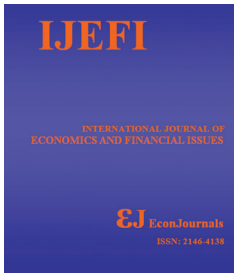

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Modelling Loan Defaults by Sugarcane Farmers

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ABSTRACT

The agriculture sector employs substantial labour force and contributes substantially to the nation's gross domestic product. Its success depends heavily on agricultural credit and financing. The significance of credit in agriculture is being marred by high rates of default. The high default rate on agricultural loans is cause for concern from both an academic and policy perspective. The loan default is a common issue that lessens the effectiveness of credit laws and lending practices. The study investigated the determinants of loan defaults by sugarcane farmers in the Lowveld region of Zimbabwe. The study is underpinned by the agency theory, social capital theory, and financial literacy theory. These theories help analyses the interaction between principals representing lenders, and agents in our case sugarcane farmers. The study used a binary logistic regression model to analyse the major determinants of loan default by sugarcane. The study established that farmer-related factors such as education level, experience, and off-farm income significantly influence loan default rates. Further the study found that lender-associated characteristics loan duration and interest rates drive loan defaults. The study recommends that borrowers should consider insurance schemes supported by lenders and government to mitigate default risks, while also embracing technology and resource-efficient land and credit use strategies to optimize productivity. Banks and financial institutions should intensify loan monitoring activities both within the office and through field visits for detecting and addressing undesirable repayment patterns promptly.

Keywords: Loan Default, Loan Monitoring, Sugarcane Farmers, Logit, Probit
JEL Classifications: O4; G1, G5

1. INTRODUCTION

Agricultural financing plays a crucial role in the quickly changing agricultural environment, essential to farmers' ability to expand and prosper. There is a growing need for food and agricultural products due to the growing worldwide population. Having access to enough funding enables farmers to invest in vital aspects of their business, such as contemporary machinery, superior seeds, or new technology that can greatly increase output and efficiency. Farmers who have access to agricultural financing can buy these seeds and raise crop yields, which will boost their earnings and enhance their standard of living. The difficulty in forecasting risks and uncertainties in the agriculture industry presents a barrier for agricultural financing. Droughts, floods, and other natural disasters are just a few of the many risks and uncertainties that farmers must deal with. These events can all seriously harm farmers. Furthermore, agricultural produce deteriorates in storage because there are inadequate facilities to keep back excess when supply exceeds demand. It causes further issues. Due to the numerous unknowns in the agricultural industry, commercial banks and insurance companies have historically found it challenging to handle, which has resulted in loan defaults by farmers. Financial institutions in developing nations have a significant obstacle in the form of loan defaults,

which restricts their capacity to significantly contribute to sustainable development (Baidoo et al., 2020). Researchers' attention has been drawn to the policy discussion around loan default, (Asiama and Amoah, 2019).

Given the significance of agribusiness, the high default rate on agricultural loans is cause for concern (Adusei, 2017). Globally loan default is a common issue that lessens the effectiveness of credit laws and lending practices (Sagbo and Kusunose, 2021). Due to declining cash flows, restricted liquidity, and financial challenges, loan default is a serious issue (Gatimu, 2022). The financial sustainability of the agricultural industry is threatened by the limited access to credit and high loan default rates among sugarcane farmers, which impede investments in their properties and production expansion (Shumba et al., 2011). Loan default could be a result of misusing loans, failure to follow up on loan repayment, illness, subpar sales performance, poor financial decisions, and insufficient loan user training (Balchin, 2023). Because credit programs don't work as planned, loan defaults interfere with lending operations and make it more difficult for the government to finance small-scale farmers at reasonable interest rates. If loan defaults are not resolved, it may result in credit rationing, which would keep poverty rates high and ultimately to the detriment of credit financing.

Defaulting on a loan can lead to a borrower's credit score being impacted, their relationships with guarantors strained, future refinancing options limited, debt collectors sending harassing letters, and legal wage garnishment may, being forced to sell the harvest for a poor price, having the collateral seized and sold through legal means, and being shut out of the credit markets altogether ensue (Cetera and Vansomeren, 2020; Sagbo and Kusunose, 2021; Hornberger, 2023).

In addition, they incur expenses that are advantageous to lose investment possibilities and suffer reputational harm (Moahid and Maharjan, 2020). Loan default is influenced by several factors, including traditional agricultural practices, poverty, political clout, a lack of profitable innovation, poor farm planning, poor management, and low formal literacy rates among loan recipients (Kiros, 2020).

The objective of the study is to determine the factors that affect the loan default rate of Lowveld sugarcane farmers. The study specifically assesses the characteristics of Zimbabwean Lowveld sugarcane farmers, their perceptions about loan defaults, and the various mitigation techniques used in Zimbabwe.

2. BACKGROUND OF THE STUDY

An important component of the economy of low-income countries like Zimbabwe is the agriculture sector. However, a significant cost barrier keeps smallholder farmers from acquiring effective agricultural inputs. Zimbabwe, like other developing countries, places a high priority on the availability of agricultural finance in order to improve the welfare of its farmers. It is difficult for smallholder farmers to obtain banking services. It is imperative that agricultural inputs, particularly agricultural finance, be provided in a timely and enough manner if Zimbabwe is to increase agricultural output and productivity.

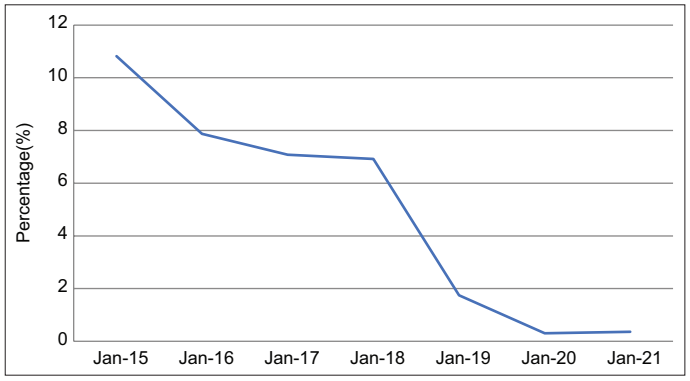
To pay for the expenses related to various agricultural operations, small-scale farmers need financial assistance (Matsvai et al., 2022). Zimbabwe's small-scale farmers rely on several forms of financing. A major factor affecting agricultural productivity is the time it takes to convert inputs into outputs, which can be expensive for rural households in the off-season. Limited financial access makes it difficult to increase agricultural productivity because the budget needs to be carefully handled in a limited amount of time. Farmers are less able to choose the optimal input combinations and consequently produce when faced with binding liquidity limitations.

The banking sector statistics shows that ending support to the productive sectors of the economy was predominantly to agriculture, manufacturing and the distribution sectors at 31.22%, 10.92% and 11.77%, respectively (Reserve Bank of Zimbabwe, 2021). Thirteen banking institutions had NPL ratios below 1%, whilst five had NPL ratios above 1% (Reserve Bank of Zimbabwe, 2021). The evolution of the non-performing loans is shown in Figure 1.

Figure 1 shows that the loan defaults among bank borrowers in Zimbabwe has been high over the years though there have significantly gone down t below the 5% threshold. Given the significant lending to agriculture in Zimbabwe at above 30%, any economic shocks to the sector has detrimental effect on the bank balance sheets hence the need to understand the dynamics of loan defaults among sugar cane farmers.

Several government schemes have been rolled out in Zimbabwe to assist small scale farmers. Pfumvudza, presidential input schemes centred on seed and fertilizer, command agriculture, Operation Maguta, and other initiatives aim to revitalize and augment the agricultural sector's contribution to GDP in Zimbabwe. A big part of ensuring food security is the cultivation of minor grains and staple crops like maize. In order to fully reap the many benefits of sugarcane, including increased employment opportunities, improved exports, decreased imports, and increased food and energy security, smallholder farmers who have migrated must receive enough support. Smallholders with settled A2 sugarcane growers contribute significantly to the production of the country by utilising land that was previously underutilised or unutilised. A higher yield of sugarcane improves the possibility of producing

Figure 1: Non performing loans



ethanol. Because this has advantages over fossil fuels in terms of the environment and the economy, it thus significantly contributes to sustainable development and the reduction of poverty.

Biofuels are important to the Zimbabwean economy for enhancing energy security, improving trade balance by reducing oil imports (import substitution), creating new export opportunities (export promotion), and potentially helping to address climate change by lowering emissions of greenhouse gases (Matsvai et al., 2022). Energy security is improved by increased sugarcane production. Because sugarcane cultivation is labour-intensive, strategically promoting it can help reduce unemployment in Zimbabwe.

3. LITERATURE REVIEW

A survey of the theoretical and empirical literature is presented in this section. The agency theory, social capital theory, and financial literacy theory serve as the underpinning theories of the study. The foundation of the financial literacy theory is the notion that financial literacy includes people's understanding of financial concepts and their ability to apply those concepts to make well-informed financial decisions (Lusardi and Mitchell, 2014). Farmers who possess higher levels of financial literacy are more likely to evaluate loan terms, interest rates, repayment schedules, and dangers (Bhushan and Medury, 2016). Farmers that are financially literate are better able to manage their risks, analyse the state of the market, determine whether their sugarcane businesses are financially viable, and forecast their cash flows (Van Rooyen et al., 2012). Financial literacy helps farmers plan for potential problems like changes in sugarcane prices or crop failures and put appropriate risk-reduction strategies in place.

The agency theory framework analyses the interaction between principals representing lenders, and agents in our case sugarcane farmers, in situations where principals assign decision-making power to agents (Eisenhardt, 1989). According to the notion, when agents represent principals but have distinct objectives or intentions, there may be possible conflicts of interest. Farmers' actions may be influenced by these conflicts, which may increase the chance that they may default on loans. Lenders and farmers have different goals and tolerance for risk. Lenders serve as intermediaries and are the primary investors in loans. If sugarcane farmers believe that lenders will make up for their losses in the event of failure on loans, then they run the risk of developing moral hazards. This idea might encourage riskier farming methods, raise the possibility of loan defaults, and negatively impact lenders' profits.

The social capital hypothesis suggests that individuals can utilize social relationships and the resources they provide for mutual gain. Collaboration and achieving group objectives require social ties, trust, social norms, and reciprocity. Social capital theory provides an explanation for how social networks and community support affect the loan repayment behaviour of farmers who are facing defaults in the setting of sugarcane planters. Social networks are largely used to facilitate knowledge sharing and information access. In a group setting, farmers can share knowledge about market conditions, risk management plans, and best practices (Bebbington, 2004). People are more likely to uphold the qualities of accountability and dependability in societies where these values are widely held (Udry, 1996). Because defaulting on a loan have a detrimental impact on their reputation and social standing, sugarcane farmers in these communities are driven to fulfil their loan obligations (Karlan et al., 2012).

Several studies have been conducted to ascertain the determinants of loan default by farmers (Akram et al., 2022; Rodrigues et al. 2021; Rahman et al., 2020). The studies span both industrialized and underdeveloped nations. Huang et al., (2022) investigated the relationship between Chinese sugarcane growers' loan defaults and farm management strategies. They found that, according to the research, farmers who improved their farm management practices and abilities had lower loan default rates. The impact of agency-related factors on loan defaults among Brazilian sugarcane growers was investigated by Rodrigues et al. in 2021. The study found that loan failures were largely caused by moral hazard and unfavourable selection. Balana and Oyeyemi (2022) list a few of these elements, which include interventions like crop insurance, information access, and extension services that are necessary to boost finance availability, technology adoption, and agricultural output for smallholders. Smallholder borrowers' loan repayment rates are also influenced by institutional factors like road distance, contact with development agents, and loan use training, as well as demographic factors like age and household size, socioeconomic factors like educational level, land size, livestock size, nonfarm income, and purpose of borrowing (Kassegn and Endris, 2022). According to Gao et al. (2023), there is a considerable and economic relevance of severe weather in predicting the likelihood of loan default. It has been shown that compared to those who borrow from informal sources, farmers who borrow from formal sources typically have more consumption, higher social spending, and lesser investment. In result, higher spending has a detrimental effect on loan repayment compared to investing. (Chakraborty and Gupta, 2023). Farmers must employ enhanced agricultural technologies, expertise, and inputs—such as fertilizer, better seeds, and pesticides—to boost output and productivity, which will change the capacity and structure of their farms (Gebeyehu et al., 2013).

The type and promptness of loan disbursements, the frequency of credit officer supervision inspections, and the profitability of the business on which loan monies were invested were all noted by Okorie (1986). While gender, annual farm income, total annual income, amount of loan disbursed, and interest rate were the significant determinants for small-scale farmers in Nigeria, educational level, annual farm income, total annual income, and interest rate were significant determinants for large-scale farmers (Isibor and Nkamigbo, 2019). Wongnaa and Awunyo-Vitor (2013) found that age, supervision, profit, education, experience, and off-farm income have favourable effects on loan payback performance, further reinforced this. On the other hand, it has been discovered that household size has an unclear impact on loan repayment, whereas gender and marriage have negative effects (Wongnaa and Awunyo-Vitor, 2013). Additionally, it has been demonstrated that farmers with low income and productivity find it difficult to raise extra money during difficult times to pay

off large loan commitments, which might result in defaults. Crop yields and agricultural earnings can be significantly impacted by weather uncertainty, pest attacks, and diseases, which raises the risk of default (Akram et al., 2023). Exposure to production dangers frequently results in decreased or unsuccessful harvests. Agricultural incomes are also impacted by fluctuating market prices, which are impacted by patterns in global supply and demand. Inadequate local markets and collecting hubs make it difficult for farmers to sell their goods (Akram et al., 2022). Farmers who depend on agriculture have fewer tools at their disposal to deal with difficult circumstances, which increases the risk of default (Akram et al., 2023). Investing in non-farm businesses helps to guarantee a steady flow of income. Most smallholders that practice subsistence farming have low resources, which limits their options.

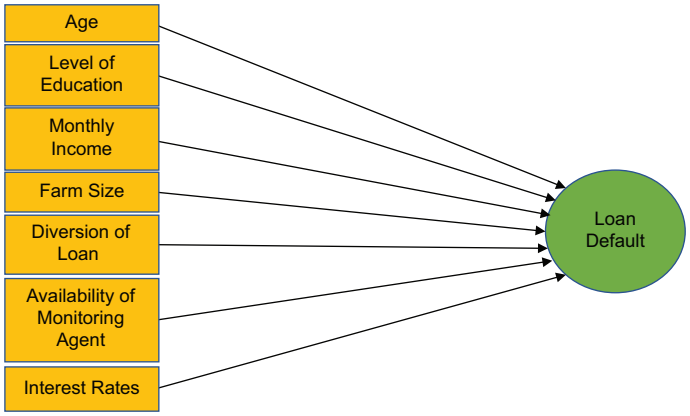
High-interest loans limit the ability to invest in assets that increase output and reduce production and market risk (Akram et al., 2023). Without sacrificing financial viability, interest rate caps and needs-based pricing of agricultural loans that take risk profiles into account promote inclusive rural lending (Diagne and Zeller, 2001). Credit-triggered defaults during challenging seasons can be avoided by extending repayment periods to coincide with harvest cycles and offering interest rate subsidies to the most vulnerable smallholder farmers (Akram et al., 2023). Inadequate financial documentation, including the absence of verifiable production records, has been associated with higher default rates in Asia and Africa. It can be difficult for those without formal education to understand complicated loan arrangements . Certain farmers do not possess the necessary abilities to optimize yields or oversee income streams (Diagne and Zeller, 2001). Rather of making prudent and cautious investments, they squander enormous sums of credit on unproductive uses. Specialized financial education programs can help small-scale farmers acquire the necessary skills for risk assessment, budgeting, and bookkeeping (Kahan, 2013). They gain the information and abilities needed to take charge of long-term financing initiatives and make wise choices. Inadequate programs for agricultural assistance, including as price guarantees, input subsidies, and financial support during droughts and floods, cause vulnerable farmers to fall into poverty and make it more difficult for them to repay debts (Muchomba, 2021). By safeguarding the livelihoods and productive capacities of susceptible farmers, proactive safety nets can reduce default rates (Akram et al., 2022).

Given the discussion above the study adopts the following conceptual framework shown in Figure 2. The conceptual framework reflects that loan defaults is determined by both demographic factors (Isibor and Nkamigbo, 2019; Wongnaa and Awunyo-Vitor, 2013; Akram et al., 2022) and bank specific characteristics (Muchomba, 2021; Diagne and Zeller, 2001; Akram et al., 2023)

The review has identified age, education level, income, interest rates, farm size, diversion, and monitoring as the causes of loan default, based on financial literacy, agency, and social capital theories. . These factors are illustrated in Figure 1, the conceptual framework. Based on the discussion above the study hypothesised that:

H_1: Interest rate positively impact loan default rate

Figure 2: Conceptual framework



Source: Own computation

H_2: Loan monitoring by banks reduces the loan default rates

H_3: Families with other sources of income have lower probability of loan default

H_4: An educated farmer has lower probability of default

H_5: Farmers with larger farms have lower chances of default

4. METHODS AND MATERIALS

This section discusses the research technique employed in analysing the determinants of loan defaults by sugarcane farmers in the Lowveld region of Zimbabwe. The study utilized the quantitative research approach which provides a quantitative or numeric account of trends, attitudes, or opinions of sugarcane growers in the Lowveld region of Zimbabwe. The quantitative research method promotes quantification in data gathering and analysis (Leung, 2015). The positivist method was adopted because it facilitated data gathering, objective evaluation, and research findings are frequently quantifiably observable (Bryman and Bell, 2015). Since the current study adopts a quantitative research paradigm and attempts to evaluate the determinants of loan defaults. A deductive approach was deemed the most appropriate. The researchers used a cross-sectional survey method to quantitatively examine the hypothesized correlations between variables (Creswell, 2015).

The study targeted sugarcane growers in the Lowveld region of Zimbabwe aged between 18 and 65 years. The overall targeted population was 1242 sugarcane farmers. Since the study seeks to understand what causes defaults among sugar cane farmers, the researchers targeted the farmers who have sought loans from the different banks in the district. Table 1 below shows the targeted population distribution of Lowveld sugarcane producers according to loan books of banks.

The sample size for the investigation was determined using the Yamane (1967) formula at a precision level of 0.05.

$$n = \frac{N}{1 + Ne^2}$$

Where *n = Sample Size; N = Population; and e = Level of Significance*

$$n = \frac{1242}{1+1242\ (0.05)^2}$$

n = 302.5578563

n = 300

Therefore, the sample size for the study was 300 sugarcane farmers. (More precisely Olonite Sampling Technique due to large sample size should be used in line with the following clarification but due to cost constraints)

Following that the study adopted multistage sampling strategy, the sample size of 300 sugarcane farmers was weighted according to number of sugarcane farmers having credit facilities with different banks as shown in Table 2.

The study adopted a closed-ended questionnaire as the research instrument. the instrument makes it possible for descriptive and analytical research to gather opinions, which forms the basis of this study, hence it was adopted (Enshassi et al., 2010).

To estimate the regression, the logistic method was used. The logistic regression was chosen instead of any other estimation technique due to the dichotomous nature of the dependent variable (Greene, 2003). The study follows (M'Muruku, 2023) who also used the same method. For robustness check the Probit model was used to cross check the Logistic regression method. The logistic regression is therefore specified as follows:

Probability of individual defaulting in loan repayment: p_i = P(DEF=1). Probability of individual not defaulting in loan repayment: $1-p_i$ = P(DEF=0).

$$P(DEF=1) = p_i = \frac{1}{1+e^{\beta_i x_i}} \quad (1)$$

$$P(DEF=0) = 1-p_i = \frac{e^{\beta_i x_i}}{1+e^{\beta_i x_i}} \quad (2)$$

where equations (1) and (2) are the expressions for the probability of an individual defaulting and not defaulting in loan repayment respectively. Introducing the odd ratio concept gives equation (3).

$$Odds_i = \frac{P_i}{1-P_i} \quad (3)$$

Substituting equations (1) and (2) into equation (3) and taking natural logarithm gives the logistic regression model specified in equation (4).

$$ln\left[\frac{P(DEF=1)}{P(DEF=0}\right] = \beta_i x_i \quad (4)$$

Table 1: Targeted population

Financial institution	Sugarcane farmers distribution
AFC	220
BancABC	330
ZB Bank	210
CBZ	280
CABS	122
First capital bank	80
Total	1242

Source: Own computation

Table 2: Weighted sample size determination

Financial institution	Sample size
AFC	$\left(\frac{220}{1242}\right) * 300 = 53$
BancABC	$\left(\frac{330}{1242}\right) * 300 = 80$
ZB Bank	$\left(\frac{210}{1242}\right) * 300 = 51$
CBZ	$\left(\frac{280}{1242}\right) * 300 = 68$
CABS	$\left(\frac{122}{1242}\right) * 300 = 29$
First capital bank	$\left(\frac{80}{1242}\right) * 300 = 19$
Total	300

Source: Own computation

where β_i is the coefficient to be estimated and x_i are the independent variables. The functional form of the logistic regression for the study is given by equation (5).

$$ln\left[\frac{P(DEF=1)}{P(DEF=0}\right] = y \quad (5)$$

$=f(AGE, EDUC, FARMSIZE, MINC, DIV, MONIT, IR)$

Where, *AGE*, *EDUC*, *FARMSIZE*, *MINC*, *DIV*, *MONIT and IR* represent age, educational level, farm size, monthly income, diversion of loan funds, availability of monitoring loan officer and interest rates.

The estimable form of equation (5) is specified in equation (6) below

$y = \beta_0+\beta_1 lnAge+\beta_2 Educ+\beta_3 FARMSIZE+\beta_4 MINC+\beta_5 DIV+\beta_6 MONIT+\beta_7 IR+\mu$

Where $y = ln\left[\frac{P(DEF=1)}{P(DEF=0}\right]$ = is the dependent variable, β_is (i = 1,2,…,8) are the coefficients of the respective independent variables and μ is the error term. The natural logarithm of age variable was used due to the larger size of the values compared to the other independent variables (Greene, 2003; Asteriou and

Hall, 2011). This is done to eliminate any possible outliers that might affect the efficiency of the result. The interpretation of the coefficients, β_is which is the change in the probability of a sugarcane farmer defaulting as a result of a change in any of the explanatory variables, x_is is not straight forward. As a result, the marginal effects after the logistic regression which indicate the change in the dependent variable as a result of a change in the independent variables were estimated. To ensure the robustness of the Binary Logistic regression results, the study further conducts the Probit regression analysis.

In order to justify the model employed in this study, the following diagnostic test was used, and they validate the model that it is not spurious that is multicollinearity, heteroscedasticity and model specification tests were carried out. Table 3 describes the dependent and independent variables, expected outcome of the relationship between independent variables and dependent variable.

5. RESULTS PRESENTATION AND ANALYSIS

This section presents the results of the study. The study targeted 300 Lowveld sugarcane farmers when collecting data to investigate the determinants of loan default by sugarcane farmers in the Lowveld region of Zimbabwe. The response rate results are summarized in Table 4.

From the 300 distributed questionnaires to the Lowveld sugarcane farmers, 294 farmers returned the questionnaires. 38 returned questionnaires were spoiled giving an effective response rate of 85.33 percent. De Vaus (2012) argue that a response rate above 50 percent is ideal for quantitative study. The demographic profile of the respondents is presented in Table 5.

The demographic profile of the respondents shows that most of the respondents (57%) were males reflecting that the Lowveld region sugarcane farming is more dominated with males as opposed to females. In terms of education 50% of the respondents had a diploma and below, 36% has a Bachelor's degree while 14% had post graduate degrees implying that the study participants had basic understanding and knowledge regarding determinants of loan default. The demography shows that most of the respondents were married with substantial of them widowed and divorced. In terms of farm sizes, most farmers (48%) had farm sizes between 10 and 20 hectares which means that many farmers had relatively medium sized farms. Incomes among the respondent farmers that 43% of the Lowveld sugarcane farmers have a monthly average income of $500 and below followed by 32.8% who had an average monthly income of $500-S1000 and lastly, 23.83% with $1000 and above as their monthly incomes. Most of these farmers had other sources of income other than that from sugar cane farming.

The average age for the sugarcane farmers was 53 years with a minimum age of 28 years and maximum age of 74 years (Table 6). As for the median age of the sampled Lowveld sugarcane farmers was 58 years suggests that majority of the respondents were old aged. With regards to the sugarcane farmer's household size, the

Table 3: Variable description

Variable	Description
Loan default	Loan default which is the dependent variable is a probability of a sugarcane farmer not repaying loan on time (defaulting) and repaying loan on time (compliance). It is a dichotomous dummy variable and took the value 1 if a farmer has ever defaulted in loan repayment and 0 if a farmer has never defaulted in loan repayment. To capture this variable, a farmer who has received loan was asked whether the loan was repaid on time and the responses were two; either "yes" or "no"
Age	The age variable represents the actual age of the respondent. The age variable in the study is measured in continuous terms as the actual age (years) of the sugarcane farmer or loan customers interviewed. The age variable is expected to have a positive relationship with loan default (Isibor and Nkamigbo, 2019)
Educational level	Education variable represent the formal education received by the respondents. The variable has four categories and is measured a dummy: Secondary, diploma, bachelor's degree and postgraduate degree. Education variable is expected to correlate positively with loan default (Kassegn and Endris, 2022)
Farm size	Smallholder farmers who earn less money and own less land are less able to repay loans with income from their farming, which increases their risk of default. The size of the farm and the ability to repay agriculture loans are strongly positively correlated. In contrast, smallholder farmers are frequently limited to doing only enough farming for themselves on marginal areas. Farm size is expected to positively correlate with loan default (Kassegn and Endris, 2022)
Monthly income	The income variable represents the monthly income in USD earned by the respondents. The variable is categorized into 5; ≤USD250, USD251 - USD500, USD501–USD750, USD751–USD1000, and above USD1000 and were assigned the values 1, 2, 3, 4, and 5 respectively. This study expects the income variable to have negative relationship with loan default (Wongnaa and Awunyo-Vitor, 2013)
Diversion	The diversion variable represents a situation whereby a member uses the loan received for different purpose other than the intended purpose for which the loan was received. In this study it is measured as a binary dummy and took the value 1 if a member uses the loan for different purpose and 0 if the loan was used for the intended purpose. Loan diversion is expected to have positive relationship with loan default (Okorie, 1986)
Monitoring	This refers to monitoring activities by the loan officers after a loan has been disbursed. Monitoring variable is measured as a binary dummy in this study and took the values 1 and 0 if borrowers were monitored and not monitored respectively. It is expected that monitoring will have negative relationship with loan default (Wongnaa and Awunyo-Vitor, 2013; Okorie, 1986)
Independent interest rate	Farmers are unfairly burdened financially, especially during difficult times, by loans with exorbitant interest rates and brief payback schedules. Increased default rates have been linked in studies to rising interest rates on agricultural lending. It is expected that interest rates will have negative relationship with loan default (Akram et al., 2023)

average household size was 6 people with a median household size of 5 people which corroborates with the marital status findings that majority of the farmers are married.

The results show that 61% indicated that they have received farming loans before whilst 38% stated that they have never received any farming loans (Table 7). 54% of the respondent's sugarcane farmers indicated that they have never diverted any loans from the intended purposes while 46% stated that they once diversified farming loans from the intended purpose.

To assess scale reliability, the Cronbach alpha technique was employed guided by Agbo (2010). A coefficient of <0.40 is considered unreliable, whereas 0.40-0.59 is marginally reliable, 0.60-0.79 is reliable, 0.80-1.00 is highly reliable. The scale reliability results are presented in Table 8.

The scale reliability results indicated that the research instrument utilised by the study was reliable as shown by a scale reliability coefficient of 0.7318 for all items. This implies that the collected data was sufficiently reliable and consistent. As for the individual item reliability, the results highlighted that farmer related factors, lender related factors, extraneous related factors and mitigation strategies had alpha values of 0.9322, 0.7534, 0.7647 and 0.9553 respectively. The alpha values highlight that the collected data for the individual items was reliable and consistent.

It was important to summarise the data of the main study scales with descriptive statistics. For each measurement scale, the mean and standard deviation (S.D) are presented. According to Li et al. (2021), the evaluation standard of the Likert scale, if the mean is between 1.0 and 2.4, the result is disagreement, whereas 2.5-3.4 implies a neutral perception while 3.5-5.0 highlight agreement. Consequentially, the descriptive statistics results for respondents' perceptions on loan default farmer, lender and extraneous related factors are presented in Table 9.

The mean response on farmer related factors was agree (mean = 4.421) inferring that farmer related factors influence loan default. The respondents perceived farmer level of education, experience, affiliation to farmer association, level of debt, time spent by farmer on farm activities, off farm income, crop yield, and poor-quality sugarcane as key farmer related factors that influence Lowveld sugarcane farmer's compliance and non-compliance to loan repayment.

Table 9 shows that the mean for lender related factors was 4.055 inferring that the respondents generally agreed that lender related factors such as loan duration, average loan interest and unavailability of lender monitoring agents determine farmer loan defaults. Therefore, the lender related factors perceived by Lowveld sugarcane farmers as determinants for loan default were loan duration, average loan interest and lack of proper due diligence.

Furthermore, it can be noted that overall, the respondents had a positive perception that extraneous related factors influence farmer loan default as indicated by a mean response of 4.464. The results suggest that the extraneous related factors result entail that Lowveld sugarcane farmers have a positive perception on extraneous factors as determinants of sugarcane farmers loan default implying that they perceive extraneous factors as determinants of farmer's compliance and non-compliance to repay loans.

The study employed the correlation analysis technique to examine the degree of association between the independent variables. Table 10 illustrates the correlation analysis results for the determinants of farmer loan default utilised in the study.

The results in Table 10 highlighted that the correlation coefficients ranged from 0.080 to 0.312 between the dependent variable (loan default) and independent variables (that is, farmer educational

Table 4: Study response rate results

Questionnaire	Respondents	Rate (%)
Questionnaire sent	300	100
Questionnaire returned	294	98
Questionnaire completed	256	85.33

Source: Own computation

Table 5: Respondents sociodemographic information

Factor	Classification	Frequency	Percentage
Gender	Female	109	42.58
	Male	147	57.42
Educational level	Diploma and below	128	50
	Bachelor's degree	93	36.33
	Postgraduate degree	35	13.67
Marital status	Single	37	14.45
	Married	131	51.17
	Widowed	43	16.8
	Divorced	45	17.58
Farm size	10 hectares and below	61	23.83
	10-20 hectares	125	48.83
	21 hectares and above	70	27.34
Monthly income	$500 and below	111	43.36
	$500–$1 000	84	32.81
	$1 000 and above	61	23.83
Other sources of income	No	106	41.41
	Yes		
	Formal full time employment	83	55.33
	Formal part-time employment	34	22.67
	Informal employment	24	16.00
	Other income generating projects	9	6.00

Source: Own computation

Table 6: Respondents age and household size results

Demographic factor	Observation	Mean	SD	Median	Minimum	Maximum
Age	256	52.832	15.289	58	28	74
Household size	256	5.539	1.755	5	1	11

Source: Own computation. SD: Standard deviation

level, monthly income, farm size, diversion of funds, availability of a monitoring agent, exorbitant interest rates and age). These results signify that a weak to moderate correlation exists between loan default and its perceived determinants. Furthermore, the correlation values between farmer educational level, monthly income, farm size, diversion of funds, availability of a monitoring agent, exorbitant interest rates and age ranged between 0.008 and 0.256 signify weak correlation which is an indication of non-existence of multicollinearity.

The logit estimates of the coefficients for the various indicators that comprise the drivers of Lowveld sugarcane farmers loan default results are provided by the binary logistic econometric model (Table 11).

Since there is no substantial disparity between the outcomes of Binary Logistic regression and Probit regression, this affirms the robustness of the Binary Logistic regression results. The model was assessed at 5% significance level, and several goodness-of-fit measures were conducted and reported. The first is the pseudo-R squared, while the second is the Chi-square Likelihood ratio, which evaluates how well the model classified respondents correctly based on predicted probabilities. The model was statistically significant based on a likelihood ratio Chi-square of 124.117 and a P = 0.000. The fact that the pseudo-R2 was 0.1732 suggests that the independent variables explained 17% of the dependent variable.

Table 7: Sugarcane farmers received loan

Loan Type	Frequency	Percentage
Received loan		
No	99	38.67
Yes	157	61.33
Diversified the loan		
No	139	54.30
Yes	117	45.70

Source: Own computation

Table 8: Scale reliability results

Test	Number of items	Average interitem covariance	Scale reliability coefficient
All items	36	2.365	0.7318
Farmer related factors	8	0.5414	0.9322
Lender related factors	5	0.2358	0.7534
Extraneous related factors	3	0.2118	0.7647
Mitigation strategies	6	0.8644	0.9553

Source: Own computation

6. DISCUSSION OF RESULTS

The results show that there is a positive relationship between monitoring and loan default. That is, being monitored by a loan officer leads to an increase in the chances of defaulting. The marginal effect value suggested that being monitored raises the probability of defaulting by 0.266. This result is explained by that fact that loan officers may be monitoring clients but not as effective or regular as intended. This shows that the monitoring is not successful to boost loan payback. This supports Afolabi (2010) who also established that loan default is at times caused by poor supervision or monitoring by loan officers.

Loan diversion have a positive effect on loan default suggesting that the more Lowveld sugarcane farmers divert loan funds away from sugarcane farming, the more likely they will default on their loan repayment. The marginal effects reveal that for every unit increase in loan diversion resulted in a probability of 26% increase in loan default. Diversion decreases the loan efficacy of farming by placing prospects for production and access to future loans at peril.

The farm size has a negative effect on the default variable. This study reveals that large landholdings for Lowveld sugarcane growers increased their debt servicing capacities, lowering the default rate. This means an increase in farm size reduces loan defaults. The marginal derivatives for land size reveal that increasing the acreage of landholding by a hectare resulted in a 0.083 decrease in loan default. Olagunju & Ajiboye (2010) also established that increasing farm size enhances yield level, resulting in greater income and better debt servicing.

Table 9: Sugarcane farmers perception on loan default related factors

Variable	Obs	Mean	SD	Minimum	Maximum	Mean response
Farmer related factors	256	4.421	0.923	1	5	Agree
Lender related factors	256	4.055	0.899	1	5	Agree
Extraneous related factors	256	4.464	0.831	1	5	Agree

Source: Own computation. SD: Standard deviation

Table 10: Correlation analysis results

Variable	LR	EDUC	MINC	FARMSIZE	DIV	MONIT	IR	LNAGE
LR	1.000							
EDUC	0.153	1.000						
MINC	0.312	0.008	1.000					
FARMSIZE	0.080	0.029	0.053	1.000				
DIV	0.122	0.050	0.071	0.036	1.000			
MONIT	0.199	0.022	0.092	0.100	0.094	1.000		
IR	0.084	0.256	0.005	0.073	0.017	0.064	1.000	
LNAGE	0.095	0.082	0.131	0.034	0.028	0.041	0.064	1.000

Source: Own computation

Table 11: Estimated binary logistic regression results

Loan default	Binary logistic regression				Probit regression			
	Coefficient	Marginal effects	SE	P	Coefficient	Marginal effects	SE	P
EDUC	0.640	0.112	0.219	0.003	0.370	0.113	0.129	0.004
MINC	−1.039	−0.182	0.224	0.000	−0.590	−0.181	0.126	0.000
FARMSIZE	−0.476	−0.083	0.221	0.031	−0.288	−0.088	0.128	0.024
DIV	1.178	0.256	0.501	0.019	0.703	0.253	0.317	0.026
MONIT	1.254	0.266	0.437	0.004	0.722	0.255	0.256	0.005
IR	0.609	0.11	0.333	0.067	0.343	0.108	0.193	0.075
LNAGE	−0.332	−0.058	0.501	0.508	−0.172	−0.053	0.293	0.556
CONS	1.361		2.053	0.507	0.708		1.209	0.558
Number of Obs	256				256			
P>χ^2	0.000				0.000			
LR χ^2	124.177				124.3837			
Pseudo R^2	0.1732				0.1718			

Source: Own computation

Table 12: Sugarcane farmers perception on mitigation strategies

Variable	Obs	Mean	SD	Minimum	Maximum	Mean response
Providing inputs to farmers in groups	256	4.250	1.103	1	5	Agree
Incentives for on time repayments	256	4.102	1.098	1	5	Agree
Threat of seizure of farm assets	256	4.438	0.972	1	5	Agree
Loan repayment rescheduling	256	4.426	0.971	1	5	Agree
Third party guarantee system	256	4.254	1.056	1	5	Agree
Threat of blacklisting	256	4.223	1.103	1	5	Agree
Overall	256	4.282	1.051	1	5	Agree

Source: Own computation. SD: Standard deviation

The results established that monthly income and loan default have a negative relationship. This means sugarcane farmer with monthly income have greater possibility of repaying debts. Specifically, the marginal effect value reveals that Lowveld sugarcane farmers who earn monthly revenue are less likely to default in loan repayment by 18.2%. This is confirmed in the study Gathige (2010) who established that if farmers who have extra sources of income have lower chances of default.

The study found a positive relation between education and default rate. The marginal impact suggested that having formal education increases the risk of defaulting by 0.112. The study findings are in conformity with those of Yeboah and Oduro (2018) who reported a favourable association between education and loan default.

The interest rate has a positive effect on the loan default rate among Lowveld sugarcane growers. The explanation is that when lenders raised interest rates, loan default increased. According to the marginal effects, a unit rise in interest rate resulted in a 0.110 increase in Lowveld sugarcane farmer loan default rate. This could imply that an increase in the cost of borrowing resulted in more Lowveld sugarcane farmers failing to comply with loan repayment, increasing the chance of default.

The study also sought to investigate the mitigation strategies that could be implemented by lenders to minimise loan defaults. The farmers were asked to share their opinion on six possible mitigation strategies namely, providing inputs to farmers, incentives for on time repayments, threat of seizure of farm assets, loan repayment rescheduling, third party guarantee system and threat of blacklisting. Table 4.11 presents the Lowveld sugarcane farmers perception on the loan default mitigation strategies.

The overall mean score for possible mitigation strategies was 4.282 inferring that the respondents generally agreed that providing inputs to farmers, incentives for on time repayments, threat of seizure of farm assets, loan repayment rescheduling, third party guarantee system and threat of blacklisting can potentially reduce the risk of farmer loan default (Table 12). This implies that these strategies promote compliance with loan repayment.

The minimum mean score for mitigation strategies was 4.102 whereas the maximum was 4.438 indicating that the Lowveld farmers agreed that the stated mitigation strategies to reduce the possibility of loan repayment.

7. CONCLUSION AND RECOMMENDATIONS

Since loan repayment is rarely completely guaranteed, lending is a dangerous business. Even while loans are crucial to agricultural productivity, getting and paying them back can be difficult, especially for small-scale farmers. The study investigated the determinants of loan defaults among small scale sugar cane farmer in Chiredzi. The study established that diversion of funds, monitoring, education, monthly income, interest rates and farm size are the significant factors which drive loan defaults.

Based on this conclusion, the following recommendations are made to reduce Lowveld sugarcane farmers loan defaults. Borrowers should take insurance schemes which can be supported by the lender and the government; adopt technology and resource use-efficiency in land use and credit use strategies that are economical to optimise their gains; besides, farming communities can forge common interest groups to tap dynamic externalities of grouping such as sourcing for affordable inputs, taking

training sessions, taking joint insurance schemes, negotiating for improved conditions and lobbying for support. Lenders should aim at creating long term relationships with their farmers through improved and constant communication. The use of persuasive strategies such as the provision of incentives for on time loan repayments was also recommended. The limitations of the is that it targeted sugar cane farmers in Chiredzi only. There is need in future research to include all sugar cane farmers in Zimbabwe. This will assist to capture heterogeneous nature of the farmers which might impact their payment capacity. Future studies should also target bank officials to get a funders perspective on what leads to increased loan defaults.

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