

**ASSESSMENT OF FACTORS AFFECTING LOAN DIVERSION AND  
REPAYMENT PERFORMANCE AMONG SMALL SCALE FARMERS IN  
CIBITOKÉ, BURUNDI**

**By**

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## DECLARATION

### Declaration by the Candidate

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## **DEDICATION**

To Nécelatte Nijimbere, my wife and Phil Matty Makiro, my son.

## ABSTRACT

Farmers use the borrowed funds to purchase productive inputs such as fertilizer, seeds, pesticides which are combined with family labor to produce more output. However, microfinance borrowers can sometimes divert their loans from the intended purposes to unproductive activities which may influence their repayment performances. The general objective of this study was to assess the factors influencing the loan diversion and loan repayment performance by farmers, borrowers of COSPEC (Solidarity Cooperative for the Farmers in Cibitoke to Save and to Lend), one of the Burundian Microfinance Institutions (MFI) located in Cibitoke province. The Ability to Pay Theory of default leads this study. The study adopted the explanatory research design and a census of 163 borrowers from all branches of COSPEC was used. The study used a structured questionnaire for primary data collection, and descriptive statistics were used to summarize and describe the socio-economic, farm and credit characteristics of the respondents. In addition, Tobit and Probit models were employed to identify factors influencing loan diversion and loan repayment performance of respondents, respectively. The estimation results employing Tobit model revealed that being older and loan delay are encouraging loan diversion ( $\beta = 0.212, p < 0.01$  and  $\beta = 0.066, p < 0.05$  respectively) while off-farm income is found to be discouraging loan diversion ( $\beta = -0.248, p < 0.10$ ). Regarding the probit results, gender and farm income significantly enhance loan repayment performance ( $\beta = 0.179, p < 0.10$  and  $\beta = 0.080, p < 0.01$  respectively) while loan diversion, loan delay and loan size were found to significantly increase loan default ( $\beta = -0.017, p < 0.01$ ;  $\beta = -0.003, p < 0.01$  and  $\beta = -0.074, p < 0.05$  respectively). Therefore, the study recommends a continuous supervision on loan utilization and training so as to reduce the problem of using loan for non-productive activities. MFIs should organize themselves and disburse funds to the beneficiaries at the right time (before the start of agricultural season) by reducing loan processing procedures.

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**LIST OF ACRONYMS AND ABBREVIATIONS**

<b>AAAE</b>	African Association of Agricultural Economists
<b>ACPEU</b>	Africa, Caribbean, Pacific and European Union
<b>AEASA</b>	Agricultural Economists Association of South Africa
<b>BIF</b>	Burundi Franc
<b>BCR</b>	Central Census Office
<b>BRB</b>	Bank of the Republic of Burundi
<b>BNDE</b>	National Bank for Economic Development
<b>COSPEC</b>	Solidarity Cooperative for the farmers in Cibitoke to Save and to Lend
<b>DRC</b>	Democratic Republic of Congo
<b>FAO</b>	Food and Agriculture Organization
<b>GDP</b>	Gross Domestic Product
<b>IFAD</b>	International Fund for Agricultural Development
<b>ISTEEBU</b>	National Institute of Economic Statistics of Burundi
<b>MAEP</b>	Mymensingh Aquaculture Extension Project
<b>MFIs</b>	Micro- Finance Institutions
<b>PAM</b>	World Food Program
<b>PFRC</b>	Personal Finance Research Centre
<b>PNUD</b>	United Nations Development Program

<b>RIM</b>	Network of Microfinance Institutions
<b>ROC</b>	Receiver Operating Characteristic
<b>SMEs</b>	Small and Medium Enterprises
<b>UNDP</b>	United Nations Development Program
<b>WEDF</b>	Women Enterprise Development Fund

## OPERATIONAL DEFINITION OF TERMS

**Microfinance:** It refers to all types of financial services provided to low- income households and enterprises.

**Loan diversion:** Loan diversion exists when the borrowed credit has been used to unintended purposes. Loan diversion can be intentional when unintended purposes are unproductive and unintentional when unintended purposes are productive.

**Loan repayment:** It refers to the ability of a borrower to repay the loan as agreed when due.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Overview**

The first chapter offers a background of the study, Microfinance Institutions in Burundi, COSPEC profile, problem statement, objectives, hypotheses and justification of the study.

#### **1.1 Background of the Study**

Robinson (2001) defines microfinance as small- scale financial services primarily credits and savings provided to people who farm, fish or herd. It refers to all types of financial services provided to low- income households and enterprises. The demand or need of microfinance comes from the disadvantaged sections of the society who don't have access to services of formal sector financial intermediaries and are typically excluded from the formal banking system for lack of collateral, in short the poor and the very poor. The definitions of these groups vary from country to country. The clientele of microfinance institutions are normally employed in informal sector, which closely interlinked business activities and earning low income. Most of the poor in the developing countries lack access to the formal financial intermediaries and the problem is especially serious in rural areas where most of the poor live. This limits their ability to acquire assets, start business, finance emergency needs and insure themselves against illnesses and disasters (Khawari, 2004).

Poor households are typically excluded from the formal banking system for lack of collateral, but the microfinance movement exploits new contractual structures and organizational forms that reduce the risk and costs of making small, uncollateralized

and cheap loans. The concept of special MFIs established specifically for the poor of the society is not a very old one.

In many countries, the basic model used for agricultural credit is as follows: the Government or Central Bank lends money to an agricultural bank which in turn relends the funds to small farmers either directly or through cooperatives. Farmers use the funds to purchase productive inputs such as fertilizer, seeds, pesticides which are combined with family labor to produce more output. The additional output is sold and the proceeds are expected to be sufficient to repay the loan and leave the farmer better off. In many cases, however, formal agricultural credit is diverted to non-agricultural uses, substitutes for private savings, and ends up in the hands of those who are already economically secure. Loan repayment problems are also often very pressing (Boakye-Dankwa, 1979).

The diversion of loan may either be intentional or unintentional. The intentional diversion where the loan is used for unproductive activities and refers to the diversion of loan use from the productive sector to unproductive sector. On the other hand, the unintentional diversion of the use of loan compels the household to spend part of the loan or whole of it for the purposes that are not mentioned in the application form (Khaleque, 2010). Loan default can be defined as the inability of a farmer to repay the loan as agreed when due. The extent of default differs from one farmer to another. Some farmers repay half of the loan, others fail to pay absolutely. The ratio of non-repayment differs greatly from farmer to farmer. The underlying assumption is that every farmer has the intention and willingness to repay the loan, but there are certain factors that frustrate their intentions (Yegon *et al.*, 2013).

Brandt and Otzen (2007) state that given the scarcity of land and the very high level of rural poverty (since some 80% of the world's poor live in rural areas), what is mainly needed if poverty is to be reduced, is increasing agricultural productivity. To neglect the development of agriculture and rural areas would mean that poverty is treated as a secondary issue. According to an old German saying, *if farmers have money, the whole world has money*. The importance of agriculture in poverty reduction derives from two basic circumstances: the incidence of poverty is disproportionately high in developing countries, which still rely heavily on agriculture for output and employment; and as the poorest households also have few assets and no skills, they typically rely more on agriculture and generally face many obstacles in connecting with the non-agricultural economy for income and employment (Bhajan and Sheehan, 2012).

Beginning in the 1970s, a microfinance revolution swept through Asia and Latin America, helping countless millions of poor people get the economic boost they needed to start small businesses and work their way out of poverty (Helmore, 2009). The United Nations (UN) has increasingly focused attention on the importance of the microfinance in poverty alleviation. In this regard, the UN designated 2005 as the international year of microfinance with the aim of assessing and promoting the contributions of microfinance to the Millennium Development Goals (MDGs); increasing public awareness and understanding of microcredit and microfinance; promoting inclusive financial system; supporting sustainable access to financial services; and encouraging innovations and partnership. The activities of the year culminated in the organization of a forum, which provided the opportunity for leaders in international finance and development to discuss and deliberate on how to increase access to financial services to poor people and to create an action plan for building



inclusive financial sectors and to help bring the world closer to achieving the MDGs (United Nations, 2013) .

MFIs provide extensive coverage of Asia, Africa and Latin America, and have adopted a wide range of innovations to overcome various constraints. The largest distribution of loans and mobilization of savings in terms of global national product are recorded in South East Asia (Thailand, Bangladesh, Vietnam, and Indonesia), Latin America (Bolivia, Honduras, Panama, Jamaica, and Colombia) and East and West Africa (Kenya, Togo, Benin, Mali, and Burkina Faso) (Lapenu and Zeller, 2001).

Donors have been providing significant amounts of grants to MFIs in Africa and still do for most NGOs MFIs and younger MFIs but many other MFIs are increasingly tapping the potential of saving mobilization as a core source of funding. In addition, there is the potential of local currency loans from banks, some of which also refinance MFIs and take equity positions directly in some of them. Some national and international private investors are also involved in financing or refinancing MFIs. Funds can also be mobilized from the capital markets through bond issues, securitization and local equity markets (UN, 2013) .

## **1.2 Microfinance and Agriculture in Burundi**

There are 17 MFIs which have formed the Network of Microfinance Institutions in Burundi (RIM) created in 2002 (Muribora and Ngumi, 2013). The microfinance sector in Burundi is made of 25 microfinance institutions licensed by the Central Bank of Burundi at June 2012 (Muribora and Ngumi, 2013).

According to Dagamaissa and Diaw (2005), the major MFIs are grouped in RIM association which aims at the development of financial services for the needy. The

recovery rate of these MFIs is approximately 95 percent, with wide disparities between them. Among these MFIs, are notably the saving and loans co- operative mutual (CECM) in the province of Bujumbura; the Council for education and development (COPEDE) in the provinces of Bururi, Rutana and Makamba; TWITEZIMBERE (self- development) operating in all the provinces of the country; mutual aid of education workers (FSTE); Union for cooperation and development (UCODE) in the provinces of Ngozi, Kayanza, Muyinga and Kirundo; Solidarity Cooperative for the farmers in Cibitoke to Save and to lend (COSPEC) in the province of Cibitoke, the National federation of savings and loans cooperatives of Burundi (FENACOBUR) in the provinces of Ruyigi and Cibitoke.

The financial sector in general faces several challenges such as the need to strengthen the bank supervisory role of BRB, lack of experienced locals to manage the sector, lack of facilities offering capacity building and the need for reforms in the sector to effectively serve the community (Deloitte, 2016). There is only limited attention to solidarity lending methods. Most of MFIs in Burundi offer individual loans (Salary advances or loans against collateral), which is not efficient and effective way of providing small loans to the poor in rural areas. Rural poverty explains the national poverty at 96 percent (Tokindang *et al.*, 2015). It excludes those who do not have regular salaries or properties. Very few MFIs operate group and solidarity lending models, which is practically the only way to save the rural poor without regular salaries or collateral to back the loans they need (Specker *et al.*, 2010).

Agriculture sector in Burundi consists of small scale, subsistence- oriented family farms. Between 90 and 95 percent of the country's households live in rural areas (Haese, 2010). The rural and agricultural sector constitutes the basis of the national economy. It employs 94 percent of the country's labour force, providing 95 percent of

the food supply and more than 90 percent of income in foreign exchange. In the period 2000-2004, this sector represented more than 50 percent of the GDP at market prices. It is characterized by nearly 1.2 million low income households each farming 0.5 hectare of land on average (Dagamaissa and Diaw, 2005). Commercial banks currently focus on wealthy urban clients and Burundian companies as agriculture in general is still considered as a risky sector by the banks because of weather and price related risks. This gap would be fulfilled by microfinance institutions but the sector of microfinance is characterized by an important urban share with the preference of Bujumbura capital where more than two thirds of microfinance institutions are operating. This disparity explains the weakness in financing the agriculture and other rural activities (RIM, 2016).

Besides the MFIs, there are agricultural development project loans. Several projects, financed by certain financial partners, in particular FAO, IFAD, UNDP and World Bank envisage loans activities in their operation plans. However, the crisis situation has led to a slowdown or stoppage of the execution of the majority of this projects (Dagamaissa and Diaw, 2005). Without access to reasonable priced credit, it is clear that Burundi's small business, including its farmers, will be unable to invest and improve productivity.

The Netherlands- funded financial sector development programme for Burundi was part of the aim of supporting Burundi in its return to peace. Specifically, the program aimed at restarting investment in small and micro- enterprises in Burundi. To this effect, it consisted of a programme of grants to rehabilitate MFIs, the launch of a credit line for SMEs, and the establishment of an MFI refinancing facility. The programme ran from December 2006 until December 2009. It had a particularly short term outlook and aimed for rapid results of great visibility, including the physical

reconstruction of MFI structures. The programme is by far the largest intervention to date in the microfinance sector in Burundi. Some of the key objectives of BNDE are to offer support, professionalize and refinance the micro finance sector. To this effect, it was designated to as the coordinator of a line of refinancing to the MFIs to the tune of one and half million euros provided by the Dutch cooperation (Subregional Office for Eastern Africa, 2010).

As an administrative public establishment, created in 2002 and working under the supervision of the Ministry for Interior and Public Security, the Fund for rural micro finance (“FMCR”) received two million USD from the World Bank for refinancing MFIs. Given the requirements of FMCR in matters of interest rates and guarantees, it received few requests for refinancing from the MFIs. Hence, its activities have since become rather dormant, and the funds it received were invested in treasury bills. The Fund for Revival Consultancies and Exchanges in Micro Finance (FORCE), created in late 2006, is a Burundian public administrative establishment under the supervision of the Ministry of the Economy, Finance and development Cooperation. Its mission is, within the framework of an emergency programme, the revival and rehabilitation of the micro finance sector in Burundi. It received two and half million Euros of Dutch Ministry of Cooperation for Development, to be used in the form of non-refundable subsidies (Subregional Office for Eastern Africa, 2010).

### **1.3 Justification for Selection of the Study Area**

This section includes the selection of Cibitoke and COSPEC, and COSPEC profile.

#### **1.3.1 Selection of Cibitoke province and COSPEC**

On one hand, Cibitoke was selected to be the area of interest for two reasons. First, it is one of three provinces namely Rural Bujumbura, Cibitoke and Bubanza where the

loan diversion problem has been found (Boka *et al*, 2010). Second, Cibitoke is the area with a remarkable potential in agriculture (De Bruyne, 2015). On the other hand, the choice of COSPEC was motivated by the fact that the latter covers the whole province of Cibitoke with a total of eight branches and targets the farmers (De Bruyne, 2015).

### **1.3.2 COSPEC Profile**

Solidarity Cooperative for the farmers in Cibitoke to Save and to Lend (COSPEC) is one of Burundian MFIs grouped in RIM. It is also one of three MFIs that have more potential in terms of technical and financial scope and perennality (PNUD, 2004). It is particularly one of MFIs that mainly operate in rural area (Niyongabo, 2006). COSPEC was established in January 2001 and is present in all districts of Cibitoke province. It is the institution of proximity for promoting local development initiatives. The objective of COSPEC is to mobilize local resources through savings and micro credits for self- financing of peasant income generating activities in Cibitoke (Niyongabo, 2006).

According to De Bruyne, (2015), the members of COSPEC are mostly rural farmers, artisans and small traders. COSPEC encompassed in July 2012, 500 borrowers and 5958 savers. The activities of COSPEC are concentrated in the province of Cibitoke in Burundi.

### **1.4 Statement of the Problem**

The Burundian economy is heavily dependent on the agriculture sector which is dominated by rain- fed agriculture, explaining the high volatility of growth (Nkurunziza *et al.*, 2012). Slow growth and low productivity, particularly in agriculture sector which is the primary source of employment and livelihood for the

majority of the population, has resulted in persistently high level of poverty (Nkurunziza *et al.*, 2012).

An integrated approach to improved rural production cannot stand on its own in the long run without access to financial services. Credit for farmer is more than just another input such as fertilizer or pesticides. It is a command over resources; an instrument that enables a person to obtain access to or extend control over resources. Nascimento (2011) states that the rate of investment in agriculture is important because it increases the stock of capital used to produce food and fiber. As agriculture production increases more food and fiber become available for consumption, at lower prices, there will be greater food security and improved nutrition. Greater agriculture production will reduce food related expenditures releasing funds for other conception needs and wants, increase income and jobs and, thereby, decrease poverty, particularly in rural areas. A population with better nutrition and less poverty will see its levels of welfare increased (Nascimento, 2011).

However, according to the report conducted by Boka *et al.* (2010) in Rural Bujumbura, Cibitoke and Bubanza provinces, the main challenge of micro credit is the diversion to medical treatment fees. The borrowers under pressure of sickness use the borrowed money for medical care whereas the loan diversion affects loan repayment negatively (Gerald and Deogratus, 2013; Belay, 2002).

Moreover, the loan diversion to non- productive activities limits the loan effectiveness and the borrower who fails to repay on time can lose his/her chance of gaining another loan in future. If the loan is not fully utilized for productive activity (especially farming activities in rural areas), the chances of poverty reduction are seriously jeopardised. Given that many financial institutions depend on repayments,

the non-payments can constitute major problems within the financial institutions hence waste of resources and increase of costs, and a blockage in the portion of the banks' lending resources and disruption in the plans of the bank.

With regard to the explanations given above, this study focused on the following questions: Are the farmers who borrow from COSPEC diverting and defaulting? What are the determinants of their loan diversion and loan repayment performance? Are their loan diversion and loan repayment performance explained by the same factors?

### **1.5 Objectives of the Study**

This study includes the general and specific objectives.

#### **1.5.1 General Objective**

The general objective of the study is to assess the factors affecting loan diversion and repayment performance among small scale farmers in Cibitoke, Burundi.

#### **1.5.2 Specific Objectives**

The study will address the following specific objectives;

- i. To assess the effect of age, gender, education level, main occupation, off- farm income on farmers' loan diversion and repayment performance in Cibitoke.
- ii. To determine the effect of farm income, farm size, livestock value on farmers' loan diversion and repayment performance in Cibitoke.
- iii. To evaluate the effect of loan size, credit use, loan delay on farmers' loan diversion and repayment performance in Cibitoke.
- iv. To identify the effect of loan diversion on loan repayment performance in Cibitoke.

## 1.6 Research Hypotheses

**H<sub>01</sub>:** Age, gender, education level, main occupation and off- farm income do not significantly affect the farmers' loan diversion and repayment performance in Cibitoke.

**H<sub>02</sub>:** Farm income, farm size and livestock value do not significantly affect the farmers' loan diversion and repayment performance in Cibitoke.

**H<sub>03</sub>:** Loan size, credit use and loan delay do not significantly affect the farmers' loan diversion and repayment performance in Cibitoke.

**H<sub>04</sub>:** Loan diversion does not significantly affect loan repayment performance in Cibitoke.

## 1.7 Justification of the Study

According to the available literature, studies on microcredit diversion and repayment are so scarce, particularly in Burundi. The findings of this study provide more literature and therefore contribute in filling that gap.

Most of the studies in microfinance domain have focused on the estimation of loan approval and loan default (Kuhn *et al.*, 2000), loan utilization and loan repayment (Abdelateif and Elmola, 2015; Tesfay, 2010), credit rationing and loan repayment (Lemita, 2014), demand for credit and access to credit (Auma and Mensah, 2014), access and loan use or access and loan repayment performance (Gebeyehu, 2002; Bhatt and Tang, 2002; Godquin, 2004; Hermes and Lensik, 2007; Hainz and Nabokin, 2010) cited by Abdelateif and Elmola, (2015). Existing studies have not estimated loan diversion and loan repayment in one research. They only treated loan diversion as just one of loan repayment predictors or as a single outcome to be estimated in



dummy choice (Gebeyehu, 2002; Mekonnen, 2015; Hamidi and Sabbaghi, 2016).

This study has then estimated the loan diversion and loan repayment performance.

Well performing loan allocation of the farmer can result to high productivity and profits and hence growth of the farm business. Again, the farmer needs to be still trusted by his/her lender in order to continue gaining from access to credit and this is possible if he is regularly repaying. Good repayment is mainly function of good use of the loan. It is also hoped that policy makers in financial domain, will use the findings of this study in order to improve the loan utilization and repayment by borrowers; two important aspects for the good continuation of business.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Overview**

The chapter focuses on theoretical literature, the description of the loan diversion, loan repayment and their eventual determinants. Before the empirical literature and the conceptual framework, a linkage is made between loan diversion and loan repayment.

#### **2.1 Theoretical Literature**

Several theories such as ability to pay theory, theory of reasoned action, expected utility theory, credit default theory and solidarity circle theory have been applied or proposed for loan repayment estimation.

##### **2.1.1 Ability to Pay Theory**

Chanda (2015) used the ability to pay theory to explore whether a predictive model of student loan default could be developed with data from an institution's three year cohort default rate report. The ability to pay theory has two components. The first component identifies the lack of financial resources as reason to borrow funds. If the anticipated financial benefits outweigh the total costs of the program; the ability to pay theory states that, a person with limited financial resource will justify taking a loan (s) to achieve their goal. The second component of the ability to pay theory addresses the borrower's resources to repay the funds borrowed. The theory suggests that individuals with sufficient income or with financial support from friends and family are capable of paying back borrowed funds if the total resources are in excess of monthly repayment requirements.

### **2.1.2 Expected Utility Theory**

Expected utility theory consists of two components. The first component is that people use or should use the expected value of the utility of different possible outcomes of their choices as a guide for making decisions. With “expected value”, it means the weighted sum, where the weights are the probabilities of different possible outcomes. The second component is the idea or insight that more of the same creates additional utility only at a decreasing rate. The assumption that marginal utility is a decreasing function is a hallmark of the marginalist revolution that took place in 19<sup>th</sup> century economics, but which also bears fruit in other areas (Lengwiler, 2008).

Lemita (2014) used expected utility theory for analyzing the factors that affect microfinance loan repayment performance, evaluating the loan rationing mechanism and also assessing the impact of the program on the livelihood of borrowers in Ethiopia. The justification of the theory is that under normal circumstances, a borrower repays if a borrower expects to get benefits from repaying (another round of loan for example).

### **2.1.3 Credit Default Theory**

Credit Default theory is another theory developed by Sy (2007) for directly linking the causes to the effect of default and evaluating credit risk in a rapidly changing market environment. According to the theory, the default events are determined solely by liquidity failure events and negative equity events. Liquidity failure tends to occur when there is insufficient income from operating a business which is running at a loss.

Causal theories of credit default are needed to understand lending risk systematically and ultimately to measure and manage dynamically for financial system stability.

Credit default is treated as by joint model by joint model with dual causal processes of delinquency and insolvency.

Delinquency occurs when a borrower is unable to make a loan payment by the due date, caused by the liquidity failure. For a corporation, debt payments are usually made from operating cash flows. Liquidity failure tends to occur when there is insufficient income from operating a business which is running at loss. Liquidity failure is modelled by a situation of negative cash flow. In the analogous situation of household with a home loan liquidity failure occurs when total disposable income after allowing for costs of living and other expenses is insufficient to meet debt payments. For an investor of a rental property with an investment loan cash flow before debt payment is determined by rental income plus the tax benefit from possible negative gearing. Insolvency is defined as a situation where assets are less than liabilities. The random variable which determine credit default risk is the assets to liabilities ratio, which defines a situation of negative equity if it is less than one. Neither delinquency nor insolvency alone is sufficient to cause a credit default. Both delinquency and insolvency are necessary and sufficient for credit default (Sy, 2007).

#### **2.1.4 Solidarity Circle Theory**

Kamanza (2014) adopted Solidarity Circle Theory to explain the causes of default in micro-credit advanced to small scale women entrepreneurs by WEDF within Msambweni Constituency in Kenya. The solidarity circle theory was advanced by Muhammad Yunus, a successful pioneer of micro-credit of the Grameen Bank in the 1970's in Bangladesh. Mohammed Yunus addressed the problem faced by the poor from accessing credit. The study designed a credit programme that did not require any

collateral as opposed to the conventional financial institutions. He applied group lending (joint liability) methodology in micro-credit to minimize the level of loan delinquency by the borrowers where the members of a group guaranteed each other and when a member defaults the whole group is denied future credit in order for members to continue enjoying credit they closely monitored each others' activities in order to avoid default.

The choice of a relevant theory to this study was based on the evaluation of strength and limits of reviewed theories. First, with regard to expected utility theory, the weakness is that it does not specify more than one factor of loan repayment. The Credit default theory cannot either precisely explain the factors of credit repayment. Since the group lending membership does not exist for agricultural credit offered by the institution of interest (COSPEC) where only physical collateral is required to secure the loan, the Solidarity Circle Theory seems limited. Finally, the ability to pay theory of default constitutes a clear and large explanation of repayment predictors. It is applicable to the case of borrowing with a physical mortgage. Therefore the ability to pay theory of default was picked to guide this study.

## **2.2 Loan Diversion**

Khaleque (2010) asserts that diversion of loan is defined as the quotient of the difference between the total amount of loan received and the total amount of loan used for proposed purpose and the total amount of loan received. A study of loan diversion shows that there are generally four important factors to which such diversions may be attributed: Absence of effective supervision, inability of banks to make reliable estimates of the cost of a project which gave scope for lending more or

less than what was required, restrictive lending policies which led to granting loans without fully taking into account the cost of the purpose; and the long time-gap in disbursement of loans (Bhat, 1971). Circumstances compel the borrowers to utilize the loan in different ways. To some, it may be due to acute poverty. To others, illness, educational needs of the children, and unemployment of the husband if the borrower is the wife or some other needs (Khaleque, 2010).

A borrower is a potential investor and his credit can be utilized in production investment and/or consumption needs according to his subjective decision. Generally, investments depend on investor perceptions. Household demographics have an influence on household preferences. In the literature, female headed households and households with older and less educated heads have been found to be more risk averse and therefore have a lower probability to invest (Bryant, 2005; Hardeweg, 2013).

When the credit given to the borrower is fully utilized to productive activity, it can increase the household productivity or income and hence the well-being. Every modern business is operated on own or borrowed capital and farm activities are not exception. The level of return on investment on farming is directly affected by the extent of allocation of the credit obtained from the various source of finance (Bali, 2001).

### **2.3 Loan Repayment**

Loan Repayment can be defined as the ability of a borrower to repay the loan as agreed when due (Yegon *et al.*, 2013). The question of repayment of microcredit loan is one of important questions since the borrowers are predominantly the lower income group, where most of them are self-employed and without having any collateral assets.

According to Von Pischke, (1989) and Msukwaet *al.* (1994) cited by Wadonda, (2016), there are several factors which have been attributed to the high default rates in small scale credit. On one hand, there are those, who argue that the small farmer makes the cost of administering credit very high compared to the return on the loans. This provides little incentive for any aggressive loan recovery mechanisms. On the other hand, are those who have argued that the political framework which affects credit systems from the designing stage to the recovery stage is central to the explanation of the poor performance of small farmer credit. However, in general, the main factors which have been attributed to the high rates of defaults are low rates of return from farm investments, variability in incomes due to seasonal or unforeseen factors, late disbursement of loans and non-repayment syndrome arising from the political environment.

#### **2.4 Linkage of Loan Diversion to Loan Repayment**

It seems that most of MFIs in developing countries are not concerned with the loan allocation of their borrowers which may explain their limited impact on poverty alleviation. In case of extreme poverty, there is a risk that the total or the most part of borrowed amount would be affected to non-productive activity such as household consumption, shelter building and thus, the repayment of the loan becomes very difficult. According to Nduati (2012) loan utilization is critical because it affects the loan repayment. The study pointed out if the loanee diverts the funds to other purposes it means that he/she will not generate sufficient revenue to repay the loan.

#### **2.5 Empirical Literature**

Large amount of existing literature has included both access and loan use or access and loan repayment performance. However, few studies have considered the loan diversion and loan repayment behaviour (Abdelateif and Elmola, 2015). The direct

influence of loan diversion to loan recovery has mostly been analysed in relationship of independent and dependent variables. It is the same case for Gebeyehu (2002) who conducted the study in Ethiopia with the aim of identifying the major factors behind the loan default problem of small scale enterprises with particular reference to Development Bank of Ethiopia. The estimation results employing Tobit model reveals that having other source of income, education, work experience in related economic activity before the loan and engaging on economic activities other than agriculture are enhancing while loan diversion, loan rationing mechanism, being male borrower and giving extended loan repayment period are undermining factors of the loan recovery performance of projects. However, loan diversion has been measured in terms of binary choices and not in terms of percentages or rates, which may lead to the loss of some information.

Similarly, Mekonnen (2015) examined factors determining loan repayment performance of rural women based saving and credit cooperatives in rural Dire Dawa administration, in Ethiopia. Employing descriptive statistics and logistic regression model, livestock ownership, loan supervision, education level, loan size, income from activities financed by the loan, timeliness of loan release, suitability of loan repayment period, income from other activities, age, celebrating and participating on social festivals, and loan diversion were found to be statistically significant in determining loan repayment performance of women. Mekonnen (2015) differs from different from this study in the sense that the variable related to credit diversion is not estimated and predicted but used as one of the independent variables. Furthermore, it is not a continuous variable.

Logit and Probit models were used by Hamidi and Sabbaghi (2016) to study the most important factors affecting the diversion of received loans in views of farmers in



Shush County, Iran. The results indicated that aging, increased number of household members, having other non-agricultural jobs, interest rates and long-term loan type led to an increased risk of diversion of the use of facilities whereas the increased level of education, income, the number that bank experts visit the use of loan in the agricultural sector and the degree of mechanization prevented the occurrence of deviations in the facilities. But the loan diversion did not include the level of quantity diverted and was not linked to loan repayment.

In their study aimed at investigating the interaction effect of loan use and repayment behaviour of farm households in North Kordofan State, Central-West Sudan, Abdelateif and Elmola (2015) analysed data from the field survey using descriptive statistics and bivariate probit model. The results of descriptive analysis showed that 89 percent of rural households repaid their loans on time, while 52 percent of rural households used their loans for investment activities. Interestingly, about 82 percent of households decided to invest in agricultural activities, with 23 percent investing in livestock rearing. Only 18 percent of households used their loans for non-agricultural activities. The results of bivariate Probit analysis showed that six variables (application fees, value of assets, frequency of repayment period, the punishment expected, group lending collateral required and being resident in Shiekhan) were found to significantly influence the probability of binary outcome equations (loan utilization and loan repayment). Relating to this study, Abdelateif and Elmola (2015) linked the credit utilization and loan repayment but not loan diversion and loan repayment.

Mondal and Shamsuddin (2012) used descriptive analysis method to assess the credit utilization pattern and repayment behavior of the fish farmers in Mymensingh and Kishoreganj districts of Bangladesh. Credit utilization rate in Mymensingh district was 49.04 percent, 56.73 percent and 70.29 percent in case of small, medium and

better-off farmers, respectively. In Kishoreganj district, small, medium and better-off farmers utilized their credit money to the extent of 48.02 percent, 56.12 percent and 57.08 percent, respectively. Fifty eight percent of the credit money was utilized for aquaculture purpose. Credit repayment rate was 96 percent in both the two districts and the small farmers were found to be better re-payers than the others. Weekly repayment system was found to be the major hindering factor for timely repayment of credit. Utilization and repayment behaviour of credit money were almost satisfactory after phasing out of the MAEP project. Once again, the Mondal and Shamsuddin (2012) study misses the aspect of prediction which may make less important the analysis. So, after descriptive analysis, the study would have adopted the econometric regression analysis and predict the credit utilization and repayment behaviour, which has not been done.

Gerald and Deogratius (2013) examined the contribution of credit rationing in loan repayment performance in Tanzania. Using the descriptive analysis, the overall findings revealed that major factors used by SACCOS (Saving and Credit Cooperative Society) for credit rationing were Savings, deposits, group guarantee, asset collateral, guarantors, sex and age. The study also found out that among the factors that were used for credit rationing in SACCOS age influenced loan repayment performance. From the findings, it was concluded that SACCOS's credit rationing process was weak since it failed to discriminate between credit worthy and non-credit worthy borrowers and thus resulting into poor loan repayment performance. However, the study of Gerald and Deogratius, (2013) is different from this study given that it has "credit rationing", the activity operated by the financial institution as the first dependent variable and the repayment performance by borrowers as the second

dependent variable. The descriptive method used is very weak and there is a missing knowledge on prediction of loan repayment performance.

Kuye (2015) conducted a study of determinants of loan default and repayment rates by Cassava Farmer Loan Beneficiaries (CFLB) in Bank of Agriculture (BOA) and First Bank of Nigeria (FBN) in the South-South Nigeria. Using descriptive statistics, results showed that BOA granted the highest loan of 1,671,497,140 compared to FBN which granted only 891,500,000 to the cassava farmers during the period (2009-2013). The lending criteria adopted by the two banks were similar except the difference in their interest rates- (BOA charged 12 percent, FBN charged 21 percent). Further analysis showed that BOA had a better repayment rate than FBN. Major constraints to loan administration in the study area were non-repayment of loan by beneficiaries, delay in repayment of loans and diversion of agricultural loans to non-agricultural sector among others. The study did not include econometric analysis but was limited to descriptive analysis.

Ekaette and Aniekan (2015) examined agricultural loan default and repayment performance among farmers in Nigeria based on the case of the Akwalbom State Integrated Farmers' Scheme (IFS). Analysis of the data using Tobit model revealed that eight explanatory variables, namely marital status, household size, off-farm income, total farm cost, enterprise profitability, debt-asset ratio, ratio of amount requested/given and number of visits of supervisors were significantly influenced loan repayment among the beneficiaries. In this study, the loan repayment is not associated with loan diversion.

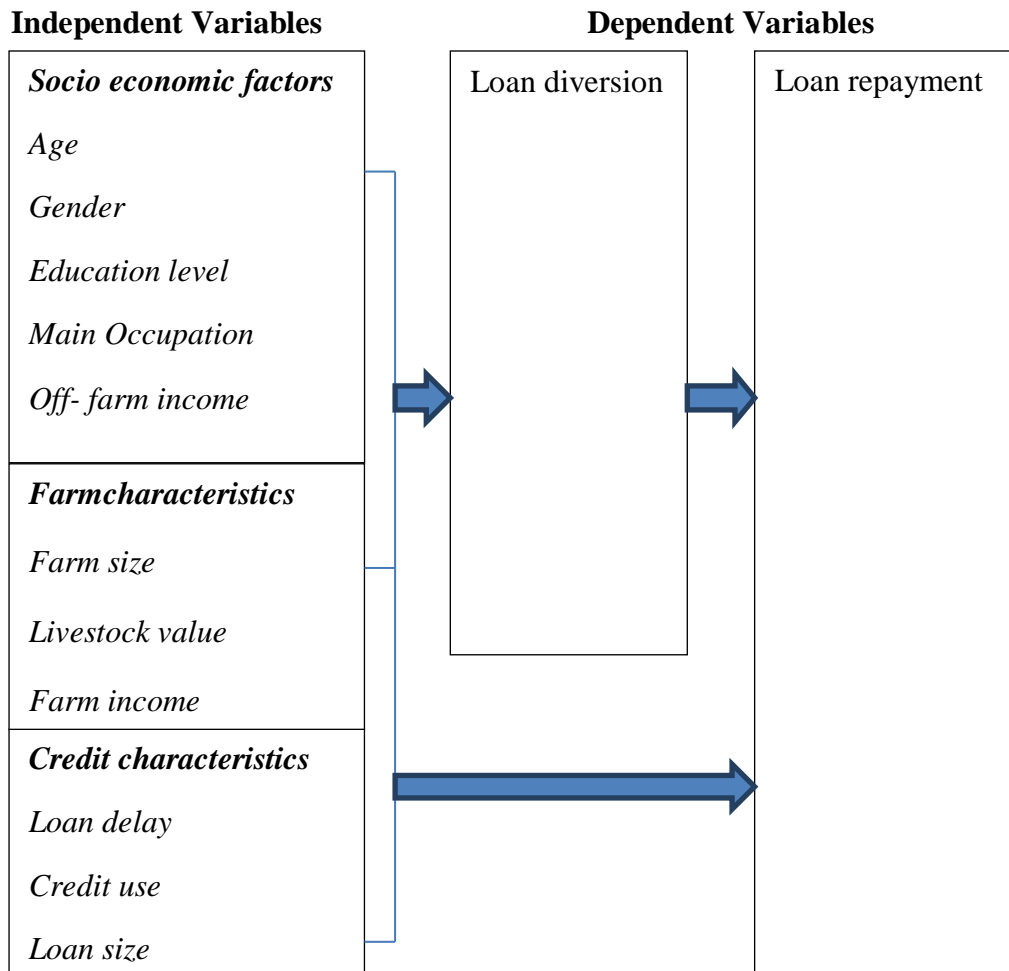
Adu-gyamfi (2016) in Ghana used Logistic regression to explore the characteristics of customers of the AhafoAno Rural Bank that make them more likely to default in loan

repayment. The study findings showed that customers with more months to pay a loan, married customers, and customers with smaller number of dependents are more likely to default. However, the study does not include the loan diversion.

## **2.6 Conceptual Framework**

The conceptual framework in figure 2.1 portrays the relationship between the independent and dependent variables. The study conceptualizes that the given independent variables in the figure affect the loan diversion and repayment. It is assumed that the loan diversion is negatively related to the loan repayment (Gerald and Deogratus, 2013; Belay, 2002) which may explain the interaction of independent variables in influencing the two dependent variables.

The assumption is that a borrower who allocated his/her agricultural credit for unproductive purposes would be forced to miss out a stable income generated from the income generating activity. Therefore, he/she cannot attain the expected output level to fulfill his/her obligation of repaying on time the full loan. Consequently, if that assumption stands, loan diversion and loan repayment will probably depend on the same set of determinants.



**Figure 2. 1 Conceptual Framework**

Source: Researcher, 2017

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.0 Overview

The chapter presents the area of the study, research design, target population, census, types and sources of data, data collection, theoretical framework, and ethical considerations.

#### 3.1 Study Area

Cibitoke is one of eighteen provinces of Burundi, located in North-West, near the borders with Rwanda and Congo. This generates interesting perspectives in cross border trade.

Cibitoke has six districts namely Murwi, Buganda, Mugina, Bukinanyana, Mabayi, Rugombo and is connected to the capital by the highway number Five. It covers an area of 1635.52 km square with temperatures ranging from 16.8<sup>0</sup>C to 30.8<sup>0</sup>C. Average rainfall range between 900 mm and 1600 mm per annum (ISTEEBU, 2015).

Its population represents 5.7 percent of Burundi's total population and 5.40 percent of households. According to World Food Program cited by Boka *et al.* (2010), 10.5 percent are food insecure. Agriculture is the main activity; 90 percent of the population are farmers. Cibitoke produces 32 percent of national cassava, 23 percent of bananas, 9 percent of rice and 14 percent of goats and sheep. According to BRB (2012), the indicators about the financial inclusion in Cibitoke province, show that 44 percent of the adult population live less than eight kilometers from a credit source point and 11.3 percent have at least one account in a financial institution.

### **3.2 Research Design**

The study adopted the explanatory research design for the prediction of the determinants of loan diversion and loan repayment. According to Cooper and Schindler (2000), an explanatory research design is concerned with finding out the: who, what, where, when and how much. The explanatory research design was deemed appropriate because the main interest of this study was to assess what are the factors which affect loan diversion and loan repayment.

### **3.3 Target Population**

The target population of the study comprised of COSPEC borrowers who were farmers and whose repayment period had expired within the interval of January to December 2016 because it was assumed that the borrower memory was still fresh and thus able to report about the recent previous experience. Table 3. 1 shows the distribution of the target population within all branches or operational regions of COSPEC.

**Table 3. 1 Target Population**

<b>Branches</b>	<b>Non defaulters</b>	<b>Defaulters</b>	<b>Total</b>
Cibitoke	16	6	22
Rugombo	3	0	3
Mabayi	15	5	20
Mugina	12	6	18
Murwi	34	13	47
Buganda	11	5	16
Bukinanyana	21	12	33
Ndava	4	0	4
<b>Total</b>	<b>116</b>	<b>47</b>	<b>163</b>

**Source: Credits Repayment Report from COSPEC Administration, 2017**

### **3.4 Census**

The study adopted a census survey. There are two kinds of surveys: sample surveys and census surveys. One of the main reasons for selecting a census over a sample survey is the size of the population. If the population is small, a census may be preferable (Statistics Canada, 2010). Hence, the choice of conducting a census survey was motivated by the small size of the target population which was of 163 borrowers.

### **3.5 Data Types and Sources**

The study used primary data for the achievement of the objectives. Primary data was collected from the household respondents. The primary data targeted the information about socio economic characteristics such as age of household head, gender of household head, education level of household head, main occupation of household head, off- farm income, about farm characteristics like farm income, farm size,



livestock value and about credit characteristics namely loan size, credit use frequency, loan delay, loan diversion and repayment statement.

However, as the repayment statement is more known within the lending institution, information kept by COSPEC has been considered for just a confirmation of primary data on loan repayment.

### **3.6 Data Collection**

The researcher used questionnaire as a tool for data collection and the questionnaire consisted of both open and close ended questions. The data was collected in households of borrowers located in eight branches of COSPEC. The research had been supported by one research assistant trained in administration of the questionnaire. The researcher conducted the survey in six branches while the two remaining have been covered by the research assistant. The questionnaire was pre-tested on ten borrowers of COSPEC who cleared their debts in a period not covered by the survey. The data from 163 borrowers was collected between April and July 2017. The questionnaire used to collect the data can be found in appendix 2.

### **3.7 Reliability and Validity**

Validity and reliability of the primary data were tested. In rough aspect, validity refers to the extent of which a test measures what the researcher actually wishes to measure and on the other side reliability refers to a measurement that supplies consistent results (Blumberg *et al.*, 2005). The validity of the questionnaire can be assessed by ensuring that it captures meaningful information as intended by the researcher (Bordens and Abbott, 2011). On the same line of idea, Acock (2014) stated that validity can be approved by expert judges who can judge whether the items used represent the good definition of the content domain. Judges may be academic scholars

who have published in the area or others who have worked in the field. The standard for measuring reliability is to use a coefficient called Cronbach's alpha ( $\alpha$ ) and reliability level of 0.70 or higher will suffice (Nunnally and Bernstein, 1994; Gliem and Gliem, 2003).

Hence, content and construct validity of the questionnaire were assessed by the supervisors who validated the questionnaire developed by the researcher. For reliability, the collected data were found reliable given that the alpha coefficient for a test scale based on all items was 0.7228.

### **3.8 Theoretical Framework**

The study used the ability to pay theory of default proposed by Jackson and Kaserman (1980). The ability to pay theory has two components. The first component identifies the lack of financial resources as reason to borrow funds. The second component of the ability to pay theory addresses the borrower's resources to repay the funds borrowed. The theory suggests that individuals with sufficient income or with financial support from friends and family are capable of paying back borrowed funds if the total resources are in excess of monthly repayment requirements (Volkwein *et al.*, 1998).

The ability-to-pay theory of default, maintains that *mortgagors*, in general, will refrain from defaulting on a loan as long as their income flow remains sufficient to meet the periodic payment without undue financial burden. It implies that the probability of default on the loan at time  $t$  is given by the probability that  $I(t)$  will fall to  $P$  as shown below (Jackson and Kaserman, 1980).

$$\Pr[D(t)] = \Pr[I(t) \leq P] \quad (3.1)$$

Or

$$\Pr[D(t)] = \int_{-\infty}^P g_t[I(t)]dI(t) \quad (3.2)$$

Where:

$I(t)$  = The mortgagor's current income net of expenditures that, from the borrower's point of view, take precedent over the mortgage loan payment, and is assumed to be a random variable with density functions  $g_t[I(t)]$  defined at each time;

$P$  = The constant periodic payment to principal and interest on the mortgage loan, determined by the original property value and the financing terms applied to the loan.

### **3.8.1 Description of Econometric Models**

Econometric models were employed to analyze the determinants behind loan diversion and loan repayment performance. Two models namely Tobit and Probit models were employed for estimating loan diversion and loan repayment respectively. The analytical procedure was supported by Stata, the statistical software package. This section describes each of these models whose choice has been mainly motivated by the nature of data.

#### **3.8.1.1 Tobit Model**

The Tobit model was selected because the information on the dependent variable is not found for all observations. According to Gujarati (2004), a sample in which information on the regressand is available only for some observations is known as a censored sample and the appropriate analysis model is Tobit or censored regression model.

Introduced by Tobin (1958), discussed by McDonald and Moffitt (1980), Breen (1996), Johnston and Dinardo (1997), the Tobit model can be presented as:

$$y_t^* = X_t\beta + u_t; \quad t = 1, 2, \dots, N, \quad (3.3)$$

Where  $N$  is the number of observations;  $y_t^*$  denotes the latent dependent variable which is not observable;  $X_t$  denotes vector of factors affecting the dependent variable;  $\beta$  denotes vector of unknown parameters;  $u_t$  denotes residuals that are independently and normally distributed with mean zero and a common variance  $\sigma^2$ . The model assumes that there is underlying, stochastic index equal to  $(X_t\beta + u_t)$  which is observed only when it is positive, and hence qualifies as an unobserved, latent variable:

$$y_t = \begin{cases} X_t\beta + u_t & \text{if } X_t\beta + u_t > 0 \\ 0 & \text{if } X_t\beta + u_t \leq 0 \end{cases} \quad (3.4)$$

Tobit model is also called a censored regression model because it is possible to view the problem as one where observations of  $y^*$  at or below zero are censored. It is an extension of probit model including both discrete and continuous (Johnston and Dinardo, 1997). Combining the contribution for the censored observations, with the contribution for the uncensored ones, the log likelihood function for the tobit model is

$$\sum_{y_t=0} \log\Phi\left(-\frac{X_t\beta}{\sigma}\right) + \sum_{y_t>0} \log\left(\frac{1}{\sigma}\phi\left(\frac{y_t - X_t\beta}{\sigma}\right)\right) \quad (3.5)$$

Where

$\Phi(\cdot)$  denotes the standard normal cumulative distribution function (cdf).

$\phi(\cdot)$  is the standard normal density function.

$\frac{X\beta}{\sigma}$  is the z- score for the area under normal curve

$\sigma$  is the standard error of the error term

The first term is the sum of the logs of probabilities, for the censored observations, while the second is the sum of the logs of densities, for the uncensored observations. This reflects the fact that the dependent variable in a Tobit model has a distribution that is a mixture of discrete and continuous random variables. This fact does not, however, prevent the maximum likelihood estimator for the Tobit model from having the usual properties of consistency and asymptotic normality (Amemiya, 1973).

There are marginal effects of interest after fitting a tobit model (McDonald and Moffitt, 1980; Wooldridge, 2002).

First, the change in probability of being above the limit or the partial effect of an independent variable  $x_j$ , around the probability that  $y > 0$  is

$$\frac{\partial P(y > 0|X)}{\partial x_j} = \left(\frac{\beta_j}{\sigma}\right)\phi\left(\frac{X\beta}{\sigma}\right) \quad (3.6)$$

Where  $\beta_j$  is a vector of Tobit maximum likelihood estimates

Secondly, the change in the expected value conditional upon being above the limit or the elasticity of  $y$  with respect to  $x_j$ , conditional on  $y > 0$  is

$$\frac{\partial E(y|X, y>0)}{\partial x_j} = \beta_j \left\{ 1 - \lambda\left(\frac{X\beta}{\sigma}\right) \left[ \frac{X\beta}{\sigma} + \lambda\left(\frac{X\beta}{\sigma}\right) \right] \right\} \quad (3.7)$$

where  $\lambda(c) = \phi(c)/\Phi(c)$  is the inverse Mills ratio (IMR) for any constant  $c$ .

Third, the change in expected value for all observations or the marginal effect of independent variable on the “unconditional” expected value of  $y$  is

$$\frac{\partial E(y|X)}{\partial x_j} = \Phi\left(\frac{X\beta}{\sigma}\right)\beta_j \quad (3.8)$$

However,  $\beta$  should not be estimated by regressing  $y_i$  on  $x_i$  on the subsample of observations with  $y_i > 0$ , for two reasons. First, the observations with  $y_i = 0$  contain

relevant information on the parameters  $\beta$  and  $\sigma$ , as is clear from the contribution of these observations in the log-likelihood. Second, in the subsample of observations with  $y_i > 0$  the error terms do not have zero mean as they come from a truncated distribution (Heij *et al.*, 2004).

### 3.8.1.2 Probit Model

The probit model was chosen from other similar models such as linear probability and logit models. Linear Probability Model is plagued by several problems such as possibility of the dependent variable lying outside the 0-1 range most importantly it assumes that the mean value of the dependent variable is linearly related with the explanatory variable, that is the marginal effect of the explanatory variable is remaining constant throughout. This seems patently unrealistic (Gujarati, 1995).

The choice of probit against logit model depends on the advantages of the Probit model. It includes believable error term distribution as well as realistic probabilities according to Nagler (1994) cited by Kuwornu *et al.* (2013). Therefore, the Probit model was preferred for the analysis.

Following Goldberger (1964), Maddala (1983), Powers and Xie (1999), an approach of probit analysis model, is to assume that there is an underlying response variable  $y_i^*$  defined by the regression relationship as:

$$y_i^* = \beta'x_i + u_i; \quad i = 1, 2, \dots, N \quad (3.9)$$

Where  $N$  is the number of observations;  $x_i$  represent vector of random variables;  $\beta'$  denotes vector of unknown parameters;  $u_i$  represent a random disturbance term. In practice,  $y_i^*$  is unobservable. What it is observed is a dummy variable  $y$  defined by:

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{Otherwise} \end{cases} \quad (3.10)$$

The likelihood function is;

$$L = \prod_{y_i=0} F(-x_i'\beta) \prod_{y_i=1} [1 - F(-x_i'\beta)] \quad (3.11)$$

Where

$F(\cdot)$  denotes the cumulative distribution function.

The derivative for the probabilities given by Probit model is

$$\frac{\partial \Pr(y_i=1|x_i)}{\partial x_{ik}} = \frac{\partial}{\partial x_{ik}} F(x_i'\beta) = f(x_i'\beta)\beta_k \quad (3.12)$$

Where  $f(\cdot)$  denotes the density function.

This derivative is used for predicting the effects of changes in one of the independent variables on the probability of belonging to a group (Maddala, 1983; Powers and Xie, 1999).

### 3.8.1.3 Test for Multicollinearity

Before fitting the selected variables into the models, it was desirable to sort out the problem of multicollinearity among variables. The reason for this is that the existence of multicollinearity affects seriously the parameter estimation. The pair-wise correlations among regressors, Variance Inflation Factor (VIF) and Tolerance (TOL) were employed as measures of multicollinearity. According to Gujarati (2004), TOL is the inverse of the Variance Inflation Factor (VIF). That is,

$$TOL_j = \frac{1}{VIF_j} = (1 - R_j^2) \quad (3.13)$$

$$\text{Where } VIF_j = \frac{1}{(1 - r_j^2)} \quad (3.14)$$

### 3.8.2 Specification of Econometric Models

One aspect of specification of the models is that loan diversion and loan repayment are assumed to be affected by the same list of independent variables and estimated through Tobit model and Probit model, respectively. The second aspect is that since the qualification of loan diversion as a problem depends on its relationship to loan repayment, loan diversion had been added to loan repayment explanatory variables.

The empirical Tobit model can be specified as follows:

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + u_t \quad (3.15)$$

The empirical Probit model can be specified as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + u_i \quad (3.16)$$

Where  $Y_t$  and  $Y_i$  denote the loan diversion and the loan repayment, respectively;  $\beta_0$  the constant of the model,  $\beta_{1,\dots,12}$  the parameters of variables,  $X_1$  the age of the farmer,  $X_2$  the gender of farmer,  $X_3$  the education level of the farmer,  $X_4$  the main occupation of the farmer,  $X_5$  the off- farm income,  $X_6$  the farm size,  $X_7$  the farm income,  $X_8$  the livestock value,  $X_9$  the loan delay,  $X_{10}$  the credit use,  $X_{11}$  the loan size and  $X_{12}$  the loan diversion,  $u_t$  and  $u_i$  are the error terms of Tobit model and Probit model respectively.

### 3.8.3 Description and Measurement of Variables

The dependent variables are noted as  $Y_t$  and  $Y_i$ . The first dependent variable  $Y_t$  is estimated by Tobit regression model and is ratio scale representing loan diversion rate to unproductive purposes measured as a ratio (volume of loan diverted to total of loan



received) multiplied by 100. The second dependent variable  $Y_i$  is nominal scale to be included in Probit regression model. It is labelled as loan repayment performance and measured by 1 if the loan has been repaid in full on time and 0 otherwise.

The independent variables included in the analysis are:

Age of the borrower ( $x_1$ ): Age is defined as the period measured in years from the respondent's birth to the time of the interview. It is a continuous variable represented by positive integer values. The first assumption in the study is that as the age progress, farmers' acquire experience and knowledge in credit use which in turn might help them to accumulate wealth over time which would enable borrowers to repay their debt in time compared to young borrowers. The second assumption in the study is that as age increases farmers' ability to earn additional income may decrease, because, as the age increases the working capacity of the household is expected to decrease.

Gender of the borrower ( $x_2$ ): This is a dummy variable equal to 1 if the borrower is female and 0 otherwise). This variable is hypothesized that female borrowers' are more loyal to the lenders to repay their loan than male borrowers for they generally more involved in agricultural activities.

Education level of the borrower ( $x_3$ ): It is variable of ordinal scale taking 1 if the borrower is Illiterate, 2 if he attended primary school, 3 if secondary and 4 if Tertiary school level. Education is a social capital, which could impact positively on household ability and well-informed about investment production decisions.

Main Occupation ( $x_4$ ): It is of nominal scale variable and takes 1 if the main occupation of the respondent is a farming activity and 0 otherwise. The farmers who operate in farm sector as main occupation are assumed to be more committed to

agricultural activities and they may refrain from loan diversion and hence the loan default.

Off Farm income ( $x_5$ ): It is defined as the total income generated from off farm sector. It is measured in Burundi Franc. Income generated from off-farm/non-farm activities would back up the farm income and facilitate the loan uses for the projected investment.

Farm size ( $x_6$ ): It refers to the total number of hectares of land owned by the borrower. Farm size is expected to be better-off if augmented with other factors of production and large farm size may give higher produce that may enable the borrower to repay the loan and invest additional other income generating activities. Therefore, if the household accumulate enough wealth the loan may not misused for unintended purposes.

Farm income ( $x_7$ ): This variable is defined as the total amount of cash that specific borrower raised from farm production activities. It is a continuous variable measured in Burundi Franc. Income generated from agricultural activities may help farmers to pay back their debts and to finance the next agricultural season.

Livestock value ( $x_8$ ): This is a continuous variable which represents the value in Burundi Franc of livestock owned by the farmer. Livestock is considered as another asset which is liquid and a security against crop failure. A farmer with higher number of livestock is better-off than those with less number of livestock therefore owning more livestock can help farmers to use the borrowed money on the intended purpose and to repay the loan.

Loan delay ( $x_9$ ): It stands for the number of days between the loan application by the specific borrower and the disbursement of the loan by COSPEC. The basic logic indicated regarding to the delay of credit is, if the borrowers get credit on time, they can purchase the inputs on time and get ready for the new agricultural season dictated by the time.

Credit use ( $x_{10}$ ): This variable represents the number of times that the farmer had borrowed before the loan he/she were repaying until 2016. Farmers who have experience in formal credit used to develop reputation, credit worthiness and they may know well to utilize the loan appropriately.

The loan size ( $x_{11}$ ): This is the total amount of credit that the farmer received from COSPEC. It is assumed that increased loan amount enables the borrowers to generate more income and this leads them to repay their debt on time.

Table 3.2 describes expected signs of variables included into two models.

**Table 3.2 Expected Signs of variables**

Variables	Expected sign in	Expected sign in
	Tobit Model	Probit Model
Age of the borrower ( $x_1$ )	+/-	+/-
Gender of the borrower ( $x_2$ )	-	+
Education level of the borrower ( $x_3$ )	-	+
Main Occupation ( $x_4$ )	-	+
Off Farm income ( $x_5$ )	-	+
Farm size ( $x_6$ )	-	+
Farm income ( $x_7$ )	-	+
Livestock value ( $x_8$ )	-	+
Loan delay ( $x_9$ )	+	-
Credit use ( $x_{10}$ )	-	+
The loan size ( $x_{11}$ )	-	+

**Source: Researcher, 2017**

### **3.9 Ethical Considerations**

During the data collection process, the researcher ensured adherence to the following ethical considerations. Firstly, the researcher applied for permission from the relevant research stakeholders such as Moi University, COSPEC and Government officials (communal administrator, Province Governor). Secondly, the researcher did not force the respondents to participate in the survey but allowed them to participate on their free will. This implied that if any of the respondents felt like withdrawing his/her cooperation to the survey, he/she was free to do so. Thirdly, the researcher had to assure the respondents that interview and data collected would be confidential.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSIONS**

#### **4.0 Overview**

The chapter includes socio-economic characteristics, farm and credit profiles with respect to loan repayment, descriptive analysis of variables and results of econometric model analysis.

#### **4.1 Socio- economic Characteristics of Respondents**

This analysis used the raw data whose copy is attached in Appendix 3.

##### **4.1.1 Age and Gender of Household Head**

The age was defined as the period measured in years from the respondent's birth to the time of the interview. It is shown that from the Table 4.1, loan defaulters are mostly distributed from 30 to 56 years of age while they are less distributed from 57 to 72, which means that loan repayment performance increases with the age of the borrower. Through time, older borrowers have acquired experience in farming and/or credit use and accumulated wealth than younger ones.

Loan non-defaulters and defaulters are not distributed below the age 20 and above 79. At the age below 20, people are so young to think about running business while people aged above 79 are generally rare and without energy of doing a business.

From Table 4.2, only 6.7 percent of respondents were women (11 out of 163) against 93.3 percent of men. This shows gender inequality for which Burundian women's right to inherit land is significantly limited by the Burundian customary law (Ndikumana, 2015). This explanation can hold since the land is the most frequent value used for agricultural loan collateral in COSPEC.

In terms of loan repayment performance, women are more likely to repay their loan in full and on time compared to men. In the sample of 163 respondents, 90.91 percent of the women have fully repaid the loans compared with 69.74 percent of the men. This indicates that women defaulted less than men despite of their small proportion of the total respondents. Attempting to generalise this case, there is a belief among many microfinance specialists that female are better loan payers than male borrowers, taking into consideration their being more entrepreneurial that results from assuming more responsibilities in the internal affairs of a household (Vigano, 1993).

**Table 4. 1 Age and Loan Repayment**

Age	Loan Repayment				Total Frequency
	Defaulters		Non Defaulters		
	Frequency	Percentage	Frequency	Percentage	
23- 29	1	2 %	10	9 %	11
30- 34	7	15 %	16	14 %	23
35- 39	13	28 %	26	22 %	39
40- 44	8	17 %	13	11 %	21
45- 51	7	15 %	22	19 %	29
52-56	7	15 %	6	5 %	13
57-61	2	4 %	9	8 %	11
62-72	2	4 %	14	12 %	16
<b>Total</b>	<b>47</b>	<b>100%</b>	<b>116</b>	<b>100 %</b>	<b>163</b>

Source: Computed from Survey Data, 2017

**Table 4. 2 Gender and Loan Repayment**

Gender	Loan Repayment		Total
	Defaulter	Non Defaulter	
Male	46 30.26 %	106 69.74 %	152 100.00 %
Female	1 9.09 %	10 90.91%	11 100.00 %
Total	47 28.83 %	116 71.17 %	163 100.00 %

Source: Computed from Survey Data, 2017

#### **4.1.2 Education Level**

In terms of education composition, the majority of the respondents' percent have attended the primary education while tertiary education is under represented with the lowest level percent. This is illustrated in table 4.3 where borrowers at primary level represent 70.5 percent of the total borrowers (115 out of 163) and the tertiary education level constitutes 4.3 percent (7 out of 163). The rest is composed by the secondary level with 17.2 percent and the illiterates at the rate of 8 percent. Globally, the number of borrowers decreases with the level of education from primary education. The predominance of the primary level in education of the respondents would be one of the impacts of civil war in Burundi since 1993 which destroyed school buildings and limited the access of young generation to education (BCR, 2011).

The repayment performance is high for the primary education level with the lowest default rate of 24.35 percent, followed by default rate of 28.6 percent for tertiary education level which presented the lowest percentage in the total population. The secondary level makes the third place with 35.7 percent and finally, the illiterate level which comes for the last place with the highest default rate of 53.8 percent. At primary level, a farmer can read and write, which can increase his/her ability to obtain, use the information and hence buy inputs and/or sell the produce at reasonable prices than the illiterates.

**Table 4. 3 Education Level and Loan Repayment**

Education	Loan Repayment		Total
	Defaulter	Non Defaulter	
Illiterate	7 53.85 %	6 46.15 %	13 100.00 %
Primary	28 24.35 %	87 75.65 %	115 100.00 %
Secondary	10 35.71 %	18 64.29 %	28 100.00 %
Tertiary	2 28.57 %	5 71.43 %	7 100.00 %
Total	47 28.83 %	116 71.17 %	163 100.00 %

**Source: Computed from Survey Data, 2017**

#### **4.1.3 Main Occupation**

The survey results in Table 4.4 revealed that most of respondents are primarily involved in farming activities for main occupation. Moreover, 67.5 percent (110 out of 163) are farmers for main occupation whereas the rest, that is 32.5 percent (53 out of 163), work in agriculture sector as a secondary occupation. This interest in agriculture of those who mainly operate out of farm sector may be connected to the fact that their non-farm revenue is no longer sufficient for facing the increasing needs of their family. Or simply, they target the agriculture sector as an important gainful activity.

The repayment performance in main occupation categories is slightly higher for the respondents who mainly work in off farm sector than those who work in farm sector as main occupation. Moreover, 30 percent of borrowers from farm sector have failed to pay back their debts on time while 26.4 percent from off farm sector failed to pay not either. The off farm sector constitute another source of income that the borrower can use to repay the loan when the agricultural project financed by the loan does not generate stable and sufficient income (Fatollahi, 2015; Saleem, 2011).



**Table 4. 4 Main Occupation and Loan Repayment**

Occupation	Loan Repayment		Total
	Defaulter	Non Defaulter	
Off farm	14 26.42 %	39 73.58 %	53 100.00 %
Farm	33 30.00 %	77 70.00 %	110 100.00 %
Total	47 28.83 %	116 71.17 %	163 100.00 %

**Source: Computed from Survey Data, 2017**

## 4.2 Farm Profile

### 4.2.1 Farm Size and Livestock Value

The farm size is one of the primary production factors for the farmer. From table 4.5, the farm size mean is 1.18 hectares for defaulters and 1.75 hectares for non-defaulters. It is then clear that a non-defaulter had more hectares to cultivate on. If augmented with other production factors, large farm size will give higher production that will enable the farmer to repay the loan.

As for livestock, it is a source of cash money that the borrower can use to repay the loan. The mean of livestock value is also high for non-defaulter with 893,018.97 BIF against 619,457.45 BIF for defaulters. It is possible to conclude that, according to this table, higher the livestock and farm size the borrower owns, higher the capacity he/she has to settle loan obligation since the mean is high for non-defaulters and low for defaulters (Bekele *et al.*, 2003). For Selassie (2008), the total land size by non-defaulters was larger than defaulters as well. This was 1.159 hectares for non-defaulters and 0.909 hectare for defaulters.

**Table 4. 5 Farm Size, Livestock Value and Loan Repayment**

Variable	Loan Repayment	Census Size	Mean	Standard Deviation	Standard Error Mean
Farm	Defaulter	47	1.18	1.16	0.17
size	Non Defaulter	116	1.75	2.11	0.2
Livestoc	Defaulter	47	619,457.45	834,434.54	121,714.79
k value	Non Defaulter	116	893,018.97	1,595,613.63	148,149.01

**Source: Computed from Survey Data, 2017**

#### 4.2.2 Farm and Off-farm Income

On average, every defaulter annually earns 1,195,212.77 BIF from the farm activities and 722,822.81 BIF from non-farm activities while a non-defaulter has annually 1,891,922.41 BIF from agriculture against 1,622,418.72 BIF gained from non-farm activities. This is shown in table 4.6.

The difference between the means of incomes denotes the capability of non-defaulters to earn more and repay well the loan than the defaulters. The farm and off farm incomes are high for non-defaulters and low for defaulters. Similarly, Selassie (2008) recognised that non-defaulters earned on the average higher amount of cash from non-farm activities (Birr 2512.94) as compared to the defaulters who earned on the average 1,476.31 Birr while non-defaulters reaped 2,418.6 Birr and defaulters Birr 2,150.05 from sale of crops. The reason for this outcome is that farm and non-farm activities are important income sources for the borrowers.

**Table 4. 6 Farm Income, Off Farm Income and Loan Repayment**

<b>Variable</b>	<b>Loan Repayment</b>	<b>Census Size</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Standard Error Mean</b>
Farm income	Defaulter	47	1,195,212.77	879,692.98	128,316.41
	Non Defaulter	116	1,891,922.41	1,720,732.45	159,765.20
Off farm income	Defaulter	47	722,822.81	954,526.68	139,232.03
	Non Defaulter	116	1,622,418.72	3,135,562.20	291,129.64

**Source: Computed from Survey Data, 2017**

### **4.3 Micro- Credit Profile**

This section includes credit use frequency, loan delay, loan size and loan diversion.

#### **4.3.1 Credit Use Frequency and Loan Delay**

As shown in table 4.7, the mean number of times borrowed (credit use frequency) is different for defaulters and non-defaulters with 2.94 against 1.64 times, respectively. The non-defaulters have borrowed more times than the defaulters. For the delay of loan, the average period of waiting for the loan from the application to the disbursement of the loan vary 61 and 36 days for defaulters and non-defaulters, respectively.

From the high mean in number of times borrowed for non-defaulters, it is assumed that repeat borrower may have acquired more experience from the institution and loan utilization, and hence could effectively repay the loan. On the other hand, the long delay in days for the loan disbursement, may harm the farmer's activities and result in defaulting. For credit use, the result is similar to the findings of Tesfay (2010) who showed that average length of formal credit usage experience of the non-defaulter group is relatively greater than the average length of defaulter group.

With respect to loan delay, Johnson and Rogaly (1997) noted that timeliness of loan disbursement is important when loans are used for seasonal activities such as agriculture. They argued that complicated appraisal and approval procedures, which might delay disbursement, influence a program of seasonal loans for farmers who use to buy inputs. Further, they noted that this could in turn worsen the prospects of repayment by diverting loan to non-intended purpose.

**Table 4. 7 Credit Use, Loan Delay and Loan Repayment**

<b>Variable</b>	<b>Loan Repayment</b>	<b>Census Size</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Standard Error Mean</b>
Credit use	Defaulter	47	1.64	2.06	0.30
	Non Defaulter	116	2.94	2.97	0.28
Loan delay	Defaulter	47	61.02	36.32	5.30
	Non Defaulter	116	36.16	22.12	2.05

**Source: Computed from Survey Data, 2017**

#### **4.3.2 Loan Size**

Table 4.8 shows a high average loan size for defaulters with 974,747.43 BIF against 865,138.14 BIF for non-defaulters, which indicates that defaulters have received a higher loan amount than the non-defaulter.

The fact that the high loan size is high for defaulters means that the risk of defaulting is high for a big amount of loan. Haile (2015) also found that average loan size disbursed were higher for defaulters than non-defaulters but differently from Hundie *et al.* (2004) who reported a highest average credit for non-defaulters.

**Table 4. 8 Loan Size and Loan Repayment**

<b>Loan Repayment</b>	<b>Census Size</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Standard Error Mean</b>
Defaulter	47	974,747.43	757,411.33	110,479.80
Non Defaulter	116	865,138.14	925,744.79	85,953.25

**Source: Computed from Survey Data, 2017**

### 4.3.3 Loan Diversion

This section describes the borrowers in terms of the way they use their loans. In this study, a borrower is a diverter if the full loan has not been used in productive activity. As shown in table 4.9, a farmer, defaulter or not, spent the agricultural loan for non-productive purposes but at different levels.

From the table, it can be seen that on average, a defaulter had diverted more than the non-defaulter. The latter diverted 2.96 percent (the rate of amount diverted to the loan received) whereas the defaulter diverted 16.47 percent. Then, the diversion of the loan to non-productive activities may increase the probability of defaulting. Osifo and Daramola (2016) revealed that only 60.1 percent of the credit obtained were used for arable crops development with about 40 percent of the credit diverted. The proportion of the loan diverted to non-farm operations was quite high and this could affect the farmers' ability to expand their farm holdings, increase in output and income with the resultant inability to repay the credits granted.

**Table 4. 9 Loan Diversion and Loan Repayment**

<b>Loan Repayment</b>	<b>Census Size</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Standard Error Mean</b>
Defaulter	47	16.47	14.00	2.04
Non Defaulter	116	2.96	6.08	0.56

**Source: Computed from Survey Data, 2017**

#### 4.4 Descriptive Analysis of Variables

This section gives an analysis on descriptive statistics of all continuous variables involved in the study. From table 4.10, the minimum value of some variables is zero. This is observed on loan diversion, off farm income, credit use and livestock value for simply meaning that some borrowers diverted nothing, earned nothing from out of the farm, did not borrow before the credit repaid until 2016 and did not own any livestock, respectively.

The mean loan diversion rate of the total sample farmers is 6.85 percent ranging between 0 and 60 percent. These range limits mean that some borrowers could divert nothing or more than the half of loan. The loans have mostly been diverted for the purpose of building houses followed by the payment of school fees (see Appendix 4 for further information), similarly or differently from other loan diversion cases found in other studies. For example, the farmers of Allahabad District (Rohin *et al.*, 2017) and the borrowers of two districts of West Bengal (Banerjee *et al.*, 2015), both cases in India, mostly diverted their loans to daughter's marriage followed by education and to consumption followed by the medical needs, respectively. The average age of household heads is 43.54 years with 23 and 72 years old for the youngest and the oldest, respectively. The average age is located in the 20- 50 age group. Moreover, borrowing tends to be highest among people aged between 20 and 50 when demands on the family budget are greatest: costs of setting up home, getting married and having children are concentrated in these years (PFRC, 2007).

The farm income varies among the sample borrowers from a minimum value of 50,000 BIF to a maximum of 8,700,000 BIF and stands on 1,691,030.67 BIF for the mean, which is largely different from the non-farm income values with a minimum of zero and a high maximum value of 25,000,000 BIF but with a small mean of

1,363,026.03 BIF comparing to the farm income one. For the farmers, the off-farm activities constitute another source of household income other than livestock and crops production and that source is a potential backup option for the loan repayment. The farmer could use it in case of livestock or crop failure. The great credit user had borrowed 13 times while others had not borrowed before their credit repaid until 2016. An average number of credit uses was about 2.56 times.

The survey results also indicate that larger farm size is 13 hectares and 0.02 for the smallest with the average farm size of 1.58 hectares. The land is an important factor in agricultural production of the farmer but its small size denotes the image of subsistence agriculture. The livestock value ranges between 0 and 14,100,000 BIF but the larger standard deviation (1421440.88) denotes an in important gap from the mean of 814,139.26 BIF. This is connected to the fact that livestock is not owned by all respondents.

The descriptive values on credit delay reveals that a borrower had to wait for 43 days from the time of application for the loan to the time of disbursement. The delay of more than a month is long and the farmer needs to be more cautious and apply for the loan early to avoid the delay from the coming agricultural season if the loan has to be allocated to crop production. On the other hand, the delay in credit disbursement may happen due to delayed loan processing as it has been the case for the Ghana Commercial Bank (GCB) (Naana, 2011). In fact, applications for credits in COSPEC are made in its branches and transferred to the central administration where they face the commission screening. As the final approval is only given by one person (the Managing Director), any unavailability of the latter can result in delay of loan disbursement. Finally, the mean of loan size is about 896,743.27 BIF and the fact that the standard deviation is close to the mean with 879,625.86 BIF could indicate a big

gap of some loan sizes from the mean. The size of credit can be an indicator of the farmer's ownership capacity since loan sizes increase with increases in the amount and value of loan collateral offered (Nagarajan and Meyer, 1995). For COSPEC rule, the loan size must be equal or less than the value of collateral.

**Table 4. 10 Summary of Descriptive Statistics**

<b>Variables</b>	<b>Census Size</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
Loan diversion	163	0.00	60.00	6.85	10.93
Age	163	23.00	72.00	43.54	11.09
Farm income	163	50,000.00	8,700,000.00	1,691,030.67	1,556,228.22
Off farm income	163	0.00	25,000,000.00	1,363,026.03	2,721,237.12
Credit use	163	0.00	13.00	2.56	2.79
Farm size	163	0.02	13.00	1.58	1.89
Livestock value	163	0.00	14,100,000.00	814,139.26	1,421,440.88
Loan delay	163	5.00	180.00	43.32	29.15
Loan size	163	37,500.00	5,000,000.00	896,743.27	879,625.86
Valid N (listwise)	163				

**Source: Field Survey, 2017**

#### **4.5 Results of Econometric Model Analysis**

This section includes diagnostic tests of the analysis models, interpretation of the results and the testing of research hypotheses.

##### **4.5.1 Diagnostic Tests of the Models**

For the econometric estimation to bring about best, unbiased/reliable and consistent results, a number of tests have to be run to ensure that there is goodness of fit of the



model and that basic linear classical assumptions are not violated. The basic assumptions include normality, homoscedasticity and no multicollinearity.

#### **4.5.1.1 Multicollinearity Test Results**

The existence of multicollinearity might cause the estimated regression coefficients to have the wrong signs and smaller t- ratios that might lead to drawing the wrong conclusions. It arises when at least one of the independent variables is perfect or an exact linear relationship with the other independent variable (Gujarati, 2004). Thus, before and after running the tobit and probit models, the hypothesized explanatory variables were checked for any existence of multicollinearity problem.

The pair- wise correlations among regressors, Variance Inflator Factor (VIF) and TOLerance (TOL) have been considered as measures of multicollinearity. The rule is that if the pair-wise or zero order correlation coefficient between two regressors is high, say, in excess of 0.8, then multicollinearity is a serious problem (Gujarati, 2004). The Table 4.11 shows different pair- wise correlation coefficients among all explanatory variables.

On the other side, the closer is  $TOL_j$  to zero, the greater the degree of collinearity of that variable with the other regressors while if the VIF of a variable exceeds 10, that variable is said be highly collinear (Gujarati, 2004).

The TOL and VIF values are presented on table 4.12. Based on the pair- wise correlations values whose the highest is 0.49, the TOL and VIF ones whose the smallest and the highest are 0.59 and 1.69 respectively, the data were found to have no problem of multicollinearity (Gujarati, 2004). Therefore, all explanatory variables were retained for the models.

Table 4.11 gives what is called the correlation matrix. In this table, the entries on the main diagonal (those running from the upper left- hand corner to the lower right- hand corner) give the correlation of one variable with itself, which is always 1 by definition, and the entries off the main diagonal are the pair- wise correlations among the variables. The first column of this table gives the correlation of loan diversion with the remaining variables. For example, 0.1978 is the correlation coefficient between loan diversion and age, -0.0412 is the correlation between loan diversion and gender, and so on.

As it is shown, some of these pair- wise correlations are quite low, showing a weak correlation between variables. It is for example the case for 0.006 between age and livestock and 0.007 between gender and loan delay. Some pair- wise correlations indicate positive correlations while some others show negative correlations. For example, farm income is positively correlated with farm size with a coefficient of 0.316 while the coefficient value of -0.209 shows that occupation is negatively correlated with loan size.

**Table 4. 11 Pair- wise Correlation Coefficients among Explanatory Variables**

	Loan diversion	Age	Gender	Education	Occupation	Farm income	Off Farm Income	Credit use	Farm size	Livestock value	Loan delay	Loan size
Loan diversion	1.000											
Age	0.1978	1.000										
Gender	-0.0412	0.053	1.000									
Education	-0.0654	-0.139	-0.0374	1.0000								
Occupation	0.0723	0.075	-0.022	-0.472	1.000							
Farm income	-0.037	-0.087	-0.140	-0.125	0.084	1.000						
Off farm income	-0.122	-0.019	-0.023	0.240	-0.495	0.061	1.000					
Credit use	-0.133	0.205	-0.107	0.238	-0.179	0.099	0.185	1.000				
Farm size	-0.072	0.027	-0.128	-0.062	-0.086	0.316	0.066	0.133	1.000			
Livestock value	0.096	0.006	-0.152	-0.047	-0.045	0.336	0.107	0.131	0.149	1.000		
Loan delay	0.249	-0.066	0.007	-0.067	0.119	-0.129	-0.122	-0.270	-0.087	0.019	1.000	
Loan size	0.052	-0.005	-0.229	0.092	-0.209	0.254	0.316	0.056	0.214	0.117	0.028	1.000

**Source: Computed from Survey Data, 2017**

**Table 4. 12 Tolerance and Variance Inflation Factor of Explanatory Variables**

<b>Variable</b>	<b>VIF</b>	<b>TOL</b>
Occupation	1.69	0.59
Off farm income	1.47	0.68
Education	1.42	0.70
Farm income	1.38	0.72
Loan size	1.30	0.77
Credit use	1.30	0.77
Livestock value	1.20	0.84
Age	1.19	0.84
Farm size	1.18	0.84
Loandelay	1.18	0.85
Loan diversion	1.18	0.85
Gender	1.11	0.90
Mean VIF	1.30	

**Source: Computed from Survey Data, 2017**

#### **4.5.1.2 Goodness of Fit, Normality and Homoscedasticity**

The goodness of fit of a model measures how well the model describes the response variable. Assessing goodness of fit involves investigating how close values predicted by the model are to the observed values (Bewick *et al.*, 2005).

Likelihood ratio chi- square test for Tobit model and Wald chi- square for Probit model both show that at least one of the predictors' coefficients is not equal to zero at less than 1 percent level of significance. For Probit regression, two diagnostic tests, Hosmer-Lemeshow and Receiver Operating Characteristic (ROC) curve were run for measuring the effectiveness with which the model describes the outcome variable. The advantage of the Hosmer- Lemeshow type tests is that they are based on groupings of the estimated probabilities that are intuitively appealing and easily understood by subject matter scientists (Hosmer *et al.*, 1997). In practice, the ROC performs very well and is often used when a general measure of predictiveness is desired and its graphs are useful for organizing classifiers and visualizing the performance (Fawcett, 2006).

The Hosmer-Lemeshow tests the null hypothesis that predictions made by the model fit perfectly with observed group memberships. Cases are arranged in order by their predicted probability on the criterion variable. These ordered cases are then divided into ten (usually) groups of equal or near equal size ordered with respect to the predicted probability of the target event. For each of these groups, the predicted group memberships and the actual group memberships are then obtained. This results in a 2 by 10 contingency table. A Chi-square statistic is computed comparing the observed frequencies with those expected under the model. A non-significant Chi-square indicates that the data fit the model well (Hosmer and Lemeshow, 2000).

The output of Hosmer- Lemeshow test is presented in Table 4.13. The value of the Hosmer- Lemeshow goodness of fit statistic is 11.20 and the corresponding *p-value* computed from the chi- square distribution with eight degrees of freedom is 0.1904. The null hypothesis that the probit model fits is not rejected, which indicates that the probit model fits well.

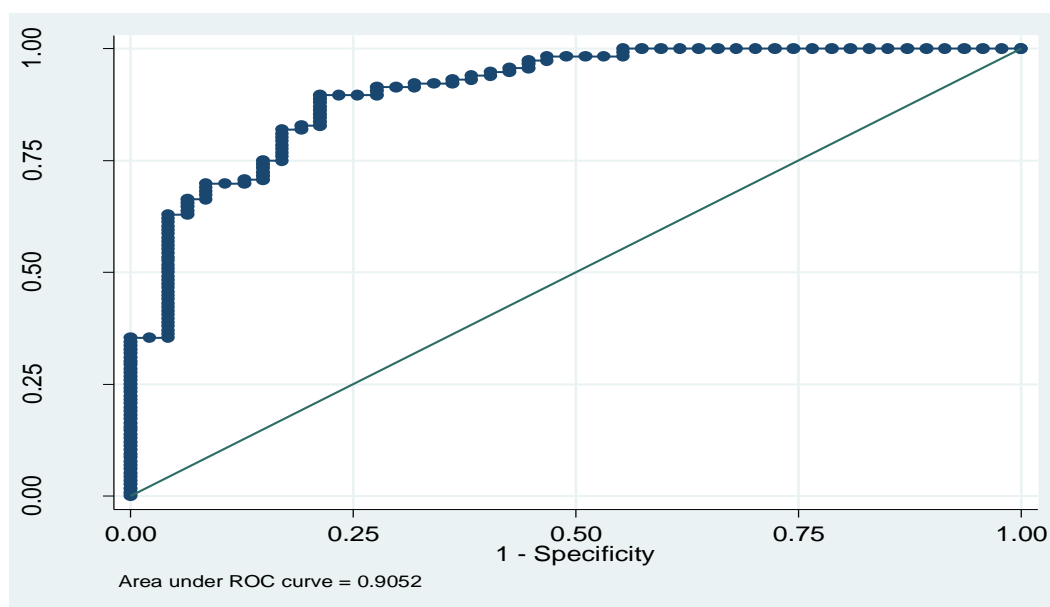
**Table 4. 13 Test of Hosmer- Lemeshow**

<b>Probit Model for Loan Repayment, Goodness of Fit Test</b> (Table Collapsed on Quantiles of Estimated Probabilities)						
Group	Probability	Observed_1	Expected_1	Observed_0	Expected_0	Total
1	0.0804	0	0.4	17	16.6	17
2	0.4404	6	4.3	10	11.7	16
3	0.6373	6	8.8	10	7.2	16
4	0.7886	15	12.4	2	4.6	17
5	0.8458	12	13.3	4	2.7	16
6	0.8978	14	14.0	2	2.0	16
7	0.9525	17	15.8	0	1.2	17
8	0.9677	14	15.4	2	0.6	16
9	0.9898	16	15.7	0	0.3	16
10	0.9999	16	15.9	0	0.1	16
Number of Observations		= 163				
Number of Groups		= 10				
Hosmer-Lemeshow $\chi^2(8)$		= 11.20				
Prob > $\chi^2$		= 0.1904				

**Source: Computed from Survey Data, 2017**

Another test run for goodness of fit is the Receiver Operating Characteristic (*ROC*) curve.

A better and more complete description of classification accuracy is the area under the *ROC* curve. It plots the probability of detecting true signal (sensitivity) and false signal ( $1 - \text{Specificity}$ ) for an entire range of possible cut points. The area of *ROC* curve, which ranges from zero to one, provides a measure of model's ability to discriminate between those subjects who experience the outcome of interest versus those who do not (Hosmer and Lemeshow, 2000). The quality of discrimination depends on the level of the area under *ROC* curve and as a general rule, the discrimination does not exist if  $ROC = 0.5$ , it is acceptable if  $0.7 \leq ROC < 0.8$ , excellent if  $0.8 \leq ROC < 0.9$  and outstanding if  $ROC \geq 0.9$  (Hosmer and Lemeshow, 2000). The figure 4.1 presents the output of (*ROC*) curve test. The probit regression model offers the area under *ROC* of 0.9052. Hence, the model qualifies for outstanding discrimination.



#### **Probit model for loan repayment:**

Number of observations: 163

Area under ROC curve: 0.9052

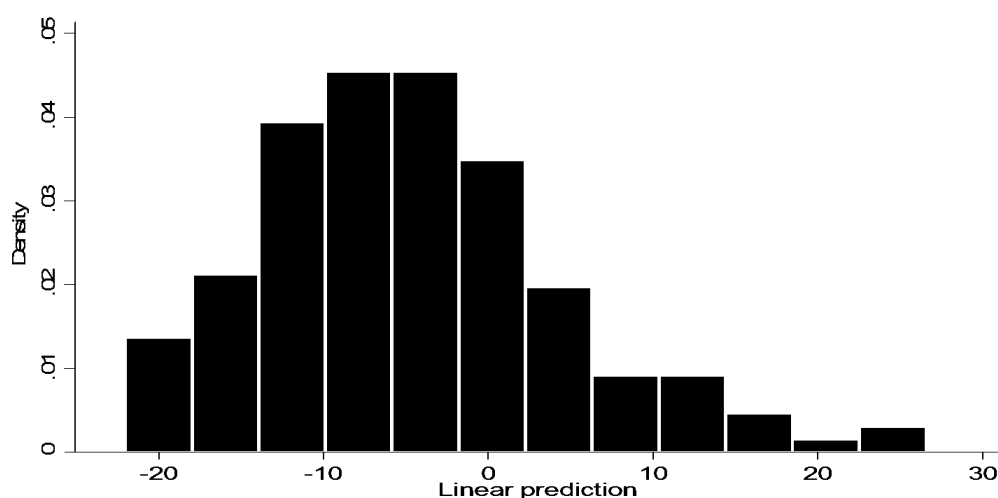
#### **Figure 4. 1 Test of ROC Curve**

**Source: Computed after Probit Regression, 2017**

The Tobit model relies crucially on normality and homoscedasticity assumptions (Cameron and Trivedi, 2009). Therefore, normality test of histogram of residuals and white test were applied for checking any violation of those assumptions. With the assumption that the error terms  $u_t$  follow the normal distribution, the estimators are unbiased, efficient and consistent. Likewise, the disturbances  $u_t$  appearing in the population regression function are homoscedastic; that is, they all have the same variance if not there is heteroscedasticity problem. Heteroscedasticity does not destroy the unbiasedness and consistency properties but the estimated parameters are no longer efficient, not even asymptotically (large sample size). This lack of efficiency makes the usual hypothesis-testing procedure of dubious value. It is always a good practice to plot

the histogram of the residuals as a rough and ready method of testing for the normality assumption and white test is a test of pure heteroscedasticity (Gujarati, 2004).

As the residuals from loan diversion in figure 4.2 seem to be symmetrically distributed, the hypothesis that the error terms are normally distributed cannot be rejected (Gujarati, 2004). Furthermore, since the white test statistic is not statistically significant with 0.99 of *p value*, the null hypothesis of homoscedasticity in table 4.14 cannot be rejected.



**Figure 4. 2 Histogram of Residuals for Normality Test**  
Source: Computed after Tobit regression, 2017

**Table 4. 14 White Test for Heteroscedasticity Diagnosis**

White Test for $H_0$ : Homoskedasticity against $H_a$ : Unrestricted heteroskedasticity			
Chi <sup>2</sup> (75) = 49.46			
Prob > Chi <sup>2</sup> = 0.9900			
Cameron and Trivedi's decomposition of IM- Test			
Source	Chi <sup>2</sup>	Degree of Freedom	Probability
Homoskedasticity	49.46	75	0.9900
Skewness	13.18	11	0.2815
Kurtosis	1.73	1	0.1887
Total	64.37	87	0.9671

Source: Computed after Tobit regression, 2017



## **4.5.2 Interpretation of Results**

This section includes loan diversion estimation, loan repayment estimation and hypotheses testing.

### **4.5.2.1 Loan Diversion Estimation**

Loan diversion was estimated using Tobit model. According to the results from Table 4.15, the probability of getting the Likelihood Ratio Chi-square test (LR  $\text{Chi}^2(2)$ ) is significant at 1 percent level which allows the rejection of the null hypothesis for which all of the regression coefficients are simultaneously equal to zero. Thus, there is significant effect between loan diversion and at least one of independent variables. Three out of eleven explanatory variables namely age, off farm income and loan delay were found to be significant at 1 percent, 10 and 5 percent levels respectively.

In interpreting the results of a Tobit model, the magnitude of change in the dependent variable due to a unit change in the independent variable is examined through two kinds of marginal effects as shown in the table 4.16. Hence, the age of the household head significantly and positively affects the loan diversion at 1 percent level. It means that older farmers are more likely to divert loan than younger farmers. Higher the number of years for age, the higher the loan level diverted. In other words, an increase of one year in age leads to the increase of loan diversion rate by 21 percent while the probability of diverting the loan also increases by 1 percent. This result is in line with the prior expectation and is consistent with the findings of Hamidi and Sabbaghi (2016) who stated that aging leads to diversion of the loan to non-agricultural sectors. Another similar finding indicated a positive association between age of household head and the odds of diverting the loan use (Khaleque, 2010). A positive relationship between age and loan

diversion would imply that as people get older, their ability to effectively use finance and generate income declines (Kebede, 2006).

Loan delay is also positively associated to loan diversion. At 5 percent level of significance, this positive relationship means that increasing days in loan delay encourages the farmers to divert their loan to unproductive activities. In terms of figures, a day increased in delay of the loan results in increase of loan diversion rate by 6.6 percent with the probability of diverting the loan by 0.3 percent. The similar result was found by Tesfay (2010) who reported that timely credit service had important influence for proper credit utilization by increasing the probability of properly utilizing the loan for production and income generating activities. The timeliness of credit helps farmers to use the loan in intended ways. A positive relationship would mean that the disbursement of the loan to the farmer delays until the new agricultural season starts. Unable to make up the delay, he/she falls under high risk of diverting the part or the total funds.

Finally, unlike the age and loan delay, the off farm income has a negative and significant effect on loan diversion at 10 percent. The relative marginal effect indicates that loan diversion rate will decrease by 24.8 percent for a unit increase in the non-farm income. A unit increase in off farm income will decrease the probability of diverting the loan by 1.2 percent. The off farm income also remains in the line of expectation by negatively influencing the loan diversion. With this trend, it is understood that a borrower who owns an important source of income beside the agricultural one, is not probably under the risk of diverting the loan to non-productive purposes. Lemita (2014) and Abafita (2003) also came up with similar results stating that income from other sources were found to be negatively related to loan diversion. The relative implication is that if the borrower has

other source of income, he/she may not spend the credit to non- productive activities. He/she may not be tempted to divert the loan to other purposes, since he/she has enough income to devote on them.

**Table 4. 15 Tobit Regression Results for Loan Diversion**

<b>Loan Diversion</b>	<b>Coefficient</b>	<b>Standard Error</b>	<b>t</b>	<b>P&gt;t</b>
Age	.5157124*	.1727735	2.98	0.003
Gender	-7.175379	8.180762	-0.88	0.382
Education	-.6614532	3.497302	-0.19	0.850
Occupation	-5.156177	5.23158	-0.99	0.326
Farm income	.8914907	2.4654	0.36	0.718
Off farm income	-.6042134***	.3551954	-1.70	0.091
Credituse	-.9943986	.7528773	-1.32	0.189
Farmsize	-1.166445	1.077286	-1.08	0.281
Livestock value	.3463766	.406433	0.85	0.395
Loandelay	.1600067**	.0638505	2.51	0.013
Loansize	1.960684	2.248134	0.87	0.385
Constant	-60.19767	41.51053	-1.45	0.149
/sigma	19.82331	1.957039		
Obs. summary:	97	left-censored observations at	ldiversion<=0	
	66	uncensored observations		
Tobit estimates	Number of obs	=	163	
	LR Chi <sup>2</sup> (11)	=	24.93	
	Prob > Chi <sup>2</sup>	=	0.0093	
Log likelihood = -344.537	Pseudo R <sup>2</sup>	=	0.0349	

Note: \*Significant at 1 percent and \*\*significant at 5 percent and \*\*\*significant at 10 percent

Source: Tobit Output from Survey Data, 2017

**Table 4. 16 Marginal Effects of Tobit Estimates for Loan Diversion**

<b>Unconditional Expected Value</b>				
<b>Loan diversion</b>	<b>dF/dx</b>	<b>Standard Error</b>	<b>z</b>	<b>P&gt; z </b>
Age	.2119252	.070999	2.98	0.003
Gender	-2.526553	3.361777	-0.75	0.452
Education	-.2718155	1.43717	-0.19	0.850
Occupation	-2.211532	2.149849	-1.03	0.304
Farm income	.3663464	1.013124	0.36	0.718
Off farm income	-.2482936	.1459629	-1.70	0.089
Credit use	-.4086351	.3093851	-1.32	0.187
Farm size	-.4793352	.4426964	-1.08	0.279
Livestock value	.1423389	.1670183	0.85	0.394
Loan delay	.0657526	.0262385	2.51	0.012
Loan size	.8057174	.9238414	0.87	0.383
<b>Probability Uncensored</b>				
<b>Loan Diversion</b>	<b>dF/dx</b>	<b>Standard Error</b>	<b>z</b>	<b>P&gt; z </b>
Age	.0101189	.00339	2.98	0.003
Gender	-.1336353	.1605171	-0.83	0.405
Education	-.0129786	.0686216	-0.19	0.850
Occupation	-.1018286	.1026504	-0.99	0.321
Farm income	.0174922	.0483743	0.36	0.718
Off farm income	-.0118554	.0069694	-1.70	0.089
Credit use	-.0195114	.0147724	-1.32	0.187
Farm size	-.0228872	.0211377	-1.08	0.279
Livestock value	.0067964	.0079747	0.85	0.394
Loan delay	.0031395	.0012528	2.51	0.012
Loan size	.0384712	.0441113	0.87	0.383

**Source: Computed after Tobit regression, 2017**

#### 4.5.2.2 Loan Repayment Estimation

The link between loan repayment and explanatory variables was investigated through Probit model. The results indicate that some of the explanatory variables included in the probit regression model, explain the variation in the dependent variable. This is illustrated by the value of 52.81 significant at 1 percent for the Chi square ( $\chi^2$ ).

As shown in table 4.17, five out of twelve explanatory variables were significant. Loan diversion, farm income and loan delay significantly affected loan repayment at 1 percent

of significance level ( $p \leq 0.01$ ), loan size at 5 percent level ( $p < 0.05$ ) and gender at 10 percent ( $p < 0.10$ ).

Table 4.17 shows the significance and the change direction of the parameters. But the magnitude of change in the dependent variable due to a unit change in the explanatory variable is obtained through the marginal effects presented in the Table 4.18. The first variable which significantly influences the loan repayment is loan diversion to non-productive activities. In this study, the problem of loan diversion to unproductive activities depends on the nature of its relationship with the loan repayment. This is why it has been previously analysed as dependent variable for assessing its predictors and now as independent variable of loan repayment for exploring its relationship with the loan repayment. Then, the result is that loan diversion strongly and negatively affects the loan repayment. It is significant at 1 percent and negatively related to loan repayment, which simply means that more the borrower diverts the loan to non-productive activities, the lower the probability that the borrower will repay the loan in full. More precisely, other things being the same, an increase of a unit in the loan diversion leads to a decrease of probability of loan repayment performance by 1.8 percent.

This result is consistent with the finding of Abafita (2003) who found that the use of diverted funds for non-income generating purposes is significant and negatively related to loan repayment performance. Pasha and Negese (2014) also found to be that loan diversion significantly influences the borrowers' loan repayment performance negatively. However, Garomsa (2017) found the result which appears to be going in the opposite direction by reporting that loan utilization for the intended purpose was found to be

negatively influencing the repayment performance of borrowers, which was in contrast to what was expected.

The implication of negative association between loan diversion and loan repayment is that the borrower diverts the loan to non-income generating activities and fails to get the sufficient and regular income for facing the periodic repayment which finally leads to loan default. The one of major causes of loan diversion is likely connected to the high demographic dependency ratio which is at 100.8 percent in Cibitoke (BCR, 2011). This means that around 101 economically inactive people are supported by 100 economically active people, which could influence the increase of household expenses and then, the diversion of loan as an alternative to adapt.

Loan delay strongly affects the credit repayment at 1 percent of significance level, as well. The negative slope coefficient shows that a change unit in loan delay leads to a decrease of probability to repay the loan in full by 0.3 percent. It simply means that the higher the number of days between the loan application and disbursement, the lower the probability of repaying the loan on required time. As expected, the loan delay expressed in number of days that the borrower has to wait from the application to the access on loan is negatively associated with the loan repayment. This result is consistent with the finding of Nawai and Shariff (2012) who pointed that loan disbursement lag has significantly and negatively affected borrower's repayment performance. However, this result was not in the line with the finding of Pasha and Negese (2014) who found that the time laps between loan application and disbursement was positively and significantly influencing borrower's loan repayment performance. The justification of negative relationship to loan repayment can be found in the fact that the farmer can no longer adapt to agricultural

season if the latter starts before he/she gets the access to the loan. Agricultural season is dictated by the time and a lack of timeliness of loan as main production factor can harm the agricultural activities and result in loan default.

Income from farming activities is another variable that significantly influences the loan repayment at 5 percent level. The positive association between farm income and loan repayment reveals that for a unit increase in farm income, the probability of becoming non-defaulter also increases by 8 percent at 5 percent of significance level. Thus, farm income has a positive effect on loan repayment as expected. This finding likely arises from the fact that the farm income is the immediate source of capital for smallholder farmers to use for repayment. Hence, higher revenue may lead to better repayment capacity of the borrower than the lower income. This result are similar to the findings of Mekonnen (2015) where the income from activities financed by the loan (farming activities) positively and significantly affected loan repayment performance of the women. Oni *et al.* (2005) got a negative effect of farm income on loan repayment, which was not expected.

Loan size has also been found to be significant variable at 5 percent of level. Since the association between this variable and the dependent variable is negative, it means that the higher the loan size, the higher the risk or the probability of defaulting. In other terms, a positive variation of a unit in loan size corresponds to a decrease of likelihood of fully repaying the loan on time by 7.4 percent. The prior expectation is not met for loan size. Instead of being positively related to loan repayment, the loan size shows a negative effect, which proves that the higher the loan size, the higher the risk of defaulting. This result complies with the result obtained by Lemita (2014) and Abafita (2003) who

concluded that loan amount is significant factor that undermines the repayment performance but contradicts the findings of Belay and Belay (1998) and Hundie *et al.* (2004) who found that the amount of formal loan that the sample household received had a significant positive effect on loan repayment. The implication of this negative relationship would be that the amount of loan may exceed what the farmer needs and can handle, it is more of a burden than help, thereby undermining repayment performance. Or, in case of failure of a project financed by the loan, the larger amount of money is likely more difficult to reimburse than smaller amount.

Finally, the gender positively affects the loan repayment and has got the same sign as the prior expectation. The positive relationship significant at 10 percent denotes that women are good payers. The slope coefficient of marginal effect shows that being female borrower increases the probability of repaying the loan in full by 18 percent. In other words, for a discrete change in the dummy variable of gender from 0 to 1, the probability of loan repayment performance increases by 17.9 percent. The high performance in loan repayment among women may be explained by the fact that females are more responsible for home management and hence may fear more than males regarding the punishments arising from loan default (Bekele, 2001). This result agrees with the findings of Gebeyehu (2002) and Malimba (2009) who reported that being male borrower is undermining factor of the loan recovery performance of projects. Contrarily, Ugbomeh *et al.* (2008) and Wongnaa and Awunyo-Vitor (2013) got the different result by finding that women as household heads negatively and significantly affected the loan repayment performance of women farmers.



**Table 4. 17 Probit Regression Results for Loan Repayment**

<b>Loan Repayment</b>	<b>Coefficients</b>	<b>Robust Standard Errors</b>	<b>z</b>	<b>P&gt; z </b>
Loan diversion	-.0986611*	.0173175	-5.70	0.000
Age	.0237422	.0157349	1.51	0.131
Gender	.9883247***	.508163	1.94	0.052
Education	.111836	.2382383	0.47	0.639
Occupation	-.0638516	.3352338	-0.19	0.849
Farm income	.4415521*	.1723177	2.56	0.010
Off farm income	.0133143	.0261561	0.51	0.611
Credit use	.048715	.0642998	0.76	0.449
Farm size	.0837719	.0879865	0.95	0.341
Livestock value	-.0056182	.0255929	-0.22	0.826
Loan delay	-.0178759*	.0052738	-3.39	0.001
Loan size	-.409445**	.1699276	-2.41	0.016
Constant	-.1740184	3.122255	-0.06	0.956
Probit regression		Number of obs =	163	
		Wald Chi <sup>2</sup> (12) =	52.81	
		Prob > chi <sup>2</sup> =	0.0000	
Log pseudolikelihood = -53.599755		Pseudo R <sup>2</sup> =	0.4525	

**Note:**\*significant at 1 percent, \*\*significant at 5 percent and \*\*\*significant at 10 percent

**Source: Probit Model Output from Survey Data, 2017**

**Table 4. 18 Marginal Effects after Probit Regression for Loan Repayment**

<b>Loan Repayment</b>	<b>dy/dx</b>	<b>Standard Error</b>	<b>z</b>	<b>P&gt; z </b>
Loan diversion	-.0179062	.0021964	-8.15	0.000
Age	.004309	.0027296	1.58	0.114
Gender	.1793732	.0947203	1.89	0.058
Education	.0202974	.0429467	0.47	0.636
Occupation	-.0115886	.0607923	-0.19	0.849
Farm income	.0801382	.0300717	2.66	0.008
Off farm income	.0024164	.0047827	0.51	0.613
Credit use	.0088414	.0117061	0.76	0.450
Farm size	.0152039	.0156447	0.97	0.331
Livestock value	-.0010197	.0046526	-0.22	0.827
Loan delay	-.0032443	.000909	-3.57	0.000
Loan size	-.0743111	.0296522	-2.51	0.012

**Source: Computed from Survey Data, 2017**

#### 4.5.2.3 Hypotheses Testing

The first hypothesis suggested that age, gender, education level, main occupation and off farm income do not significantly affect loan diversion and loan repayment. The hypothesis was not supported by the study findings which significantly linked age, off farm income to loan diversion and gender to loan repayment. The study findings revealed that age and off farm income had coefficients of 0.212 with *p value* of 0.003 less than 0.01 percent and -.248 with *p value* of 0.089 less than 0.10 respectively. Gender had coefficient of .179 associated to a *p value* of 0.058 less than 0.10. Hence, the first null hypothesis was rejected since age and off farm income had a significant effect on loan diversion and gender on loan repayment. Age and off farm income significantly influences loan diversion while gender significantly affects loan repayment. Gender, education level, main occupation do not significantly affect loan diversion while age, education level, main occupation, off farm income do not significantly explain the loan repayment.

The second hypothesis stipulated that farm income, farm size and livestock value do not significantly affect loan diversion and loan repayment. Study findings showed a coefficient of .080 with a *p value* of 0.008 less than 0.01 of significance level for farm income. Hence, the second null hypothesis was rejected for farm income with respect to loan repayment. Farm income significantly affects loan repayment. However, farm

income, farm size and livestock value do not significantly affect loan diversion while farm size and livestock value do not significantly affect loan repayment.

The third hypothesis suggested that loan size, credit use and loan delay do not significantly affect loan diversion and loan repayment. The findings revealed that the loan delay coefficients of .066 associated to *p value* of 0.012 less than 0.05 with regard to loan diversion and -.003 with 0.000 of *p value* less than 0.01 in respect of loan repayment. The coefficient and *p value* of loan size as regards loan repayment are -.074 and 0.012 (less than 0.05) respectively. Hence, the third null hypothesis was rejected since loan delay had a significant effect on both loan diversion and loan repayment. Loan size was also significantly linked to loan repayment. Loan delay significantly affects loan diversion and loan repayment while loan size significantly affects loan repayment. Credit use does not significantly affect loan diversion and loan repayment while loan size does not either affect loan diversion.

The fourth hypothesis suggested that loan diversion does not significantly affect loan repayment. The study findings showed that loan diversion had a coefficient of -.017 associated to a *p value* of 0.000 less than 0.01. Thus, the fourth null hypothesis is rejected. Loan diversion significantly affects loan repayment.

**Table 4. 19 Hypotheses Test Results**

<b>Loan Diversion</b>	
<b>Hypotheses</b>	<b>Test Decision</b>
Age, gender, education level, main occupation and off- farm income do not significantly affect the farmers' loan diversion	Rejected
Farm income, farm size and livestock value do not significantly affect the farmers' loan diversion	Accepted
Loan size, credit use and loan delay do not significantly affect the farmers' loan diversion	Rejected
<b>Loan Repayment</b>	
<b>Hypotheses</b>	<b>Test Decision</b>
Age, gender, education level, main occupation and off- farm income do not significantly affect the farmers' loan repayment performance	Rejected
Farm income, farm size and livestock value do not significantly affect the farmers' loan repayment performance	Rejected
Loan size, credit use and loan delay do not significantly affect the farmers' loan repayment performance	Rejected
Loan diversion does not significantly affect loan repayment performance	Rejected

**Source: Survey Data, 2017**

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.0 Overview

The Chapter presents the summary of findings, conclusions, recommendations of this study and the areas suggested for further research.

#### 5.1 Summary of Findings of the Study

The objective of this study was to analyse the factors that affect loan diversion and loan repayment performances. The primary data was collected using a structured questionnaire to interview 163 farmers whose 116 non- defaulters and 47 defaulters were selected among borrowers drawn from eight branches of COSPEC. Both descriptive and inferential statistics were carried out to attain the above-mentioned objective.

The descriptive statistics showed that loan defaulters were mostly distributed from 30 to 56 years of age while they were less distributed from 57 to 72. The access of women on credit was very limited with only 6.7 percent of women against 93.3 percent of men among all the sample respondents. The majority of respondents have attended the primary school (70.5 percent) while those who attended the tertiary level represent the lowest share (4.3 percent). Most of the respondents are primarily involved in farming

activities for main occupation at 67.5 percent whereas the rest (32.5 percent) works in agriculture sector as a secondary occupation.

In terms of loan repayment, the results showed that the non-defaulters have a better performance than defaulters. The repayment performance is high for the primary education level with the lowest default rate of 24.3 percent followed by default rate of 28.6 percent for tertiary education level. The illiterates come for the last place for their highest default rate of 53.8 percent. The repayment performance in main occupation categories is higher for the respondents who mainly work in off farm sector than those who work in farm sector as main occupation with the default rates of 26.4 and 30 percent, respectively. On average, the non-defaulter has borrowed many times than the defaulter and the average period of waiting the loan from the application to the disbursement of the loan are 61 to 36 days for defaulters and non-defaulters, respectively. The defaulter has diverted more than the non- defaulter with 2.96 percent and 16.47 percent, respectively.

The non-defaulters group is economically well off than the defaulter group. The income generated from farm and non-farm activities of the non-defaulters is higher than the income generated by the defaulters. Similarly, the value of livestock and farm size owned by the non-defaulters is greater than the value of livestock and the size of farm owned by

the defaulters. However, a loan defaulter had received a higher loan size than the non-defaulter.

Regarding the econometric analysis result, three out of eleven and five out of twelve independent variables had a significant effect on loan diversion and loan repayment performance of sampled borrowers, respectively. One of these variables influences both loan diversion and loan repayment. The Tobit regression model showed that at 1 percent, the variable age significantly and positively affects the borrowers' loan diversion simply meaning that the higher the age of the borrower the higher the amount of loan diverted to unproductive activities. At 5 percent level, the loan delay effect is also found to be significant and positive on loan diversion, which indicates that delaying the disbursement of the loan increases the level of loan diversion. The off farm income is the third determinant of loan diversion at 10 percent level and with negative effect. This proved that increased off farm income decreases the amount percent diverted. In other words, sustaining a non- farm income prevents from the diverting the loan.

On the other hand, the Probit regression model results revealed that the loan diversion significantly affects the loan repayment negatively. The higher the loan diversion rate the lower the loan repayment performance. Loan delay was found to negatively explain the loan repayment performance as well. An increase of days in processing the loan leads to a

decrease of chance to pay the loan in full at 1 percent level of significance. The farm income is also found as a determinant of loan repayment at 1 percent. With positive effect, the increased amount of farm income also results in increase of probability to pay back the loan on required date. The loan size is found to be significantly and negatively associated with loan repayment at 5 percent level of significance. The negative relationship indicates that increasing the size of loan disbursed to the farmers results in increase of probability to default and hence, it is not an efficient option. Gender was the final variable that explained the loan repayment performance at 10 percent level. Its significant and negative effect on loan repayment means that being female increases the likelihood to repay the loan in full.

## **5.2 Conclusions**

Age and loan delay significantly and positively influence loan diversion. The implication of this result is that aged borrowers and the delay in loan disbursement are the causes which encourage the loan diversion problem. However, off farm income negatively affects loan diversion which means that having a supplementary income from non agricultural job constitutes a way of solution to loan diversion.

Loan diversion negatively affects loan repayment. Diverting the agricultural loan to unproductive purposes constitutes a threat to its repayment performance. The negative effect on loan repayment performance is also found from the size of loan disbursed and



the time that the applicant waits until to the access of the loan requested. Loan size and loan delay significantly and negatively affect loan repayment performance. Therefore, loan size and loan delay are favorable factors of loan default.

However, farm income and gender significantly and positively affect loan repayment performance. The income from agricultural activities constitutes for the farmer, the factor which encourages the loan repayment performance while female borrowers are good payers than male ones despite their low proportion in the total respondents.

### **5.3 Recommendations**

Based on the findings of the study, the following recommendations are made. The loan diversion was influenced by some factors. It was also identified as a major problem behind loan repayment by establishing that loan diversion was significant and negatively affects loan repayment performance. So, there is a need for a continuous supervision on loan utilization and training so as to reduce both the problem of using loan for non-productive activities. A pre-disbursement training is recommended for efficient loan allocation and management.

Since loan delay significantly affects both loan diversion and loan repayment performance positively and negatively respectively, it means that loan delay constitutes a priority issue to avoid if there is a concern to improve loan utilization and loan repayment

performance. Therefore, MFIs should organize themselves and disburse funds to the beneficiaries at the right time (before the start of agricultural season) by reducing loan processing procedures.

Age positively influences loan diversion. A focus on vulnerability reduction strategies of aged farmers by increasing financial support through providing jobs by policy makers should be promoted.

As the off farm income discourages the loan diversion, policy makers should increase rural income diversification. The rural population well-being and rural development programs may focus on facilitating rural income diversification by increasing access to market and road, and supporting farmer organizations.

Farm income was found to significantly increase the probability of repaying the loan in full. It is recommended to keep encouraging the farmers to cultivate the crop and/ or rear animals whose market prices are found to be good.

Loan size was another determinant that negatively affected loan repayment. This implies that there is a need to determine an appropriate loan amount that just suffices the project cost or purpose of the borrower, through a careful investigation of the demand for loans and plans submitted by borrowers. For a larger amount to disburse, the institution can even join the farm of the applicant for an effective evaluation.

Female borrowers performed better in terms of loan repayment than their male counterparts. This is good information particularly in terms of women empowerment but it is not a panacea about MFIs' services for women for the number of women being served by the institution was very small (only 6.7 percent of women were found among all respondents). So, the institution needs to strengthen the awareness- raising activities for women.

Policy makers namely Burundian government and donors are strongly recommended to follow closely the rural area and microfinance sector. Moreover, loan diversion to non-productive activities and default mainly reflect the problems connected to poverty. Therefore, poverty alleviation policies should be very important.

#### **5.4 Suggestions for Further Research**

There are some important points that may need further investigation. These issues may serve as points of departure for further research. In this study, loan diversion focused on the use of loan to unproductive activities (intentional diversion) and did not include the use of loan to any unintended purpose that is not mentioned in the application form (unintentional diversion). Therefore, unintentional diversion is another research aspect that may be bridged by the future researchers.

In addition, Pseudo  $R^2$  equal to 0.4525 and 0.0349 for loan repayment and loan diversion estimations respectively, are not enough implying that other studies should focus on other factors that are not included in the models. These new factors should be location of the borrower in terms of the distance from COSPEC, family expenditure, farm expenditure, expected punishment, availability of other sources of credit, loan rationing and natural hazards.

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## APPENDICES

### Appendix 1: Questionnaire

My name is Jackson Ntunzwenimana, I am a student pursuing Master's Program in Agricultural Economics and Resource Management at Moi University, Kenya. I am doing a research on analysis of factors affecting loan diversion and repayment performance among small scale farmers in Cibitoke, Burundi. You have been selected as one of the persons to participate in this research. All the information given will be treated strictly confidential and will be used to improve loan utilization and repayment by borrowers and hence improve the welfare of the people.

Thank you for your support.

Write your answers in the spaces provided or indicate by a tick where applicable to your situation.

#### A. Socio economic Factors of the respondent

1. Address: Branch \_\_\_\_\_, District \_\_\_\_\_, Hill \_\_\_\_\_
2. Age \_\_\_\_\_ Years
3. Gender of household head: male \_\_\_\_\_, female \_\_\_\_\_
4. Marital status? 1. Married 2. Single
5. Your family size is \_\_\_\_\_(number)
6. What is your level of education? Illiterate (1), Primary (2), Secondary (3), Tertiary (4)
7. The main occupation: On farm \_\_\_\_\_ Off – farm \_\_\_\_\_
8. Please list your annual cash income raised from off farm activities
  - a) Income from off-farm activities \_\_\_\_\_,

## B. Farm Characteristics

1. What are the most common farm activities you are engaged in? Crop production\_\_\_\_\_ Livestock production\_\_\_\_\_ Other (to be specified) \_\_\_\_\_
2. What is your total cultivated land size in hectares? \_\_\_\_\_, land size owned \_\_\_\_\_ land size rented? \_\_\_\_\_
3. Please list your annual cash income raised from farm activities
  - a) Income from crops\_\_\_\_\_,
  - b) Income from livestock\_\_\_\_\_,
  - d) Others (Specify)\_\_\_\_\_
4. How many livestock do you own? Please fill the following table

Number	Types of livestock	Number	Value in BIF
1	Cows		
2	Goats		
3	Sheep		
4	Poultry		
5	Others (Specify)		
TOTAL			

**C. Credit Characteristics**

1. How much time did you need from the application to the access of the loan you were paying back until 2016 \_\_\_\_\_(days)
2. Did you get the exact amount you applied for? Yes \_\_\_\_\_, Otherwise \_\_\_\_\_
3. If no, how much did you apply for? \_\_\_\_\_and how much you finally obtained? \_\_\_\_\_
4. How many times did you borrow before the credit you were paying back in COSPEC until 2016? \_\_\_\_\_

**D. Loan Diversion**

1. Have you used the full loan(the loan repaid until 2016) in the farming activity for which you borrowed? Yes \_\_\_\_\_, No \_\_\_\_\_
2. If yes, for which activities? a) Crop production b) Purchase of Livestock c) Others (Specify) \_\_\_\_\_
3. If No, indicate the non-intended activities and the amount you allocated on them from the loan

<b>Unintentional diversion (Diversion to productive activities other than farming)</b>	<b>Allocated amount</b>
Activity 1 (Specify)_____	
Activity 2 (Specify)_____	
<b>Total 1</b>	
<b>Intentional diversion (Diversion to non-productive activities)</b>	
Clothing	
Housing	
School fees	
Food consumption	
Medical care	
Wedding	
Funeral ceremonies	
Engagement	
Circumcision	
Religious	
Financial assistance to friends or relatives	
Others (specify) _____	
<b>Total 2</b>	



**E. Loan Repayment (For Defaulter and Non-Defaulter)**

1. What is the status of that loan you were repaying until 2016? 1. Fully repaid\_\_\_\_\_ 2. Repayment in arrears\_\_\_\_\_
2. If full repaid, did you all times repaid on schedule? a)Yes \_\_\_\_\_ b)No \_\_\_\_\_
3. If no, how many times didn't you repay on time? \_\_\_\_\_

## Appendix 2: Survey Raw Data used for Analysis

Hid	Lrepayment	Ldiversion	Age	Gender	Education	Occupation	Farm Income	Off farm Income	Credit use	Farm size	Livestock Value	Loan delay	Loan size
1	1	8	50	0	2	0	1100000	2400000	1	0.72	100000	14	1500000
2	1	0	35	1	2	0	500000	520000	2	0.81	0	30	500000
3	0	3	38	0	2	1	2000000	0	2	1	310000	30	900000
4	1	7	54	0	3	0	5000000	7000000	8	4	3000000	30	3421486
5	1	0	37	0	4	0	4000000	3600000	1	1.53	3000000	14	2600000
6	0	0	44	0	2	0	450000	500000	2	0.18	355000	30	600000
7	1	0	35	0	2	0	5000000	5400000	8	3.24	525000	14	1200000
8	1	8	42	0	2	0	3100000	4000000	2	2	990000	60	300000
9	1	21	54	0	2	0	4100000	6000000	6	13	3500000	5	600000
10	1	0	29	0	3	0	550000	2000000	3	1	0	15	1500000
11	0	0	36	0	2	1	1000000	0	1	3.24	135000	30	160000
12	1	0	47	0	2	1	700000	600000	2	1.44	1335000	60	500000
13	0	25	59	0	3	1	1200000	0	1	2	15000	65	483379
14	1	0	30	1	3	0	5000000	6000000	2	1.44	200000	60	625000
15	1	0	66	0	2	0	1170000	12500000	5	1	1100000	7	5000000
16	1	23	62	1	3	0	1290000	4000000	2	0.12	520000	8	900000
17	1	12	31	0	3	0	5000000	25000000	3	4	4200000	60	4000000
18	1	0	62	0	2	0	950000	3000000	2	3.24	70000	30	300000
19	1	0	34	0	2	1	1700000	0	2	1.44	0	30	800000
20	0	11	32	0	3	0	300000	1000000	1	0.18	4870000	90	875000
21	0	0	35	0	2	0	2000000	1500000	2	0.18	40000	60	4500000
22	1	0	53	0	4	0	1500000	3600000	2	2.34	2000000	30	800000
23	1	2	46	0	2	1	430000	0	1	1.44	0	14	700000
24	1	0	36	0	2	0	2800000	800000	2	1	1980000	60	600000
25	0	17	43	0	1	1	2200000	0	2	2	380000	30	187500
26	1	0	31	0	2	1	200000	0	2	0.36	128000	60	150000
27	1	9	49	0	2	1	1700000	400000	9	1.44	500000	30	600000
28	1	20	62	0	2	0	1000000	2000000	10	0.18	260000	15	100000
29	1	0	31	0	2	1	8700000	700000	2	0.12	1020000	20	1500000
30	1	3	33	0	2	0	2100000	4320000	0	3.24	300000	30	1500000
31	1	23	66	0	2	1	5400000	0	3	2	270000	30	400000
32	1	14	35	0	2	1	1150000	0	8	3.3	425000	30	300000
33	1	0	60	0	2	1	1000000	200000	4	2.5	20000	30	1000000
34	0	6	49	0	3	0	500000	700000	0	1	215000	90	900000

35	1	19	29	0	1	1	2250000	200000	1	5.76	409000	60	300000
36	1	0	55	0	2	1	840000	700000	1	5	5150000	15	1200000
37	0	12	44	0	2	1	200000	0	0	0.5	0	90	420000
38	0	14	52	0	1	1	2000000	500000	0	0.37	725000	45	870000
39	0	32	52	0	2	1	2500000	3600000	0	2	1150000	60	960000
40	1	3	65	0	2	1	700000	600000	1	0.34	12000	15	600000
41	1	0	26	0	2	1	2500000	400000	1	0.5	800000	21	94000
42	1	0	61	0	2	0	3150000	5000000	8	3.26	1040000	15	1500000
43	1	0	38	0	2	1	2500000	0	2	1	0	90	300000
44	1	0	23	0	2	0	1300000	2000000	2	4.68	340000	30	2500000
45	1	0	64	0	2	1	150000	500000	7	2	200000	7	2500000
46	1	4	41	0	2	0	800000	5000000	2	1.44	290000	15	430000
47	0	3	35	0	2	1	2000000	500000	2	2.8	18000	90	300000
48	1	17	65	0	2	1	8200000	1800000	4	0.39	370000	60	500000
49	1	0	36	0	3	1	1108000	1700000	4	1	3120000	90	300000
50	1	13	35	0	2	1	1000000	0	1	1	3000000	60	600000
51	0	0	45	0	2	1	500000	500000	1	5.76	250000	30	2000000
52	1	0	46	0	2	1	100000	150000	3	3.24	0	30	600000
53	1	0	37	0	2	1	2000000	500000	1	0.36	127000	30	700000
54	1	0	52	0	2	1	1300000	0	2	5.76	845000	15	270000
55	1	0	36	0	3	0	300000	1500000	1	1	0	30	1500000
56	0	16	30	0	3	0	850000	900000	1	1.8	850000	30	250000
57	0	0	39	0	2	1	500000	3600000	1	0.86	120000	60	1350000
58	0	0	34	0	2	0	800000	4000000	2	3	370000	90	2400000
59	0	18	36	0	3	0	200000	800000	6	0.36	0	45	1200000
60	1	15	45	0	2	1	2000000	0	2	2	70000	15	1000000
61	1	0	66	0	2	0	165000	1000000	1	0.36	0	90	700000
62	1	0	50	0	1	1	1000000	100000	0	1.44	120000	60	250000
63	1	0	37	0	2	1	1000000	500000	2	1.5	398000	30	300000
64	1	5	35	0	2	1	5000000	1000000	2	1.44	2200000	30	1000000
65	1	0	37	0	2	0	4450000	2000000	2	2	600000	15	600000
66	1	0	39	0	2	1	5000000	2500000	2	2	3480000	30	1000000
67	0	5	60	0	2	1	1000000	0	1	1.44	0	30	1000000
68	1	0	57	0	2	0	4200000	5000000	7	10	14100000	30	4000000
69	1	0	51	0	2	1	1700000	36000	2	0.45	880000	14	100000
70	0	26	40	0	2	1	2200000	400000	0	0.36	640000	30	1500000
71	1	0	45	0	2	1	1800000	0	4	2	132000	20	400000
72	0	37	56	0	2	1	500000	500000	1	0.5	50000	90	300000

73	1	0	38	0	2	1	1300000	2000000	2	0.75	0	14	1200000
74	1	10	43	1	2	1	800000	100000	1	0.6	0	90	75000
75	1	0	36	0	2	1	4000000	500000	2	2	1627000	60	1900000
76	0	0	32	0	4	0	150000	1152000	2	0.5	0	60	400000
77	1	5	64	0	2	1	1600000	0	2	1	1080000	60	400000
78	1	0	41	0	2	1	2500000	200000	2	7.5	700000	60	950000
79	0	28	38	0	2	1	1100000	400000	4	2	830000	60	810000
80	1	0	46	0	2	1	3000000	100000	1	0.5	1017000	60	2000000
81	0	45	54	0	2	1	800000	0	1	0.04	620000	60	450000
82	0	12	35	0	1	1	2000000	300000	3	0.5	2470000	60	900000
83	1	0	40	0	2	1	1500000	0	1	1.5	445000	30	75000
84	1	9	46	0	2	1	2100000	1000000	1	1	737000	60	1300000
85	1	0	33	1	2	1	2400000	0	2	1	600000	60	1200000
86	0	0	65	0	2	1	4000000	600000	3	2	1340000	60	1400000
87	1	0	34	0	2	1	1200000	0	1	1.5	580000	60	900000
88	1	0	28	0	3	0	1050000	960000	1	1	300000	60	300000
89	1	0	33	1	3	0	600000	1080000	2	0.3	370000	30	300000
90	1	0	32	0	2	1	2700000	0	3	1	800000	14	1000000
91	1	0	43	0	2	0	1100000	2000000	2	0.18	2235000	28	250000
92	1	0	29	0	2	1	3020000	0	1	7	30000	60	159188
93	1	0	40	0	2	1	1300000	1500000	2	1.5	0	25	600000
94	1	0	45	0	2	1	800000	200000	1	2	57000	60	200000
95	0	10	39	0	2	1	900000	800000	2	1	0	60	600000
96	0	39	40	0	3	0	1400000	600000	2	3	800000	90	1400000
97	1	0	45	0	2	1	2400000	0	1	5.4	0	60	272250
98	0	0	40	0	1	1	400000	0	1	0.5	340000	60	112500
99	1	0	29	0	2	1	700000	0	2	0.5	0	60	100000
100	0	40	37	0	2	1	600000	0	2	1	818000	60	900000
101	1	0	39	0	2	1	1150000	0	1	1.5	1550000	60	875000
102	0	17	38	0	2	1	900000	150000	1	0.4	1300000	60	750000
103	0	60	51	0	2	1	500000	100000	1	0.32	900000	60	300000
104	1	0	34	0	2	1	3000000	240000	1	0.06	0	30	450000
105	0	32	50	0	2	1	900000	250000	1	0.81	400000	30	600000
106	0	20	24	0	2	1	600000	0	1	0.18	1155000	180	900000
107	1	0	37	0	3	1	1200000	500000	3	1.44	600000	90	2000000
108	1	0	45	0	2	1	2650000	2000000	8	1	1800000	30	1500000
109	1	0	28	0	2	1	2390000	400000	3	0.36	15000	30	2000000
110	1	0	32	0	4	1	350000	210000	2	0.18	150000	15	300000

111	0	10	37	0	2	1	1750000	0	1	0.36	0	30	1125000
112	1	19	58	0	3	1	1000000	300000	1	0.36	0	21	1500000
113	0	20	34	0	2	1	2500000	1000000	1	0.36	0	30	1300000
114	1	13	58	0	1	1	800000	0	5	0.36	820000	21	300000
115	1	0	44	1	2	1	250000	50000	2	0.81	247000	30	90000
116	1	0	45	0	3	0	640000	2520000	8	1.5	2310000	21	750000
117	0	5	30	0	4	0	400000	1800000	13	0.06	108000	34	600000
118	1	0	35	0	2	1	2700000	100000	0	1	716000	18	300000
119	0	14	54	0	3	0	1800000	1110672	0	0.5	195000	18	350000
120	1	0	38	0	4	0	50000	816000	0	0.3	120000	14	250000
121	0	28	42	0	1	1	1370000	2000000	2	1.5	176500	14	1500000
122	1	0	69	1	2	1	200000	200000	0	0.3	0	45	300000
123	0	21	45	0	1	0	650000	1500000	0	0.65	600000	60	1800000
124	1	0	59	0	3	0	500000	900000	8	1	1020000	21	100000
125	1	0	49	0	4	0	7800000	3010000	11	2	112000	17	300000
126	1	0	33	0	2	1	6140000	420000	1	0.6	1500000	60	200000
127	1	0	35	0	3	1	2800000	0	4	0.83	2200000	21	800000
128	1	0	37	0	2	1	1500000	300000	1	0.36	700000	21	360000
129	1	0	33	0	2	0	520000	1542857	1	1	390000	32	1200000
130	1	0	45	0	3	0	680000	720000	8	0.02	190000	30	280000
131	1	0	49	0	1	1	3010000	800000	1	0.89	305000	21	300000
132	1	0	57	0	2	1	1700000	500000	12	0.5	2440000	14	1900000
133	1	8	40	0	2	0	400000	500000	0	0.3	30000	30	1400000
134	0	19	37	0	3	0	900000	1000000	3	0.83	760000	30	1000000
135	0	24	42	0	3	0	500000	860000	2	0.36	670000	120	700000
136	1	0	59	0	2	1	1000000	0	1	0.45	340000	60	500000
137	1	21	69	0	2	1	700000	0	1	0.18	800000	60	500000
138	0	27	62	0	2	1	1440000	0	0	2	1380000	90	2000000
139	1	0	47	0	1	1	750000	480000	0	0.18	721000	30	400000
140	1	0	32	0	2	1	1100000	1028571	4	0.36	545000	21	720000
141	1	0	46	0	2	0	2150000	1400000	0	0.16	566200	60	1200000
142	0	20	56	0	2	1	300000	100000	0	0.5	20000	180	2000000
143	1	0	41	0	3	0	2000000	5000000	12	4.68	1167000	15	1200000
144	1	12	59	0	2	1	800000	0	5	2	650000	14	250000
145	1	0	72	0	2	1	300000	700000	10	1.5	0	21	200000
146	1	0	45	0	2	1	2600000	5000000	3	3	3000000	14	600000
147	1	0	41	0	3	1	1280000	480000	10	0.72	100000	21	750000
148	1	0	37	0	2	0	500000	2400000	0	1.8	500000	60	760000

149	1	0	35	0	2	0	2000000	14000000	2	3.6	0	30	1300000
150	1	0	45	1	1	1	580000	1000000	0	1.8	250000	90	80000
151	0	0	46	0	2	1	1075000	1200000	1	1.62	1059000	90	900000
152	1	0	28	0	2	1	1000000	0	0	0.72	298000	21	250000
153	1	0	35	0	2	1	3000000	1800000	1	9.09	373000	40	4700000
154	0	19	50	0	2	1	3560000	0	2	3.44	600000	105	1000000
155	1	0	36	0	2	1	350000	0	3	0.18	135000	30	37500
156	1	0	62	0	2	1	1000000	800000	12	1	1920000	90	331600
157	1	0	29	0	2	1	850000	760000	2	0.36	350000	30	375000
158	1	16	40	0	3	0	350000	600000	1	0.36	0	30	112500
159	0	24	54	1	1	1	580000	0	2	0.18	230000	21	300000
160	1	4	34	0	2	1	1000000	0	1	0.36	156000	60	150000
161	0	15	34	0	3	1	2200000	50000	0	1.5	1850000	31	559750
162	1	0	55	1	2	1	400000	0	1	0.18	0	21	100000
163	1	0	40	0	2	1	600000	857143	4	0.15	800000	30	562500

### Appendix 3: Cronbach' Alpha Coefficient

Test scale = mean(standardized items)

Reversed items: ldiversion age gender maritalstatus householdsize occupation farmerexperience loandelay

Average interitem correlation: 0.1330

Number of items in the scale: 17

Scale reliability coefficient: 0.7228

### Appendix 4: Aggregated Data on Loan Diversion of Surveyed Borrowers

Purposes	Amount diverted (in BIF)	Percentages diverted
Clothing	443,000	4.69 %
Housing	2,830,600	30.00 %
School fees	2,277,500	24.14 %
Food consumption	878,100	9.31 %
Medical care	1,044,200	11.07 %
Wedding	436,000	4.62 %
Funeral	482,000	4.33 %
Circumcision	10,000	0.10 %
Religious	350,660	3.72 %
Assistance to friends and relatives	269,000	2.85 %
Costs spent on trial	202,500	2.15 %
Repayment of other debts	284,850	3.02 %
<b>Total amount diverted</b>	9,435,410	100 %
<b>Total amount borrowed</b>	146,819,153	
<b>Total Loan Diversion Rate</b>	6.43 %	

Source: Survey data, 2017

### Appendix 5: Tobit Regression Output

```

Tobit estimates
Number of obs   =      163
LR chi2(11)     =      24.93
Prob > chi2     =      0.0093
Pseudo R2      =      0.0349
Log likelihood = -344.5373

```

ldiversion	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
age	.5157124	.1727735	2.98	0.003	.1743648	.85706
gender	-7.175379	8.180762	-0.88	0.382	-23.33806	8.987303
education	-.6614532	3.497302	-0.19	0.850	-7.571052	6.248145
occupation	-5.156177	5.23158	-0.99	0.326	-15.49218	5.179823
farmincome	.8914907	2.4654	0.36	0.718	-3.979384	5.762366
offfarminc~e	-.6042134	.3551954	-1.70	0.091	-1.305971	.097544
credituse	-.9943986	.7528773	-1.32	0.189	-2.481854	.4930565
farmsize	-1.166445	1.077286	-1.08	0.281	-3.294831	.9619417
livestockv~e	.3463766	.406433	0.85	0.395	-.4566107	1.149364
loandelay	.1600067	.0638505	2.51	0.013	.0338576	.2861557
loansize	1.960684	2.248134	0.87	0.385	-2.480942	6.40231
_cons	-60.19767	41.51053	-1.45	0.149	-142.2098	21.81443
_se	19.82331	1.957039	(Ancillary parameter)			

```

Obs. summary:      97 left-censored observations at ldiver~n<=0
                   66 uncensored observations

```



## Appendix 6: Marginal Effects after Tobit Regression

Marginal Effects: Latent Variable

variable	dF/dx	Std. Err.	z	P> z	X_at	[	95% C.I.	]
age	.5157124	.1727735	2.98	0.003	43.5399	.177083	.854342	
gender*	-7.175379	8.180762	-0.88	0.380	0 --> 1	-23.2094	8.85862	
education	-.6614532	3.497302	-0.19	0.850	2.17791	-7.51604	6.19313	
occupation*	-5.156177	5.23158	-0.99	0.324	0 --> 1	-15.4099	5.09753	
farmincome	.8914907	2.4654	0.36	0.718	13.9594	-3.9406	5.72359	
offfarmincome	-.6042134	.3551954	-1.70	0.089	10.1676	-1.30038	.091957	
credituse	-.9943986	.7528773	-1.32	0.187	2.56442	-2.47001	.481214	
farmsize	-1.166445	1.077286	-1.08	0.279	1.58399	-3.27789	.944996	
livestockvalue	.3463766	.406433	0.85	0.394	10.8971	-.450218	1.14297	
loandelay	.1600067	.0638505	2.51	0.012	43.3252	.034862	.285151	
loansize	1.960684	2.248134	0.87	0.383	13.2988	-2.44558	6.36695	
_cons	-60.19767	41.51053	-1.45	0.147	1	-141.557	21.1615	

Marginal Effects: Unconditional Expected Value

variable	dF/dx	Std. Err.	z	P> z	X_at	[	95% C.I.	]
age	.2119252	.070999	2.98	0.003	43.5399	.07277	.351081	
gender*	-2.526553	3.361777	-0.75	0.452	0 --> 1	-9.11551	4.06241	
education	-.2718155	1.43717	-0.19	0.850	2.17791	-3.08862	2.54499	
occupation*	-2.211532	2.149849	-1.03	0.304	0 --> 1	-6.42516	2.00209	
farmincome	.3663464	1.013124	0.36	0.718	13.9594	-1.61934	2.35203	
offfarmincome	-.2482936	.1459629	-1.70	0.089	10.1676	-.534376	.037788	
credituse	-.4086351	.3093851	-1.32	0.187	2.56442	-1.01502	.197748	
farmsize	-.4793352	.4426964	-1.08	0.279	1.58399	-1.347	.388334	
livestockvalue	.1423389	.1670183	0.85	0.394	10.8971	-.185011	.469689	
loandelay	.0657526	.0262385	2.51	0.012	43.3252	.014326	.117179	
loansize	.8057174	.9238414	0.87	0.383	13.2988	-1.00498	2.61641	
_cons	-24.73744	17.05821	-1.45	0.147	1	-58.1709	8.69603	

## Marginal Effects: Conditional on being Uncensored

variable	dF/dx	Std. Err.	z	P> z	X_at	[	95% C.I.	]
age	.1635838	.0548037	2.98	0.003	43.5399	.05617	.270997	
gender*	-2.073951	2.594934	-0.80	0.424	0 --> 1	-7.15993	3.01203	
education	-.2098127	1.109343	-0.19	0.850	2.17791	-2.38408	1.96446	
occupation*	-1.682884	1.659455	-1.01	0.311	0 --> 1	-4.93536	1.56959	
farmincome	.2827805	.7820237	0.36	0.718	13.9594	-1.24996	1.81552	
offfarmincome	-.1916562	.1126678	-1.70	0.089	10.1676	-.412481	.029169	
credituse	-.3154228	.2388124	-1.32	0.187	2.56442	-.783486	.152641	
farmsize	-.3699958	.3417145	-1.08	0.279	1.58399	-1.03974	.299752	
livestockvalue	.1098705	.1289204	0.85	0.394	10.8971	-.142809	.36255	
loandelay	.0507541	.0202534	2.51	0.012	43.3252	.011058	.09045	
loansize	.6219281	.7131073	0.87	0.383	13.2988	-.775736	2.01959	
_cons	-19.09468	13.16712	-1.45	0.147	1	-44.9018	6.71241	

## Marginal Effects: Probability Uncensored

variable	dF/dx	Std. Err.	z	P> z	X_at	[	95% C.I.	]
age	.0101189	.00339	2.98	0.003	43.5399	.003475	.016763	
gender*	-.1336353	.1605171	-0.83	0.405	0 --> 1	-.448243	.180973	
education	-.0129786	.0686216	-0.19	0.850	2.17791	-.147474	.121517	
occupation*	-.1018286	.1026504	-0.99	0.321	0 --> 1	-.30302	.099362	
farmincome	.0174922	.0483743	0.36	0.718	13.9594	-.07732	.112304	
offfarmincome	-.0118554	.0069694	-1.70	0.089	10.1676	-.025515	.001804	
credituse	-.0195114	.0147724	-1.32	0.187	2.56442	-.048465	.009442	
farmsize	-.0228872	.0211377	-1.08	0.279	1.58399	-.064316	.018542	
livestockvalue	.0067964	.0079747	0.85	0.394	10.8971	-.008834	.022427	
loandelay	.0031395	.0012528	2.51	0.012	43.3252	.000684	.005595	
loansize	.0384712	.0441113	0.87	0.383	13.2988	-.047985	.124928	
_cons	-1.181156	.8144903	-1.45	0.147	1	-2.77753	.415215	

(\*) dF/dx is for discrete change of dummy variable from 0 to 1

**Appendix 7: Probit Regression**

```

Iteration 0:  log pseudolikelihood = -97.907883
Iteration 1:  log pseudolikelihood = -53.99517
Iteration 2:  log pseudolikelihood = -53.600504
Iteration 3:  log pseudolikelihood = -53.599755
Iteration 4:  log pseudolikelihood = -53.599755

```

```

Probit regression                                Number of obs   =       163
                                                Wald chi2(12)   =       52.81
                                                Prob > chi2     =       0.0000
Log pseudolikelihood = -53.599755             Pseudo R2      =       0.4525

```

lrepayment	Robust					[95% Conf. Interval]	
	Coef.	Std. Err.	z	P> z			
ldiversion	-.0986611	.0173175	-5.70	0.000	-.1326028	-.0647194	
age	.0237422	.0157349	1.51	0.131	-.0070976	.054582	
gender	.9883247	.508163	1.94	0.052	-.0076564	1.984306	
education	.111836	.2382383	0.47	0.639	-.3551024	.5787744	
occupation	-.0638516	.3352338	-0.19	0.849	-.7208977	.5931946	
farmincome	.4415521	.1723177	2.56	0.010	.1038157	.7792885	
offfarmincome	.0133143	.0261561	0.51	0.611	-.0379508	.0645794	
credituse	.048715	.0642998	0.76	0.449	-.0773102	.1747403	
farmsize	.0837719	.0879865	0.95	0.341	-.0886785	.2562223	
livestockvalue	-.0056182	.0255929	-0.22	0.826	-.0557793	.0445429	
loandelay	-.0178759	.0052738	-3.39	0.001	-.0282123	-.0075394	
loansize	-.409445	.1699276	-2.41	0.016	-.7424969	-.0763931	
_cons	-.1740184	3.122255	-0.06	0.956	-6.293525	5.945489	

## Appendix 8: Marginal Effects after Probit Regression

Average marginal effects    Number of obs   =        163

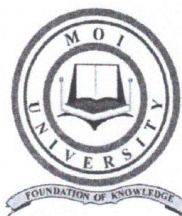
Model VCE     : Robust

Expression    : Pr(lrepayment), predict()

dy/dx w.r.t. : ldiversion age gender education occupation farmincome offfarmincome credituse farmsize livestockvalue loandelay loansize

	Delta-method					
	dy/dx	Std. Err.	z	P> z	[95% Conf. Interval]	
ldiversion	-.0179062	.0021964	-8.15	0.000	-.0222111	-.0136014
age	.004309	.0027296	1.58	0.114	-.0010408	.0096588
gender	.1793732	.0947203	1.89	0.058	-.0062751	.3650215
education	.0202974	.0429467	0.47	0.636	-.0638766	.1044713
occupation	-.0115886	.0607923	-0.19	0.849	-.1307393	.1075621
farmincome	.0801382	.0300717	2.66	0.008	.0211988	.1390776
offfarmincome	.0024164	.0047827	0.51	0.613	-.0069576	.0117904
credituse	.0088414	.0117061	0.76	0.450	-.0141022	.031785
farmsize	.0152039	.0156447	0.97	0.331	-.0154591	.045867
livestockvalue	-.0010197	.0046526	-0.22	0.827	-.0101386	.0080993
loandelay	-.0032443	.000909	-3.57	0.000	-.005026	-.0014627
loansize	-.0743111	.0296522	-2.51	0.012	-.1324284	-.0161937

## Appendix 9: Research Permits



### MOI UNIVERSITY SCHOOL OF BUSINESS AND ECONOMICS

Tel: (0321) 43620  
Fax No: (0321) 43360  
Telex No.35047 MOIVARSITY

Box 3900  
Eldoret  
KENYA

RE: SBE/PGA/014/15

DATE: 11<sup>th</sup> April, 2017

### TO WHOM IT MAY CONCERN

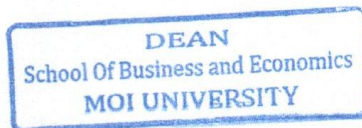
#### RE: JACKSON NTUNZWENIMANA – SBE/PGA/014/15

The above named is a bonafide student of Moi University School of Business and Economics, undertaking a Master of Science degree in Agricultural Economics and Resource Management.

He has completed coursework, defended his proposal, and is proceeding to the field to collect data for his research titled: *“Factors Affecting Loan Diversion and repayment performance among Small Scale Farmers on Cibitoke, Burundi.”*

Any assistance accorded to him will be highly appreciated.

Yours Faithfully,



*for* PROF. THOMAS CHERUIYOT

DEAN, SCHOOL OF BUSINESS AND ECONOMICS



**COSPEC**

Coopérative Solidarité avec les Paysans pour l'Épargne et le Crédit à Cibitoke.  
B.P. 5671 Kinindo Bujumbura(Burundi), Téléphone / Fax = (+257) 22 26 22 54 / 79 928 585.  
E-mail = [cospec20200@gmail.com](mailto:cospec20200@gmail.com)

**NIF : 4000315954**

N. Réf. n° 180417 / COSPEC / 2017  
V. Lettre Réf. n° .....du 20 / 03 / 2017 à Cibitoke.

Cibitoke, le 18 avril 2017

**Objet** : Enquête concernant les Clients débiteurs défaillants COSPEC  
de la période allant de 01 / 01 / 2016 au 20 / 03 / 2017.

**A Monsieur Jackson NTUNZWENIMANA,  
C/O Moi University, Eldoret - Kenya  
Au KENYA.**

Monsieur,

COSPEC accuse bonne réception - en date du 21 / 03 / 2017 - de votre lettre dont la référence et l'objet sont susmentionnés dans la marge et vous remercie beaucoup pour le choix que vous avez fait sur COSPEC pour votre travail de fin d'études.

Prenant bonne note du contenu de votre lettre susmentionnée, COSPEC vous informe de ce qui suit :

- 1) La documentation d'une Institution de Microfinance, comme COSPEC, tout comme celle de toute autre structure financière, n'est pas comparable à une bibliothèque publique.
- 2) COSPEC accepte - par principe - de vous recevoir en son sein pendant la période ne dépassant pas 60 jours comptés à partir du 20 / 04 / 2017 pour des raisons de calendrier des activités déjà programmées dans tous les services COSPEC après le mois de juin 2017 jusqu'en octobre 2017.
- 3) Pendant votre séjour dans les enceintes de la COSPEC, la documentation souhaitée sera demandée sur base d'une liste exhaustive préétablie et acceptée pour consultation sur place et sur pièce sans possibilité de les emporter ni d'en faire des copies. **La demande des données souhaitées sera adressée à Monsieur le Chef du Service chargé des Crédits, CSC**
- 4) Si cette proposition satisfait à vos attentes et qu'elle obtient votre assentiment, vous avez la latitude de nous en faire part - verbalement - avant de commencer vos enquêtes le 20 / 04 / 2017 pour des dispositions nécessaires et utiles à prendre en faveur de votre travail.

**NB** : COSPEC ne prend aucun engagement matériel ni financier en faveur de toute personne effectuant de Stage ou menant ses activités de recherche en son sein quelle que soit la durée.

Vous souhaitant bonnes réception et compréhension de cette lettre, COSPEC vous prie de croire, Monsieur, en l'expression de sa considération professionnelle.

**Pour COSPEC,**  
Charles ITANGISHAKA  
Directeur Gérant et CEO

**Copie pour information à :**

- Monsieur le Directeur Gérant - Adjoint de la COSPEC,
- Monsieur le Chef du Service chargé des Crédits COSPEC.

