability to obtain, process, and use information. For instance, literate farmers may seek information on prices more than the illiterate ones and as a result, there are able to sell their produce at reasonable prices. Moreover, education may enable farmers to be more cognisant of the importance of formal loans and hence may reduce deliberate defaulting. Ceteris paribus, education is expected to reduce the rate of loan default among cotton out grower farmers. The hypothesis that the education level does not affect loan repayment will fail to be rejected if the beta (P) of EDU is zero.

Experience in formal credit use (EXPCREDIT): This is the number of years during which the respondents have borrowed from formal credit institutions. Farmers, who have experience and knowledge in formal credit use, develop a reputation or goodwill for creditworthiness and become credo clients of financial institutions, therefore, they are more likely to pay their obligations on due date, as opposed to the inexperienced farmers. The hypothesis that experiences in formal credit use does not affect loan repayment will fail to be rejected if the beta (P) of EXPCREDIT is zero.

Availability of other source of income: It is a dummy variable taking 0 for borrowers that do not have other source of income and 1 for borrowers that do have other source of income. If the borrowers have other source of income, it is expected that he/she will cover his/ her other expenses and obligations from that income which is out of the project and it is assumed that this will result in higher deposit of money from the outcome of the project, which will help the borrower to have successful loan repayment performance. It is expected that other sources of income have a positive influence on loan repayment performance. The more the farmer had other sources of income the more the funds are available for the fulfilment of loan obligations.

Loan size (LONSIZ): This is a continuous variable, and it is expected to have a negative influence on the repayment of agriculture loans. Poliquit (2006) stipulated that the greater the loan size, the lower the prospect of repayment also declines. In this instance an increase in loan amount will ultimately result in some farmers failing to meet their obligations when they become due.

Land holding (LANDSIZE): This refers to the total farm size (in hectares) owned by household. A farmer with more hectares of land is expected to be better off in terms of loan repayment performance. It is hypothesised that, an increase in hectares in farming has a direct impact on the final output. In this case, land is a factor of production which if combined with other factor inputs enables the farmer to produce better output thereby enabling the borrower to improve on loan repayment performance. However, this variable is expected to have a positive relation with the dependent variable of this study. The hypothesis that land size does not affect loan repayment will fail to be rejected if the beta (P) of LANDSIZE is zero.

Interest charged on loan (INTRST): This is a continuous variable. It is measured as a percentage of the principal. Interest rate is anticipated to have a negative effect on the loan repayment performance. The higher the price of the loan facility the more the less the probability of full reimbursement since this increases the amount to be refunded back by the farmer.

Other loans due (OLDUE): Is a discrete variable in this study and is a dummy variable with 1 for availability of other loans due and 0 for unavailability? Unavailability of other loans due will be used as a position base in the examination and it is predictable to have a negative co-efficient value. The amount of other loans borrowed by the borrower has a direct effect on the repayment of the running facility. This is because if the farmer has several commitments, this creates problems in the repayment process

since the farmer will intend to prioritize repayments of loans depending on the intensity of the loan disbursed.

Loan supervision (LONSPV): This attributes farm visits by the lender where assessments are done to have an appreciation of the viability of the projects and have an overview on the prospects of loan repayments. Loan supervision is going to be analysed as a dummy variable. It is expected to have a positive effect on the loan repayment capacity since supervision guarantees that the borrower performs to impress the lender. In addition, various financial decisions can be sharpened through the advice from the loaning officers who visit the farms.

RESULTS AND DISCUSSION

Determinants of loan repayment performance: The results from the econometric model data computations clearly indicate that 400 observations were included. A total of14 variables were also included in the econometric model and out of the 14 variables included in the model, 6 variables showed significance at a significance level of 5%. The estimates of the model indicated that, farming experience (FARMEXP), other loans due (OLDUE), loan supervision (LOANSUP), time of loan release (TMOLRLS), household size (HOUSIZ) and average revenue (AVRGR) are the critical factors affecting loan repayment performance on cotton out grower farmers. Six variables have negative co-efficiencies, and these include household size (HOUSIZ), loan size (LONSIZ), loan tenure (LONTEN), loan supervision (LONSUP), other loans due (OLDUE) and average revenue (AVERGV) as indicated by table 1 below whilst 8 variables have a positive co-efficiency value. The log likelihood of -15.306235 is shown in the model and can be used for nested comparisons. The likelihood ratio of 70.13 with a p value of 0.0001 indicates that the model fits significantly better than an empty model, which is a model without the predictors.

Table 1: Two Limit Tobit Model and Marginal effect output. *Significant at 5% significance level

Variable	Coefficient	Std. Err.	T	P>t	[95% Conf.	Interval]	Marginal effect
AGE	0.0042166	0.0063659	0.98	0.332	-0.00648	0.018937	0.005518
HOUSIZ	-0.270342	0.0267168	-2.7	0.009*	-0.12539	0.018702	-0.06431
LANDSIZ	0.153267	0.0463637	2.2	0.031*	0.009342	0.194478	0.101326
FAMEXP	0.0359287	0.0254959	2.59	0.012*	0.015015	0.116823	0.055477
LONSIZ	-0.0000157	0.0000202	-1.28	0.207	6.60E-05	1.46E-05	-2.6E-05
LONTEN	-0.0210908	0.0849033	-1.56	0.125	-0.30161	0.037425	-0.12173
LONINT	-0.0034974	0.0102224	-0.93	0.356	-0.02991	0.010911	-0.00614
AVEREV	-0.3421043	0.0000372	3.21	0.002*	4.53E-05	0.000194	0.000126
EDU	0.0437250	0.1364593	0.57	0.571	-0.19472	0.350175	0.067534
SEX	0.015062	0.1218662	0.42	0.674	-0.19181	0.274322	0.052284
LONSUP	-0.0460367	0.1391434	-1.41	0.164	-0.47386	0.02174	-0.20894
OLDUE	-0.2650435	0.1076936	-2.46	0.016*	-0.48006	0.040026	-0.26507
LONTIM	0.7035669	0.1224562	0.03	0.978	-0.24112	0.242839	-0.00384
OSINCM	0.0642584	0.144681	0.65	0.517	-0.19459	0.283147	0.11673
Constant	0.6927732	0.3732402	1.86	0.068	-0.05242	1.332931	
Sigma	0.3010934	0.0405858			0.220061	0.382126	
Tobit regression Number of obs = 50							
LR chi2(14) = 70.13							
Prob > chi2 = 0.0000							
Log likelihood = -15.3065 Pseudo R2 = 0.456							

Regression outcome of the multinomial logistic model: In this section, the multinomial logistic regression was interpreted in terms of relative risk ratios and hence can be obtained by exponentiation the multinomial logit coefficients. As has been shown, the outcome categories in the estimation where cotton out grower farmers were categorised as follows: loan paid on time, defaulted, and partially paid where fully paid was coded zero as the base category or reference point. Thus, the entire analysis focused on the relationship of these outcome categories with several independent variables that ranges from demographic to institution related characteristics.

Factors affecting loan repayment performance on cotton out grower farmers: Table 2, indicates that, household size, is one of the factors that is significantly influencing loan repayment performance on cotton out grower farmers and has a negative value. Household size in the study was characterized as the number of dependents under the owner of the enterprise. The econometric model results indicate that an increase in the household size by 1 member leads to a decrease in loan repayment performance by 0.27 (27%). The increase in 1 family member results in less chances of the householder to repay the loan by 27%. Therefore, from the above results of the two limit Tobit model, the more the number of dependents the lower the probability of repayment of the loan. In this study, it is apparent that, cotton out grower farmer has high chances of poor loan repayment performance since most of the farmers in the study area are from the apostolic religious group, popularly known as the *Mapostori ekwamarange*. This religious group is characterized by polygamy and many children because of their religious beliefs. Wongnaa and Awunyo-Vitor (2013) concurred with these results where his study showed negative relationship between household and loan repayment prospects. Besides that Oladeebo and Oladeebo (2008), also supported that an increase in household size leads to a decrease in the repayment performance of small holder farmers in his study. Contrary to this, Afolabi (2010) expounded a positive relationship between

household size and repayment performance of respondents. In his study, he cited that the positive relationship between

Table2: Estimated Output of Multinomial Logit Model for the Socio-Economic Factors affecting Loan Repayment Performance

Variables	Partially paid	Defaulted	Fully paid
AGE	0.8423	0.747	0.6117
HOUSIZ	0.6072	0.041	12.3571
LANDSIZ	0.0472	0.67462	0.6310
FAMEXP	0.0493	-12.69	-11.9116
LONSIZ	9.48E-06	0.7631	45.3016
LONTEN	0.0680	1.3457	0.8231
EDU	0.04673	0.1264	-3.7561
SEX	-0.0417	0.658	2.543
LONSUP	0.079	0.0607	0.8894
OLDUE	2.0341	0.0724	0.5789
OSINCM	0.346	-8.6378	0.456

Source. Computed survey results 2020.Loglikehood= 113, 374.

household size and loan repayment performance is brought about by major contributions by household members to labour and technical advice in agricultural production resulting in more output per enterprise.

Land size (LANDSIZ) is amongst the variables that were found to be significant in the econometric model. In this case, land size has a positive co-efficient which shows that either an increase in acres or hectares increases the loan repayment performance since the farmer have higher chances on given fixed factor input (land). From the econometric results, an increase in land size by 1 hectare sees a more than proportionate increase in the possibility of loan repayment by 0.15 (15%). This will eventually increase both technical and productive efficiency on the farm resulting in improved profitability of an enterprise, thereby increasing the ability of the farmer to repay the loan. Gebeyehu (2002) cited a positive relationship between land size and the repayment performance in the study "*Loan repayment and its determinants in small scale enterprises financing".* These findings however contradicted with the findings of Chang (2006), who indicated a decrease in repayment capacity relationship to the size of the farm.

Farming experience (FAMEXP) was also found to be significant at 5% in the research and was coded as the number of years one is active in cotton production. A year increase in experience also increases the repayment performance of the loan by 6.6%. The marginal effect section indicates that the probability of being a non-defaulter increases by 6.6% with an increase in one year of experience. This entails that when a farmer becomes experienced in cotton production, the probability of repaying the loan also increases. This is because a farmer with more experience in the enterprise employs effective farm and credit management skills which enhance productivity on the farm. The results also agree with Oladeebo and Oladeebo (2008) and Wongnaa and Awunyo-Vitor (2013), who also established the positive relationship between loan repayment and farming experience.

Other loans due (OLDUE) was another variable found to be statistically significant at 5% significance level. This variable was coded as a dummy variable with 1 standing for availability of other loans due and 0 for unavailability of other loans due. In this case, the variable has a negative coefficient, and this implies that famers without other loans due have higher chances of loan defaulting. This is so because farmers with other obligations due have higher chances of diverting funds from any enterprise towards payment of other loans due. Average revenue (AVGREV) is another variable found significant at 5% significance level. Average revenue according to the econometric model has a negative influence on the loan repayment performance of the cotton out grower farmers in the study area. A decrease of US$1 in the average revenue per unit hectare, ultimately decreases the loan repayment ability by 0.34 (34%). The probability of repayment by cotton out grower farmers decreases by 34% with a decrease of average revenue per hectare by US$1. In this case, cotton out growers has lower average revenues due to the lower market prices of cotton. As a result, there are higher chances of poor loan repayment performance by cotton out grower farmers. Based on the results of the econometric model of the two limits Tobit model, out of fourteen variables, five variables are significantly affecting loan repayment performance on cotton out grower farmers. The variables include household size, land size, farming experience, other loans due and average revenue.

Factors influencing loan defaulting on cotton out grower farmers in Sanyati District: In this section, the multinomial logistic regression was interpreted in terms of relative risk ratios and hence can be obtained by exponentiation the multinomial logit coefficients. The outcome categories in the estimation were cotton out grower farmers, who paid their loans on time, partially paid and defaulted. However, the entire analysis focused on the relationship of these outcome categories with several explanatory variables that ranges from socio -economic related characteristics. To do so, the Stata chose the most frequently occurring group and, in this study, fully paid loans denoted as the base category.

Level of education (LEVEDUC): The variable was found to be positive and statistically significant at 5 % percent. This means that the probability that literate individuals are not defaulting is very high (46%). This result subscribes to the theoretical expectations of the Information Asymmetry theory which says lack of knowledge or correct information about financial products and services reduces the likelihood of loan defaulting. Thus, as people are becoming more literate especially financial literate, the probability of loan defaulting decreases. A similar result was attained by Ashhari and Nassir (2009).

Loan size (loan size): This multinomial logit estimate shows that an increase in the size of loan for both defaulters and those who partially paid relative to those who fully paid on time category given that all other variables are held constant. An increase loan size by one, the relative risk of cotton out grower farmers to fully pay their loans due will be expected to increase by 49% at a significance level of 5%. These results contradicted with the findings of Afolabi (2010). However, if the amount of loan exceeds what the borrower needs and can handle, it would be more of a burden than help as it goes to personal use, thereby undermining repayment performance.

Farming experience (FARMEX): This relative risk ratio compares cotton out grower farmers who have cotton farming experience to cotton out grower farmers who did not for both defaulters and other partially paid farmers relative to the base category of cotton out grower farmers who paid their loan on time given other independent variables in the model held constant. In this case, the relative probability of partial payment rather than defaulting for clients who had farming experience

was more than double the corresponding relative probability for defaulters (49% at 5% level of significance). However, this result contradicted with the previous findings that farming experience and who received well-organized and sufficient training by extension workers would improve loan repayment performance.

Other Loans Due: The econometric result of the multinomial logistic model shows that farmers with other loans due have a higher probability of loan defaulting as compared to the cotton out grower farmers without other loan obligations due. In this case, most cotton out grower farmers in the study area where also contracted in sunflower production. Therefore, the probability of loan defaulting increased by 32.4% at 5% significant level. Thus, an increase of cotton out grower farmers, results in the multinomial log-odds for defaulting to increase by a factor of 0.0324 which was significant at 5%. The result was in line with the study that has been done by Awoke (2004).

Household size: This was found to be positive and statistically significant at five percent on the multinomial logistic model. This means that large household sizes of cotton out grower farmers have a high probability of loan defaulting than those with small household sizes. This means that, 41% of the cotton out grower farmers who have large household sizes is defaulting. In this case, most of these farmers are from a religious group (*Mapostori ekwamarange*) who believes in polygamy and bear more children. Therefore, these cotton out grower farmers devote part of their loan packages towards consumption to feed the farming family.

Out of eleven variables hypothesised to be factors influencing loan defaulting amongst cotton out grower farmers, four variables were found to be statistically significant for cotton out grower farmers for both who partially paid and three defaulters. The maximum likelihood estimates of multinomial logistic regression model showed that loan size, education level, farming experience, and other loans due were the most important factors influencing loan defaulting on cotton out grower farmers.

However, other variables hypothesised in the model, namely, sex, loan tenure, loan size, age and loan interest were less influential in explaining factors influencing loan defaulting on the model. To analyse factors influencing loan defaulting on cotton out grower farmers, multinomial logit model was estimated using Stata version 11.2 statistical packages.

CONCLUSION AND RECOMMENDATIONS

Results from the Two-limit Tobit revealed that loan repayment is significantly determined by farming experience, household size, other loans due and other sources of income. These variables are significant at 5% level. Other variables which positively affect loan repayment performance amongst cotton out grower farmers were loan tenure and loan supervision. The maximum likelihood estimates of multinomial logistic regression model showed that loan size, education level, farming experience, and other loans due and household size, were the most important factors influencing loan defaulting on cotton out grower farmers.

Taking into consideration, the research findings from the study and the prevailing macro-economic environment in which the agricultural credit is exposed, the following recommendations need to be taken into consideration,

- The results from the econometric model sign posted that household size was found to be negatively significant in influencing loan repayment performance. The key main factor in this relationship is that there are a lot of diversions of loan under large families; therefore, the financial institutions should have consumption loan packages for the farmers to avoid loan diversions. Besides that, most of the farmers involved in cotton production are from a religious group popularly known as (*Mapostori ekwamarange)* that believes in polygamy and have many wives and children. Lending institutions should also be aware of the borrowers with other loan obligations because this has a negative bearing in repayment performance. There is need for them to come out with a proper models of credit risk rating that can consider clients that have other loans due.
- The results from the survey indicate that average revenue per hectare is significant in influencing the loan repayment performance and has a positive influence. This therefore means that an emphasis on the output from the field can lead to higher loan repayment capacities amongst farmers. Therefore, farm management development programs as well as intensive extension services should be regularly disseminated to the farmers to increase their production output which leads to increased output.
- The lenders should also pay much attention on the supervision of disbursed loans to clients. From the results above, it is apparent that the lender did not make fall ups on the loans disbursed to the cotton out grower farmers. Failure to do so, results in farmers having more chances of deliberate loan defaulting and sometimes side marketing their produce.

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