ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE DEPARTMENT OF

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THE IMPACT OF PRIZE LINKED SAVING PROGRAM ON SAVING CULTURE OF INDIVIDUALS

BY: BIRHANU ALAMNEH

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JULY, 2018

ADDIS ABABA, ETHIOPIA

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Declaration

I, Birhanu Alamneh, hereby declare that the study done on “The Impact of Prize Linked Saving Program on Saving Culture of Individuals” is the result of my own effort and study that all sources of materials used for the study have been acknowledged. I have conducted the study independently with the guidance and comments of the research advisor.

This study has not been submitted for any degree in any university. It is conducted for the partial fulfilment of the Master of Art Degree in Project Management.

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Letter of Certification

This is to certify that Birhanu Alamneh has conducted this project work entitled “The Impact of Prize Linked Saving Program on Saving Culture of Individuals” under my supervision.

This project work is original and suitable for the submission in partial fulfilment of the requirement for the award of Master of Arts Degree in Project Management.

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Abstract

The Commercial Bank of Ethiopia has been running a Prize Linked Saving Program with a great deal of fund. However, its impact had been left unevaluated. Hence this research was done on the impact of Prize Linked Saving Program on saving culture of individuals. This research has been done using a systematic sampling technique and data were collected from randomly selected respondents through semi-structured questionnaire, which were analyzed using both descriptive and econometric models of the logit and matching on the propensity score. The results of the research were supportive enough to conclude that perception of individuals is minimal and the program has a positive impact which is found to be significant at 95% level of confidence. Finally, the research has recommended; exertion of maximum effort to improve the public perception and adjust the prize mix to make attractive to the mean individual and the program has to continue to run with some adjustments of form.

Key words: saving, prize linked saving, logit regression, propensity score match,

List of Acronyms

CBE - Commercial Bank of Ethiopia

NBE - National Bank of Ethiopia

CSA -Central Statistics Agency

PLSP – Prize Linked Saving Program

PSM – Propensity Score Match

NNM-Nearest Neighbour Match

MPS-Marginal Propensity to Save

MPC-Marginal Propensity to Consume

PLS- Prize Linked Saving

ETB-Ethiopian Birr

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CHAPTER ONE

1 INTRODUCTION

1.1Background of the Study

Prize linked saving programs have existed for hundreds of years and are prevalent around the world (Cole et al., 2014**)**, and it takes different forms and different ways of offering coupons, which leads to the prize, across different nations and different banks. In some nations and banks like South Africa, there is a tendency to offer the prize in lieu of interest (Kowalski, 2014**)** and in some other nations like Ethiopia as the information gathered from brand and promotion department of the Commercial Bank of Ethiopia, there is a tendency to offer it in addition to interest. The criteria used to provide customers a coupon differs as well.

In Ethiopia PLSP is a recent time occurrence, which was introduced in 2012, by the Commercial Bank of Ethiopia. Since 2012, the bank has run six successive rounds of the program and the seventh one is on the way and the prize has been growing from round to round in terms of value and volume. As it can be realized from the account statement of the PLSP, In terms of volume the bank first started with a prize of about Birr 17,514,521.23 and by now its volume has reached about Birr 36,152,542.32. On average, it has been growing by Birr 3,125,124.21 from round to round.

According to the procedure of the program, maintained by brand and promotion department of the bank, which had been remained unchanged for the last six programs, the Commercial Bank of Ethiopia has fifteen districts and each district has been allotted the same amount of prize. Therefore customers in different districts have different likelihood to win prizes, depending on the number of customers, who have responded to the program at each district. The maximum number of coupons an individual could have is ten and the minimum is one, for which the individual is needed to have a saving increment of Birr 100,000 and 1,000 respectively, from the account balance he/she had one day earlier than the date on which the program get kicked off. The amount of incremental deposit needed to have one more coupon increases as the number of coupons an individual wishes to have increases. The incremental deposit needed to be saved till the end of the program so that it exists to be valid; otherwise if withdrawal is made earlier than the end date of the program the coupons will come to be invalid.

Researches done on the area of the impact of PLSP on saving culture of individuals are not conclusive. Most of them are overseas (Cole et al., 2017, Atalay et al., 2013 and Kowalski, 2014) and hence they are not conclusive about, what impact does the program of the Commercial Bank of Ethiopia has, because of the fact that the feature of programs researched are quite different from the program, which have been run by the Commercial Bank of Ethiopia. The mere local research done on the area is the unpublished research done by the Commercial Bank of Ethiopia itself, which emphasizes on assessment of the public perception towards the program and merely descriptive in terms of methodology.

1.2 Statement of the Problem

Individuals have different motives to save money, of which the one is to earn interest income out of their saving. However, in the case of commercial banks working in Ethiopia, the interest rate which had been paid until October, 2017, which was 5% (NBE, 2017), is by far lesser than the average inflation rate of the last six years, declared by the government, which was 11.18 % (CSA, 2017). Therefore saving entails cost or loss of value owing to inflation. Hence interest income, because of a negative real interest rate cannot be a motive for individuals to save in Ethiopia. The Commercial Bank of Ethiopia has introduced to its customers another motive for saving, which has been run for the last six years as a prize linked saving program, for which a great deal of fund has been allotted. Up on developing this program, the bank has assumed, customers can be encouraged to save by offering them a prize on a lottery method based on their saving level in addition to interest.

Rational people systematically and purposefully do the best they can to achieve their objectives, given the available opportunities (Mankiw, 2007). Hence, they may make some comparison of cost benefit of getting one coupon from the program and having one lottery coupon from the National Lottery including their likelihood to win. In Ethiopia, individuals have a tendency of distrusting the reports of the government related with macro economic variables of the country including inflation. Therefore individuals may even consider their perceived level of inflation in analysing their cost benefit of joining the program. Hence individuals may not be motivated to save by such program, if they found it not better than buying a lottery ticket from the national lottery.

On the other hand, the rationality of individuals depends on the individual's analytical capacity and the information available for decision. To this end, there is no means for customers to know how probable a

single coupon is to win a prize. Therefore, individuals may come to be subject to illusion due to the prizes available and get motivated to save. Hence the program is still likely to achieve the expected result. Nevertheless, the bank has continued to invest on the program and till 30-Jun-2017 it has run six successive programs while the seventh one is on the way.

Different cluster of individuals based on different variables like, income level, gender and educational status are expected to have different test for the program. Therefore, the responsiveness of individuals across different clusters is likely to differ. Hence it needs investigation to know which cluster is responsive and which is not.

It might be owing to the recentness of its existence, the impact of prize linked saving program has been hidden from the eye of researchers. Though it is not published, only the commercial bank of Ethiopia itself has attempted to examine, how the perception of the public looks like and what impact it has with its incompleteness in methodology, which is merely descriptive. Descriptive ways of evaluating an impact of a program is inconclusive, since it cannot clearly show us causation, what it would have been if the program were not undertaken and how significant is the impact or it can't do more than simple comparison of mean outcomes of our variables of interest with the program and without the program. Hence we need to estimate the impact taking other variables, which can cause a change in to consideration (Lance et al., 2014).Therefore the researcher was aimed to fill this gap.

1.3 The Research Question

The research was undertaken to provide answer for the following three basic questions;

1) Have the public perceived the program?
2) Have the prize linked saving program an impact on saving culture of individuals?
3) What determines response (decision of individuals to respond) to the program?

1.4 Objectives of the Study

The general objective of this study was to examine the impact of the prize linked saving program on saving culture of individuals. Specific objectives of the research are listed here under;

- To evaluate the perception of individuals about the PLSP
- To examine the impact of prize linked saving program on saving culture of individuals.

- To factor out the determinants of program participation (the decision of individuals to responded to the program by increasing their saving)

1.5The Research Hypothesis

Null Hypothesis (H0)**:** Prize linked saving program has an impact on saving culture of individuals.

Alternative Hypothesis (HA): Prize linked saving program has not an impact on saving culture of individuals.

1.6 Delimitation of the study

This study was confined only to examine the impact of the prize linked saving program on saving culture of individuals, who are customers of banks, working in Addis Ababa city, by analysing the saving culture of a sample size of 340 respondents using propensity score match model taking the saving balance of respondents after treatment as dependent variable and different variables, which can possibly determine savings of individuals as independent variable with the moderator variable, treatment status of individuals (individuals status of getting the treatment).

1.7 Limitation of the Study

This research was mainly done to show average treatment effect on treated and measurement of variables was done immediately at the end of the program. Therefore the research doesn't show how sustainable the impact is.

1.8 Significance of the Study

The study shades light in the area of PLS program impact evaluation literature and it can serve as a stepping-stone for future researchers. Moreover, it is quite informative for the Commercial Bank of Ethiopia and other private banks as well, about what impact, does the program has in the study area, so that they make an informed decision.

1.9 Organization of the study

The study is organized with five chapters. Chapter one provides the introduction, problem statement, objectives, significance, limitation and delimitation of the study. Chapter two gives an overview of literatures relevant to the study and discusses the conceptual framework of the impact of PLSP on saving culture of individuals. Chapter three outlines the methodology employed to achieve the objectives of the study, the sampling techniques adopted for the data collection. Chapter four provides the descriptive

statistics; socio economic and demographic characteristics of respondents and discusses the empirical results. The last chapter provides a summary and the conclusions of the study with recommendations.

CHAPTER TWO

2 REVIEW OF RELATED LITERATURE

This part of the paper presents literatures reviewed in two sections; theoretical and empirical literature review. The theoretical literature review part has contained different theories of saving and different forms of prize linked saving adopted by different banks, while the empirical literature review part addresses empirical issues related with saving and prize linked saving. Moreover, the chapter comprises of the conceptual framework of the study.

2.1. Theoretical Literature Review

2.1.1 Theories of Saving

There are several theories of saving that are implied from consumption theories (hypothesis) as the amount of income not consumed is saved and these are discussed below.

2.1.1.1 The Keynesian Theory of Absolute Income Hypothesis

This theory focuses on current income (the absolute/disposable income/income after tax) to explain changes in savings and consumption behavior of individuals. As to Keynes, consumption will increase at a decreasing rate as the income increases other things being constant. This implies that part of the income will be saved at an increasing rate as the disposable income increases, which implies consumption and savings are functions of disposable income. Hence, as per this theory, individuals consume a decreasing and save increasing, percentage of their income as income increases. Other things being constant, it is assumed that rich people will save more than poor people (Keynes 1936).

Algebraically, if we consider the postulate of Keynes, saving is part of the income, which is left unconsumed; saving is the difference between disposable income and consumption given by the equation,

$S=Y_d - C$, where $C=a+bY_d$. Therefore $S=Y_d-(a+bY_d) = -a+ (1-b) Yd$

Where,-a,is the dissaving at $Y_d=0$, Y_d is disposable income, income after tax and (1-b) is marginal propensity to save, which is part of the income get saved out the additional unit of income.

2.1.1.2 Relative Income Hypothesis

The theory attributed to Duesenberry after his book titled “Income, Saving and the Theory of Consumer Behavior” (1949), relative income hypothesis, claims the proportion of income an individual is expected to use for consumption purposes will be the same regard less of absolute income, implying that individuals

care about status, which is based on a postulate that has long been acknowledged by psychologists and sociologists. Two key assumptions have been put in place in an effort to explain in detail the core of the hypothesis.

- The consumption behavior of individuals in the society is interdependent
- The consumption relations are irreversible over time.

According to the first assumption, the consumption and saving behavior of an individual in the society does not depend on his/her absolute income but rather on his/her percentile position in the income distribution. This implies that the MPS of an individual would be higher if his/her percentile position in the income distribution is higher.

Assumption two focuses on the status that members of the society seek to maintain by ensuring that their consumption standards do not change over time. This implies that if a person has attained a certain standard of living he will not change his consumption pattern due to downward change in his current income as compared to previous peak income rather his consumption pattern will be maintained by consuming more of his disposable income even to a point of dissaving. On the other hand, if there is an upward change in income of a person, he would not aspire for a similar upward change in consumption level than the one already achieved meaning that his saving rate will increase due to increase in income.

2.1.1.3 Permanent Income Hypothesis

It is developed by the monetarist economist Milton Friedman in 1957 and hypothesizes that, income and consumption is divided into two major components, the transitory and permanent components. Friedman argued that, it is the permanent income, which determines the saving and consumption behavior of individuals, not absolute income as Keynes suggested. The permanent income is defined as the lifetime income an individual is expected to earn out of the physical and human assets that he/she possesses, while transitory income has been defined as the difference between actual income and permanent income over a specified period of time. That being the case, permanent income is related to permanent savings implying that the higher the permanent income, the higher the savings rate other things being constant.

2.1.1.4 Life-Cycle Hypothesis

In a series of papers written in the 1950s, Franco Modigliani and his collaborators Albert Ando and Richard Brumberg, have developed the life cycle hypothesis, which explains the consumption and saving pattern of an individual in a specified period of time. According to this hypothesis, individuals seek to

maintain their standard of consumption throughout their lifetime. To be able to achieve that, a proportion of their income earned during their working years has to be saved in order to meet their consumption needs after retirement.

2.1.1.5 Prize Linked Saving

Prize linked saving has different application and different forms across the world. The following table elaborates more.

Type of product	Examples	Product	Prizes	Institution	Type of Issuer
Savings bond	United Kingdom	Premium Bonds	Cash	National Savings and Investments (NS&I)	Government agency
	Sweden	Lottery Bonds	Cash	National Debt Office	Government
Savings account	South Africa†	A-Million-a-Month Account (MaMA)	Cash	First National Bank	Commercial bank
	Brazil	HiperFundo Account	Consumer goods	Banco Bradesco	Commercial bank
	Indonesia	BritAma Account	Cash	Bank Rakyat Indonesia	Microfinance institution
Certificate of deposit	United States	Save to Win	Cash	Various credit unions in some states	Credit union
Promotional raffle	Nigeria	Save and Excel	Cash/Consumer goods	First Bank of Nigeria	Commercial bank

Sources: Guillen and Tschoegl 2002; Guryan et al., 2010 and Kowalski, 2014 (cited from Kowalski, 2014)

2.2. Empirical Literature Review

The independent variable covariates, which we considered to match, treated versus non treated individuals are variables, which determine individuals saving in addition to variables related with access to the program. Hence it is relevant to review literatures related with determinants of saving.

2.2.1. Determinants of Saving Behaviour of Individuals

Though there are numerous economic theories about what determines the saving behaviour of individuals, none of them are conclusive and it is a matter of debate. Since theories are cumulative result of studies in some areas, as culture and different socio economic characteristics of individuals varies from area to area, theories may come to be invalid. Hence, it needs to be studied in the case of each specific area. In this regard, Yonas and Gebrekirstos, 2016 have studied the factors affecting individuals saving in the case of Diredawa City. In their study, they used a binary econometric (Tobit) regression model, taking the rates of mean monthly saving of individuals as dependant variable regressing it on independent variables, sex, marital status, age, educational level, occupation, respondent's use of planning, where to get meal, dependency on income (helping others), work experience, average monthly income and expenditure on stimulants. There result shows that four of their fifteen explanatory variables are significant to affect saving of individuals. Namely, marital status of being married, use of planning for consumption, helping others and average income are found to be significantly affecting variables of individual's savings. However, their finding, helping others has significant positive impact on saving of individuals is somewhat in contrary to theories, which theorize saving as a function of income. As they use their income for helping others their income left for saving is going to be minimal. As a result, their saving would have been reduced, but, their research doesn't reveal this way, for which they justified, saying individuals who help others need to be much conscious and careful.

Another study done by Tsega and Yemane, 2014, in the case of Amhara Region, North Gonder Zone, sharing a model with Yonas and Gebrekirstos, binary econometric (Tobit) model, have estimated the determinants of households saving in Ethiopia, taking the amount of household's saving as a dependant variable and independent variables, sex, age, marital status, family size, educational level, occupation, average monthly income, income source, access to credit and saving institutions, money getting pattern frequency and institutions used by households for saving. Coming to their finding, unlike the finding of Yonas and Gebrekirstos age is found to be significant to positively affect saving, while in line with them, they have found marital status is significant to affect saving positively. The other finding they come up

with is, the forms of institutions used by households to save is a significant determinant of saving, indicating that individuals who used formal institutions like banks have better saving performance than those who used the informal once.

The study done in the case of Benishangul Gumuz Regional State, studied by Bogale et al., 2017 using the double hurdle model, in which the determinants of household's decision to save and the extent or amount of savings of households are estimated independently. For hurdle one, they used the decision to save as dependant variable, and for hurdle two the amount of saving. In their study they have involved a number of explanatory variables representing household's composition and characteristics, individual features of households, social and economic features, location and geographic features as well as monetary factors such as income, and they have found that, annual income of households has a positive effect on both the decision to save and saving level of households. The other variable educational status has also a significant positive effect on the amount of households saving but insignificant for the decision to save. The researchers has also found that distant location of financial institutions have a negative significant effect on saving decision of households.

2.2.2 Literatures Related with the Impact of Prize Linked Saving

In money banks prize linked saving is not a program rather it is a product. Hence researches done on the impact of prize linked saving considered it as a product, as a result, the methodologies used in prize linked saving literatures are more of experiment types. However, in the absence of program impact evaluation literature of PLS, we can consider them as a best substitute of it, to learn about, what looks like the responses of individuals to PLS. Taking it into consideration, a research done by Atalay et al., 2013, studied the impacts of prize linked saving using an online experiment organized to know three basic things: if PLS product has attracted loss averse individuals, leading them to reallocate funds from the lottery and consumption to the PLS, if individuals has reallocated some savings from traditional savings to PLS and if the money allocated to the PLS is sourced from current consumption or lottery expenditure and then PLS has increased total savings. For doing so, the researches designed their experiment with a series of individual portfolio allocation decisions in which each subject (participant) had a maximum budget of $100 and a maximum of four potential alternatives to which participants could allocate their $100 budget: (1) receiving cash within two weeks of participation (consumption), (2) traditional savings, (3) entering a lottery and (4) a PLS account. By the experiment the researchers has studied how individuals allocate their portfolio making the lottery odds to be bad, fair and good, at which the expected value of the PLS account

for each dollar invested is determined (1+pPLS*$1,000,which is the lottery face value) with an interest rate of 5,10 and 20% for the traditional saving. They varied the interest rate and the lottery and PLS odds in order to examine the demand for the PLS account under a variety of market conditions in which traditional savings, the lottery and the PLS account would each be more or less attractive relative to the other options. Then the researchers observed portfolio allocation of individuals with different combinations of the interest rate and the lottery odds with PLS and without PLS at all the possible 27 potential combinations of interest, lottery odds and PLS odds. Using the allocation decision data of individuals with demographic information as well as information on subjects' (participants) financial circumstances and savings behaviour, they estimated the impact of PLS on total saving using a fixed effect model taking the sum of money that is allocated to interest bearing savings and PLS as dependant variable and the vector containing the price variable indicators for each interest rate and for each lottery and PLS odds, the presence of the PLS(1,for after introduction of PLS;0 other ways) and the individuals fixed effect as independent variables. They also estimated a probit (binary econometric) model to know the impact of PLS on participation in savings taking a restricted sample of only participants with $0 reported savings, holding the personal characteristics constant and they found that the introduction of PLS has a significant positive impact on both total savings and the decision to save. The other motive of the researches was to know from where the source of PLS is, which they estimated by another fixed effect model, taking the amount allocated to current consumption, traditional savings or lottery) by each individual at each decision as dependant variable with the independent variables they used in the first fixed effect model, at which they come up with a finding, all alternative allocations are affected by the PLS.

Another study done by Cole et al., 2017,on the popular PLS product, MaMa (Million a Month account), which was developed by First National Bank, the retail and commercial bank subsidiary of First Rand Bank Limited, the third largest bank in South Africa, has attempted to answer questions of many problems related with PLS. Of them, their findings which are relevant for the consumption of this paper are reviewed. In their research three main datasets were involved, branch level data for all bank branches, anonymized account level for all bank level employees and anonymized account level data for all prize winners. In analysis of branch level demographic characteristics of depositors, their finding shows that 52% and 46% are male users of MaMa and the normal saving products respectively, in terms of age MaMa users are younger than the normal saving and individuals with lower income are more interested to MaMa, while their analysis made on account level data of employees of the bank, 63% are found to be users of

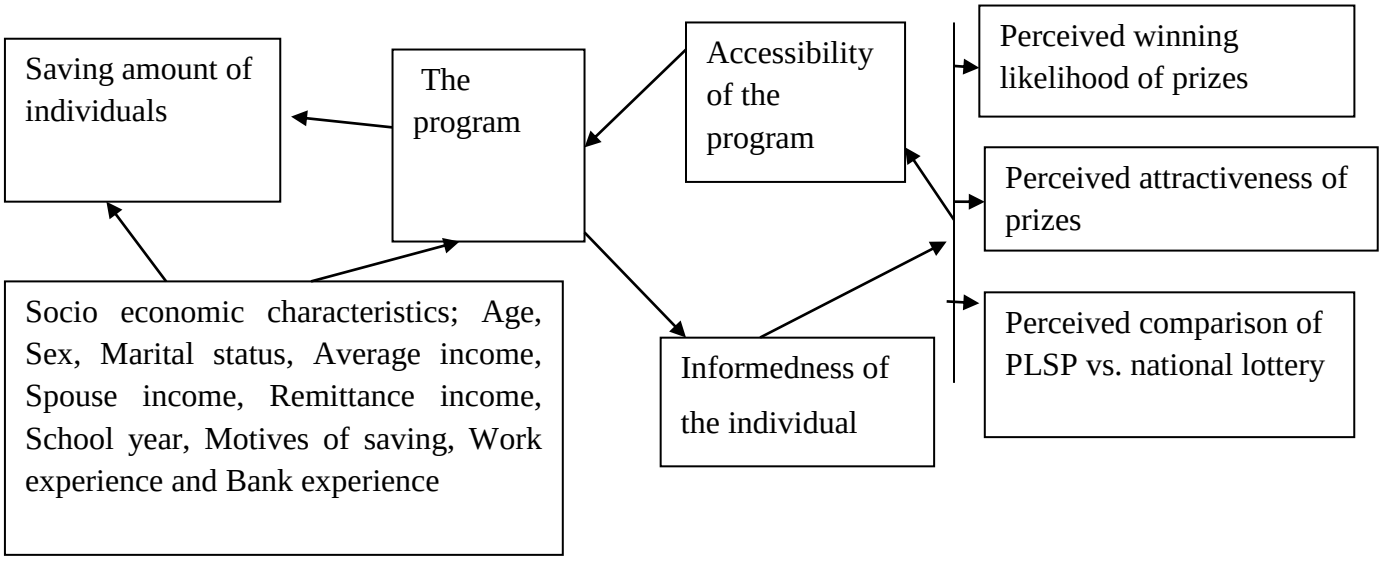
MaMa and only 44.7 are users of normal savings account. In addition, the researches has assessed the demand for MaMa, using a survey data collected by Finscope (FinScope surveys are nationally representative surveys carried out annually by FinMark Trust, and are designed to measure the use of financial products by consumers in South Africa, this specific survey involved 3,885 individuals), specifically using the Finscops's financial segmentation model, which had five components, financial penetration, financial access, financial discipline, financial knowledge and connectedness and optimism based on which the population was segmented in to eight tiers. Their attempt using OLS estimation shows that there is no strong relation with demand of MaMa at individual level. However, in terms of area, they find that the demand for MaMa was significantly lower in areas with higher financial penetration and higher connectedness and optimism scores. The other attempt of the researchers to know if MaMa had attracted new saving by regressing a fixed effect model, the dependant variable the bank's employees level of total net saving as a percent of income at time t, on independent variables, the individuals characteristics like age, race, income, and gender, employees ownership of MaMa account at time t (dummy) controlling the fixed effect of regions resulted them, MaMa caused a 38% increase in net saving. To conclude PLS has some interesting feature to increase saving. However, it is difficult to conclude in the case of the program which has been run by the Commercial Bank of Ethiopia owing to the affecting factors are different from the areas, where the above literatures has focused.

2.3. Conceptual Framework

The conceptual framework of the study was developed standing from literatures reviewed. There are variables which can affect both participation to the program and our variable of interest, saving of individuals, which we call them technically as confounders. Hence participation in the program depends on factors, which can affect saving, plus access to the program. Therefore participation is a function of all variables, which can determine saving and access to the program. The diagram below shows the relation of factors affecting the impact of the program on saving culture of individuals.

As can be referred from the diagram below, once the program is designed, to become effective and achieve its goal, individuals have to get the information and the access to the program. However, being informed about the program and accessing the program without individual's interest can't lead the program to the required result and individual's interest depends on their perception of winning likelihood and attractiveness of prizes.

The diagram of the conceptual frame work



Source; developed by self

Taking the above diagram in to consideration, variables are identified and the table below depicts the nature of each variable in detail.

Table 2.1 Nature of variables used in this research

Types of variable	Variable name	Measurement Scale	Measurement
Dependent variable	Saving balance	Ratio	Respondents saving amount
Moderator variable	Treatment status	Categorical	Dummy, 1, if the individual is treated and 0,othrwise
Independent variables	Sex	Categorical	Dummy, 1, if the individual is female and 0,othrwise
	Marital status	Categorical	Dummy,1, if the individual is married and 0,othrwise
	Employment status	Categorical	Dummy, taking permanent employment as reference, Employment status1, 1, if the individual is employed but contract and 0, otherwise. Employment status2, 1, if the individual is self-employed and 0, otherwise. Employment status3, 1, if the individual is not employed and 0, otherwise.

	Age	Ratio	Age of respondents
	Average income	Ratio	Average earnings of respondents
	Remittance income	Ratio	Remittance earnings of respondents
	Spouse income	Ratio	Average earnings of spouse of respondents
	Consumption of dependents	Ratio	Average expenditure of respondents for dependents
	School year	Ratio	Number of years the respondent attend formal class
	Bank experience	Ratio	Number of years the bank has been using a bank
	Work experience	Ratio	Number of years the respondent has been on work
	Access to the bank	ordinal	Measurement was done using a likert scale, 4 if the respondent accesses the bank less than half kilometre as a reference, 3 if the individual access the bank less than one kilometre but greater than half 2, if the individual access the bank less than one and half kilometre but greater than one 1 if the individual access the bank greater than one and half kilometre
	Motives of saving	Categorical	Dummy, taking saving for smoothing consumption as a reference, Motive1, 1, if for future investment and 0, otherwise. Motive2, 1, if for saving income in excess of consumption and 0,otherwise Motive3, 1, if to get prize and 0, otherwise. Motive4, 1, if for both smoothing consumption and get prize, 0, otherwise. Motive5, 1, if for both future investment and get prize 0, otherwise.
	Informedness about the program	Ordinal	Measurement was done using a likert scale, 3 if the respondent have had all relevant information 2 if the individual was informed to some extent 1 if the individual haven't had information at all.

Researches done on the area of the impact of PLSP on saving culture of individuals are not conclusive. Most of them are overseas (Cole et al., 2017, Atalay et al., 2013 and Kowalski, 2014) and hence they are not conclusive about, what impact does the program of the Commercial Bank of Ethiopia has, because of the fact that the feature of programs researched are quite different from the program, which have been run by the Commercial Bank of Ethiopia.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Introduction

This part of the research presents the research methodology used; the research approach, the research design, population of the study, the types and sources of data, the sampling technique, the technique of data analysis and presentation used, which is demonstrated in two parts ,descriptive methods and econometric models.

3.2. The Research Approach

Owing to the nature of the research, the objectives involved, the data and the methodologies used, the approach of this research was basically quantitative.

3.3. The Research Design

The feature of the research is explanatory and the data involved were merely primary data, collected from randomly selected respondents from the population. Respondents were selected from both cluster of the population, who have received and haven't received treatment of the program to attribute the difference in outcome to the program.

3.4. Population of the Study

To take a sample, the researcher has purposely selected one sub city of Addis Ababa city with high population density, Kirkos sub city, out of this sub city the researcher again purposely selected area of woreda-03 and woreda-04, around Gotera Condominium, where branches of banks are densely found. Namely, two branches of the Commercial Bank of Ethiopia, Awash Bank, Birhan Bank, Lion Bank, Abissinya Bank and Nib Bank.

The population of the study is all account holder customers of the branches of the banks. Since the Commercial Bank of Ethiopia is the only PLSP providing bank, to bring balanced sample involvement of treated and untreated individuals by the program, the Commercial Bank of Ethiopia has been represented by two branches, Gotera Condominium and Gotera Masalecha, while branches of non-program delivering banks were represented by one branch each, named Gotera Branch of each bank. As the customer register boo of each branch shows, the Commercial Bank of Ethiopia has around 3,346 and 2,225 customers in

Gotera Condominum and Gotera Masalecha branches, respectively and the non-program delivering banks have about 1,349 ,1240,1714,1058 and 1,568 customers in Birhan Bank, Nib Bank, Awash Bank, Lion Bank and Abissinya Bank, respectively. Hence, the total population of the study is estimated to be 12,500.

3.5. Sampling Technique and Method of Data Collection

A sample was drawn from each branch proportional to their contribution to the population, in such a way the total population equals to 340, which was determined by Yemane's formula given by $n = \frac{N}{1+Ne^2}$

Where, n is sample size, N is population and e^2 is probability of error at 95% level of confidence. Based on the above formula, 47,43,29,37 and 34 respondents were selected from Awash Bank, Abissinya Bank, Lion Bank, Birhan Bank and Nib Bank, respectively. After selecting respondents from each bank using systematic method of sampling technique, data was collected using a semi structured questioner. To collect accurate or nearly accurate information of respondents, the questioner was prepared in Amharic language, so that respondents can easily understand the required information. In addition to this oral explanation was given to each respondent upon filling the questioner.

3.6. Method of Analysis

For the purpose of analysis, this study was used both descriptive and econometric model. Descriptive statistics like, mean, frequency tables and figures were used to summarize the socioeconomic behaviour of respondents.

3.6.1Econometric Model Specification

In examining the impact of the program, this paper has used two models for the participation and the outcome equation. In addition, there is a response equation for the analysis of what determines response to the program. The participation equation and the response equation have shared a model; they both have used the logit model commonly.

*3.6.1.*1The Participation Equation (The Logit Model)

The participation equation has been specified using the logit model. As this model is relevant, when the outcome of the dependent variable is dichotomous (Gujarati 2004), which is realistic in this study, the dependent variable, program participation (treatment status of individuals) has taken a value 1 if the i^{th} individual is part of the program or treated by the program and 0, otherwise.

Hence the model was specified as,

$Pi = E(Y = 1|XI) = \frac{1}{1+e^{-(\beta 1+\beta 2xi+ei)}}$ ..... (1)

Where Xi is confounding variables (x_1, x_2 ...) and Y = 1 means the individual participates.

If Zi=β1+β2xi+ei, Pi=$\frac{1}{1+e^{-Zi}}$ ..... (2)

Multiplying both the numerator and the denominator by e^{zi} will give us,

Pi = $\frac{e^{zi}}{1+e^{zi}}$ ..... (3)

Which represents what is known as the (cumulative) or logistic distribution function (Gujarati 2004).

As can be learned from (3) Pi has nonlinear relation with xi and β's, which can be linearized as follows.

If Pi, the probability of participating in the program, is given by (1), then (1 − Pi), the probability of not participating in the program, is

1 − Pi = $\frac{1}{1+e^{zi}}$ ..... (4)

Now we can write the odds ratio, Pi/ (1-Pi) in favour of program participation, the ratio of the probability that an individual will participate in the program to the probability that the individual will not.

$\frac{Pi}{1-PI} = \frac{1+e^{zi}}{1+e^{-zi}} = e^{zi}$ ..... (5)

If we take the natural logarithm of (5) we will get the logit model,

Li = $\ln\left(\frac{\text{Pi}}{1-\text{Pi}}\right) = \ln(e^{zi}) = Zi = \beta 1+\beta 2xi+ei$ ..... (6)

Where, β1 and β2 are coefficients, Xi is vector of independent variables, pi is probability of participation and ei is the error term.

3.6.1.2Propensity Score Matching Model Specification (The Outcome Equation)

Analysing the impact of program interventions requires the establishment of the counterfactual that represents what would have happened, had the program were not taken place or what otherwise would have been true(Lance et al., 2014). The fact that we can't observe one individual in two scenarios (when the individual got the treatment and didn't get the treatment), we miss the counterfactual; hence we need to consider the outcome of untreated individuals who are similar with treated individuals in terms covariates of variables which affect the outcome of interest, saving. For doing so, the propensity score method of matching was applied.

Matching on the propensity score is probably the most common current approach to matching, which estimates the counterfactual for each individuals in a sample by matching them to an individual, who

experienced the counterfactual outcome and had a similar probability of participation conditional on observed characteristics (x1, x2,…). The probability of participation conditional on K observed covariates, Pr (P = 1|x1, x2,…,xK) is called the Propensity Score (Lance et al., 2014). By so doing the selection bias can get largely eliminated.

To develop the PSM framework, let Y*i* be the outcome variable of individual *i*, such that Y_{1i} and Y_{0i} denote individual outcomes with and without participation respectively. A dummy variable P_i denotes participation of household *i*, where $P_i = 1$ if the individual has participated and, $P_0 = 0$, otherwise.

$$Y_i = P_i Y_i + (1 - P) Y_{0i} \quad \text{..... (1)}$$

The impact of participation on individuals saving culture is given by;

$$\Delta_i Y_i = Y_{1i} - Y_{0i} \quad \text{..... (2)}$$

Where, $\Delta i Yi$ denotes the change in the outcome variable of individual *i*, resulting from participation. An individual cannot be both participated and non-participated, therefore, at any time, only either Y_{1i} (for participated individual) or Y_{0i} (for non-participated) can be observed. This gives rise to the selectivity bias problem (Heckman *et al*., 1997). The ATT estimates program impacts conditional on participation in the program.

$$ATT = [E(\Delta_i | P = 1)] = E[Y_{1i} - Y_{0i} | Y_{1i}] = E[Y_{1i} | P_i = 1] - E[Y_{0i} | P_i = 1] \text{..... (3)}$$

From equation (3), $E[Y_{0i} | P_i = 1]$ is the missing data, representing the outcomes of participated individuals in the absence of the program. One way to estimate this missing data is to use outcomes of the non-participated individuals. By using the outcomes of a non-participated individuals, (3) can be rewritten as

$$E(\Delta_i | P_i = 1)] = E[Y_{1i} | P_i = 1] - E[Y_{0i} | P_i = 1] \text{..... (4)}$$

Without controlling for the unobservable heterogeneity, equation 4 can be shown to consist of a bias in addition to the impact estimate. Subtracting and adding $E[Y_{0i} | P_i = 1]$ to the right side of equation 4

$$E[Y_{1i} | P = 1] - E[Y_{0i} | P_i = 0] - E[Y_{0i} | P_i = 1] + E[Y_{0i} | P_i = 1] \text{..... (5)}$$

$$= E[Y_{1i} - Y_{0i}) \big| P_i = 1] + E[Y_{0i} | P_i = 1] - E[Y_{0i} | P_i = 0]$$

Rearranging (5) gives,

$$[E(\Delta_i | P_i = 1)] + \{E[Y_{0i} | P_i = 1] - E[Y_{0i} | P_i = 0]\} \quad (6)$$

However, the PSM method takes care of the bias, so that estimated program impact is largely consistent. The method identifies and matches individuals within the participated group that are similar in observable characteristics Xi, to those of the non-participated group. Based on their propensity scores, the nearest neighbour matching Kernel matching, radius matching methods can be used to select the best match non-participated individual for the participated individual.

$$\{E[Y_{0i}]P_i = 1, X_i = x\} = \{E[Y_{0i}]P_i = 0, X_i \approx x\} \quad (7)$$

Equation 7 proved that, if outcomes without participation (Y0i) are independent of participation to the program (*Pi*) given Xi = x, then participants are also independent of participation (P*i*) given their propensity scores [P(X)].

Once we generate the propensity score of each individual and appropriate common support is established, the heterogeneous impact of treatment (ATT) can be estimated using the equation;

$$\text{ATT} = \left[\text{E}(\Delta_\text{i} | \text{P}_\text{i} = 1)\right] = \frac{1}{\text{P}_\text{i}} \sum (\text{Y}_{0\text{i}}) \text{P}_\text{i} = \frac{1}{\text{P}_\text{i}} \sum \Delta_\text{i} \text{P}_\text{i} \quad (8)$$

For showing the consistency and robustness of the results, the study has applied three methods of matching. These are Nearest Neighbor matching, Radius Matching and Kernel Matching.

3.7 Variable Description and Priori Expectation

The dependant variable which was considered in this study is the saving amount of individuals at the end of the sixth round program, as at June 30, 2016.

The independent variables are identified from previous studies and theories. These variables are expected to cause (and therefore, explain) both variation in saving culture and program participation across individuals in the study area. The independent variables are explained as follows:

- Income (Ai): The Keynesian theory of Absolute Income Hypothesis suggests that consumption will increase at a decreasing rate as the income increases other things being constant. This implies that part of the income will be saved at an increasing rate as the disposable income increases. Therefore consumption and savings are functions of disposable income. However, other things being constant, it is assumed that rich people will save more than poor people (Keynes 1936). In this study the natural logarithmic value of monthly average income of respondents was considered.

- Consumption of Dependants (Cd): consumption of dependants refers to the consumption of individuals, who have no income source and depend on the individual's income. Other things being equal, an individual who have more consumption of dependants saves less and it was measured in terms their consumption.
- Education (literacy) level of the individual (Sy): Education has paramount impact on income improvement. Hence it is likely that educated individuals save more. The variable was measured as school year of respondents.
- Marital status of individuals (Ms): as to the Keynesian theory of Absolute Income Hypothesis, saving is part of the disposable income left unconsumed. Married individuals are beneficial of scale. As a result, income left for saving is more than singles. Hence; they are likely to save more. This variable has been used categorically.
- Spouse income of respondents (Si); measured by the average monthly earnings respondent's spouse, expected to affect saving positively.
- Work experience (We): This variable is a continuous variable and saving is likely to grow with experience since earning of individuals depends on experience.
- Gender of the individual (Sex): This is a dummy variable with 1 for being female and 0 otherwise. Females are expected to save more.
- Age of the individual (Age): Age is a continuous variable and measured in years. As age increases the individuals earning is likely to increase. Since income matters saving, the individuals saving is expected to increase with age.
- Individuals access to the program (Accb); even if individuals have everything needed to participate in the program, they can't participate, unless they have access to the program. Therefore, participation is dependent on access to the program. In this research access to the program was measured, in two dimensions, in terms of how much kilometres an individual has to go, to access the PLS program providing bank and how informed is the individual about the program (the information they have). To bring both informedness and access of individuals in to the model, both has been treated as ordinal variable
- Bank experience of respondents (Be); measured by the number of years, the respondents has been using a bank is expected to affect saving positively, since individuals with better bank experience have better saving culture.

- Motives of saving (Mfs1, Mfs2, Mfs3 Mfs4, Mfs5 and Mfs6,); entered in to the model categorically, individuals, whose motive of saving is to invest in the future are expected to save more.
- Employment status (Es1, Es2, Es3); entered in to the model categorically, individuals, who are employed permanent wise are expected to save more.
- Perceived attractiveness of prizes (Attpr); considered as an ordinal variable, individuals, who better perceive prizes as attractive are expected to save more.
- Perceived winning likelihood of prizes (Attlh); considered as ordinal variable, individuals with better perception of winning likelihood are expected to save more.
- Individuals informedness about the program (INFPLSP); considered as an ordinal variable, individuals with better informedness about the program are expected to save more.
- Perceived comparison of PLSP vs. national lottery(comPvsN); considered as an ordinal variable, individuals, who prefer PLSP are expected to save more

CHAPTER FOUR

4. RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the main findings of the study concerning the impact of PLSP on individual's saving culture, determinants of individual's reaction to the program and individual's perception about the program. The analysis has been done using statistical software called STATA, version 13. Accordingly, the chapter presents the descriptive and econometric findings.

4.2. Descriptive Statistics

The study has involved 340 respondents of which 150 are treated and 190 are untreated with the following socio economic and demographic characteristics.

4.2.1. Socio Economic and Demographic Characteristics of Respondents

4.2.1.1. Gender of Respondents

As can be seen from the table below, gender mix of respondents shows that, out of the total 340 respondents, females are 138(40.59%). Of them, 64(46.38%) and 74(53.62%) are treated and untreated respectively, while out of 202(59.41%) male respondents 86(42.57%) and 116 (57.43%) are treated and untreated, respectively.

Table 4.1 Gender, Marital Status and Employment Status of Respondents

Characteristics of Respondents	Categories	Treated Respondents		Untreated Respondents		Total	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender	Male	86	42.57	116	57.43	202	59.41
	Female	64	46.38	74	53.62	138	40.59
Marital Status	Single	82	42.49	111	58.42	193	56.76
	Married	68	46.26	79	53.74	147	43.24
Employment Status	Employed Permanent	87	25.59	116	34.12	203	59.71

	Employed Contract	7	2.06	8	2.35	15	4.41
	Self-Employed	44	12.94	55	16.18	99	29.12
	Others	12	3.53	11	3.24	23	6.76

Source; own computation

4.2.1.2. Marital Status of Respondents

In terms of marital status, 193(56.76%) respondents are single and 147(43.24) are married. Out of a total of 147 married respondents 79(53.74%) are untreated and 68(46.26%) are treated, respectively, whereas out of 193(56.76%) single participants 111(58.42%) and 82(42.49%) are untreated and treated, respectively, as can be observed from table 4.1above.

4.2.1.3. Employment Status

Table 4.1 shows that, in terms of employment status out of 150 treated respondents 87,7,44 and 12 are employed permanent, employed contract, self-employed and others, respectively, while out of 190 untreated respondents 116,8,55 and 11 are employed permanent, employed contract, self- employed and others, respectively.

4.2.1.4. Age of Respondents

Age of respondents involved in this study has a mean value and standard deviation of 29.41and 7.75 for untreated, respectively, while for treated individuals, 29.71 and 8.25, respectively.

Table 4.2 Mean and Standard Deviation of Continuous Variables

Respondent characteristics	Treatment status	Mean	Standard deviation
Age	Treated	29.71	8.25
	Untreated	29.41	7.75
	Both	29.54	7.96
School year	Treated	14.78	4.35
	Untreated	13.88	4.13
	Both	1384	4.22
Bank experience	Treated	6.7	4.64
	Untreated	6.38	4.81

	Both	6.52	4.73
	Treated	5.53	5.94
	Untreated	6.26	6.19
Work experience	Both	5.94	6.08
	Treated	5789.68	5841.47
	Untreated	8080.43	8668.42
Average income	Both	7069.8	7628.14
	Treated	1340	4776.66
	Untreated	1888.95	9890.89
Remittance income	Both	1646.77	8040.23
	Treated	1697.29	3474.31
	Untreated	1850.53	3801.49
Spouse income	Both	1782.93	3656.25
	Treated	10847.67	21381.85
	Untreated	10234.11	21913.46
Consumption of dependents	Both	10504.79	21650.87

Source; own computation

4.2.1.5 School Year

The school year composition of respondents shows that, treated respondents have a mean school year of 13.78 with standard deviation 4.35 and untreated respondents have a mean school year of 13.88 with standard deviation 4.13.

4.2.1.6 Average Income

Average income of individuals as measured by the monthly average earnings of respondents; untreated respondents have a mean average income of Birr 8,080.43 with a standard deviation of 8,668.42, while treated respondents have a mean of Birr 5,789.68 and a standard deviation of5,841.47, as can be evidenced from table 4.2.

4.2.1.7. Remittance Income

In terms of remittance income untreated respondents have better remittance income with a mean and standard deviation value of Birr 1,888.95 and 9,890.89, respectively, compared with treated respondents, who have a mean and standard deviation of 1,340 and 4,776.66, respectively.

4.2.1.8. Spouse Income

Spouse income of the two comparison group of respondents, as measured by the average monthly earnings of respondent's spouse, shows that the untreated respondents are a little better than that of the treated respondents with a mean and standard deviation of 1, 850.53 and 3,801.49, respectively, while treated respondents have a mean and standard deviation of 1,697.29 and 3,474.31, respectively.

4.2.1.9. Consumption of Dependents

In terms of consumption of dependents, treated respondents spent for their dependents a mean of 10,847.67 with standard deviation 21,381.85, whereas untreated respondents spent a mean of 10,234.11 with standard deviation 21,913.46, as measured by the amount of money spent for the consumption of individuals, who have not income and dependent on respondent's income.

4.2.1.10. Bank Experience

Table 4.2 informs us, bank experience of respondents as measured by number of years; the respondent has been using a bank, treated respondents are found to have better banking experience with mean and standard deviation 6.7 and 4,64, respectively, while untreated respondents have 6.38 mean and 4.81 standard deviation.

As per the information from table 4.2, though there is no significant difference between treated and untreated respondents there is high standard deviation in all variables.

4.3 Perception of Respondents about the PLSP

4.3.1 Individuals Informedness about the PLSP

To examine how informed are respondents about the PLSP, they were asked to label themselves on three predefined informedness levels. Namely, I have had all relevant information, I have had to some extent and I hadn't had at all. Based on their response, out of the 150 treated respondents, 62(41.33%) respondents had all relevant information, 68(45.33%) respondents had the information to some extent and the remaining

20(13.33%) respondents hadn't had the information at all. When we come to the 190 untreated respondents, only 21(11.1%) respondents had all relevant information, 129(67.9%) respondents had the information to some extent, while the remaining 40(21%) respondents hadn't had the information at all. When we look informedness in terms of marital status, out of the total 147 married respondents 59(40.14%) have all relevant information and in terms of gender females are a little better informed about the program being 45(54.9%) out of 82 informed respondents are female, while in terms of age 46(56%) out of 82 are above the mean age, 29.5.

Table 4.3 Informedness across Socio economic and Demographic Characteristics

Degree of informedness		Individual's socio economic characteristics									
		Gender		Age		Marital status		School Year		Treatment Status.	
		Male	Female	<29.5	>29.5	Sing.	Marr.	<13.8	>13.8	Trea.	Untr.
Informed	Frequency	37	46	37	46	24	59	13	70	62	21
	Percent	18.32	33.33	18.23	33.58	12.44	40.14	12.15	30.04	41.33	11.05
Less informed	Frequency	117	80	125	72	124	73	69	128	68	129
	Percent	57.92	57.97	61.58	52.55	64.25	36.14	64.49	54.94	45.33	67.89
Uninformed	Frequency	48	12	41	19	45	15	25	35	20	40
	Percent	23.76	9.38	20.20	13.87	23.32	7.43	23.36	15.02	13.33	21.05

Source; own computation

4.3.2 Perceived Attractiveness of Prizes

Table 4.4 Perceived Attractiveness of Prizes.

		Individual's socio economic characteristics										Treatment Status			
		Gender		Age		Marital status		School Year		Average Income		Trea.		Untr.	
Degree of attractiveness		Male	Fem.	<29.5	>29.5	Sing.	Marr.	<10	>10	<3500	>3500	Frequency	%	Frequency	%
V. Att	Fre.	25	16	29	12	23	18	19	24	14	28	29	10.39	12	4.30
	%	16.23	10.39	18.83	10.08	15.54	13.64	35.19	10.04	20.29	13.15				
Att	Fre.	42	35	46	32	40	37	12	69	24	58	41	14,70	36	12.90
	%	27.27	27.78	29.87	26.89	27.03	28.03	22.22	28.87	34.78	27.23				
S att	Fre	67	49	63	53	68	48	14	109	22	90	43	15.41	73	26.16
	%	43.51	38.89	40.91	44.54	45.95	36.36	25.93	45.61	31.88	42.25				
Un.Att	Fre,	20	26	24	22	17	29	9	37	9	37	17	6.09	29	10.39
	%	12.99	20.63	15.58	18.49	11.49	21.97	16.67	15.48	13.04	17.37				
total		154	126	162	119	148	132	54	239	69	213	130	46.56	150	57.76

Source; own computation

To know how attractive were prizes, respondents were asked to label the attractiveness of prizes available and as can be seen from table 4.6, out of 279 respondents, who have had all relevant information or who have had to some extent, they are only 29(10.39%) treated respondents, for whom prizes were very attractive, while for 41 (14.7 %) treated respondents, prizes were attractive. For the remaining 43 (15.41%) and 17 (6.09%) treated respondents, prizes are somewhat attractive and unattractive, respectively. Among the untreated respondents only 12(4.30%) and 36(12.90%) respondents rated prizes as very attractive and attractive, respectively. When our analysis proceed to, how attractiveness of prizes looks like across different socio economic and demographic characteristics of respondents considering respondents, for whom prizes are very attractive, it is 25(16.23%) male respondents and 16(10.39) female respondents, out of the total 154 males and 126 females, who had the information respectively. In terms of age, 29(18.83%) individuals below the mean age are better attracted by the prizes compared to individuals, who are above the mean age, who are only 12(10.08%) respondents. High difference has been observed across school year of individuals, at which 18(35%) individuals below grade ten and only 24(10.04%) above grade ten rated prizes as very attractive. Moreover, in terms of average income, 14(20.29%) individuals, whose average

monthly earning is less than ETB 3,500 are better attracted by the prizes compared to only 28(13.25%) individuals, who have better earning.

4.3.3. Perceived Likelihood of Winning Prizes

The perception of individuals, about how likely a single coupon is to win the prizes, has an important role on motivation of individuals to save more. Hence attempt was made to examine the perception of respondents, on which respondents were asked to label the winning likelihood as very likely, likely, somewhat likely and unlikely. Table 4.7 shows that, out of 279 respondents, who had all relevant information or who have the information to some extent, respondents who rated the likelihood as very likely are 18(12.24%) male and 18(14.06%) female respondents, while who rated it as likely are 42(28.57%) male and 35(27.34%) female respondents. Only 29(17.90%) and 12(10.08%) respondents who are below the mean age and above the mean age respectively, have rated as very likely. In addition, respondents, who are below grade ten and less income earners, have better rated the winning likelihood as very likely.

Table 4.5 Perceived Winning Likelihood of Prizes

Degree of likelihood		Gender		Age		Marital Status		School Year		Average Income	
		Male	Female	<29.5	>29.5	Sing.	Marr.	<10	>10	<3500	>3500
Very likely	Frequency	18	18	29	12	23	18	19	24	14	28
	Percent	12.24	14.06	17.90	10.08	15.54	13.64	35.19	10.04	20.29	13.15
likely	Frequency	42	35	46	32	40	37	12	69	24	58
	Percent	28.57	27.34	28.40	26.89	27.03	28.03	22.22	28.87	34.78	27.23
Somewhat likely	Frequency	67	49	63	53	68	48	14	109	22	90
	Percent	45.58	38.28	38.89	44.54	45.95	36.36	25.93	45.61	31.88	42.25
Unlikely	Frequency	20	26	24	22	17	29	9	37	9	37
	Percent	13.61	20.31	14.81	18.49	11.49	21.97	16.67	15.48	13.04	17.37
Total		147	128	162	119	148	132	54	239	69	213

Source; own computation

4.3.4. Perceived Comparison of the Likelihood of Winning a Prizes and National Lottery

Rational individual always makes comparison of alternatives in making a decision. Hence it is important to measure the respondent's perceived comparison of winning likelihood of a prize from the program and

national lottery. In doing so, respondents, who have had the information about the program, were asked, which likelihood of winning is better among prizes of the PLSP and national lottery. Based on their response, out of 279 respondents, who have had the information about the program, for 130(46.6%) respondents, the winning likelihood of the prizes from the program is greater than the likelihood from national lottery, of which 90(69.2%) and 40(30.8%) are males and females, respectively. In terms of marital status out of 130 respondents, who prefer the likelihood of the prizes of the PLSP over the national lottery, there is significant difference, 90 (69.2%) are single respondents and the remaining 40 (30.8%) are married respondents, while in terms of age 75(57.7%) respondents are below the mean age and the remaining 55(42.3%) respondents are above the mean age. The other significant difference has been shown in terms school year, 89(68.5%) respondents are above the average school year and 42(31.5%) respondents are below the mean school year.

Table 4.6 Perceived Comparison of Winning Likelihood of a Prize from the Program and National Lottery

perceived comparison of winning likelihood of PLSP		Individuals socio economic characteristics									
		Gender		age		Marital status		School year		Average income	
		Male	Female	<29.5	>29.5	Sing.	Marr	<10	>10	<3500	>3500
PLSP greater than national lottery	Frequency	90	40	75	55	90	40	32	103	38	98
	Percent	58.44	32.00	46.30	47.01	60.81	30.53	59.26	42.56	51.35	44.95
National lottery greater than PLSP	Frequency	64	85	87	62	58	91	22	139	36	120
	Percent	41.56	68.00	53.70	52.99	39.19	69.47	40.74	57.44	48.65	55.05
Total		154	125	162	117	148	131	54	242	74	218

Source; own computation

Moreover, the above table shows, in terms of sex, males (58 %) better prefer the lottery from the PLSP than the national lottery compared to females (32%), 60% of singles prefers the program, which is much better than married respondents (30.5%). The other remarkable difference is across school year; individuals, who have attended class for less than ten years of school year, have better preferred the lottery of the program (59%) compared to who attended class for more than ten years (42%).

4.4 Results of Econometric Models

4.4.1 Results of the Logit (participation) Model

In this study the logit (participation) model given by the equation;

$Li = \ln\left(\frac{Pi}{1-Pi}\right) = \ln(e^{zi}) = Zi = \beta 1 + \beta 2xi + ei$, where Xi is the vector of independent variables, was specified as, the dummy of treatment status of respondents as dependent variable, 1, for treated respondents, 0, otherwise, with independent variables, the socio economic and demographic characteristics of respondents; sex, marital status, the natural log values of age, average monthly income, remittance income, spouse income, consumption of dependents, school year, bank experience, work experience, dummy of employment status, access to the bank, informedness about the program and dummy of the motives of saving (the natural log values of continuous variables have been taken to resolve problems of multi co linearity). Moreover, participation is not a function of only the above listed independent variables because of the fact that treated respondents got the treatment because of being customers of the program running bank, the Commercial Bank of Ethiopia and the untreated respondents haven't got the treatment because of not being customers of the program running bank. However, if we consider being a customer of the Commercial Bank of Ethiopia as independent variable, the model will get over specified. Over specification of a model has a problem of tending the propensity score of treated respondents to one and untreated respondents to zero, in such a case we will not have a common support or we will have weak common support (Khandker et al., 2010). Hence beside to calculating the propensity scores, the model shows, the socio economic and demographic determinants of being customer of the program running bank, the Commercial Bank of Ethiopia.

Table 4.7 Output of the Logit (participation) Model Estimation

Logistic regression				Number of obs		340
				LR chi2(21)		81.86
				Prob > chi2		0.0000
Log likelihood	-192.38337			Pseudo R2		0.1754
Ts	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
lnage	-.5119284	1.03086	-0.50	0.619	-2.532377	1.508521
Sex	-.1290342	.2896862	-0.45	0.656	-.6968088	.4387403
Ms	-.0036942	.3706948	-0.01	0.992	-.7302426	.7228542
Employment status, being employed contract	.5657796	.6483655	0.87	0.383	-.7049934	1.836553
Employment status being self-employed	.0246252	.3802645	0.06	0.948	-.7206794	.7699299
Employment status being other	.1786606	.7409217	0.24	0.809	-1.273519	1.63084
Average income	-.3437643	.1385655	-2.48	0.013	-.6153477	-.0721809*
Remittance income	-.145338	.0818676	-1.78	0.076	-.3057955	.0151195
Spouse income	-.0393645	.0444917	-0.88	0.376	-.1265667	.0478377
Consumption of dependents	.0551033	.037536	1.47	0.142	-.0184659	.1286725
School year	-.3456571	.360348	-0.96	0.337	-1.051926	.360612
Bank experience	1.010812	.3315053	3.05	0.002	.3610733	1.66055*
Work experience	-.6396934	.2447763	-2.61	0.009	-1.119446	-.1599407*
Access to the bank	-.0258702	.1085486	-0.24	0.812	-.2386216	.1868812
Motives of saving being for future investment	-.2657618	.4163551	-0.64	0.523	-1.081803	.5502791
Motives of saving being income in excess of consumption	.2005212	.3699024	0.54	0.588	-.5244742	.9255165
Motives of saving being to get prize	1.799092	.9979007	1.80	0.071	-.1567572	3.754942
Motives of saving being both to smooth consumption and	3.325255	1.242411	2.68	0.007	.8901744	5.760336*

to get prize						
Motives of saving being both to for future investment and to get prize	2.877386	1.187778	2.42	0.015	.5493835	5.205389*
Motives of saving being income in excess of consumption and to get prize	1.951448	1.429352	1.37	0.172	-.8500308	4.752927
Informedness about the program .	.9588645	.1592747	6.02	0.000	.6466919	1.271037*
_cons	2.643762	3.313002	0.80	0.425	-3.849603	9.137126*

Source; own computation

*, significant at 95% level of confidence.

As can be seen from the results of the STATA output above, The Pseudo R-square indicates that, about 18% of the variation in being a customer of the Commercial Bank of Ethiopia decision model can be explained through the included explanatory variables. However, the overall model is statistically significant at a Prob > chi2= 0.0000. The result reveals that banking experience has a positive significant impact at a 95 % level of confidence on being a customer of the Commercial Bank of Ethiopia, which means compared to the customers of other banks involved in this study; the customers of the Commercial Bank of Ethiopia have more experience of banking, which might be because of the fact that the service year of the Commercial Bank of Ethiopia is by far greater than the comparator banks. Here we can note that the Commercial Bank of Ethiopia has been operational for the last 75 years while others have not greater than 25 service years. Informedness about the program as well, found to be significant at 95% level of confidence, to determine being a customer of the Commercial Bank of Ethiopia, in a sense that the customers of the Commercial Bank of Ethiopia are more informed about the program, which is owing to the fact that they have more access of information about the program from customer service officers and brochures distributed in branches in addition to public media advertisements, compared to the others. Motives of saving specifically, both to smooth consumption and win prize and only to win prize and for future investment compared to motives of saving being to smooth consumption are also positive and significant to determine the customers of the Commercial Bank of Ethiopia. The other variables which are found to be significant are work experience and average income showing that the customers of the Commercial Bank of Ethiopia are less income earners and less experienced, which might be because of, as

status of individuals increases their demand for attention of others increases and since the Commercial Bank of Ethiopia has many customers, their demand for getting attention of the service providers may not be fulfilled. Hence they tend to be customers of banks, which have fewer customers.

4.4.2 Results of the Propensity Score Matching (Outcome) Model

After generating the propensity score using the participation model, the outcome model develops the common support area and finds a match for each treated individual from the comparator group. For proving the robustness of the propensity matching model, matching has been done using three techniques of propensity matching; nearest neighbor matching (nn matching), radius matching and kernel matching. ‘‘There are several ways to check robustness of the model. One approach is to estimate the propensity score equation and then use the different matching method and compare the results. If the findings with different matching techniques are consistent the model is robust.” (Khandker et al., 2010). Hence matching was made with the three techniques and the results are found to be consistent, showing the average treatment effect is positive and statistically significant at 95% level of confidence, which is in line with the findings of Cole et al.,2017 and Atalay et al., 2013.

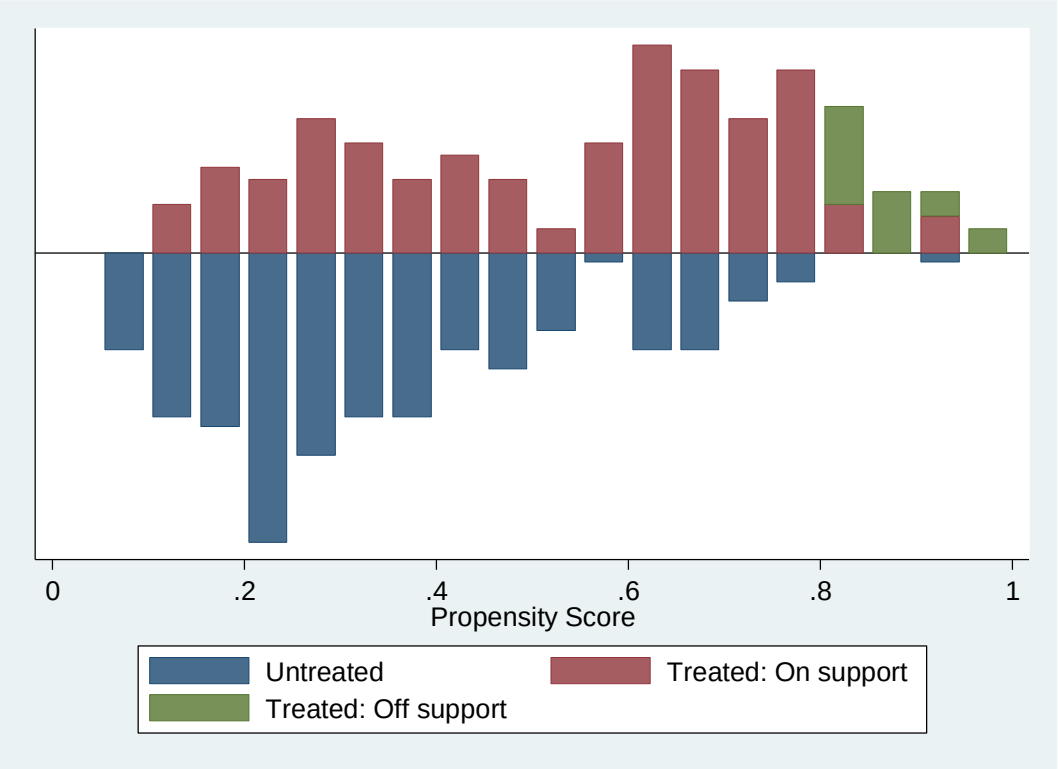
In all the three matching techniques used, the outcome variable was the natural logarithmic value of the respondents saving balance after treatment (saving amount at the end of the program) with the independent variables; the socio economic and demographic characteristics of respondents; Sex, marital status, the natural log value of age, average monthly income, remittance income, spouse income, consumption of dependents, school year, bank experience, work experience, access to the bank, informedness about the program, dummy of employment status and dummy of the motives of saving. Using the model given by the equation,

$$\mathrm{ATT} = \left[\mathrm{E}(\Delta_i \,|\mathrm{P_i} = 1)\right] = \frac{1}{\mathrm{P_i}}\sum\left(\mathrm{Y_{0i}}\right)\mathrm{P_i} = \frac{1}{\mathrm{P_i}}\sum \Delta_i \,\mathrm{P_i}$$

Table 4.8 Estimation Result using the Nearest neighbor Matching with Replacement at neighbor(1) caliper(0.03)

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
lnbalat	Unmatched	8.96737625	8.10579036	.861585892	.196119776	4.39
	ATT	8.96354265	8.16018679	.803355859	.306469273	2.62

- source; own computation using STATA
- lnbalat is the natural log value of balance after treatment
- 17 Treated observations are found to be off support



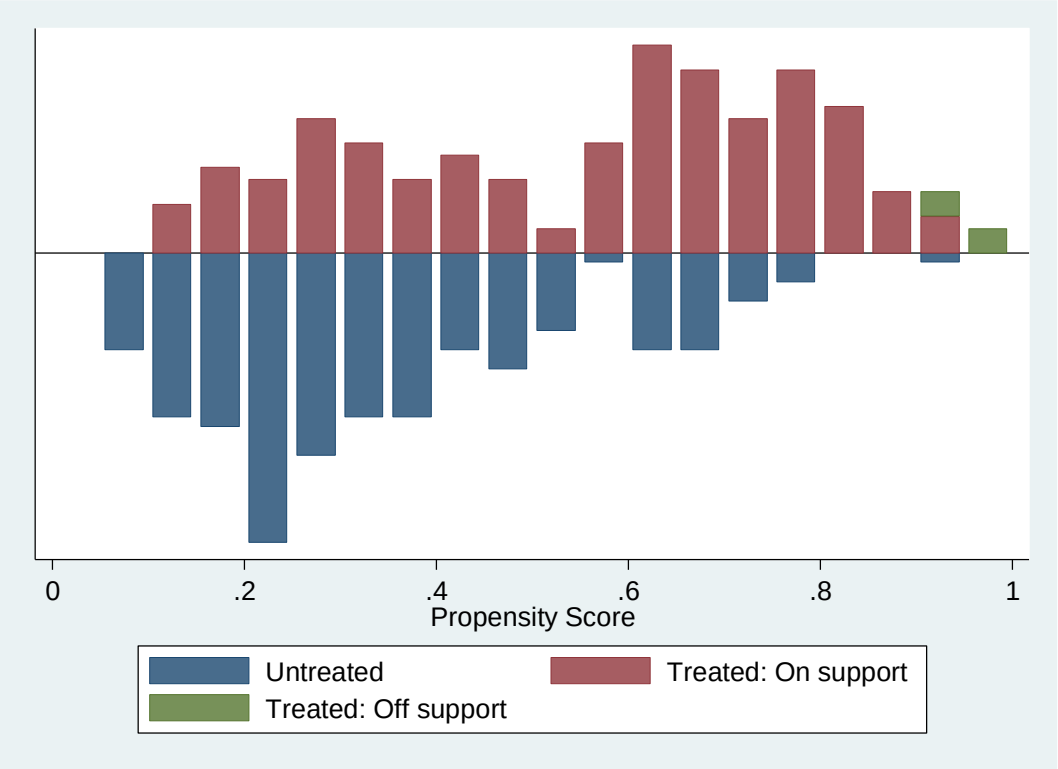
Density distribution of propensity score with the nearest neighbor matching

Table 4.9 Results of estimation using radius matching at radius caliper (0.25)

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
lnbalat	Unmatched	8.96737625	8.10579036	.861585892	.196119776	4.39
	ATT	8.95018353	8.06788115	.882302378	.256038281	3.45

Source; own computation

- lnbalat, is the natural log value of balance after treatment
- 4 Treated observations are found to be off support



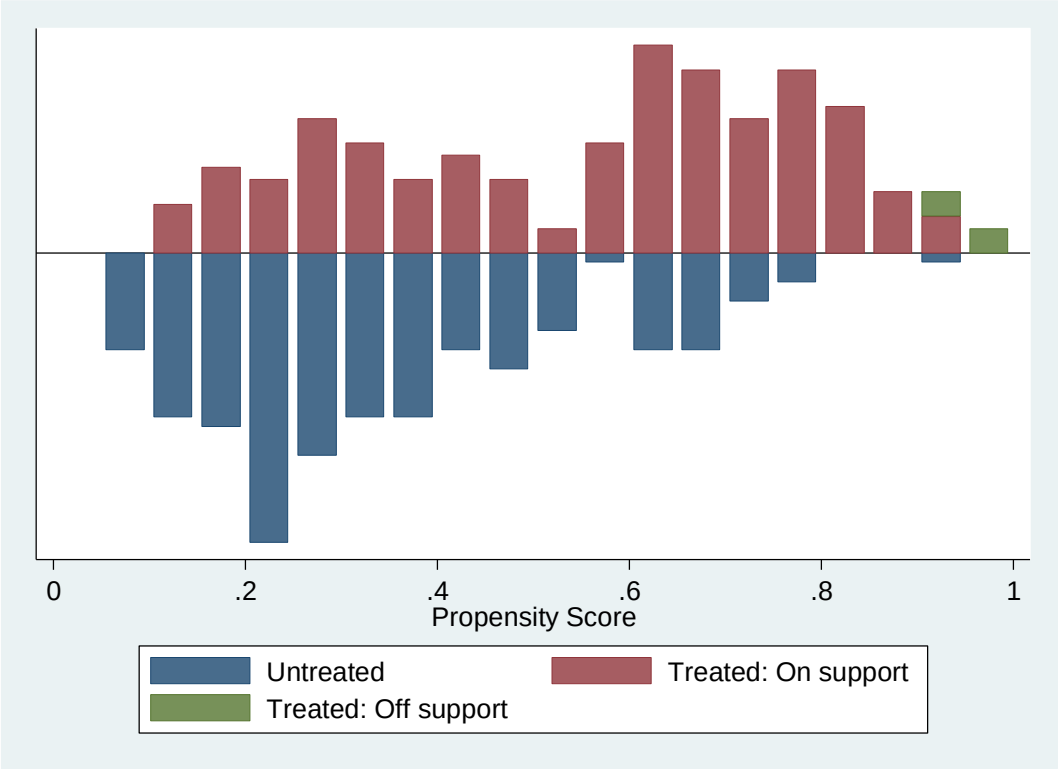
Density distribution of propensity score with the radius matching

Table 4.10 Estimation Result using Kernel Matching

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
lnbalat	Unmatched	8.96737625	8.10579036	.861585892	.196119776	4.39
	ATT	8.95018353	8.02368022	.926503307	262288963	3.53

Source; own computation

- lnbalat, is the natural log value of balance after treatment
- 4 Treated observations are found to be off support



Density distribution of propensity score with the Kernel matching

Compared to traditional regression methods, the estimated variance of the treatment effect in PSM should include the variance attributable to the derivation of the propensity score, the determination of the common support, and (if matching is done without replacement) the order in which treated individuals are matched (Caliendo and Kopeinig 2008). Failing to account for this additional variation beyond the normal sampling variation will cause the standard errors to be estimated incorrectly (Heckman et al., 1998). One solution is to use bootstrapping (Efron and Tibshirani 1993; Horowitz 2003), where repeated samples are drawn from the original sample, and properties of the estimates (such as standard error and bias) are reestimated with each sample. Each bootstrap sample estimate includes the first steps of the estimation that derive the propensity score, common support, and so on. Cited from, Khandker et al., 2010.

Table 4.11 Bootstrap Estimation Result

	Observed Coef.	Bootstrap Std. Err.	z	P>z	Normal-based [95% Conf. Interval]
_bs_1	1.29701	. 3591892	3.61	0.000	. 5930118 2.001008

Source; own computation using STATA

4.3.2 Results of the Response Model

The last objective of this research was to examine, what determines response to the program, which was estimated using a binary (logit) model (the dependent variable used in this model was the decision to respond to the program, 1 if the individual has responded by increasing saving by ETB 1,000 and 0, otherwise, given by the equation;

$$Li = \ln\left(\frac{Pi}{1-Pi}\right) = \ln(e^{zi}) = Zi = \beta 1 + \beta 2xi + ei.$$

Where,

- Pi is the probability to respond
- β1 and β2 are coefficients of independent variables
- xi is vectors of i independent variables
- ei is the error (stochastic) term

It is because of the fact that, as per the program individuals to get one coupon from the program, it is obligatory to increase saving at least by ETB 1,000.00. The independent variables of the model was the socio economic and demographic characteristics of respondents and their perception and attitude towards prizes of the program; sex, marital status, dummy of employment status, natural logarithmic value of (monthly average income, remittance income, spouse income, consumption of dependents, school year, age and work experience) access to the bank, dummy of motives of saving, informedness of respondents about the program, attractiveness of prizes, respondent's perceived winning likelihood of prizes and respondent's perceived comparison of winning likelihood of prizes from the program and the national lottery. As can be seen from the STATA output bellow, four variables are significant to determine the response decisions of individuals at 95% level of confidence. Namely, age, gender of respondents; being female and average monthly income of respondents, positively affect the response decision, while bank experience of respondents negatively affects the response decision. Moreover, the constant term has a negative sign, which agrees with the Keynesian theory of saving; showing the possible dis-saving at income is equal to zero.

Table 4.12 output of the response model (logit) estimation

Variables	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]	
Age	7.641409	3.792025	2.02	0.044	.2091776	15.07364
Sex	2.61092	.9500165	2.75	0.006	7489215	4.472918
Marital status of being married	.0734688	.9458053	0.08	0.938	-1.780276	1.927213
Employment status, being employed contract	3.467749	1.811687	1.91	0.056	-.0830926	7.01859
Employment status being self-employed	-32.79401	3376.891	-0.01	0.992	-6651.38	6585.792
Employment status being other	1.47185	3.00873	0.49	0.625	-4.425152	7.368852
Average income	5.23287	1.346918	3.89	0.000	2.592959	7.87278*
Remittance income	.0713673	.2192188	0.33	0.745	-.3582938	.5010283
Spouse income	-.1280044	.1306338	-0.98	0.327	-.3840419	.1280331
Consumption of dependents	-.0290565	.0997466	-0.29	0.771	-.2245563	.1664432
School year	2.707003	1.573579	1.72	0.085	-.3771559	5.791161
Bank experience	-3.294302	1.604756	-2.05	0.040	-6.439566	-.1490379*
Work experience	2.247308	.9454755	2.38	0.017	.3942096	4.100406*
Access of bank	.0142288	.3759493	0.04	0.970	-.7226183	.7510759
Motives of saving being for future investment	31.71299	3376.891	0.01	0.993	-6586.873	6650.299
Motives of saving being income in excess of consumption	-1.534724	1.152568	-1.33	0.183	-3.793717	.7242685
Motives of saving being to get prize	15.25287	2387.077	0.01	0.995	-4663.332	4693.838
Motives of saving being both to smooth consumption and to get prize	-6.250331	3.877005	-1.61	0.107	-13.84912	1.348459
Motives of saving being both to for future investment and to get prize	38.89908	3376.987	0.01	0.991	-6579.874	6657.672
Motives of saving being income in excess of consumption and to get prize	-10.02233	138.0399	-0.07	0.942	-280.5756	260.5309

Informedness about the program	-.4468241	.4883355	-0.91	0.360	-1.403944	.5102959
Perceived comparison of PLSP Vs national lottery	.8037187	.840434	0.96	0.339	-.8435016	2.450939
Attractiveness of prizes	.5941032	.5999837	0.99	0.322	-.5818433	1.77005
Perceived winning likelihood of prizes	1.546213	.6774145	2.28	0.022	.218505	2.873921*
_cons	-80.14802	18.9899	-4.22	0.000	-117.3675	-42.92851*
Logistic regression				Number of obs =		150
				LR chi2(24) =		144.29
				Prob > chi2 =		0.0000
Log likelihood = -31.774504				Pseudo R2 =		0. 6942

*Significant at 95% level of confidence

Source; own computation using STATA

CHAPTER FIVE

5 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

To summarize, the objective of the study was to evaluate the impact of Prize Linked Saving Program, which has been run by the Commercial Bank of Ethiopia, on saving culture of individuals in the study area. To do so, a multi-stage sampling technique was employed. The study first purposively selected Kirkos sub city based on population density. The sample size of the study was 340, 150 treated and 190 untreated. Respondents were selected from each bank branch using the systematic technique. Data of the study were collected from randomly selected individuals via a semi-structured questionnaire from two program running bank branches and five non program running bank branches. Although the treated and untreated respondents are found to be same in terms of variables which can affect saving, the saving of treated individuals was found to be higher than that of the untreated individuals.

For the consumption of the research, both the logit and the propensity score matching model were employed. Propensity score matching (PSM) was favoured, since it minimizes problems associated with selection bias. For checking robustness of the model the three types of matching, namely, the nearest neighbour matching, kernel matching and radius matching has been used and found to be consistent. Finally, the research has come up with the following findings;

- ✓ In terms of informedness about the program, female respondents, married respondents and respondents above the mean age and school year are better informed about the program.
- ✓ In terms of attractiveness of prizes, male respondents, less income earner respondents and respondents below the mean age and school year are better attracted by the program.
- ✓ The program has positively affected individuals saving culture.
- ✓ In terms of response to the program, age, sex-being female and average income have positive impact on individuals decision to responded to the program, while employment status-being self-employed and bank experience negatively affect the decision to respond

5.2 Conclusion

From the research findings, it could be concluded that, the program has motivated individuals to improve their saving culture. However, the public's perception of the program is minimal. The other interesting

result, the program has a tendency to attract low income earners and less educated part of the society. However, response to the program or the reaction of the public to respond the program by increasing saving has been constrained by income. Moreover, we can conclude that the advertisement mix of the program is not inclusive, it has informed only some cluster of the society and the prize mix as well is attractive for only some cluster of the public. This shows that the bank can still induce individuals to save more, by taking some adjustments to the program.

5.3 Recommendations

The results indicate that the program have a profound effect on individuals saving culture. Hence, the program needs to be continued. The following recommendations, which can possibly be applied in the next rounds of the program, were suggested based on findings of the study results in the study area.

- Since the program is hitting its target, it shall continue to run. However, its form shall take some adjustment, meaning that the rounds, which had been run so far, had a life span of six months and it used to start run again after six months of rest. This could give a room for a dissaving during lag time between two consecutive rounds. Hence it would be better if it get designed in such a way; it could run with no interruption on a continual basis.
- Maximum attempt shall be made to improve the perception of the public about the program by making prizes, advertisement methods and Medias, inclusive and all-round, to address all clusters of the public.
- The minimum amount of saving increment needed to get a coupon shall be reduced, which was ETB 1,000, so that parts of public, who have positive attitude to the program but constrained by income got participated.

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Appendix I

Questionnaire;

Dear respondents for the purpose of filling this questionnaire please consider the time period covering form 01-Jan-2017 to 30-Jun-2017, when the program was running.

1) Age?.....
2) What is your gender? Male ☐ Female ☐
3) What was your marital status? Single ☐ Married ☐ Divorced ☐
4) What was your employment status?

   Employeed permanent ☐

   Employeed contract ☐

   self-employeed ☐

   Others ☐
5) Your school year ?.....
6) What was your occupation?.....
7) How much was your work experience?.....
8) How much was your average monthly income?.....
9) Had you a remittance income? If yes, how much was it annually?.....
10) If you were married how much was your spouses averege monthly income?…….
11) Is there any individual who can't generate income and dedpendant on your income?
12) If yes how much did you spent for them annually?.....
13) Why did you use banks or why did you save ?

☐ Precautionary, for the seek of smoothing consumption

☐ For investing in the future

☐ To save part of my income, which was in excess of my consumption.

☐ To earn interest income out of my saving

☐ To get prize

14) How many years have you been using a bank?.....
15) Did you had information about the prize linked saving program which has been run by the Commercial Bank of Ethiopia?

- ☐ Yes I have had all relevant informations
- ☐ Yes I have had to some extent
- ☐ No I hadn't had at all

16) If you had information about the PLSP how do you rate the prizes?

- ☐ Very attractive
- ☐ Attractive
- ☐ Somewhat attractive
- ☐ Unattractive

17) If you had information about PLSP how do you rate the likelihood to win the prize?

- ☐ Very likely
- ☐ Likely
- ☐ Somewhat likely
- ☐ Unlikely

18) How do you comapare the likelihood to win a prize from the PLSP and to win a lottory from National Lottory

- ☐ PLSP likelihood is greater than National Lottory
- ☐ National Lottory is greater than PLSP

19) Howmuch killometres you had to go, to access the commercial bank of ethiopia?

- ☐ Less than half a killometre
- ☐ Greater than half a killometre but less than one killometre
- ☐ Greater than one killometre but less than one and half killometre
- ☐ Greater than one and half killemetre

The researcher kindly requests you to fill the following information by checking your account statment, confidentiality will never be compromised.

20) How much was your account balance on 01-Dec-2016?.....

21) How much was your account balance on 15-Dec-2016?.....

22) How much was your account balance on 31-Dec-2016?.....

23) How much was your account balance on 01-Jun-2017?.....

24) How much was your account balance on 15-Jun-2017?.....

25) How much was your account balance on 30-Jun-2017?.....

Appendix II

Estimation results

Result of the nearestneighbor matching

```
. psmatch2 Ts lnage Sex Ms Es1 Es2 Es3 lnai lnri lnsi lncd lnsy lnbe lnwe Accb Mfs1 Mfs2 Mfs3 Mfs4 Mfs5 Mfs6 INFPLSP, lo
> git out(lnbalat) neighbor(1) caliper(0.03) common

Logistic regression                             Number of obs   =        340
                                                LR chi2(21)     =      81.86
                                                Prob > chi2     =     0.0000
Log likelihood = -192.38337                     Pseudo R2       =     0.1754
```

Ts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnage	-.5119284	1.03086	-0.50	0.619	-2.532377	1.508521
Sex	-.1290342	.2896862	-0.45	0.656	-.6968088	.4387403
Ms	-.0036942	.3706948	-0.01	0.992	-.7302426	.7228542
Es1	.5657796	.6483655	0.87	0.383	-.7049934	1.836553
Es2	.0246252	.3802645	0.06	0.948	-.7206794	.7699299
Es3	.1786606	.7409217	0.24	0.809	-1.273519	1.63084
lnai	-.3437643	.1385655	-2.48	0.013	-.6153477	-.0721809
lnri	-.145338	.0818676	-1.78	0.076	-.3057955	.0151195
lnsi	-.0393645	.0444917	-0.88	0.376	-.1265667	.0478377
lncd	.0551033	.037536	1.47	0.142	-.0184659	.1286725
lnsy	-.3456571	.360348	-0.96	0.337	-1.051926	.360612
lnbe	1.010812	.3315053	3.05	0.002	.3610733	1.66055
lnwe	-.6396934	.2447763	-2.61	0.009	-1.119446	-.1599407
Accb	-.0258702	.1085486	-0.24	0.812	-.2386216	.1868812
Mfs1	-.2657618	.4163551	-0.64	0.523	-1.081803	.5502791
Mfs2	.2005212	.3699024	0.54	0.588	-.5244742	.9255165
Mfs3	1.799092	.9979007	1.80	0.071	-.1567572	3.754942
Mfs4	3.325255	1.242411	2.68	0.007	.8901744	5.760336
Mfs5	2.877386	1.187778	2.42	0.015	.5493835	5.205389
Mfs6	1.951448	1.429352	1.37	0.172	-.8500308	4.752927
INFPLSP	.9588645	.1592747	6.02	0.000	.6466919	1.271037
_cons	2.643762	3.313002	0.80	0.425	-3.849603	9.137126

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
lnbalat	Unmatched	8.96737625	8.10579036	.861585892	.196119776	4.39
	ATT	8.96354265	8.16018679	.803355859	.306469273	2.62

psmatch2: Treatment assignment	psmatch2: Common support		
	Off suppo	On suppor	Total
Untreated	0	190	190
Treated	17	133	150
Total	17	323	340

Estimation results of the radius matching

```
. psmatch2 Ts lnage Sex Ms Es1 Es2 Es3 lnai lnri lnsi lncd lnsy lnbe lnwe Accb Mfs1 Mfs2 Mfs3 Mfs4 Mfs5 Mfs6 INFPLSP,
> git kernel out(lnbalat) bwidth(0.1)common

Logistic regression                             Number of obs   =        340
                                                LR chi2(21)     =      81.86
                                                Prob > chi2     =     0.0000
Log likelihood = -192.38337                     Pseudo R2       =     0.1754
```

Ts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnage	-.5119284	1.03086	-0.50	0.619	-2.532377	1.508521
Sex	-.1290342	.2896862	-0.45	0.656	-.6968088	.4387403
Ms	-.0036942	.3706948	-0.01	0.992	-.7302426	.7228542
Es1	.5657796	.6483655	0.87	0.383	-.7049934	1.836553
Es2	.0246252	.3802645	0.06	0.948	-.7206794	.7699299
Es3	.1786606	.7409217	0.24	0.809	-1.273519	1.63084
lnai	-.3437643	.1385655	-2.48	0.013	-.6153477	-.0721809
lnri	-.145338	.0818676	-1.78	0.076	-.3057955	.0151195
lnsi	-.0393645	.0444917	-0.88	0.376	-.1265667	.0478377
lncd	.0551033	.037536	1.47	0.142	-.0184659	.1286725
lnsy	-.3456571	.360348	-0.96	0.337	-1.051926	.360612
lnbe	1.010812	.3315053	3.05	0.002	.3610733	1.66055
lnwe	-.6396934	.2447763	-2.61	0.009	-1.119446	-.1599407
Accb	-.0258702	.1085486	-0.24	0.812	-.2386216	.1868812
Mfs1	-.2657618	.4163551	-0.64	0.523	-1.081803	.5502791
Mfs2	.2005212	.3699024	0.54	0.588	-.5244742	.9255165
Mfs3	1.799092	.9979007	1.80	0.071	-.1567572	3.754942
Mfs4	3.325255	1.242411	2.68	0.007	.8901744	5.760336
Mfs5	2.877386	1.187778	2.42	0.015	.5493835	5.205389
Mfs6	1.951448	1.429352	1.37	0.172	-.8500308	4.752927
INFPLSP	.9588645	.1592747	6.02	0.000	.6466919	1.271037
_cons	2.643762	3.313002	0.80	0.425	-3.849603	9.137126

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
lnbalat	Unmatched	8.96737625	8.10579036	.861585892	.196119776	4.39
	ATT	8.95018353	8.02368022	.926503307	.262288963	3.53

psmatch2: Treatment assignment	psmatch2: Common support		
	Off suppo	On suppor	Total
Untreated	0	190	190
Treated	4	146	150
Total	4	336	340

Estimation results of caliper matching

```
. psmatch2 Ts lnage Sex Ms Es1 Es2 Es3 lnai lnri lnsi lncd lnsy lnbe lnwe Accb Mfs1 Mfs2 Mfs3 Mfs4 Mfs5 Mfs6 INFPLSP, lo
> git out( lnbalat) radius caliper(0.1) common

Logistic regression                               Number of obs   =        340
                                                  LR chi2(21)     =      81.86
                                                  Prob > chi2     =     0.0000
Log likelihood = -192.38337                       Pseudo R2       =     0.1754
```

Ts	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnage	-.5119284	1.03086	-0.50	0.619	-2.532377	1.508521
Sex	-.1290342	.2896862	-0.45	0.656	-.6968088	.4387403
Ms	-.0036942	.3706948	-0.01	0.992	-.7302426	.7228542
Es1	.5657796	.6483655	0.87	0.383	-.7049934	1.836553
Es2	.0246252	.3802645	0.06	0.948	-.7206794	.7699299
Es3	.1786606	.7409217	0.24	0.809	-1.273519	1.63084
lnai	-.3437643	.1385655	-2.48	0.013	-.6153477	-.0721809
lnri	-.145338	.0818676	-1.78	0.076	-.3057955	.0151195
lnsi	-.0393645	.0444917	-0.88	0.376	-.1265667	.0478377
lncd	.0551033	.037536	1.47	0.142	-.0184659	.1286725
lnsy	-.3456571	.360348	-0.96	0.337	-1.051926	.360612
lnbe	1.010812	.3315053	3.05	0.002	.3610733	1.66055
lnwe	-.6396934	.2447763	-2.61	0.009	-1.119446	-.1599407
Accb	-.0258702	.1085486	-0.24	0.812	-.2386216	.1868812
Mfs1	-.2657618	.4163551	-0.64	0.523	-1.081803	.5502791
Mfs2	.2005212	.3699024	0.54	0.588	-.5244742	.9255165
Mfs3	1.799092	.9979007	1.80	0.071	-.1567572	3.754942
Mfs4	3.325255	1.242411	2.68	0.007	.8901744	5.760336
Mfs5	2.877386	1.187778	2.42	0.015	.5493835	5.205389
Mfs6	1.951448	1.429352	1.37	0.172	-.8500308	4.752927
INFPLSP	.9588645	.1592747	6.02	0.000	.6466919	1.271037
_cons	2.643762	3.313002	0.80	0.425	-3.849603	9.137126

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
lnbalat	Unmatched	8.96737625	8.10579036	.861585892	.196119776	4.39
	ATT	8.95018353	8.06788115	.882302378	.256038281	3.45

psmatch2: Treatment assignment	psmatch2: Common support		Total
	Off suppo	On suppor	
Untreated	0	190	190
Treated	4	146	150
Total	4	336	340

```
Logistic regression                                     Number of obs   =        326
                                                        LR chi2(17)     =      66.64
                                                        Prob > chi2     =     0.0000
Log likelihood = -188.15535                             Pseudo R2       =     0.1504
```

psmatch2: Treatment assignment	psmatch2: Common support		
	Off suppo	On suppor	Total
Untreated	0	190	190
Treated	16	120	136
Total	16	310	326

Results of the response (logit) model

```
. logit Res lnage Sex Ms Es1 Es2 Es3 lnai lnri lnsi lncd lnsy lnbe lnwe Accb Mfs1 Mfs2 Mfs3 Mfs4 Mfs5 Mfs6 INFPLSP comPv
> sN Attpr Attlh
```

Logistic regression

Number of obs	= 150
LR chi2(24)	= 144.29
Prob > chi2	= 0.0000
Log likelihood = -31.774504	Pseudo R2 = 0.6942

Res	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnage	7.641409	3.792025	2.02	0.044	.2091776	15.07364
Sex	2.61092	.9500165	2.75	0.006	.7489215	4.472918
Ms	.0734688	.9458053	0.08	0.938	-1.780276	1.927213
Es1	3.467749	1.811687	1.91	0.056	-.0830926	7.01859
Es2	-32.79401	3376.891	-0.01	0.992	-6651.38	6585.792
Es3	1.47185	3.00873	0.49	0.625	-4.425152	7.368852
lnai	5.23287	1.346918	3.89	0.000	2.592959	7.87278
lnri	.0713673	.2192188	0.33	0.745	-.3582938	.5010283
lnsi	-.1280044	.1306338	-0.98	0.327	-.3840419	.1280331
lncd	-.0290565	.0997466	-0.29	0.771	-.2245563	.1664432
lnsy	2.707003	1.573579	1.72	0.085	-.3771559	5.791161
lnbe	-3.294302	1.604756	-2.05	0.040	-6.439566	-.1490379
lnwe	2.247308	.9454755	2.38	0.017	.3942096	4.100406
Accb	.0142288	.3759493	0.04	0.970	-.7226183	.7510759
Mfs1	31.71299	3376.891	0.01	0.993	-6586.873	6650.299
Mfs2	-1.534724	1.152568	-1.33	0.183	-3.793717	.7242685
Mfs3	15.25287	2387.077	0.01	0.995	-4663.332	4693.838
Mfs4	-6.250331	3.877005	-1.61	0.107	-13.84912	1.348459
Mfs5	38.89908	3376.987	0.01	0.991	-6579.874	6657.672
Mfs6	-10.02233	138.0399	-0.07	0.942	-280.5756	260.5309
INFPLSP	-.4468241	.4883355	-0.91	0.360	-1.403944	.5102959
comPvsN	.8037187	.840434	0.96	0.339	-.8435016	2.450939
Attpr	.5941032	.5999837	0.99	0.322	-.5818433	1.77005
Attlh	1.546213	.6774145	2.28	0.022	.218505	2.873921
_cons	-80.14802	18.9899	-4.22	0.000	-117.3675	-42.92851

The marginal effects after logit

```
. mfx

Marginal effects after logit
      y  = Pr(Res) (predict)
         =  .02921918
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
lnage	.2167518	35.151	0.01	0.995	-68.6771	69.1106	3.35523
Sex*	.1120979	16.752	0.01	0.995	-32.7213	32.9455	.413333
Ms*	.0020921	.34027	0.01	0.995	-.664828	.669012	.446667
Es1*	.41554	38.417	0.01	0.991	-74.8802	75.7113	.06
Es2*	-.9957662	3.1826	-0.31	0.754	-7.23354	5.24201	.273333
Es3*	.0763665	11.485	0.01	0.995	-22.4347	22.5874	.1
lnai	.1484326	24.071	0.01	0.995	-47.03	47.3269	8.01552
lnri	.0020244	.32835	0.01	0.995	-.64153	.645579	.888347
lnsi	-.0036309	.58883	-0.01	0.995	-1.15772	1.15046	2.44203
lncd	-.0008242	.13369	-0.01	0.995	-.262853	.261205	5.73427
lnsy	.0767853	12.452	0.01	0.995	-24.3293	24.4829	2.546
lnbe	-.0934443	15.154	-0.01	0.995	-29.7944	29.6075	1.65776
lnwe	.0637458	10.338	0.01	0.995	-20.1977	20.3252	1.28702
Accb	.0004036	.06631	0.01	0.995	-.129556	.130364	2.87333
Mfs1*	.9998766	.09724	10.28	0.000	.809288	1.19047	.173333
Mfs2*	-.0288265	4.74019	-0.01	0.995	-9.31943	9.26177	.16
Mfs3*	.9782857	4.32591	0.23	0.821	-7.50034	9.45691	.02
Mfs4*	-.035674	5.92426	-0.01	0.995	-11.647	11.5757	.033333
Mfs5*	.9936897	1.91769	0.52	0.604	-2.76491	4.75229	.04
Mfs6*	-.0354726	5.89215	-0.01	0.995	-11.5839	11.5129	.02
INFPLSP	-.0126744	2.05542	-0.01	0.995	-4.04123	4.01588	1.96
comPvsN	.0227978	3.69719	0.01	0.995	-7.22357	7.26916	1.55333
Attpr	.016852	2.73292	0.01	0.995	-5.33958	5.37328	2.68667
Attlh	.043859	7.11258	0.01	0.995	-13.8965	13.9843	2.54667

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