

**INFLUENCE OF SOCIO-DEMOGRAPHIC, BEHAVIORAL AND
ECONOMIC DETERMINANTS ON CREDIT CARDS DEFAULT IN
COMMERCIAL BANKS IN KENYA**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or for any other award.

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DEDICATION

To my beloved family and all friends of goodwill for the love, support and encouragement they gave me during this PhD study.

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TABLE OF CONTENTS

Declaration	ii
Dedication.....	iii
Acknowledgements	iv
List of Tables	ix
List of Figures.....	x
Operational Defination of Terms.....	xi
Abbreviations and Acronyms	xiv
Abstract.....	xv
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the Study	1
1.1.1 Socio-Demographic Factors	5
1.1.2 Behavioural Factors.....	6
1.1.3 Economic Factors	7
1.1.4 Credit Cards Default.....	9
1.1.5 Commercial Banks in Kenya.....	10
1.2 Statement of the Problem	13
1.3 Objectives of the study	16
1.3.1 General Objective	16
1.3.2 Specific Objectives	16
1.3.3 Research Hypotheses.....	17
1.4 Significance of the Study.....	18
1.5 Scope of the Study	20
1.6 Limitations of the Study	21
1.7 Organization of the Study.....	22
CHAPTER TWO: LITERATURE REVIEW.....	23
2.1 Introduction	23
2.2 Theoretical framework	23
2.2.1 Agency Theory	23
2.2.2 Theory of Planned Behaviour.....	24
2.2.3 Adverse Selection Theory	26
2.2.4 Credit Scoring Model	27
2.3 Empirical Literature Review	28

2.3.1 Socio-Demographic factors (DF) of Credit Cards Default.....	29
2.3.2 Behavioural Factors (BF) in Credit Cards Default.....	32
2.3.3 Economic Factors (EF) in Credit Cards Default	33
2.4 Summary of Literature Review and Research Gaps.....	35
2.5 Conceptual Framework	37
CHAPTER THREE: RESEARCH METHODOLOGY	41
3.1 Introduction	41
3.2 Research Paradigm	41
3.3 Research Design	42
3.4 Empirical Model.....	43
3.4.1 The Bernoulli Distribution	44
3.4.2 The Logistic Function.....	45
3.4.3 The Odds Ratio.....	46
3.4.4 The Logistic Regression Model.....	47
3.4.5 Independent Samples T-tests	50
3.4.6 Chi-Square Test for Independence	51
3.5 Operationalization and Measurement of Variables	51
3.6 Target Population	53
3.7 Sampling Design and Sample Size Determination.....	53
3.8 Data Collection Instrument.....	55
3.8.1 Datasheet for Secondary Data	55
3.8.2 Validity of the Data Collection Instrument	55
3.9 Data Collection Procedure.....	56
3.10 Data Analysis.....	57
CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS	59
4.1 Introduction	59
4.2 Data Description and Sample Statistics.....	59
4.3 Determinants of Credit Cards Default in Commercial Banks in Kenya	62
4.3.1 Socio-demographic Factors of Credit Cards default	62
4.3.1.1 Gender and Credit Cards Default	63
4.3.1.2 Marital Status and Credit Cards Default	64
4.3.1.3 Education Level of Cardholder and Credit Cards Default	67
4.3.1.4 Age of Cardholder and Credit Cards Default	68

4.3.2 Behavioural Factors of Credit Cards Default	70
4.3.2.1 Other Loans Repayments and Credit Cards Default	70
4.3.2.2 Approved Credit Limit and Credit Cards Default	72
4.3.3 Economic Factors of Credit Cards Default	74
4.3.3.1 Cardholder's Residential Status and Credit Cards Default	74
4.3.3.2 Income of Cardholder and Credit Cards Default.....	76
4.3.3.3 Occupation of Cardholder and Credit Cards Default	78
4.4 Logistic Regression Results and Interpretations	80
4.5 Test of Hypotheses	84
4.5.1 Influence of Socio-demographic Factors on Credit Cards Default	84
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND	
RECOMMENDATIONS	93
5.1 Introduction	93
5.2 Summary of the Study	93
5.3 Conclusion	96
5.4 Recommendations	98
5.5 Implications on Theory.....	100
5.6 Implications on Practice	101
5.7 Implications on Policy	102
5.8 Suggestions for Further Research.....	103
REFERENCES	105
APPENDICES.....	115
APPENDIX I: Secondary data collection guide.....	115
APPENDIX II: List of licensed commercial banks issuing credit cards in Kenya as at 2014	116
APPENDIX III: Gender of cardholder and default status cross tabulation.....	117
APPENDIX IV: Marital status of cardholder and default status cross tabulation	118
APPENDIX V: Education level of cardholder and default status cross tabulation...	119
APPENDIX VI: Any other loan repayment and default status cross tabulation.....	120
APPENDIX VII:Residential status of cardholder and default status cross tabulation	121
APPENDIX VIII:Occupation of cardholder and default status cross tabulation	122
APPENDIX IX: Research Approval	123
APPENDIX X: Research Authorization	124
APPENDIX XI: Research Permit.....	125

LIST OF TABLES

Table 3.1: Defination and measurement of variables	52
Table 3.2: Distribution of credit cards accounts records among sampled banks	54
Table 4.1: Cardholders’ characteristics for the categorical variables.....	60
Table 4.2: Cardholders’ characteristics for the continuous variables.....	61
Table 4.4: Chi-square tests for independence of gender and default status	64
Table 4.6: Chi-Square Tests for Independence of marital status and default status	66
Table 4.8: Chi-square tests for independence of Education level and default status.....	68
Table 4.9: Independent samples t-test of age and default status	69
Table 4.11: Chi-square test for other loan repayments and default status.....	72
Table 4.12: Independent samples t-test of approved credit limit and default status	74
Table 4.14: Chi-square test for residential ownership and default status.....	76
Table 4.15: Group statistics for income per month	77
Table 4.16: Independent samples t-test of income per month and default status.....	78
Table 4.18: Chi-square test for occupation and default status.....	80
Table 4.19: Logistic regression results	81
Table 4.3: Gender of cardholder and default status cross tabulation	116
Table 4.5: Marital status of cardholder and default status cross tabulation	117
Table 4.7: Education level of cardholder and default status cross tabulation	118
Table 4.10: Any other loan repayment and default status cross tabulation.....	119
Table 4.13: Residential status of cardholder and default status cross tabulation	120
Table 4.17: Occupation of cardholder and default status cross tabulation.....	121

LIST OF FIGURES

Figure 2.5: Conceptual framework.....	38
Figure 4.1: Default status by gender of credit cardholder	63
Figure 4.2: Default status by marital status of cardholder.....	65
Figure 4.3: Default status by education level of cardholder.....	67
Figure 4.4: Default status by age of cardholder	69
Figure 4.5: Default status of cardholders with other loan repayments	71
Figure 4.6: Default status on approved credit limit	73
Figure 4.7: Default status on residential ownership	75
Figure 4.8: Default status on income of cardholder	76
Figure 4.9: Default status on occupation of cardholder	79
Figure 4.10: ROC curve for sensitivity against specificity	82

OPERATIONAL DEFINITION OF TERMS

- Acquirer** : A bank which sign contracts with merchants to so that they can accept cards. An acquirer pays merchants directly.
- Cardholder** : Any person holding a plastic card which can be used to obtain goods and services.
- Card issuer** : An organization which issue plastic cards to its customers.
- Charge card** : Plastic card for credit purchases which requires all monthly usage of card to be settled at once.
- Credit bureau** : An organisation that keeps a record of a person's credit information.
- Credit card** : Plastic card used to buy goods and services on credit and allowing an agreed minimum payment of total monthly usage to be made. The balance is rolled over to a following month.
- Credit policy:** Guidelines that spell out how to decide which customers are sold on open account, the exact payment terms, the limits set on outstanding balances and how to deal with delinquent accounts.
- Credit default risk:** Risk that the borrower may be unable or unwilling to honour his obligations under the terms of the contract for credit.

- Customer attrition:** Also known as customer churn, customer turnover, or customer defection. Is a business term used to describe loss of clients or customers.
- Debit card** : Plastic card that has to be authorised 100% on-line and holder must have a bank account with the issuer bank.
- Delinquency** : Failure to make a payment when due.
- Electronic card** : Plastic card which allows holder to pay money in advance to an issuing institution, upon which the paid up amount is loaded onto the card and thus allowing cardholder to make purchases against the credit loaded onto the card.
- Facility card** : Plastic card used exclusively by members of a certain organization, club or facility which receives income from user transactions.
- Liquidity** : The ability of an asset to be converted into cash quickly and without any price discount.
- Loyalty cards** : Plastic cards used for loyalty programmes to accumulate redeemable points or prizes but not as a payment tool.
- Payment association:** Organizations such as VISA International and MasterCard Ltd which provides the ICT infrastructure for processing of plastic cards.
- Plastic cards** : Refers to all the various cards used for credit, debit or redeeming of points for prices.
- Merchant** : Outlets where plastic cards are used to obtain goods and

services, for instance supermarkets, hotels, petrol stations

among others.

Obligor : An individual or company that owes debt to another individual or company (the creditor), as a result of borrowing or issuing bonds, also called debtor.

ABBREVIATIONS AND ACRONYMS

CBK	:	Central Bank of Kenya
CRB	:	Credit Reference Bureau
FSD	:	Financial Sector Deepening
FICO	:	Fair, Isaac & Co
KCPA	:	Kenya Credit Providers Association
KCDCA	:	Kenya Credit and Debit card Association
NPL	:	Non-Performing Loans
KBRR	:	Kenya Banks' Reference Rate
TCC	:	Total Cost of Credit
APR	:	Annual Percentage Rate
KBA	:	Kenya Bankers Association
POS	:	Point of Sale

ABSTRACT

Commercial banks play a major role in economic growth and development through provision of credit to execute economic activities. Credit cards are financial payment instruments that are increasingly accepted and used in consumer credit market worldwide. However, credit card performance surveys shows that credit default poses a major risk to the commercial banks in Kenya. Mitigation against this risk is necessary for the safety and soundness of the banking sector. This study therefore sought to investigate the influence of socio-demographic, behavioural and economic determinants of credit cards default in commercial banks in Kenya. The study used secondary data containing socio-demographic, behavioural and economic details of credit cardholders obtained from bank records. The target population of the study were the eighteen credit cards issuing commercial banks in Kenya. The study used descriptive and correlational research designs which supported the study's requirement to generate explanatory information about default in credit cards and also establish significant relationships between the explanatory variables and default in credit cards. Commercial banks issuing credit cards were stratified into three strata, namely; banks with international affiliation, banks where Government of Kenya has majority shareholding and banks owned by individuals. A sample of ninety five cardholders whose records contained all the variables of interest was randomly drawn from the sampled banks. Independent samples t-tests and Chi-Square tests were carried out to identify significant explanatory variables for default in credit cards. A Logistic regression model was then fitted to determine factors with high predictive power of default in credit card loans. The study established that age, approved credit limit ,payment of other loans and residential status of a cardholder were important socio-demographic, behavioral and economic factors respectively whereas gender, marital status, education level, income and occupation of a cardholder were unimportant in credit cards default in commercial banks in Kenya. From the study, younger cardholders (mean age of 44.18years) have higher likelihood (odds of 1.2) of default than older cardholders (mean age of 52.14 years), cardholders with other loan repayments are approximately ten times (odds of 9.77) likely to default than those without and there is an equal likelihood (odds of 1.00) of default for lower (USD 2247.2) and higher (USD 22471.9) approved credit limits. The study has extended the general understanding in literature on determinants of credit cards default by empirically establishing the risk factors and their marginal contributions to credit cards default. The need to establish other determinants of credit cards default either as moderating or intervening has been underscored. The study recommends further research on the moderating effect of such variables on credit cards default. Similarly the study recommends that credit cards application processing and evaluation should be based and aligned to the identified risk factors. There is also need to invest in programmes to sensitize young credit card holders on the best industry practice for credit cards use so as to leverage on their benefits and reduce credit cards default. Finally the Government of Kenya should strengthen mechanisms for monitoring credit cards default trends and team up with industry players to reduce the cost of borrowing credit.

CHAPTER ONE

INTRODUCTION

This chapter presents background of the study and the role of credit cards in economic development. The chapter also presents an in-depth description of the key determinants of credit cards default under study, namely socio-demographic, behavioural and economic determinants. Further, the chapter presents the statement of the research problem, research objectives and hypotheses of the study, scope of the study, significance of the study and the structure of the thesis.

1.1 Background of the Study

Consumer debt levels and non-business bankruptcy trends indicate that consumers are increasingly getting over-committed and overly-dependent on credit to supplement their consumption patterns (Olukunle & Simangaliso, 2012). However, consumer debt is two-faced.

On the one hand, the use of credit facilities in purchases can be mutually beneficial to both the buyer and the seller. For the retailer, it helps to promote sales as buying on credit constitutes an enhancement of the buyer's purchasing power, thereby increasing demand, turnover and consequently profitability (Olukunle & Simangaliso, 2012; Beal & McKeown, 2006; Leonard, 2008). From the consumer's perspective, availability of credit increases the purchasing convenience and raises the level of consumption and welfare of the buyer. This is supported by the fact that the consumer is able to buy and consume now at a spending level only feasible at a future higher level of income (Olukunle & Simangaliso, 2012; Bernthal, Mathew & Crockett, 2005; Kilborn, 2005).

At the national economic level, credit purchases can accelerate the pace of growth and development. First, the increase in spending has the effect of increasing the multiplier effect on income in addition to encouraging aggregate investment (Olukunle & Simangaliso, 2012). Increased income raises the level of expenditure and sets in motion a virtuous cycle of growth in consumption, investment, income and development (Olukunle & Simangaliso, 2012). Debt also helps to sustain such growth by making it possible for consumers to resist the downward adjustment of their consumption during a fall of their income (Marjo, 2010).

On the other hand, default in credit negatively affects the overall safety and soundness of the commercial banking system and impacts negatively on the general performance of an economy (CBK, 2014). Credit default leads to high borrowing and lending rates. The high lending rates restrict access to credit and generally increase the cost of doing business (FSD-Kenya, 2014). Lending institutions respond to credit default through credit rationing, higher interest rate, and shorter loan maturity. These in turn result in an inefficient allocation of credit, less efficient banking industry, slower economic growth and development (Muthoni, 2014; Wafula & Karumba, 2012; CBK, 2014).

The development of credit card as a payment instrument in consumer credit is probably the most significant phenomenon in the commercial banking industry (Simiyu, Mumanyi, Naibei & Odondo, 2012).

Since the first credit card was first issued in 1730, there has been a tremendous increase in use of plastic cards in the purchase of goods and services as corporate and individual consumers seek to avoid the inconvenience and risks of cash-based transactions, including fraud, robbery and violence.

Whereas many world economies have revolutionized their transactions towards paperless economy, it was not until early 1990's that local banks in Kenya started embracing the use of debit and credit cards (Simiyu *et al.*, 2012). According to Timetric (2014), the global card market is dominated by two US-based players, Visa International and MasterCard.

Within the East African region, Kenya has the highest credit card customers supported by 9,000-Visa POS machines. Tanzania and Uganda have 450 each, while Rwanda and Burundi have 100 and five outlets respectively (Global Payments Solution, 2013). According to FSD-Kenya (2014), the number of cards in circulation in the Kenya's card payment industry (including debit, credit and charge cards) registered a robust growth and recorded a compound annual growth rate (CAGR) of 26.32% during the period (2009–2013). In the same period there was an increase from 3.8 million cards in 2009 to 9.7 million cards in 2013. In terms of transaction value, payment cards valued KES 1.5 trillion (US\$18.5 billion) in 2013 and registered a significant CAGR of 34.40% (FSD, 2014).

The high volume of financial transactions made through plastic cards and the resultant interests earned make credit cards to be key financial instruments not only in the financial market but also in spurring economic growth (CBK, 2014).

However, increased consumer debt through credit cards lending introduces the risk of unpredicted default in credit which is the root cause of credit crisis (Collins, 2009). The increased adoption of credit cards as major drivers of financial transactions and therefore economic growth requires in-depth understanding of the factors that may contribute to their credit default (BIS, 2004; Bolton, 2009).

Empirical literature indicates that socio-demographic, behavioural and economic characteristics of a credit card holder can influence credit cards default. Despite the many studies on this critical relationship between credit cards default and those characteristics of a cardholder, there has not been consistence of results in research on the precise and marginal contributions of each characteristic to credit cards default (Marjo, 2010) and hence the focus of this study.

Globally, the concern to understand and establish the specific influence of various determinants of credit cards default has resulted in several studies. The challenge in these studies has been to find the best fitting and most parsimonious, yet reasonable model to describe the relationship between credit cards default and one or more of socio-demographic, behavioural and economic characteristics of a cardholder.

According to Marjo (2010), the commonly used methods to study determinants of credit default includes Linear Discriminant Analysis (LDA), Logistic Regression and Ordinary Linear Regression. Other techniques such as Neural Networks and Classification Trees have also been applied either parametrically or non-parametrically.

The assumption in all these studies is that there is a relationship between socio-demographic, behavioral and economic characteristics of a cardholder and credit cards default (Mokaya, 2011). This study, just like those earlier scholarly work make the same assumption. To build on this assumption, the study defines a theoretical framework that incorporates various theories of credit cards default. These include the adverse selection theory (Piganno and Japelli, 1993), theory of planned behavior (Rutherford and Sharon, 2004) and the agency theory (Pirog and Roberts, 2007). Other models guiding this study are the credit score models as postulated by Anderson and Argarwal (2009).

1.1.1 Socio-Demographic Factors

In studies on credit cards default in consumer markets, socio-demographic factors are described as all characteristics inherent to a cardholder that are not proxies or surrogates for economic performance of the cardholder or reflecting behavioral relationship of cardholder and the commercial bank (Marjo, 2010). Such characteristics include age, gender, marital status and education level of a cardholder (Devlin *et al.*, 2007).

Other socio-demographic factors include number of children for a cardholder, number of adults in the cardholder's household and the nationality of a cardholder (Erdem, 2008).

Different scholarly investigations have given conflicting findings on the set of socio-demographic factors that constitute significant explanatory variables for credit cards default (Belloti and Crook, 2013). However, in the study by (Ma, Crook, & Ansell, 2010; Thomas, Ho, & Scherer, 2001) in assessing the riskiness of applicants and obligors for credit cards loans, four socio-demographic factors of highest predictive power for default were identified as age, gender, marital status and education level. These findings are consistent with those of Thomas *et al.*, (2000), in their description of how Markov chain stochastic processes can be used as a dynamic model of delinquency in credit cards. This study conceptualizes that age, gender, marital status and education level of a cardholder are explanatory variables for credit cards default.

1.1.2 Behavioural Factors

Behavioural factors in studies on credit cards default characterize the relationship between cardholder and the bank (Marjo, 2010). In some studies, for instance, Kocenda & Vojtek (2009), behavioral variables primarily describe the behavior of the customer related to the credit taking and payment matters. According to Marjo (2010), behavioral factors include the approved credit limit, whether or not the cardholder has other loan repayments and the credit score the credit card applicant will have obtained at the application time for the credit card measured using the FICO risk score.

Other behavioral factors are possession of previous loans as a proxy for the relationship between a cardholder and the bank, payback period for the credit and the monthly repayment a cardholder is willing to make (Kocenda & Vojtek, 2009).

Previous research, for instance, Dinh and Kleimeier (2007); Özdemir's (2004); Gross and Souleles (2002) give conflicting findings on the influence of behavioral factors on credit cards default. The exact set of behavioral factors that have high predictive power of default in credit cards remains controversial and hence the focus of this study. Belloti and Crook (2009), in their research using Cox proportional hazard survival model for time to default by a cardholder identified approved credit limit and repayment of other loans to be important explanatory behavioral variables in credit cards default. Other previous researches, for instance, (Gerardi, Shapiro & Willen (2008) ; Calhoun & Deng (2002)) on behavioral factors as time varying covariates for credit cards default supports that credit limit and repayment of other loans are behavioral factors with highest predictive power of default. This thesis was based on the premise that credit limit and repayment of other loans influences credit cards default.

1.1.3 Economic Factors

Economic factors of credit cards default have been described as those factors that are direct proxies for the economic performance of a cardholder (Gross and Souleles (2002)). This description excludes economic risk factors that affect all obligors in a portfolio in generally the same way such as interest rates, tax levels or inflation rates (Belloti and Crook (2013)).

From this distinction, the economic variables for credit cards default include income of a cardholder, residential ownership, occupation and housing type (Steenackers and Goovaerts (1989)). Other economic variables include possession of other credit cards and ownership of rental houses or cottages (Marjo, 2010).

Several studies, for instance, Devlin *et al.*, (2007); Balasundram and Ronald (2006); Crooks and Belloti (2009) have looked at the impact of economic factors on credit card's possession, use and default. The findings are however not without varying conclusions. Devlin *et al.*, (2007) found that households with higher incomes tend to hold more credit cards. Nevertheless, due to their high income, they are more likely to pay off their credit card debts (Balasundram and Ronald, 2006). Slocum and Matthews (2007) argue that those from the lowest category of income always think wisely before making any kind of money-related decisions and may therefore not have high default rate. Belloti and Crook (2013), provide an extensive analysis and review of inclusion of economic factors in dynamic models for credit cards default. According to their views, inclusion of income of cardholder, occupation and residential status as covariates in models for credit cards default achieves high parsimony and better model fits.

Further, in the studies on parameterisation of vector autoregressive regression models for credit cards default, Breuer *et al.*, (2012) and Castren *et al.*, (2010), supports that income, occupation and residential status of a cardholder are more important covariates in credit cards default. This study focused on these three economic factors of credit cards default.

1.1.4 Credit Cards Default

The need for consumer credit and use of credit cards as a financial payment instrument is projected to increase in future (FSD, 2014; Timetric, 2014; Marjo, 2010). However, (Kocenda & Vojtek, (2009) estimate that as high as 50% of all credit cards loans default. For lending institutions such a high default rate would affect the finance sector performance significantly (CBK, 2014). In the Kenyan banking sector for instance, while market risk is a great business concern for all institutions, credit default risk is cited as a major concern by 95 % of the banking institutions (CBK, 2014). The overall observation of risks facing commercial banks is that while market risk can be easily managed through hedging activities, credit default risk has emerged as a new management challenge to financial institutions (Gonzalez-Paramo, 2010).

According to CBK (2014) despite the wide use and adaption of credit cards, their non-performance both globally and regionally remains a serial component in the stock of gross non-performing loans. For instance, the Central Bank of Kenya Credit Survey (2014) shows Non-performing loans (NPLs) which includes default in credit cards in Kenya's banking sector increasing by 13.33 % in 2013. This was a rise to Ksh61.57 billion (\$716.25 million) as at end of December 2013 from Ksh54.33 billion (\$638.66 million) at the beginning of January 2013.

From these statistics, credit default risk is a real threat to the banking industry due to the fact that loan portfolios form the largest part of the balance sheet items (CBK, 2014).

In this situation, default in credit has a potential to hinder a bank from executing its core business of credit provision and in the extreme may cause collapse of the bank (BIS, 2004). Such collapse, especially of a large bank could result in diminished confidence in the banking system and this could have dire consequences for a country and have possible global impacts (Bolton, 2009).

1.1.5 Commercial Banks in Kenya

The Banking Industry in Kenya is governed by the Companies Act (Cap 486), the Banking Act, the Central Bank of Kenya Act and the various prudential guidelines issued by the Central Bank of Kenya (CBK, 2014). As at 31st December 2014 the Industry comprised of forty three (43) commercial banks, one(1)mortgage finance company, seven(7) representatives of foreign banks, nine(9) microfinance banks, two (2) credit reference bureaus, two(2) remittance providers and one hundred and twelve(112) foreign exchange bureaus (CBK, 2014). Of the 43 commercial banks, 18 were licensed to issue credit cards (Appendix II). The CBK places commercial banks in Kenya in four broad categories based on ownership; foreign owned but not locally incorporated, institutions with government participation, foreign owned but locally incorporated institutions (partly owned by locals) and locally owned institutions(CBK, 2014).

Commercial banks in Kenya are exposed to a variety of risks among them; interest rate risk, foreign exchange risk, political risk, market risk, liquidity risk, operational risk and credit risk (Yusuf, 2003; Cooperman, Gardener and Mills, 2000).

While most of these risks can be managed through hedging activities, credit default risk has emerged as a new management challenge to financial institutions (Gonzalez-Paramo, 2010). Credit risk is the possibility that the actual return on an investment or loan extended will deviate from that, which was expected (Conford, 2000). Coyle (2000) defines credit risk as losses from the refusal or inability of credit customers to pay what is owed in full and on time. Among the main sources of credit risks are inappropriate credit policies, laxity in assessment of borrowers' credit worthiness and application of ineffective credit score models which fail to identify characteristics of a borrower that have high predictive power of default which is the focus of this study.

In commercial banks a credit policy helps to define the framework within which credit will be extended and managed. Hempel, Simonson and Coleman (1994) stated that there are two credit evaluation systems in relation to banks assessment of credit loan applications. Judgmental credit analysis which relies on the consumer loan officer's experience in assessing the loan and empirical credit analysis also referred to as credit scoring which assesses applicants based on scores applied to various applicant characteristics. Examples of applicant characteristics assessed include age, gender, marital status, education level, credit limit, other loan repayments, income, residential status and occupation of credit borrower (Aduda and Gitonga, 2011).

The Central Bank of Kenya (CBK) defines credit defaults as those loans that are not being serviced as per loan contracts and expose the financial institutions to potential losses.

It is also important to note that credit default refers to accounts whose principal or interest remains unpaid 90 days or more after due date. This study conceptualised credit cards default as a dependent variable to be more than 90 days overdue with any payment connected with the credit card. According to the Central Bank of Kenya Supervision Report, the level of credit default has been increasing steadily from Ksh54.33 billion (\$638.66 million) at the beginning of January 2013 to Ksh. 61.57 billion (\$716.25 million) as at end of December 2013. This high level of credit default continues to be an issue of major supervisory concern in Kenya (Aduda and Gitonga, 2011).

Commercial banks in Kenya use various techniques of mitigating credit default risk. The most common are collateral, guarantees and netting off of loans against deposits of the same counter-party. More recently the Central bank of Kenya has introduced credit information sharing as an initiative to promote financial access to bankable customers in which their information capital is used as collateral to access bank services. The institutional arrangement allowing creditors to exchange information on past payment behaviour of individuals and firms are commonly known as Credit Reference Bureaus (CRBs) or Public Credit Registers (PCRs).

A credit reference bureau or a credit reference agency is an institution that collects and collates all personal financial credit information of individual borrowers from various sources and provides such information to data furnishers (creditors and lenders) so that they can assess their current and prospective customer's credit worthiness, the interest to charge such clients and their ability to repay such borrowed funds.

In Kenya, the Banking (Credit Reference Bureau) Regulation, 2008 became operational on 2nd February, 2009. The Central Bank of Kenya (CBK) has since then licensed two credit reference bureaus, CRB Africa and Metropol Credit Reference Bureau.

The banking sector credit information sharing was rolled out with effect from 31st July, 2010. Banks and mortgage finance companies were expected to submit the mandatory non- performing loans data as at 31st July 2010 to licensed CRBs by 10th August 2010. These institutions were thereafter expected to submit to all licensed CRBs updates on non - performing loans and other information sets on a monthly basis.

1.2 Statement of the Problem

Default in credit negatively affects the overall safety and soundness of the commercial banking system and impacts negatively on the general performance of an economy. According to Parlour & Winton (2008); CBK (2014) and FSD-Kenya (2014), credit default leads to high borrowing and lending rates especially in an environment where probability of default is high. High lending rates restrict access to credit and generally increase the cost of doing business (FSD-Kenya, 2014).

Lending institutions respond to credit default through credit rationing, higher interest rate, and shorter loan maturity. These in turn result in an inefficient allocation of credit, less efficient banking industry, slower economic growth and development (Muthoni, 2014; Wafula & Karumba, 2012; CBK, 2014).

Numerous research studies on credit cards default have suggested that socio-demographic, behavioral and economic characteristics of a cardholder have influence on default (Kocenda & Vojtek, 2009). In contrast, other studies suggest that credit cards loan portfolio management, general credit risk management and operational efficiency management are the key determinants of credit cards performance and hence default (Saunders & Allan, 2002).

Consequently there have been varying suggestions in literature on credit cards default regarding these conflicting results. A review of research demonstrates that socio-demographic, behavioral and economic characteristics of a credit card holder are important factors in determining credit cards default (Kocenda & Vojtek, 2009). However there has been little research conducted to understand the influence and marginal effects of each of the identified determinants of credit cards default. Many research studies on credit cards default have focused on investigating the general relationships and associations between socio-demographic, behavioral and economic variables and the credit cards default (Marjo, 2010) despite research indicating that individual variables influence credit cards default differently when studied together and when studied individually.

The phenomenon of use and adoption of credit cards in Kenya shows rapid growth in future (FSD-Kenya, 2014). However, the relatively high default in credit cards (CBK, 2014) and the inconsistency of findings from prior studies on factors determining the default points to the possibility that clear understanding of the exact influence of various determinants on default has not been achieved. Paucity of this understanding created a valuable opportunity for further research and hence this study. Further, credit cards default is highly dependent on a country's unique and specific economic, environment, recessions and general economic conditions.

Studies undertaken in the Kenyan context by Mokaya (2011), Simiyu *et al.*, (2012), Mbijiwe (2005) and Wafula & Karumba (2012) have all defined credit cards default as a dependent variable of the independent characteristics of a cardholder. The study by Mokaya (2011) found that credit cards default is a function of cardholder characteristics, credit card characteristics and behavioral scoring process. Simiyu *et al.*, (2012) study focused on effect of cardholder characteristics on credit and debit cards cash flow management. Mbijiwe (2005) study focused on the application of discriminant model of a credit scoring process while Wafula and Karumba (2012) study analyzed alternatives of collateral lending as a mitigation of credit default.

Taking cognizance of the findings of these previous studies, and observing that there is absence of consensus in research so far on influence of various determinants of credit cards default, there was need for this study to provide new insights in the specific socio-demographic, behavioural and economic variables that have highest predictive power in credit cards default.

This study therefore sought to investigate the influence of socio-demographic, behavioural and economic determinants on credit cards default in commercial banks in Kenya.

1.3 Objectives of the study

1.3.1 General Objective

The general objective of the study was to investigate the influence of determinants of credit cards default among Commercial Banks in Kenya.

1.3.2 Specific Objectives

The study sought to:

1. Investigate the influence of socio-demographic factors on credit cards default in Commercial Banks in Kenya.
2. Establish the effects of behavioral factors on credit cards default in Commercial Banks in Kenya.
3. Determine the influence of economic variables on credit cards default in Commercial Banks in Kenya.

1.3.3 Research Hypotheses

The study sought to test the following null hypotheses:

H₁ : Socio-demographic factors have no effect on credit cards default in commercial banks in Kenya.

H_{1a} : Age as a socio-demographic factor does not affect credit cards default in commercial banks in Kenya.

H_{1b} : Gender as a socio-demographic factor has no effect on credit cards default in commercial banks in Kenya.

H_{1c} : Marital status as a socio-demographic factor does not affect credit cards default in commercial banks in Kenya.

H_{1d} : Education as a socio-demographic factor has no effect on credit cards default in commercial banks in Kenya

H₂ : Behavioral factors have no effect on credit cards default in commercial banks in Kenya.

H_{2a} : Approved credit limit as a behavioral factor has no effect on credit cards default in commercial banks in Kenya.

H_{2b} : Repayment of other loans as a behavioral factor does not affect credit cards default in commercial banks in Kenya.

H₃ : Economic factors have no effect on credit cards default in commercial banks in Kenya.

H_{3a} : Income as an economic factor does not affect credit cards default in commercial banks in Kenya.

H_{3b} : Residential status as an economic factor does not affect credit cards default in commercial banks in Kenya.

H_{3c} : Occupation as an economic factor does not affect credit cards default in commercial banks in Kenya.

1.4 Significance of the Study

Credit lending has been, and still is, the mainstay of commercial banks business, and this is truer for emerging economies like Kenya where capital markets are not yet well developed (Mwisho, 2001). To most of the transition economies, however, and Kenya in particular, credit lending faces inherent risks including credit default risk. It is the duty of credit risk managers in the commercial banks to develop structured approaches to mitigate the risks and hence the general performance of the entities. An important step in credit risk management is identification of the leading variables causing the risk. This study significantly shed new insights into the influences of various determinants of credit cards default in commercial banks in Kenya as a crucial step in credit risk management.

This study contributes to theory building by extending understanding of the marginal and individual effects of different socio-demographic, behavioral and economic factors on credit cards default. Further, the study contributes to theory building in credit risk management by providing the distinct effects of each determinant of credit cards default when studied individually and the interactive effects when studied collectively.

From this study's findings and identification of credit risk factors and their influence on credit cards default, the commercial banks' credit risk management portfolio will benefit in several ways. First, the credit risk managers will be able to devise methods to quantify the risks using appropriate models in order to understand the risk profile of credit cards as payment instruments. Once a general framework of risk identification and management is developed, the techniques can be applied to different situations, products, instruments and institutions.

Further, the study addresses paucity and research gaps in credit risk management on the influence of various socio-demographic, behavioral and economic factors on credit cards default especially in an emerging economy such as Kenya with a less mature credit market. In addition, the Bank of International Standards (BIS), through Basel II accord requires all financial regulators to set up meticulous risk and capital management frameworks to mitigate financial risks. In compliance with the Basel II accord, the Central Bank of Kenya provides risk management guidelines to all commercial banks in Kenya.

The findings of this study will be helpful in informing such policy guidelines. Recognizing the influence of various determinants of credit cards default obtained from this study finding, and putting in place the necessary mitigation measures will lead to lower borrowing and lending rates which in turn will increase access to credit and generally lower the cost of doing business. Furthermore, optimizing banks' lending activities and lowering credit default rates will have the resultant effect of lowering interest rates which would in turn increase access to credit and therefore improve the general performance of the economy. The findings of this study also forms a basis on which credit cards application processing policies may be evaluated and where possible refocused.

Recommendations drawn from the study will inherently support stakeholders and policy makers from the financial sector in drawing relevant policies that will improve performance in consumer credit market. The study also adds to other efforts by the banking industry to fulfill the soundness of the banking system through vastly improved risk and capital management that is tailored to each individual bank and banking group.

1.5 Scope of the Study

The study investigated the influence of socio-demographic, behavioural and economic determinants on credit cards default among the licensed credit cards issuing commercial banks in Kenya. These comprised 18 commercial banks out of which 4 banks had a significant government and state corporation shareholdings.

Three out of the 18 commercial banks licensed to issue credit cards were foreign owned and the rest 11 were privately owned. In all the banks, the focus was on credit card account records whose age were more than three months old since the credit card application was approved. This was to allow accurate definition of credit card default in line with Base II framework as defined by the Bank of International Settlement (BIS).

1.6 Limitations of the Study

Complete data on variables of interest for the socio-demographic, behavioural and economic characteristics of credit card holders was not available from 8 banks out of the 18 licensed credit cards issuing commercial banks. This was as a result of lack of a standardised credit cards application forms for all the banks. The analysis of the individual and collective influences of the socio-demographic, behavioural and economic determinants on credit cards default was therefore based on sampling frame of 10 out of the 18 target banks. This represented 55.6% which was adequate for drawing significant statistical inferences. Also, due to the sensitivity and confidentiality of account details, most credit card managers authorised extraction of limited cardholder records randomly selected as opposed to giving the whole database of cardholders for the banks. However, a random large sample of size, $n= 95$ records with complete details of the variables of interest was generated which was sufficient to draw significant statistical inferences.

1.7 Organization of the Study

This thesis is structured as follows: the foregoing chapter one provides the research background, statement of the problem, research objectives and research hypotheses, significance of the study, scope of the study and limitations of the study. Chapter two presents a review of both theoretical and empirical literature on the determinants of default in credit cards and identifies the research gaps and further derives a conceptual framework from the reviewed literature. Chapter three provides the research methodology used in the study. Chapter four presents results of the study findings, their discussions and interpretations. Chapter five presents summary and discussions of the study and the policy implications drawn from the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, a review of literature on determinants of credit cards default is given. The review begins with the theoretical discussion of theories related to credit cards default. This is followed by an examination of the empirical evidence of the various determinants of credit cards default. A summary of the literature review is then given and the research gaps identified. Finally the conceptual framework for the study is given.

2.2 Theoretical framework

In the investigation of the influence of determinants of credit cards default, the study was guided by a number of theories and models. These included credit scoring model, theory of planned behavior, adverse selection theory and signaling argument theory. The basic tenets of each theory which included proponents, postulation and relevance were reviewed as follows:

2.2.1 Agency Theory

The agency theory is based on the concept of principal-agent relationship. In this relationship, principals represent individuals, or groups of individuals, who are in control of a set of economic functions or assets in some form of ownership or property rights (Nance, Smith, and Smithson, 2003). The agency theory contends that commercial banks are managed by managers and not by the owners. In the context of credit risk management, credit managers, as agents, are expected to devise effective credit risk mitigation strategies (Stiglitz, 2001).

Such strategies include careful and accurate risk assessment of credit customers using both qualitative and quantitative techniques. One major challenge of using qualitative models is their subjective nature (Bryant, 2001; Chijoriga, 2000). However, borrowers attributes assessed through qualitative models can be assigned numbers with the sum of the values compared to a threshold beyond or below which credit can be granted or denied (Heffernan, 2002).

This theory is relevant to the current study since it provides rationale for assessment of credit default risk based on cardholder's characteristics which is the focus of the study. Effective credit risk rating system enables commercial banks' credit management to identify changes in individual credits, or portfolio trends in a timely manner (Derban *et al.*, 2005). Based on the changes identified, credit mitigation measures can be identified which can lead to decrease in credit default.

2.2.2 Theory of Planned Behaviour

The theory of planned behavior focuses on consumer behavior as a basis of behavioral intentions of financing expenses with credit cards. The theory classifies credit card users as either convenient users or revolvers (Rutherford & Sharon, 2004). According to (Chien & DeVaney, 2001), convenience cardholders receive their credit card statements at the end of the contractual period and pay the balance in full on a regular basis.

On the other hand, revolver cardholders receive their credit card statements at the end of the contractual period and pay only a portion of the balance and thus letting the remaining balance accrue interest.

The differences between credit card convenience users and revolvers with regard to the demographics, advantages and disadvantages are of significant interest to both research and practice of credit cards lending (Chakravorti & Emmons, 2003; Kim & DeVaney, 2001). Based on the work of Gross & Souless (2002),the theory of planned behavior premises that credit cards defaults do not stem primarily from liquidity problems of the credit cardholder but are as a result of a person's behavior which is influenced by various individual socio-demographic, behavioral and economic characteristics.

In addition, the theory of planned behavior emphasizes that depending on a cardholder's characteristics, credit cards can be spending-facilitating stimuli. This theory further premises that because of budgeting effect, credit card holders will most likely forget or underestimate the price of goods and the total amount spent during their purchasing activities which leads to the problem of overuse and hence default (Durkin, 2000).

In the current study, income, occupation and residential ownership status of a credit cardholder were considered as appropriate proxies for liquidity of the cardholder and were analyzed to establish whether or not they are significant determinants of credit cards default. This theory is therefore relevant and timely as a basis of understanding whether indeed liquidity is or is not a significant determinant of credit cards default as argued by the proponents of the theory. Further, and for purpose of representativeness of the cardholders population the subjects of the current study were not discriminated as either convenience or revolver cardholders.

2.2.3 Adverse Selection Theory

The adverse selection theory developed by Pagano & Jappelli (1993) posits that information asymmetry existing between lenders and borrowers of credit is a basis of credit default risk. The theory postulates that in most market environments, it is very difficult to compare, in any meaningful way, the characteristics of credit customers of one bank with the characteristics of credit customers of another bank without information sharing. In the absence of such information sharing each bank has private information about the credit worthiness of its local credit applicants but has no information about non - local applicants. The latter, therefore, face adverse selection (Heffernan, 2002).

On the other hand, the on-local applicants will have borrowed in the past from their banks and therefore will have been known to that bank. The theory emphasizes that if banks exchange information about their clients' quality, they can identify which of the credit seekers who have newly moved into the bank are creditworthy and lend to them as safely as they do with their long standing clients and as a result, default rate decreases (Muthoni, 2014; Pagano & Jappelli, 1993).

The adverse selection model creates ground for finance sector regulatory to create credit reference bureau to address the problem of information asymmetry (Kantor and Maital, 2001).

The credit reference bureau serves as a mechanism to ensure that lenders can not only evaluate credit default risks that are unknown to them *ex ante* in order to avoid adverse selection but also evaluate default risk *ex post* to avoid moral hazards (Richard, 2006).

This theory is applicable to the current study since the credit cardholders as subjects of the study had statutorily been referred by the lending commercial banks to the credit reference bureau for appraisal before credit cards loans were granted. The relevance of such referencing, according to the theory, is to mitigate the twin problems faced by commercial banks of moral hazard (monitoring problem) and adverse selection (risk assessment problem).

2.2.4 Credit Scoring Model

Credit scoring in commercial banks' lending is based on the premise that credit borrowers can be classified into 'good' or 'bad' risk classes depending on their likelihood to default in credit (Hand and Henry, 2007). The basic assumption of the model is that likelihood to default is a function of an individual credit applicant's observable attributes (Chen & Huang, 2008; West, 2010; Li Zhang, 2012). The attributes of interest may be socio-demographic, behavioral or economic (Santomero, 2003).

According to credit scoring model, the different permutations of individual characteristics of a credit borrower contributes generally to a credit borrower's consumption behaviour, riskiness or risk averseness (Hand and Henry, 2007).

The main construct of the model is to mitigate against granting credit to “bad” credit borrowers and to avoid giving false rejection to “good” credit borrowers (Pirog & Roberts, 2007).

Credit scoring is based on quantitative models which make it possible to, among others, numerically establish which factors are important in explaining credit default risk and evaluate the relative degree of importance of the factors (Chijoriga, 2000). Further, credit scores modeling help to improve the pricing of credit default risk and allow more visible screening out of “bad” loan applicants from the “good” ones based on the analysis of their individual characteristics.

The main theoretical perspective of this study is the credit scoring model (Hand and Henry, 2007), which categorizes cardholders into defaulters and non-defaulters for the dichotomous dependent variable which was credit cards default. A distinct feature of the credit scoring model relative to other theories guiding this study is its focus on likelihood of credit default as a function of socio-demographic, behavioral and economic characteristics of a cardholder. This study is therefore anchored on this model since the study focuses on investigation of the influence of various socio-demographic, behavioral and economic determinants of credit cards default.

2.3 Empirical Literature Review

The empirical literature review for this study was grounded on previous studies on the determinants of credit cards default in commercial banks.

The review covers empirical studies on socio-demographic, behavioural and economic determinants of credit cards default. The review provides an in-depth understanding of the variables that have higher predictive power of default in credit cards and the specific methods used in the estimation of parameters of interest.

2.3.1 Socio-Demographic factors (DF) of Credit Cards Default

Theoretical literature indicates that socio-demographic characteristics of a credit card holder can influence credit card default. Agarwal *et al.*, (2009) focused on the role of individual socio-demographic information characteristics on household default and bankruptcy outcomes. The study used monthly panel data set of more than 170 000 credit cardholders for a period of over 24 months. Using Cox proportional hazard model, the observations of each borrower's default and bankruptcy filing status were made. The findings of the study showed that a borrower who is married has a lower risk of default in household credit and hence bankruptcy filing. With respect to age, the findings further showed that older (60 years or more) groups of consumers had the lowest bankruptcy filing and default risk. This study was limited to the relationship between socio-demographic factors and credit default in household borrowing. It was therefore vital to find out whether the same relationships exist in other forms of credit borrowing.

The current study focuses, among others, on identification of quantifiable influence of socio-demographic factors in credit cards default in commercial banks. Dunn & Kim (1999) study focused on the relationship between credit default and the outcomes of financial choices consumers make within the constraints of the contract terms set by credit card issuers. The study used a monthly random household telephone survey conducted by the Center for Survey Research at the Ohio State University in each of the 12 months per year from the February 1998 through to May 1999. The sample consisted of at least 500 households spread throughout the state of Ohio. The findings of the study were that socio-demographic variables; age and marital status are strongly related to the financial choices that consumers make and hence default in credit. However, this study did not establish the quantifiable influence of socio-demographic factors on credit default which is among other the focuses of this study.

There are few studies in literature on credit defaults whose focus is not in minimizing the misclassifications between “good” and “bad” cardholders but in the profit maximization. The study by Boyes *et al.*, (2002), focused on estimation of each credit applicant’s probability of default and the pay-offs that will be realized in the event of default or repayment. The study demonstrated in credit card lending how maximum likelihood estimates of default probabilities can be obtained from a bivariate censored probit framework using a choice based sample originally intended for discriminant analysis. The findings of the study were that socio-demographic characteristics of a credit applicant determine the probability of default and pay-off.

However the study did not establish the marginal influence of various socio-demographic characteristics on credit default which is a focus of this study. Abdul-Muhmin & Umar (2007) study focused on the tendency to revolve in credit cards.

The findings of the study were that the tendency to revolve is significantly higher among males. Further, the study found that the relationship between the tendency to revolve and credit cards default was significant with cardholders who revolve more tending to default more. It was necessary to carry out a study to find out whether the relationship between credit default and revolver-type of a cardholder is the same or different for other types of cardholders such as convenience users while holding the socio-demographic characteristics of the cardholder constant. The current study focused on the influence of socio-demographic factors on credit cards default for both revolvers and convenience cardholders.

The common and general limitations with the above reviewed studies is that they all focused on socio-demographic factors of credit default in complete isolation of other factors of interest such as behavioural and economic. Recognising that the performance of credit cards portfolio is influenced by a complex interaction between several factors, the current study greatly improved on the above studies by incorporating behavioral factors (BF) and economic factors (EF) in addition to the socio-demographic factors (DF).

2.3.2 Behavioural Factors (BF) in Credit Cards Default

According to Marjo (2010), behavioral factors are those that characterize the relationship between the cardholder and the bank. The study by Kocenda & Vojtek, (2009) focused on the prediction of various behavioral variables in credit default using both logistic analysis and classification and regression tree (CART) analysis. The study used a dataset of 3403 observations and 21 variables. With both methods, the findings were that the important behavioral characteristics of credit cards default with higher predictive power were the approved credit limit and repayment of other loans.

However, the study did not establish the precise and marginal influences of these variables on credit cards default which is a focus of the current study.

The study by Kim *et al.*, (2005) focused on relationship between credit default and the number of cards on which a consumer has reached the credit limit as a behavioral factor. The findings were a positive correlation between credit default and the number of cards that had reached credit limit. In addition to obtaining a general correlation between the two variables, a study was necessary to determine the exact influence of this behavioral factor on credit cards default. This was a focus of the current study.

Study conducted by Hamilton & Khan (2001) focused on the effect of servicing more than one interest-charging products or loans on credit default. The findings were that cardholders servicing more loans had a higher likelihood to become revolvers and hence defaulters. The study did not establish the marginal effects of the behavioral factors on credit default which was a focus of the current study.

Dinh & Kleimeier (2007) study focused on effects of behavioral determinants of credit default in transactional lending. The study used forward stepwise selection to select behavioral variables of interest. Based on the principles of transactional lending the findings of the study were that repayment of other loans and approved credit limits were significant predictors of default. The study, however, was limited to transactional lending and was therefore important to establish whether these effects can be replicated in other forms of lending. The current study focused on influence of behavioral factors on credit cards default in commercial banks.

2.3.3 Economic Factors (EF) in Credit Cards Default

Armingier, *et al.*, (1997) focused on analyzing the best method in predicting economic determinants of credit default among three different techniques; logistic discriminant analysis, classification tree analysis and a feed forward network method. The variables of interest were income of cardholders, house ownership, house type, car ownership and occupation. Findings of the study showed that the predictive power is about equal for all the techniques with logistic discriminant providing the best estimates. From the logistic discriminant analysis the probability of non-default in credit is higher for house owners, cardholders with formal employment and high monthly income. The study was limited to establishing the probability of default using various quantitative techniques. It was vital to establish the influence of the various economic factors on credit cards default and hence the focus of this study.

Unlike most studies in credit cards default, Musto & Souleles (2006) study focused on computation of the risk-adjusted returns and the covariance of these returns on borrower's credit based on aggregate returns. The covariance of the consumer's default risk with aggregate consumer default rates were calculated based on the economic characteristics of the borrower. The findings of the study showed that covariance risk, and hence default risk, tends to be higher for lower-income consumers and those who rent rather than own and those with an informal employment. This study was limited to computation of covariance risks as a proxy to default rate based on credit scores. There was paucity of a research study to analyze the particular influence of economic factors on credit cards default which was a focus of the current study.

Jacobson & Roszbach (2003) study focused on analyzing the sample-selection bias that credit scoring models suffer from with respect to economic characteristics of a cardholder. The study found that the basic value-at-risk (VaR) measure is not reliable enough for credit default estimation and suggested use of unbiased scoring model such as bivariate probit approach that takes into account the rejected loans also. The study was limited to analysis of sample selection biases in credit scoring on economic characteristics of a cardholder. There was need to extend the focus of the study to establish economic factors with higher predictive powers of default. This was a focus of the current study.

The study by Mokaya (2011) focused on the relationship between credit cards default and cardholder characteristics, credit card characteristics and behavioural scoring process. The study established a positive correlation between credit cards default and the characteristics of both the cardholder and the card itself. The study did not address the concern of the influence of various cardholder characteristics on credit cards default which is the focus of the current study.

2.4 Summary of Literature Review and Research Gaps

The reviewed literature on consumer credit market has provided useful insights into the influence of socio-demographic, behavioral and economic determinants on credit cards default. Although there is empirical evidence that these factors influence credit cards default, much of it is confined to the developed countries enjoying more mature credit markets (Marjo, 2010; Simiyu *et al.*, 2012). In contrast, the credit cards business is still at its infancy in emerging credit markets such as Kenya. Recognizing that default in credit depends on a country's unique and specific economic environment, recessions and general economic conditions, there was therefore need for a study using model parameters obtained from local data to address the paucity of research in credit cards default in commercial banks in Kenya.

Most empirical studies on credit cards default risk focus mainly on investigating the general relationships and associations between the socio-demographic, behavioral and economic variables of interest and the credit cards default but fail to provide the marginal effects of each determinant of credit cards default in commercial banks.

The marginal effects analysis using appropriate quantitative model captures the individual influence of each determinant on credit cards default which was a major focus of the current study.

Also, reviewed studies on credit default have been shown to focus on traditional collateralized loans from the perspective of information asymmetry and adverse selection (Beder, 2009; Marjo, 2010). Recognising that traditional loans are unlike credit cards loans in several key aspects there was need for a study to provide new insights of the influence of determinants of credit cards default from a precise analysis. Further, most studies in credit consumer market focus on finding the best possible technique of building a credit score model (Kocenda & Vojtek, 2009) . However, no major differences between the techniques have been established (Beal, 2006). There was therefore need for a study which focuses on the significant and predictive variables in credit cards default and identifies the specific socio-demographic, behavioural and economic variables that have highest predictive power in credit cards default.

This study attempts to fill the identified research gaps by investigating the influence of socio-demographic, behavioural and economic determinants on credit cards default in commercial banks in Kenya using locally available country- specific data. For all the categorical variables of interest, Chi-Square tests for independence were carried out to identify those factors that are statistically significant in credit cards default.

For each of the socio-demographic, behavioural and economic continuous variables, independent samples t-tests were carried out to obtain the significance in the difference of means for the two groups, defaulted and not defaulted, under statistical investigation. To draw inferences about the influence on credit cards default of each factor of interest, a logistic regression model was fitted. The overall fit of the model was tested using log likelihood and associated Chi-square statistics. Statistical contribution of each predictor (independent) variable was tested using the wald Chi-square statistic. Marginal effects analysis for the effect of a unit change in the independent variable on the dependent variable (credit cards default) was carried out using the odds ratios.

2.5 Conceptual Framework

In this study the determinants of credit cards default were derived from the literature review. The dependent variable is credit card default within the definition by Bank of International Settlement (BIS, 2004). The independent variables are socio-demographic, behavioral and economic factors influencing credit cards default as shown in Figure 2.5.

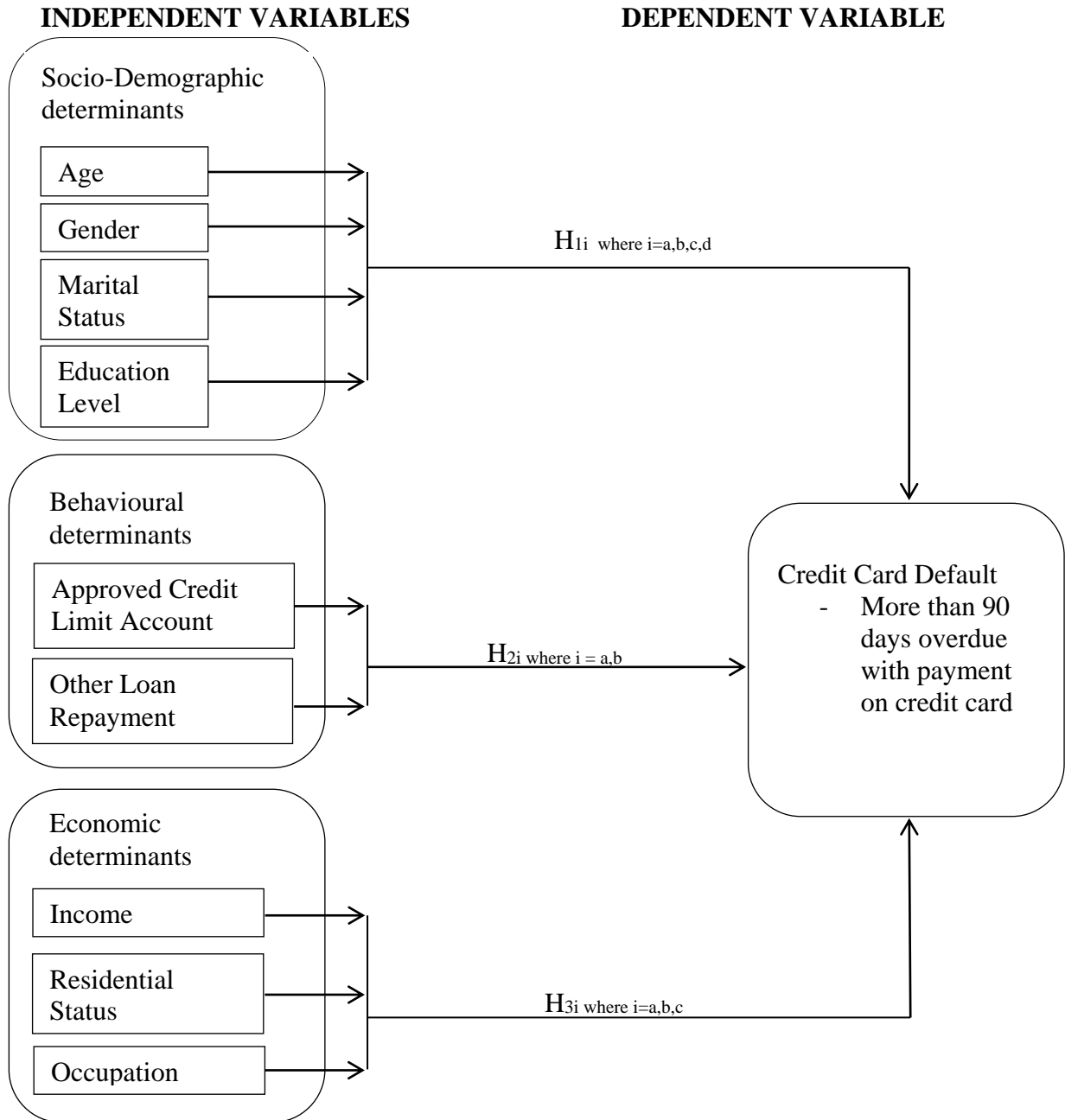


Figure 2.5: Conceptual framework
Source: Researcher, 2014

The variable credit card default was operationalized following the guidelines of the New Basel Capital Accord (known as Basel II) by the Bank of International Settlement (BIS) that defines credit default as more than 90 days overdue with any payment connected with the credit card.

The socio-demographic factors that have high influence on credit cards default were identified from the literature review as gender, marital status, education level and age of a credit card holder (Marjo, 2010; Mokaya, 2011, Simiyu *et al.*, 2012; Autio, 2009; Dinh & Kleimeier, 2007; Roszbach, 2004; Jacobson & Roszbach, 2003). Gender was categorised as male or female. The rationale was to establish if gender influences credit cards default as postulated in empirical studies (Abdul-Muhmin & Umar, (2007). Marital status was categorized as married or not married to include all other marital statuses. From the literature review marital status is posited to affect default as it is viewed as a proxy for responsibility, reliability or maturity of a borrower (Agarwal *et al.*, 2009). Education level was categorized as university level or lower than university level. It is premised from literature review that customers who are highly-educated professionals are less likely to default on their credit cards (Steenackers & Goovaerts, (1989). Age of a cardholder was a numeric figure measured in years. It is rationalized in literature review that age and credit risk averseness have an inverse proportion with older cardholders being more risk averse (Marjo, 2010; Mokaya, 2011, Agarwal *et al.*, 2009).

The behavioral variable “any other loan repayment” was categorized as “yes” for cardholders servicing other bank loans outside the credit card loan and “No” for those servicing credit card loans only. The effect of this variable on credit default is postulated in the studies by Tunal & Tatoglu (2010), Kim, Dunn & Mumy (2005). Approved credit limit was the maximum credit limit availed to a cardholder. This variable was numeric and measured in Kenya shillings per month. The effect of loan size on credit default is premised on the studies by Jacobson & Roszbach (2003) and Kocenda & Vojtek (2009).

Residential status of a cardholder was categorized as either owned or not owned to include all other statuses such as mortgaged and rented. The effect of residential ownership on credit default is extensively covered in the study by Steenackers & Goovaerts (1989). Income of a cardholder was measured as a numeric figure in Kenya shillings. From the literature review income is posited to have an influence on credit default (Jacobson & Roszbach, 2003) & Agarwal *et al.*, 2009). The variable occupation was categorized as formally employed or self-employed. There have been contradicting findings in literature regarding the influence of employment on default as postulated by Autio *et al.*, (2009).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used in the study. It covers sections on research paradigm, research design, model specification, definition and measurement of variables, target population, sampling design, and data collection instruments and data analysis.

3.2 Research Paradigm

Any scientific research is based on philosophical frameworks known as paradigms. According to Thomas (1993), a paradigm is characterized as an integrated cluster of substantive concepts, variables and problems attached with corresponding methodological approaches and tools. Collins & Hussey (2009) and Jackson (2009), identifies the two main philosophical frameworks that guide any scientific research as positivism and interpretivism.

The positivist paradigm of exploring social reality emphasizes on observation and reason as means of understanding human behavior (Jackson, 2009). According to the study by Collins & Hussey (2009) true knowledge is based on experience of senses and can be obtained by observation and experiment. Positivistic thinkers adopt this study's scientific method as a means of knowledge generation. The study further emphasizes that knowledge generation through research should be done and understood within the framework of the principles and assumptions of science.

These assumptions, as Conen *et al.*, (2000) noted, are determinism, empiricism, parsimony, and generality. The positivist makes inferences from generalizations using a deductive approach. In this approach hypotheses are formulated and tested for acceptance or rejection. Positivists emphasize on objectivity of findings based on established facts (Nagy & Biber, 2010).

On the other hand, interpretivism or anti-positivism is characterized by the belief that social reality is not objective but subjective based on the researcher's perceptions. In this paradigm, findings are derived qualitatively and not through statistical analysis (Collins & Hussey, 2009). This study was based on quantitative approach to research and was therefore guided by positivism philosophical framework.

3.3 Research Design

According to Saunders, Lewis & Thornhill, (2007) combining different designs in one study enable data triangulation and increases validity of the findings. The current study adopted both correlational and descriptive survey designs. Descriptive research aims to generate explanatory information or characteristics about a specific phenomenon (Mugenda & Mugenda, 2012). On the other hand, correlational design aims to establish significant relationships existing between two or more phenomena of interest (Saunders *et al.*, 2007). The choice of these designs was consistent with the general objective of the study which was to investigate the influence of socio-demographic, behavioral and economic determinants on credit cards default in commercial banks in Kenya.

This investigation involved analyzing credit cards applicants' characteristics on the variables of interest and making inference on the association and influence of these factors on credit cards default.

3.4 Empirical Model

The goal of any model-building technique in statistics is to find the best fitting and most parsimonious, yet reasonable model to describe a relationship between a dependent variable and one or more independent variables. According to Marjo (2010), the commonly used methods to study determinants of credit default includes Linear Discriminant Analysis (LDA), Logistic Regression and Ordinary Linear Regression. Other techniques such as Neural Networks and Classification Trees have also been applied either parametrically or non-parametrically.

Gujarati & Sangeetha (2007) observes that the three approaches to developing a probability model for a binary response variable are linear probability model (LPM), logit model and probit model. According to Adem, Gichuhi & Otieno (2012), the logistic model is most appropriate for dichotomous data when the response variable can only take one out of two possible outcomes representing success and failure. For credit card account holders, the possible outcomes are either payment or default in payment. This made the choice of logistic model and logistic regression technique appropriate for the study. Further, the following four essential assumptions of logistic regression model were satisfied by the current study data: the dependent variable should be measured on a dichotomous scale, there should be one or more independent variables which can be either continuous (an interval or ratio variable) or categorical(an ordinal or nominal

variable), there should be independence of observations and the dependent variable should have mutually exclusive and exhaustive categories ,there needs to be a linear relationship between any continuous independent variables and the logit transformation of the dependent variable. According to Adem *et al.*,(2012) the concept of logistic model is based on Bernoulli and Binomial distributions.

3.4.1 The Bernoulli Distribution

For a binary response variable Y_i assuming only two values which for purpose of this study were $Y_i = 1$ if the i^{th} credit cardholder defaulted and $Y_i = 0$ if the account holder paid, Y_i is a realization of a random variable Y_i that can take the values 1 and 0 with probabilities Π_i and $1-\Pi_i$, respectively. The distribution Y_i is Bernoulli distribution with parameters Π_i which can be written as

$$p(Y_i = y) = \Pi_i^{y_i} (1 - \Pi_i)^{1-y_i} \dots\dots\dots (3.1)$$

For $Y_i = 0,1$.

From Adem *et al.*(2012), the probability distribution function (pdf) of Y_i is given by

$$P(Y_i = y_i) = \begin{bmatrix} n_i \\ y_i \end{bmatrix} \Pi_i^{y_i} (1 - \Pi_i)^{n_i - y_i} \dots\dots\dots (3.2)$$

for $Y_i = 0,1,\dots,n_i$ where $\Pi_i^{y_i} (1 - \Pi_i)^{n_i - y_i}$ is the probability of obtaining Y_i successes and $n_i - y_i$ failures.

The mean and variance of Y_i is given by $\mu_i = n_i \Pi_i$ and $\sigma_i^2 = n_i \Pi_i (1 - \Pi_i)$ respectively where n_i denotes the number of card holders in group i classified according to the variables of interest such as gender, age, marital status etc. Y_i denotes the number of defaulters in group i .

3.4.2 The Logistic Function

The logistic function describes the mathematical form on which the logistic model is based. The logistic function $f(z)$ is given by

$$f(z) = \frac{1}{1 + e^{-z}} \dots\dots\dots (3.3)$$

where

$$Z = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k$$

and

$X_1, X_2, X_3 \dots X_k$ are a vector of observed covariates (independent variables) and

$\alpha, \beta_1, \beta_2, \beta_3, \dots, \beta_k$ are a vector of regression coefficients of the independent variables to be determined.

In the current study, the vector of observed covariates $X_1, X_2, X_3 \dots X_k$ were:

X_1 = Observed age of a cardholder measured in years.

X_2 = Observed gender of cardholder coded as 1 = male and 2 = female.

X_3 = Observed marital status of cardholder coded as 1 = married and 0 = other statuses.

X_4 = Observed education level of cardholder coded as 1 = university and 0 = lower than University.

X_5 = Observed approved credit limit of cardholder in Kenya shillings.

X_6 = Observed repayment of any other loan by cardholder coded as 1 = yes and 0 = No.

X_7 = Observed monthly income of cardholder in Kenya shillings.

X_8 = Observed residential status of cardholder coded as 1 = owned and 0 = not owned.

X_9 = Observed occupation of cardholder coded as 1= employed and 0 = self-employed.

B_i = Vector of the coefficients of determinants that describes how changes in the independent variables influences credit cards default.

3.4.3 The Odds Ratio

The parameters in logistic regression have an interpretation in terms of odds and odds ratios. Odds is defined as the relative probability of success ($y = 1$) compared to the probability of failure ($y= 0$) when the data is binomial (Ntzoufras, 2009).

Thus,

$$Odds = \frac{\Pi}{1 - \Pi_i} \dots\dots\dots(3.4)$$

and the logistic regression model can be re-written

$$\eta = \log it(\Pi_i) = \log\left(\frac{\Pi_i}{1 - \Pi_i}\right) \dots\dots\dots(3.5)$$

which has the effect of removing floor restrictions as odds have no ceiling restrictions.

Solving for Π_i in equation 3.5 gives

$$\Pi_i = \text{logit}^{-1}(\eta_i) = \frac{e^\eta}{1 + e^\eta} \dots\dots\dots(3.6)$$

It is assumed that the logit of the probability Π_i , rather than the probability itself follows a linear model (Adem *et al.*, 2012).

The odds ratio R is defined as the ratio of two odds,

$$R = \frac{p_0 / (1 - p_0)}{p_1 / (1 - p_1)} \dots\dots\dots(3.6.1)$$

Where P_1 refers to the probability of an event, for instance, default in credit cards for particular characteristic such as female gender and P_0 refers to the corresponding probability of the omitted characteristic, such as male gender. By solving equation (3.6.1) for P_1 and assigning a specific value to P_0 , we can estimate the corresponding marginal effect m :

$$m = p_1 - p_0 = \left[\frac{Rp_0}{1 - p_0 + Rp_0} \right] - p_0 \dots\dots\dots(3.6.2)$$

3.4.4 The Logistic Regression Model

Consider k independent observations Y_1, Y_2, \dots, Y_k and where the i^{th} observation is a realization of a random variable Y_i . Assuming $Y_i \approx B(n_i, \Pi_i)$ the logit of the probability Π_i is the linear function of

$$\text{logit}(\Pi_i) = X'\beta \dots\dots\dots(3.7)$$

where X_i are a vector of covariates and β_i are a vector of regression coefficients.

From equation 3.7 the odds for the i^{th} unit are given by

$$\frac{\Pi_i}{1 - \Pi_i} = \exp(X_i' \beta) \dots\dots\dots (3.8)$$

Solving for π_i in equation 3.8 gives

$$\Pi_i = \frac{\exp(X_i' \beta)}{1 + \exp(X_i' \beta)} \dots\dots\dots (3.9)$$

This can be re-written as

$$f(y) = \frac{e^z}{1 + e^z} \dots\dots\dots (3.10)$$

Where z is the logit of y defined as

$$z = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k \dots\dots\dots (3.11)$$

Default in credit card is probabilistic and maybe influenced by demographic variables, behavioural variables and economic variables as described in previous sections.

Incorporating these variables in the logistic regression model defined above gave the general model for the study as

$$\Pi_i = f(df, bf, ef) \dots\dots\dots (3.12)$$

where:

Π_i = probability of default in credit card by the i^{th} cardholder

df = socio-demographic factors (gender, marital status, age and education level)

bf = behavioural factors (approved credit limit and any other loan repayments)

ef = economic factors (Income, residential status and occupation)

From equations 3.11 and 3.12

$$Default\ in\ credit\ card\ (z) = \alpha + \beta_1df + \beta_2bf + \beta_3ef + \varepsilon_i \dots\dots\dots (3.13)$$

Each of the determinants of credit card default is further broken down into respective components as follows:

$$Default\ in\ credit\ card\ (z) = \alpha + \beta_{1,1}dfg + \beta_{1,2}dfm + \beta_{1,3}dfa + \beta_{1,4}dfe + \beta_{2,1}bfc + \beta_{2,2}bfl + \beta_{3,1}efi + \beta_{3,2}efr + \beta_{3,3}efo + \varepsilon_i \dots\dots\dots (3.14)$$

Where:

Socio-demographic variables

- dfg = Gender of cardholder
- dfm = Marital status of cardholder
- dfa = Age of cardholder
- dfe = Education level of cardholder

Behavioural variables

bfc = Approved credit limit for a cardholder

bfl = Payment of any other loan by cardholder

Economic variables

efi = Monthly income of a cardholder

efr = Residential status of a cardholder

efo = Occupation of a cardholder

3.4.5 Independent Samples T-tests

The independent samples *t*-test compares the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. The samples *t*-test is a parametric test. In this study, the independent samples *t*-test was used to test the statistical differences between the means of defaulted and non-defaulted groups of cardholders on the continuous variables of a cardholder's age, approved credit limit and the income. The critical assumptions of normality in the distribution of the dependent variable for each group and homogeneity of variances across the groups were made.

Formulation of null and alternative hypotheses for the independent samples *t*-test can be expressed as either;

$H_0: \mu_1 = \mu_2$ the two population means are equal

$H_1: \mu_1 \neq \mu_2$ the two population means are not equal

Or

$H_0: \mu_1 - \mu_2 = 0$ the difference between the two population means is 0

$H_1: \mu_1 - \mu_2 \neq 0$ the difference between the two population means is not 0

3.4.6 Chi-Square Test for Independence

The Chi-square test for independence, also called Pearson's chi-square test or the Chi-square test of association, is used to establish if there is a relationship between two categorical variables. In this study, Chi-square tests were carried out to find out if there were significant relationships between default in credit cards and all the other categorical variables of gender, marital status, educational level, occupation, residential status and whether or not a cardholder had other loan repayments. The two assumptions for Chi-square test for independence are that the variables of interest for the test should be measured at the ordinal or nominal level, and that the two variables should consist of two or more categorical, independent groups. These assumptions were met in the current study.

3.5 Operationalization and Measurement of Variables

For this study, explanatory (Independent) variables for the dichotomous response variable default were categorized into socio-demographic, behavioral and economic. Specific variable definitions, operationalization and measurements are presented in Table 3.1.

Table 3.1 Definition and Measurements of Variables

Category	Variable	Operationalization	Measurement
Dependent Variable	Y= Credit card default	More than 90 days overdue with any payment connected with the credit card loan	1- Defaulted 0–Not defaulted
Independent variables			
Socio-demographic determinants	Age	Effect of age of cardholder on credit card default	Age of card holder in years
	Education level	Effect of education level on credit card default	Dummy, takes value 1 if credit card holder has university education and 0 if lower than university level
	Gender	Influence of gender on credit card default	Categorical- takes value 1 if cardholder is male and 0 if female
	Marital status	Influence of marital status on credit card default	Categorical- takes value 1 if cardholder is married and 0 for other marital statuses
Behavioral determinants	Other loans repayment	Extent to which other loans repayments influences credit card default	Categorical – takes value 1 if cardholder has other loans repayments and 0 if none
	Approved credit limit	Effect of amount of credit approved on credit card default	Amount of approved credit card limit in KES
Economic determinants	Income	Effect of income of cardholder on credit card default	Amount of monthly income of card holder in KES
	Occupation	Effect of occupation on credit card default	Categorical- takes value 1 if card holder is formally employed and 0 if self employed
	Residential status	Effect of residential ownership on credit card default	Categorical- takes value 1 if card holder owns residence and 0 otherwise

Source: Researcher (2014)

3.6 Target Population

The list of all commercial banks licensed by the Central Bank of Kenya (CBK) to issue credit cards served as the sampling frame for this study. As at October 2014 when the data for this study were collected, there were eighteen (18) commercial banks licensed by Central Bank of Kenya (CBK) to issue credit cards. A further inclusion criterion for a commercial bank to have been included in the target population was to have had active credit card accounts that had been in operation for at least ninety days. This restriction was informed by the New Basel Capital Accord (known as Basel II) by the Bank of International Settlement (BIS) that defines credit default as more than 90 days overdue with any payment connected with the credit. Based on this Basel II framework, the eighteen commercial banks formed the target population of the study (Appendix II).

3.7 Sampling Design and Sample Size Determination

Out of the 18 commercial banks in Kenya that were licensed to issue credit cards (Appendix II), 8 of them did not include all the variables of interest for the study as part of requirement for credit cards application. These banks were therefore excluded from the sampling frame. The remaining 10 banks were stratified into banks with international affiliations, banks where the government of Kenya (GoK) holds majority shareholding and banks that are privately owned. From each stratum, two banks were selected using simple random sampling.

Table 3.2 Distribution of credit cards accounts records among sampled banks

Category of commercial bank	Frequency	No of banks in the sample	No of credit accounts records provided	No of records used in the sample
Bank with international affiliation	2	2	30	30
GoK has majority shareholding	3	2	40	30
Private or family owned	5	2	35	35
Total	10	6	105	n = 95

Source: Researcher (2014)

Six banks out of ten banks in the sampling frame provided sample data on credit cardholders as requested and therefore constituted the study data collection sample. This represented 60% of the sampling frame and was considered sufficient for analysis and drawing of inferences about credit cards default. The number of credit card accounts records obtained from the three categories of banks also met the statistical threshold of a large sample which is a minimum of thirty sample elements. Ten records from category two of the banks lacked complete details of the variables of interest in the study and were therefore not included in the analysis.

From the central limit theorem and basic assumptions of statistical normality of data, the random sample of size $n = 95$ was considered adequate for the study. Also the sample size meets the minimum number of elements $n = 46$, for use in estimation of parameters using logistic regression method.

3.8 Data Collection Instrument

The data for the study were all secondary cardholder details extracted from bank records.

3.8.1 Datasheet for Secondary Data

Socio-demographic, behavioral and economic data for the credit card account holders were collected using the data sheet presented in Appendix I. Each of the sampled banks for data collection was given a hard copy of the data sheet. A single data sheet was then aggregated from the individual data sheets for purpose of analysis.

3.8.2 Validity of the Data Collection Instrument

The aim of validity testing is to confirm whether or not the data collection instrument measures what it is intended to measure (Jackson, 2009). The main checks for validity are construct validity, content validity and criterion validity. For content validity, the study reviewed theoretical and empirical literature to identify demographic, behavioural and economic characteristics of credit cardholders that were relevant for the objectives of the study. Further, Lynn (1986) posit that a minimum of three experts can be used to validate a research instrument but more than ten experts will add no marginal value . To achieve the benefit of expert opinion in validation of the research instrument, the current study contacted four experts in the field of credit cards risk management whose views were rationally incorporated. Construct and criterion-related validity were ensured through proper operationalisation of study variables and proper indication of key indicators of the study variables respectively.

Validity problem in secondary data research may also arise when the definitions of a situation by the original data collector or organization do not match with that of the theoretical definition of the secondary data user. To further ensure construct validity, the study adopted, consistently for all the banks in the study, the finance sector definition of credit default according to the Bank of International Standards (BIS).

3.9 Data Collection Procedure

Data collection for the study commenced upon obtaining the necessary approvals and permits from National Council of Science, Technology and Innovation (NACOSTI) and the Graduate School of Kenyatta University. Research ethical considerations of confidentiality, anonymity, informed consent and confined use of data for the purpose declared was strictly followed.

For confidentiality of credit card holders and their subsequent performances in credit card management, the data sheet for collection of the secondary data instructed that any information that could lead to the identity of the credit card holder should be concealed. From this instruction records obtained for each cardholder only contained relevant socio-demographic, behavioral and economic details that could not trace the identity of the cardholder. The method for collecting the accounts records was the general drop-and-pick later approach.

3.10 Data Analysis

The study addressed three specific objectives. These objectives were to investigate the influence of socio-demographic, behavioural and economic factors, respectively, on credit cards default in commercial banks in Kenya. The three objectives were analysed both descriptively and inferentially.

Descriptive statistics used included computation of relevant measures of central tendency mainly the arithmetic means for all the continuous variables and measures of variation, mainly variances and standard deviations, and general variable cross tabulations. For categorical variables, each of the socio-demographic, behavioural and economic categorical variables (gender, marital status, education level, occupation, residential status and other loans repayments), Chi-Square tests for independence of the categorical variable and default status were carried out. The purpose of the chi-square testing for independence of variables was to identify if there were statistically significant associations between these categorical variables and default in credit cards. The two assumptions of chi-square tests for independence are that the two variables are to be measured at an ordinal or nominal level and that variables should consists of two or more categorical independent groups. These requirements were satisfied in the study and therefore justified the choice of the Chi-Square tests for independence of variables.

For continuous variables (Age, Approved credit limit and Income of cardholder) of each of the socio-demographic, behavioural and economic factors respectively, independent samples t-tests were carried out to obtain the significance in the difference of means for the two groups under statistical investigation.

The independent samples t-tests compare the means between two unrelated groups on the same continuous variable. In this study, the questions of interest for the continuous variables age, approved credit limit and income of cardholder were whether each or all of them differed based on default status.

To draw inferences about the influence on credit cards default of each variable of interest, a logistic regression model was fitted. The overall fit of the model was tested using log likelihood and associated Chi-square statistics. Statistical contribution of each predictor (independent) variable was tested using the Wald Chi-square statistic. Marginal effects analysis for the effect of a unit change in the independent variable on the dependent variable (credit cards default) was carried out using the odds ratios. The results of all the data analysis and statistical tests are reported in the subsequent chapter four.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents results of the study and their interpretations. It covers descriptive statistics of the socio-demographic and other characteristics of the credit cardholders as units of observation for the study. Inferential statistics on the influence of various determinants of credit cards default risk are also presented and discussed.

4.2 Data Description and Sample Statistics

The study used a data set consisting of ninety five applicants whose credit card loans were approved at different times by three categories of commercial banks in Kenya. The three categories represented banks with international affiliations, banks where the government of Kenya has majority shareholding and banks owned by individual persons or families. Table 4.1 presents descriptive statistics of the categorical variables for each of the socio-demographic, behavioral and economic determinants of credit cards default. Cardholders' characteristics for the continuous variables Age, Income level and Approved credit limit and their descriptive statistics are provided in Table 4.2.

Table 4.1 Cardholders' characteristics for the categorical variables

Characteristic	Classification factor	Frequency	Percentage
Gender	Male	61	64
	Female	34	36
	Total	95	100
Marital status	Married	76	80
	Other marital status	19	20
	Total	95	100
Education level	University	50	53
	Lower than university	45	47
	Total	95	100
Occupation	Employed	33	35
	Self employed	62	65
	Total	95	100
Residential status	Owned	48	51
	Not owned	47	49
	Total	95	100
Any other loan repayment	Yes	81	85
	No	14	15
	Total	95	100
Default status	Defaulted	39	41
	Not defaulted	56	59
	Total	95	100

Source: Survey data (2014)

From Table 4.1, 64% of the sampled cardholders were male. This is consistent with literature, (Abdul-Muhmin& Umar, 2007) that males are less risk averse and will therefore have a higher tendency to borrow credit using various interest-charging instruments such as credit cards.

This argument is congruent with the study findings by Goyal *et al.*, (2006), that women are more risk averse compared to males. The results also show that 80% of the cardholders were married compared to 20% in other marital status.

From the study results, cardholders with university education were 53% against those with lower than university education at 47%. The results also show that the percentage of cardholders who were self-employed was almost double (at 65%) of those that were formally employed (at 35%). Significantly, the number of cardholders who owned residences was almost equal to that of them who did not own residences at 51% and 49% respectively. Cardholders who held a credit card and also had other bank repayments were 85% compared with 15% who were only servicing or revolving with one credit card. Consistent with literature on default in credit cards compared to normal loans (Beder, 2009; Marjo, 2010), the study results showed that 41% of the cardholders had defaulted.

Table 4.2 Cardholders' characteristics for the continuous variables

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age of cardholder	95	51	24	75	48.87	11.190
Income per month in USD	95	33314.6	393.3	33707.9	4691.8	5751.6
Approved credit limit in USD	95	22247.2	2247.2	22471.9	2508.6	3042
Valid N (Listwise)	95					

Source: Survey data (2014)

From Table 4.2 the overall mean Age of the cardholders was 49 years. Average approved credit limit was found to be USD 2508.6. From Figure 4.9, there were outliers for this continuous variable with majority of them being in the non-defaulted group. The average income for the cardholders was USD 4691.8 (Table 4.2). There were outliers for the income earned by cardholders as shown in Figure 4.12 with majority of them being in the group for non-default. This was consistent with findings by Jacobson & Roszbach (2003) and Agarwal *et al.*, (2009) that income of a cardholder is inversely related to credit default.

4.3 Determinants of Credit Cards Default in Commercial Banks in Kenya

The overall purpose and focus of the study was to investigate the influence of determinants of credit cards default among Commercial Banks in Kenya. The determinants of interest were identified as socio-demographic, behavioural and economic. These factors constituted the explanatory variables of the study with credit card default as the dependent variable. All the commercial banks sampled for the data adapted the Basel II framework (Bolton, 2009) on definition of default that a borrower is in default if he or she is more than 90 days overdue with any payment connected with the loan. Results of analysis of the influence of these independent variables on the dependent variable are presented in the subsequent sections.

4.3.1 Socio-demographic Factors of Credit Cards default

The socio-demographic factors of interest in the study were gender, marital status, education level and age of a credit cardholder. Descriptive and inferential analysis of the default status based on the four socio-demographic factors is presented below.

4.3.1.1 Gender and Credit Cards Default

From Table 4.3 (Appendix III) and Figure 4.1 female cardholders had a lower default rate of 13.7% compared with male cardholders whose default rate was 27.4%. Also from the study results, 64.2% of sampled credit cardholders were male. These results are consistent with findings by (Abdul-Muhmin & Umar, 2007) that the tendency to involve in interest-charging borrowing is higher among males.

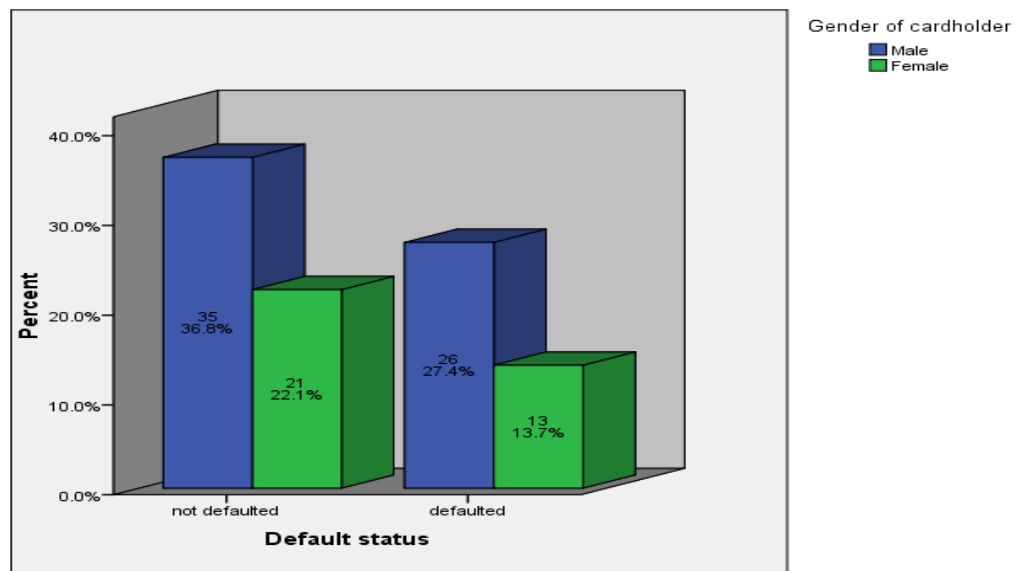


Figure 4.1: Default status by gender of credit cardholder

Source: Survey data (2014)

Despite the observed relatively higher default rate among male cardholders, the study sought to establish whether gender is really a risk factor in credit cards default. To do this, a Chi-Square test for independence was carried out. Results of these tests are shown in Table 4.4.

The Chi-square test results in Table 4.4 showed that there was no statistically significant relationship between gender and credit card default rate ($\chi^2 = 0.174$, $p = 0.677$, $\alpha = 0.05$) which implied that gender, taken alone did not influence default in credit card.

This further implied that the null hypothesis that gender is independent of default in credit card could not be rejected at the 95% confidence level. These results vary with the findings of Arminger *et al.*, (1997), Kocenda & Vojtek, (2009), Dunn & Kim, (1999) that gender is a risk factor in loans and that females default less frequently possibly because they are more risk averse.

Table 4.4: Chi-Square Tests for Independence of gender and default status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.174 ^a	1	.677		
Continuity Correction ^b	.040	1	.842		
Likelihood Ratio	.174	1	.676		
Fisher's Exact Test				.828	.423
Linear-by-Linear Association	.172	1	.678		
N of Valid Cases ^b	95				

Source: Survey data (2014)

4.3.1.2 Marital Status and Credit Cards Default

Descriptive results of the study on default status among married and other marital status of cardholders, Table 4.5(Appendix IV) and Figure 4.2 show that there was lower default rate of 39.5% among married cardholders compared to cardholders in other marital status whose default rate was 47.4%.

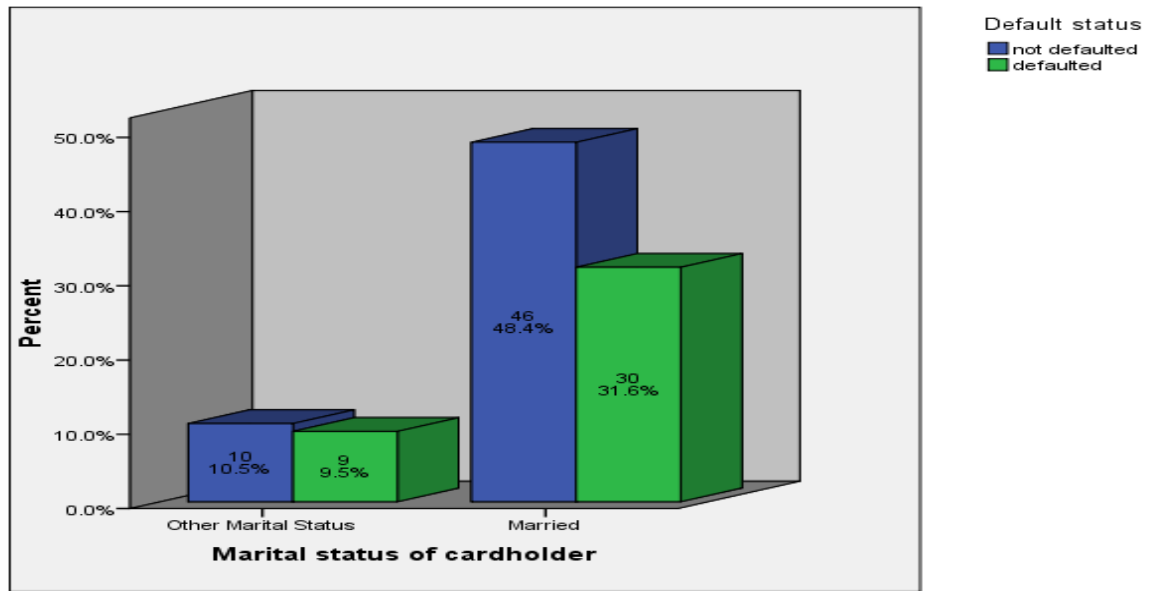


Figure 4.2: Default status by marital status of cardholder
Source: Survey data (2014)

To test for significance of relationship between marital status and credit card default, Chi-square test of independence was carried out. The results of this test are presented in Table 4.6.

Table 4.6: Chi-Square Tests for Independence of marital status and default status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.391 ^a	1	.532		
Continuity Correction ^b	.133	1	.715		
Likelihood Ratio	.388	1	.533		
Fisher's Exact Test				.606	.355
Linear-by-Linear Association	.387	1	.534		
N of Valid Cases ^b	95				

Source: Survey data (2014)

The results of the Chi-square test in Table 4.6 showed that there was no significant relationship between marital status and credit card default rate ($\chi^2 = 0.391$, $p = 0.531$, $\alpha = 0.05$) which implied that default in credit card was independent of marital status of the cardholder.

This study result disagrees with the study by Agarwal *et al.*, (2009) which indicated that marital status can predict default rate on the basis that marital status should be seen to be a sign of responsibility, reliability or maturity of a borrower. The study by Agarwal *et al.*, (2009) further suggested that a borrower who is married is 24% less likely to default on his credit card debt and 32% less likely to file for bankruptcy. The current study did not find statistical evidence to support these findings.

4.3.1.3 Education Level of Cardholder and Credit Cards Default

On education level, the results showed that 16.8% of cardholders with university level education defaulted compared with 24.2% for cardholders with education level lower than university. These results are presented in Figure 4.3 and Table 4.7 (Appendix V).

Consistent with the findings of Steenackers & Goovaerts (1989) that customers who are highly-educated professionals were less likely to default on their credit cards, the current study similarly observed, albeit descriptively, a lower frequency in default for cardholders with university education relative to cardholders with lower than university education.

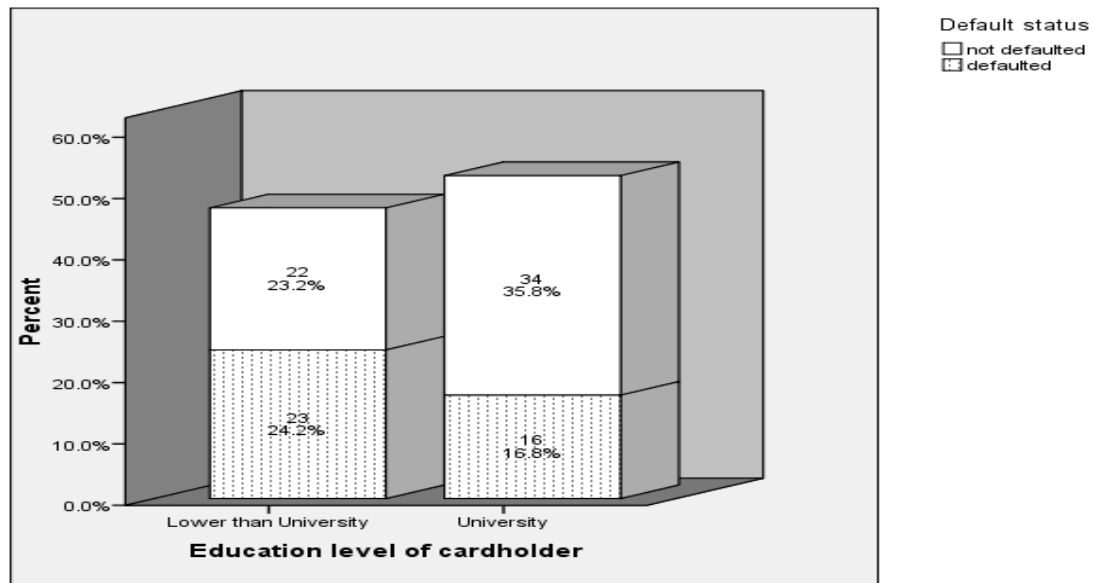


Figure 4.3 Default status by Education level of cardholder

Source: Survey data (2014)

However, Chi-Square tests results ($\chi^2 = 3.575$, $p = 0.059$, $\alpha = 0.05$) presented in Table 4.8 showed that education level of a cardholder is independent of credit card default at 95% confidence level.

Table 4.8: Chi-Square Tests for Independence of Education level and default status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.575 ^a	1	.059		
Continuity Correction ^b	2.828	1	.093		
Likelihood Ratio	3.591	1	.058		
Fisher's Exact Test				.065	.046
Linear-by-Linear Association	3.537	1	.060		
N of Valid Cases ^b	95				

Source: Survey data (2014)

4.3.1.4 Age of Cardholder and Credit Cards Default

Regarding age of a credit cardholder, Figure 4.4 and the group statistics for age showed that the mean age (44.18 years) of those who defaulted was lower than the mean age (52.14 years) who did not default.

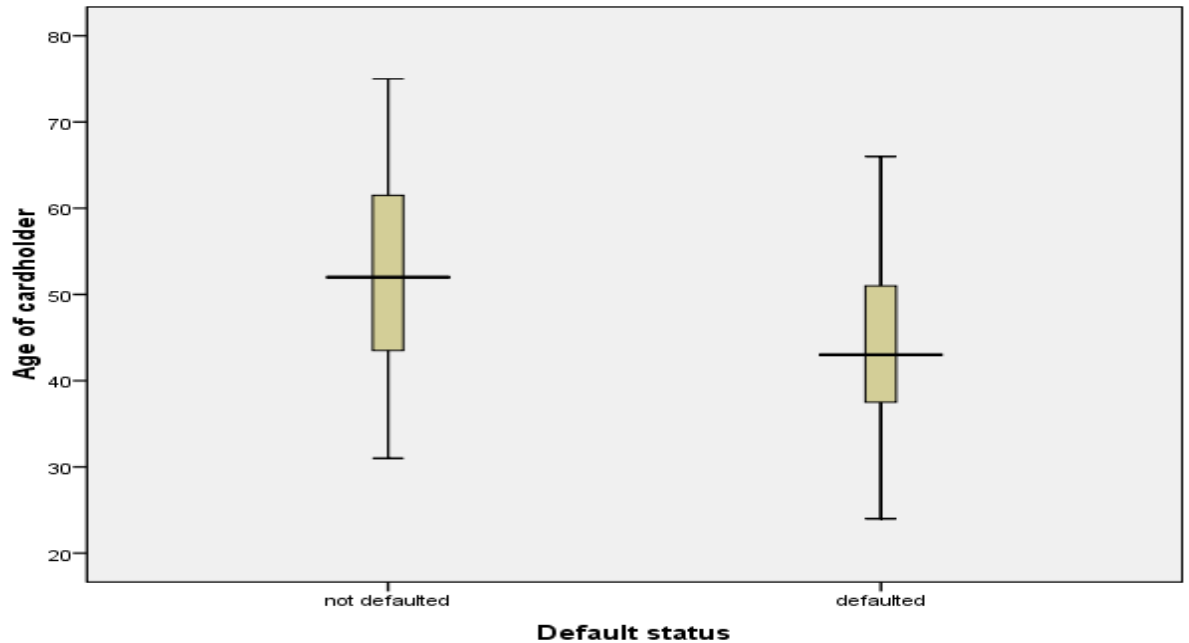


Figure 4.4 Default status by Age of cardholder

Source: Survey data (2014)

The Levene's test of equivalence of variance ($p = 0.854$, $\alpha = 0.05$) in Table 4.9 showed that the variance of the two groups, defaulted and non-defaulted are the same.

Table 4.9: Independent samples t-test of age and default status

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age of cardholder	Equal variances assumed	.034	.854	3.626	93	.000	7.963	2.196	3.602	12.325
	Equal variances not assumed			3.598	79.598	.001	7.963	2.214	3.558	12.369

Source: Survey data (2014)

From the t-test for equality of means ($p = 0.000$, $\alpha = 0.05$) presented in Table 4.9 there was statistically significant relationship at 5% level of significance between age of cardholder and credit card default. In particular, young cardholders had a higher default rate compared to older cardholders. These results are consistent with literature (Mokaya (2011), Arminger *et al.*, (1997) as well as Agarwal *et al.*, (2009) that older borrowers are more risk averse and will therefore be less likely to default.

4.3.2 Behavioural Factors of Credit Cards Default

Behavioral factors characterize the relationship between the credit cardholder and the bank. In some studies, for instance, (Kocenda & Vojtek, 2009) behavioral variables primarily describe the behavior of the customer related to the credit taking and payment matters. In this study, the behavioral factors investigated were the approved credit card limit and whether or not the credit cardholder had other loan repayments with the bank.

4.3.2.1 Other Loans Repayments and Credit Cards Default

From Figure 4.5 and Table 4.10 (Appendix VI) default rate among cardholders having other loan repayment obligations was 37.9% compared to default rate among cardholders servicing only one credit card loan which was 3.2%.

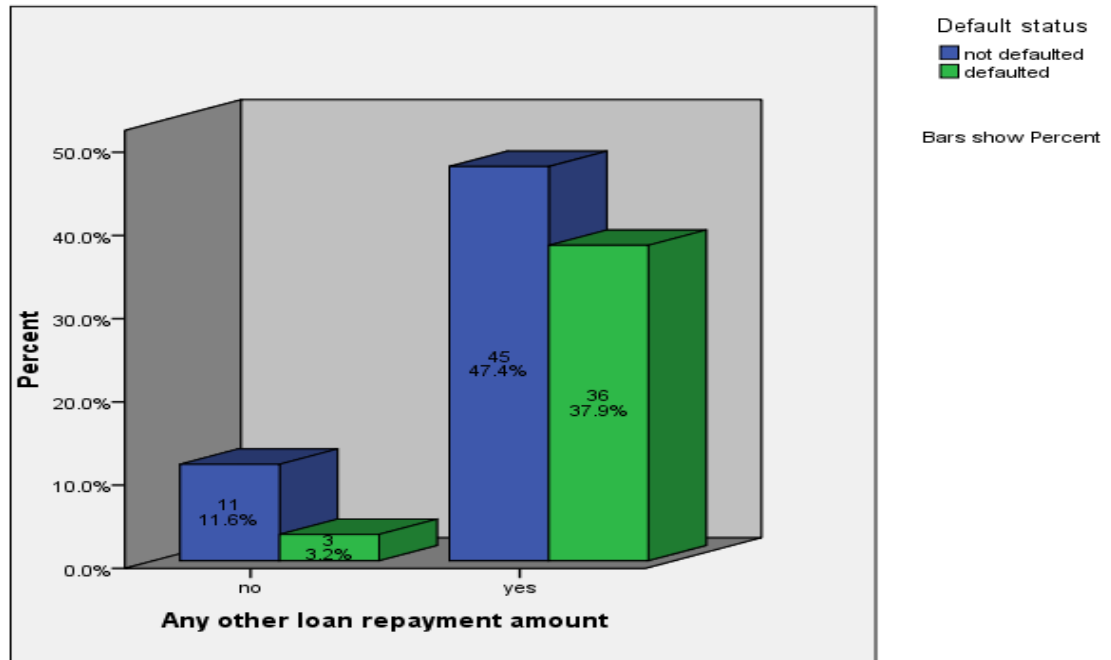


Figure 4.5: Default status of cardholders with other loan repayments
Source: Survey data (2014)

In recent years (2002-to date) when the banking sector in Kenya has been greatly liberalized , there has been a dramatic growth in credit card offers, both in terms of quantity and credit card features. This could explain the observation that it's not unlikely to find many cardholders owning more than one credit card, (Lopes, 2008).

Furthermore, as Tunal & Tatoglu (2010) observes, some credit cardholders consider credit cards as a lifestyle choice rather than a method of payment. Such cardholders generally hold more than one credit card. An increase in the number of bank repayments is found to increase default (Kim, Dunn & Mumy, 2005). This observation is consistent with the findings of the current study.

To establish whether “any other loan repayment” is a risk factor for default in credit cards, Pearson’s Chi-Square test was carried out. The results of this test are presented in Table 4.11.

Table 4.11: Chi-square test for other loan repayments and default status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.613 ^a	1	.046		
Continuity Correction ^b	1.748	1	.186		
Likelihood Ratio	2.803	1	.094		
Fisher's Exact Test				.144	.091
Linear-by-Linear Association	2.585	1	.108		
N of Valid Cases ^b	95				

Source: Survey data (2014)

From the Chi-square test results in Table 4.11 ($\chi^2 = 2.613$, $p = 0.046$, $\alpha = 0.05$) there is significant relationship between any other loan repayments and credit card default. This implies that cardholders having other loan obligations are at a higher risk of defaulting in credit cards compared with those servicing only the credit card loan.

4.3.2.2 Approved Credit Limit and Credit Cards Default

The approved credit limit is the amount of credit card loan an applicant is granted. From the group statistics for approved credit limit and Figure 4.6 the mean approved credit limits for the non- defaulted cardholders was Ksh 2.28e5 compared with that of the defaulted cardholders which was lower at Ksh 2.17e5.

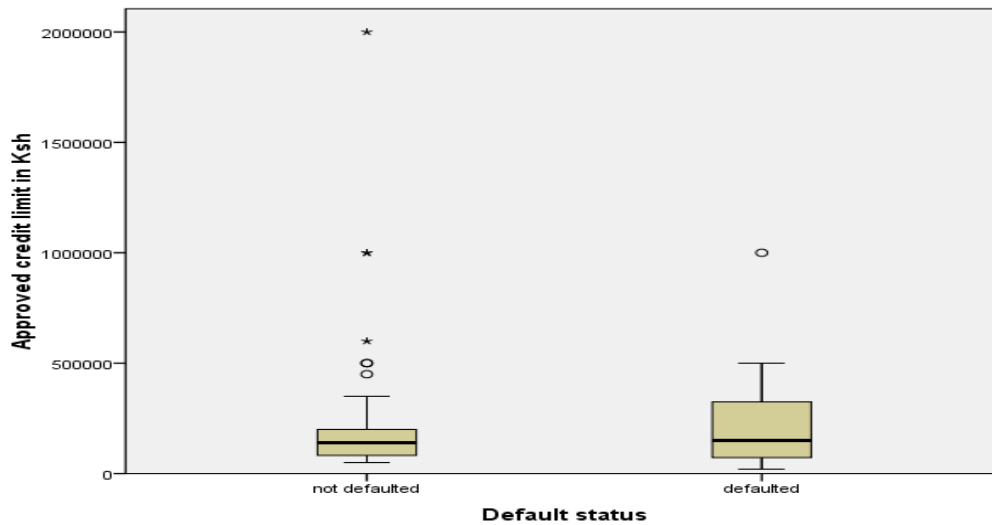


Figure 4.6: Default status on approved credit limit
Source: Survey data (2014)

The Levene's test of equivalence of variance ($p = 0.690$, $\alpha = 0.05$) in Table 4.12 showed that the variance of the two groups, defaulted and non-defaulted are the same. From Table 4.12, the t-test for equality of means ($p = 0.030$, $\alpha = 0.05$) indicated that there was statistically significant relationship at 5% level of significance between approved credit limit and credit card default. The interpretation of the t-test is that higher approved credit cards limit increases probability of default. These findings vary with results of Jacobson & Roszbach (2003) which show that loan size has no significant influence on default risk. However, the study findings are consistent with the results of Kocenda & Vojtek, (2009) that larger loans appear to be more risky than small loan amounts.

Table 4.12: Independent samples t-test of approved credit limit and default status

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Approved credit limit in Ksh	.160	.690	.189	93	.030	10755.495	56760.295	-101959.203	123470.192
Equal variances assumed									
			.204	92.493	.839	10755.495	52646.620	-93797.807	115308.796
Equal variances not assumed									

Source: Survey data (2014)

4.3.3 Economic Factors of Credit Cards Default

The economic factors on default risk considered in this study were residential status, occupation and income of credit cardholder.

4.3.3.1 Cardholder's Residential Status and Credit Cards Default

Regarding residential ownership, the results (Figure 4.7 and Table 4.13 (Appendix VII) showed a slightly higher percentage of 43.8% in default among cardholders having own residences compared to 38.3% default among cardholders not having own residences.

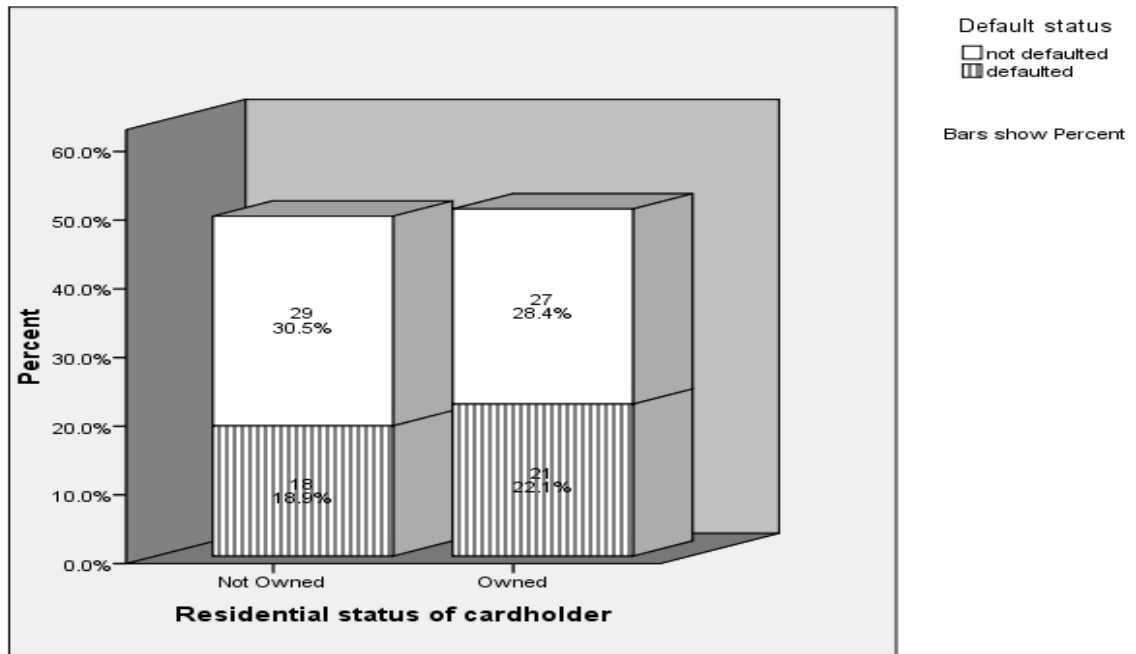


Figure 4.7: Default status on residential ownership
Source: Survey data (2014)

To test for significance of the relationship between residential ownership and credit card default chi-square test of independence was carried out. The results of this test are presented in Table 4.14. From the Chi-square test results in Table 4.14 ($\chi^2 = 0.292$, $p = 0.0489$, $\alpha = 0.05$) there is significant relationship between residential status and credit card default.

These results concur with the findings of Agarwal *et al.*, (2009) that residential ownership is a significant factor in credit default and filing for bankruptcy. The results also agree with the findings by Steenackers & Goovaerts (1989) that residential status is a risk factor in credit default.

Table 4.14: Chi-square test for residential ownership and default status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.292 ^a	1	.0489		
Continuity Correction ^b	.110	1	.740		
Likelihood Ratio	.292	1	.589		
Fisher's Exact Test				.678	.370
Linear-by-Linear Association	.289	1	.591		
N of Valid Cases ^b	95				

Source: Survey data (2014)

4.3.3.2 Income of Cardholder and Credit Cards Default

To investigate the influence of income of a credit cardholder on credit cards default, group statistics were calculated and presented in Table 4.15 and Figure 4.8.

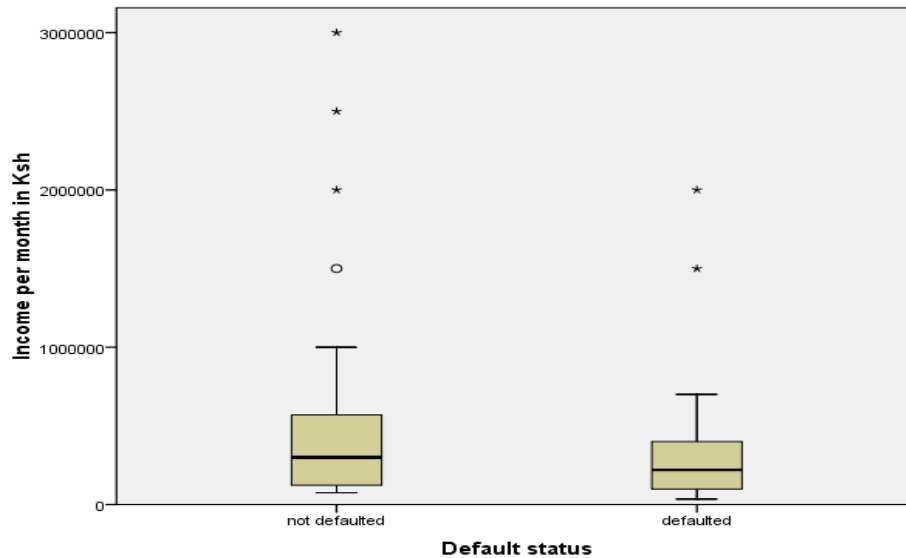


Figure 4.8 Default status on income of cardholder

Source: Survey data (2014)

From the group statistics Table 4.15 the mean income for the credit cardholders who did not default was higher (Ksh 4.74×10^5) than the mean of those who defaulted (Ksh 3.36×10^5).

Table 4.15: Group statistics for income per month

Default status		N	Mean	Std. Deviation	Std. Error Mean
Income per month in Ksh	not defaulted	56	4.74×10^5	579902.831	77492.775
	Defaulted	39	3.36×10^5	387132.585	61990.826

Source: Survey data (2014)

However, from Table 4.16 the t-test for equality of means ($p = 0.197$, $\alpha = 0.05$) indicated that there was statistically insignificant relationship at 5% level of significance between income of a cardholder and credit card default. This implied that income of the cardholder is not a risk factor in credit cards default. This finding contradicts the study by (Jacobson & Roszbach, 2003) which posits that income of a cardholder affects credit default.

Table: 4.16: Independent samples t-test of income per month and default status

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Income per month in Ksh	2.461	.120	1.301	93	.197	138362.179	106370.263	-72868.082	349592.441
Equal variances assumed									
			1.394	92.870	.167	138362.179	99237.053	-58706.574	335430.933
Equal variances not assumed									

Source: Survey data (2014)

4.3.3.3 Occupation of Cardholder and Credit Cards Default

On occupation of credit cardholders, the results (Table 4.17 (Appendix VIII) and Figure 4.9) of the study showed no significant difference in default among cardholders who were formally employed compared to those in self-employment. However, cardholders in formal employment had a slightly higher default rate of 42.4% compared to 40.3% among cardholders in self-employment.

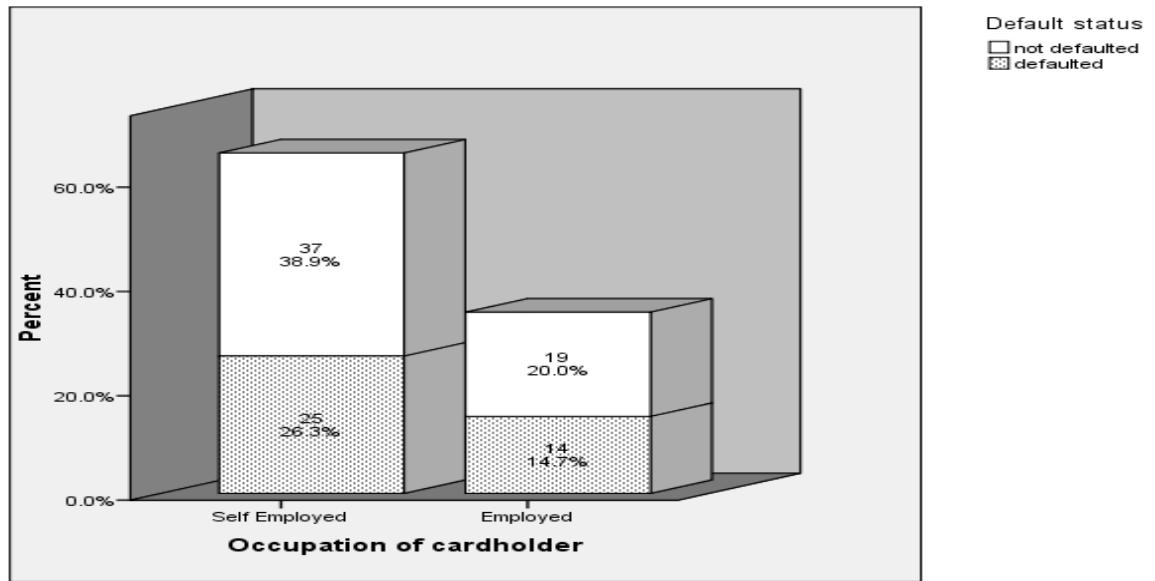


Figure 4.9: Default status on occupation of cardholder
Source: Survey data (2014)

However, from Table 4.18 there was no significant relationship between occupation of cardholder and credit card default rate ($\chi^2 = 0.039$, $p = 0.843$, $\alpha = 0.05$) which implied that default in credit card was independent of occupation of the cardholder. These findings agree with the study by (Musto & Souleles, 2006) which showed insignificant relationship between credit default and occupation of cardholder.

Table 4.18: Chi-square test for occupation and default status

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.039 ^a	1	.843		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.039	1	.843		
Fisher's Exact Test				1.000	.507
Linear-by-Linear Association	.039	1	.844		
N of Valid Cases ^b	95				

Source: Survey data (2014)

4.4 Logistic Regression Results and Interpretations

The explanatory variables of interest in this study were gender, marital status, age, occupation, education level, income, other repayments and residential status. Their values were either continuous or categorical. The dependent variable was default status which was dichotomous and thus able to have only two exclusive values coded as 1 and 0 for default or non-default.

The results of the logistic regression is provided in Table 4.19 and Table 4.20

Table 4.19: Logistic Regression results

Coefficient	Estimate (β)	Std Error (SE)	Wald	DF	P-value	Exp(β) (Odds ratio)
Gender(2)	-1.20E+00	6.71E-01	3.216	1	0.073	3.3201
Age	-1.54E-01	3.85E-02	16.062	1	6.13E-05	1.1665
Marital status(1)	-5.60E- 01	7.52E-01	0.554	1	0.457	1.7507
Education level(1)	-1.04E+00	5.84E-01	3.141	1	0.076	2.8292
Income	-2.01E-06	1.06E-06	3.571	1	0.059	1.000
Occupation(1)	-5.51E-01	6.85E-01	.648	1	0.421	1.7349
Residential status(1)	1.80E+00	7.20E-01	6.215	1	0.013	6.0496
Approved credit limit	3.28E-06	1.65E-06	3.961	1	0.047	1.000
Any other loan repayment(1)	2.28E+00	8.41E-01	7.358	1	0.007	9.7766
Constant	5.86E+00	1.94E+00	9.698	1	0.002	330.2996

Source: Survey data, 2014

Table 4.20: Omnibus, Hosmer and Lameshow Tests Results

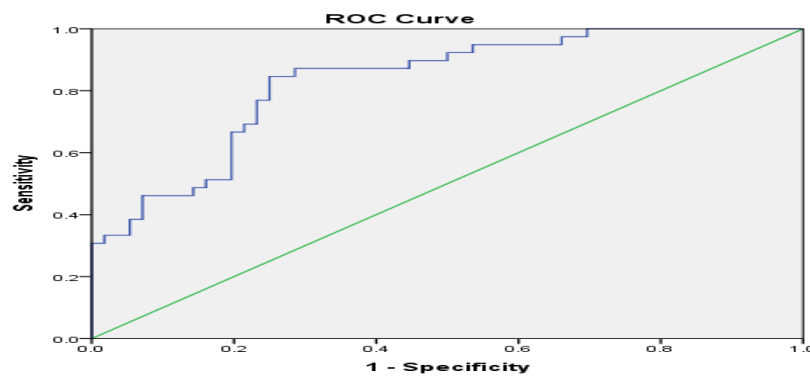
Description	Value
Observation	95
Nagelkerke R squared	0.740
Cox & Snell R squared	0.326
-2Log Likelihood	91.094
Omnibus Test of model coefficient	Chi square = 37.545, DF = 9, p-value =0.000
Classification rate	72.6 %
Hosmer and Lameshow rate	Chi square = 4.924, DF = 8, p-value = 0.766

Source: Survey data, 2014

Omnibus Tests of Model Coefficients gave a Chi-Square of 37.545 on 9 degrees of freedom (df) which is significantly beyond the cut value of .001. The results show that with inclusion of the predictor variables, the model fits significantly better than the null model (model with no predictors).

The Nagelkerke (R^2) of 0.740 indicates that 74% of variations in the response variable are explained by the identified socio-demographic, behavioural and economic explanatory variables of the study. From literature, Nagelkerke (R^2) is a better measure than Cox & Snell R^2 and is therefore mostly used in analysis. Further, while both the two types of R^2 can be interpreted like R^2 in multiple regressions, Cox & Snell R^2 cannot reach a maximum value of 1 but Nagelkerke (R^2) can. Classifications table for logistic regression analysis shows the proportion of cases which have been classified correctly. For this study, the specificity of the study's prediction (cases correctly classified for non-default group) was 80.4 % while sensitivity of prediction (cases correctly classified for default group) was 61.5 %. The overall prediction success rate (Table 4.20) was 72.6 %. The ROC curve for sensitivity and specificity is given in Figure 4.10 below.

Figure 4.10: ROC curve for sensitivity against specificity



Source: Survey data (2014)

The Hosmer-Lemeshow tests the null hypothesis that predictions made by the model fit perfectly with observed group memberships. Cases are arranged in order by their predicted probability on the criterion variable. Well-fitting models show non-significance on the Hosmer-Lemeshow goodness-of-fit test. From table 4.20 above, the p value is 0.766 which implies that the model is a good fit. The desirable outcome of non-significance indicates that the model prediction does not significantly differ from the observed.

At the 5% level of significance (p -value = 0.05), the results show age as a significant socio-demographic factor in prediction of credit cards default. The odds ratio for age (Odds = 1.1665) implies that younger cardholders (mean age of 44.18 years) are approximately 1.2 times more likely to default than older cardholders (mean age of 52.14 years). For the behavioral factors, the results of the study found both the approved credit limit (p -value = 0.047) and any other loan repayment (p -value = 0.007) to be statistically significant at 5% level of significance. The odds ratio for default by cardholders with other loan repayments to default by cardholders without other loan obligations (Odds = 9.7766) implies that the likelihood of default by cardholders with other loan repayments is approximately ten times higher than that of cardholders without other loan obligations. The odds ratio for approved credit limit (Odds = 1.000) is even for high and low amounts of approved credit limit. For the economic determinants, Residential status (p -value = 0.013) was found to be statistically significant at 5% level of significance in prediction of credit cards default

whereas income per month (p-value = 0.059) and occupation (p-value = 0.421) were both statistically insignificant at 5% level of significance for prediction of credit cards default.

4.5 Test of Hypotheses

This section addresses all the nine hypotheses of the study. The first four hypotheses aimed at investigating the influence of socio-demographic variables of interest on credit cards default. The fifth and sixth hypotheses sought to analyze the influence of behavioral factors on credit cards default. Finally, the seventh, eighth and ninth hypotheses sought to determine the influence of economic factors on credit cards default.

4.5.1 Influence of Socio-demographic Factors on Credit Cards Default

Objective one of the study sought to investigate the influence of socio-demographic factors on credit cards default. This was achieved by testing the following four hypotheses:

H_{1a} : Age as a socio-demographic factor does not affect credit cards default in commercial banks in Kenya.

The age of a cardholder was a numeric variable measured in years. From the independent t-test for equality of means ($p = 0.000$, $\alpha = 0.05$) presented in Table 4.9 there was statistically significant relationship at 5% level of significance between age of cardholder and credit card default.

This result was further confirmed by logistic regression analysis (Table 4.19), which gave a p-value =6.13E-05, Wald Chi-Square statistic =16.062 and an odds ratio =1.1665. The odds value for age shows that younger cardholders are approximately 1.2 times more likely to default in credit cards compared with older cardholders. From these results, the null hypothesis that age of a cardholder does not affect credit cards default was rejected. The results from this study are congruent with those of Argarwal *et al.*, (2009), Dunn & Kim (1999) as well as Marjo (2010) that age of a cardholder influences probability of credit default. However, the current study did not focus on bankruptcy filing as it relates to age (Argwarwal et al, 2009) or the relationship between financial choices that cardholders make and default risk which was a focus of the study by Dunn & Kim (1999).

H_{1b} : Gender as a socio-demographic factor has no effect on credit cards default in commercial banks in Kenya.

The Chi-square test results in Table 4.4 showed that there was no statistically significant relationship between gender and credit card default rate ($\chi^2 = 0.174$, $p = 0.677$, $\alpha = 0.05$) which implied that gender, taken alone did not influence default in credit cards. This inference was supported by the logistic regression analysis for gender (Table 4.19) which gave a p-value= 0.073, Wald Chi-Square statistic =3.216 and an odds ratio =3.3201. At the 5% level of significance ($\alpha = 0.05$) the p-value = 0.073 interprets that gender is statistically insignificant in credit cards default. From these results, the null hypothesis that gender of a cardholder does not affect credit cards default was not rejected.

These results vary with the findings of Arminger *et al.*, (1997), Kocender & Vojtek (2009) and Dunn & Kim (1999) that gender is a risk factor in credit default and that female cardholders default less. The results are however consistent with the findings by Pirog and Roberts (2007) that the mean credit cards misuse scores as a proxy for credit default are essentially the same for male and female cardholders.

H_{1c} : Marital status as a socio-demographic factor does not affect credit cards default in commercial banks in Kenya.

The results of the Chi-square test in Table 4.6 showed that there was no significant relationship between marital status and credit card default rate ($\chi^2 = 0.391$, $p = 0.531$, $\alpha = 0.05$) which implied that default in credit card was independent of marital status of the cardholder. This deduction is confirmed by the results of logistic regression analysis for marital status (Table 4.19) which gave a p-value = 0.457, Wald Chi-Square statistic = 0.554 and an odds ratio = 1.7507. At the 95% confidence level ($\alpha = 0.05$) the p-value = 0.457 interprets that marital status of a cardholder is statistically insignificant in credit cards default. From these results, the null hypothesis that marital status of a cardholder does not affect credit cards default was not rejected. These results disagree with those of Agarwal *et al.*, (2009) which indicated that marital status can predict default rate on the basis that marital status can be viewed as a proxy for responsibility, reliability or maturity of a credit holder. The results also vary from the findings by Abdul-Muhmin & Umar (2007) which posited that the tendency to revolve in credit cards and hence default is higher among male cardholders.

The results of the current study however agrees with those of Autio *et al.*,(2009) which observed that age of a cardholder and not the marital status influences credit default rate.

H_{1d} : Education as a socio-demographic factor has no effect on credit cards default in commercial banks in Kenya

From the Chi-Square tests results ($\chi^2 = 3.575$, $p = 0.059$, $\alpha = 0.05$) presented in Table 4.8 education level of a cardholder is independent of credit card default at 95% confidence level. These results concurred with those of logistic regression analysis for education level (Table 4.19) which gave a p-value = 0.076, Wald Chi-Square statistic =3.141 and an odds ratio =2.8292. At the 95% confidence level ($\alpha = 0.05$) the p-value = 0.076 implied that education level of a cardholder is statistically insignificant in credit cards default. From these results, the null hypothesis that education level of a cardholder does not affect credit cards default was not rejected. This finding is inconsistent with the findings of Steenackers & Goovaerts (1989) that cardholders who are highly-educated professionals are less likely to default on their credit cards. The current study results also vary from those of Kim, Dunn & Mumy (2005) as well as those of Lopes (2008) which all observe that education of a cardholder would include financial literacy and a background in economics which all influence a cardholder's financial choices and hence credit default.

4.5.2 Influence of behavioural factors on Credit Cards Default

Objective two of the study sought to establish the influence of behavioral factors on credit cards default. This was achieved by testing the following two hypotheses:

H_{2a} : Approved credit limit as a behavioral factor has no effect on credit cards default in commercial banks in Kenya.

From Table 4.12, the independent t-test for equality of means ($p = 0.030$, $\alpha = 0.05$) indicated that there was a statistically significant relationship at 5% level of significance between approved credit limit and credit cards default. Logistic regression analysis for approved credit limit (Table 4.19) gave a p-value = 0.047, Wald Chi-Square statistic = 3.961 and an odds ratio = 1.000. At the 95% confidence level ($\alpha = 0.05$) the approved credit limit for a cardholder is statistically significant in credit cards default. From these results, the null hypothesis that approved credit limit for a cardholder does not affect credit cards default was rejected. The results are consistent with those of Kocenda Vojtek (2009), Scott (2007) and Stauffer (2003) that credit limit is significantly related to credit default. However, these results vary from those of Jacobson & Roszbach (2003) which posited that loan size and credit limits have no influence on default risk.

H_{2b} : Repayment of other loans as a behavioral factor does not affect credit cards default in commercial banks in Kenya.

To establish whether “payment of other loans” is a risk factor for default in credit cards, Pearson’s Chi-Square test was carried out.

From the Chi-square test results in Table 4.11 ($\chi^2 = 2.613$, $p = 0.046$, $\alpha = 0.05$) there is a significant relationship between payment of other loans and credit cards default.

These results were vindicated by logistic regression analysis for payment of other loans (Table 4.19) which gave a p-value = 0.007, Wald Chi-Square statistic = 7.358 and an odds ratio = 9.7766. At the 5% significance level ($\alpha = 0.05$) the p-value = 0.007 implied that payment of other loans by cardholder is statistically significant in credit cards default. From these results, the null hypothesis that payment of other loans by a cardholder does not affect credit cards default was rejected. This finding agrees with the findings of Hamilton & Khan (2001) which indicated that servicing of more than one interest-charging products or loans affects credit default. The findings of the current study are also consistent with those of Dinh & Kleimeier (2007), Tunal and Tatogla (2010), Lope (2008) and Johnson (2001) which all showed that increase in the number of other loan repayments increases credit cards default. The results however, differ with those of Kocenda & Vojtek (2009) which showed that the length of history that a cardholder has with the commercial bank, and not loan repayments, is the significant behavioural determinant of credit default.

4.5.3 Influence of economic factors on Credit Cards Default

Objective three of the study sought to determine the influence of economic factors on credit cards default. This was achieved by testing the following three hypotheses:

H_{3a} : Income as an economic factor does not affect credit cards default in commercial banks in Kenya.

From Table 4.16 the independent t-test for equality of means ($p = 0.197$, $\alpha = 0.05$) indicated that there is statistically insignificant relationship at 95% confidence level between income of a cardholder and credit cards default. This implies that income of a cardholder is not a risk factor in credit cards default.

The findings from the independent t-test on income of a cardholder concurred with the results from logistic regression analysis (Table 4.19) which gave a p-value = 0.059, Wald Chi-Square statistic =3.571 and an odds ratio =1.000. At the 95% confidence level income of a cardholder is statistically insignificant in credit cards default. From these results, the null hypothesis that income of a cardholder does not affect credit cards default was not rejected. This finding varies with the findings of Mutso & Souleles (2006), Scott (2007) and Stauffer (2003) which all observed that income of a cardholder is a significant factor in credit default. The results however agree with those of Jacobson & Roszbach (2003) which showed that income of a cardholder is insignificant in credit default prediction.

H_{3b} : Residential status as an economic factor does not affect credit cards default in commercial banks in Kenya.

From the Chi-square test results in Table 4.14 ($\chi^2 = 0.292$, $p = 0.0489$, $\alpha = 0.05$) there is a significant relationship between residential status of a cardholder and credit cards default. Logistic regression analysis on residential status of a cardholder (Table 4.19) gave a p-value = 0.013, Wald Chi-Square statistic of 6.215 and an odds ratio = 6.0496. From the odds ratio a cardholder whose residential status is owned is approximately six times less likely to default in credit cards compared with a cardholder who do not own a residence. At the 5% level of significance, the null hypothesis that residential status of a cardholder does not affect credit cards default was therefore rejected.

These results are consistent with those of Steenackers & Goovaerts (1989) and Agarwal *et al.*, (2009). In particular Agarwal *et al.*, (2009), show evidence that a cardholder who owns residence is 17% less likely to default in credit and 25% less likely to file for bankruptcy.

H_{3c} : Occupation as an economic factor does not affect credit cards default in commercial banks in Kenya.

From Table 4.18 there was no significant relationship between occupation of cardholder and credit card default rate ($\chi^2 = 0.039$, $p = 0.843$, $\alpha = 0.05$) which implied that default in credit cards was independent of occupation of the cardholder. This finding was vindicated by logistic regression analysis on occupation of a cardholder which gave a p-value = 0.421, Wald Chi-statistic of 0.648 and an odds ratio of 1.7349. This implies that default risk in credit cards is not influenced by whether or not a cardholder is formally employed.

At the 95% confidence level, the null hypothesis that occupation of a cardholder does not affect credit cards default was not rejected. These results vary from those of Autio *et al.*, (2009) and Erdem (2008) which postulated that employment type or occupation of a cardholder are suitable proxies for credit default. The results however agree with those of Perry (2008) which showed that a cardholder's locus-of-control as a key personality variable of motivation and performance is significant in credit default and not the occupation of a cardholder.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study was an effort to add insights into the understanding of the influence of socio-demographic, behavioural and economic determinants on credit cards default. The study was motivated by the growing concern of the relatively high default in credit cards as a financial payment instrument. The projected rapid growth in phenomenon of use and adoption of credit cards in Kenya, and the observed default rates in credit cards have stimulated research concerns on the influence of various factors on credit default. This chapter presents summary of the study, conclusions and recommendations within the context of the study findings. It further presents contributions of the study to existing body of knowledge and suggestions for further research. The chapter finally discusses the implications of the study on theory, policy and practice.

5.2 Summary of the Study

The first objective of the study was to investigate the influence of socio-demographic factors on credit cards default in commercial banks in Kenya. Four socio-demographic factors of interest were identified as age, gender, marital status and education level of a cardholder. To obtain the influence of each of these socio-demographic factors on credit cards default, the study formulated four null hypotheses on the relationship of each factor with credit cards default.

Overall the results of independent t-tests, Chi-square correlation analysis and logistic regression indicated that out of the four factors identified it was only the age of a cardholder that was significant in credit cards default. At the 95% confidence level, logistic regression analysis on age and credit cards default gave a p-value of 0.00000613 (6.13E-05) and an odds ratio =1.1665. The odds value for age showed that younger cardholders are approximately 1.2 times more likely to default in credit cards compared with older cardholders. From these results, the null hypothesis that age of a cardholder does not affect credit cards default was rejected. The null hypotheses that gender, marital status and education level of a cardholder do not affect credit cards default were not rejected at the 95% confidence level.

The second objective of the study sought to establish the effect of behavioural factors on credit cards default in commercial banks in Kenya. Two behavioural factors identified as being related to credit cards default were payment of other loans and approved credit limit. To ascertain the significance of the relationship between each of the two variables and the credit cards default, the study formulated two null hypotheses one for each of the two variables. Chi-square correlation analysis on the categorical variable “payment of other loans” gave the test results as ($\chi^2 = 2.613$, $p = 0.046$, $\alpha = 0.05$) which implied a significant relationship at 95% confidence level between payment of other loans and credit cards default. On the other hand, independent t-test for equality of means for the continuous variable “approved credit limit” gave the test results as ($p = 0.030$, $\alpha = 0.05$) which indicated a statistically significant relationship at 95% confidence level between approved credit limit and credit cards default.

The results from the two tests were vindicated by the logistic regression analysis which showed that a cardholder paying other loans outside the credit card loan was approximately 10 times more likely to default in credit cards. The two null hypotheses that payment of other loans and approved credit limit do not affect credit cards default were therefore rejected.

The third objective was to determine the influence of economic factors on credit cards default in commercial banks in Kenya. Under this objective, three economic factors, income, residential status and occupation of cardholder were identified as most related to credit cards default. Independent t-test for the relationship between income and credit cards default gave test results as ($p = 0.197$, $\alpha = 0.05$) which indicated that there is statistically insignificant relationship at 95% confidence level between income of a cardholder and credit cards default. Chi-square correlation analysis for each of the categorical variables residential status and occupation of cardholder gave test results as ($\chi^2 = 0.292$, $p = 0.0489$, $\alpha = 0.05$) and ($\chi^2 = 0.039$, $p = 0.843$, $\alpha = 0.05$) respectively. From these results, residential status of a cardholder had a significant relationship at 95% confidence level with credit cards default. The odds ratio (odds =6.0496) for residential status in logistic regression analysis implied that a cardholder who owns a residence is approximately six times less likely to default than one whose residential status is not owned. The null hypotheses that income and occupation of cardholder do not affect credit cards default were not rejected but the null hypothesis that residential status is independent of credit cards default was rejected.

5.3 Conclusion

The general objective of the study was to investigate the influence of socio-demographic, behavioral and economic factors on credit cards default in commercial banks in Kenya. Globally, there has been growing concern among researchers and scholars to understand and establish the specific influence of various determinants of credit cards default. The findings from this study revealed that all the four socio-demographic factors (age, gender, marital status and education level of cardholder) had an influence on credit cards default but these influences were not necessarily significant. For instance, out of the four socio-demographic factors only age of the cardholder was found to significantly influence credit cards default with young cardholders being approximately 1.2 times more likely to default. These results vindicate arguments in different scholarly investigations that despite many studies on credit cards default, there have been conflicting findings on the exact set of socio-demographic factors that constitute significant explanatory variables for credit cards default (Belloti and Crook, 2013).

From the findings of the study, gender, marital status and occupation of a cardholder are not significant in influencing credit cards default. These results vary from the findings of Arminger *et al.*, (2009), Kocenda & Vojtek (2009) and Dunn & Kim (1999) that gender is a risk factor in credit cards default and that marital status can predict default rate on the basis that marital status can be a proxy for responsibility, reliability or maturity of a borrower.

The study findings also disagree with findings by Steenackers & Goovaerts (1989) that customers who are highly-educated professionals were less likely to default on their credit cards.

The study further established that repayment of other loans as a behavioral factor is significant in influencing credit cards default. In particular, the results of the study showed that cardholders with other loan repayments in addition to the credit card loan were approximately ten (10) times more likely to default than those servicing only the credit card loan. These results were consistent with the findings by Lopes (2008) and Tunal & Tatoglu (2010) that an increase in the number of bank repayments is found to increase credit default.

The study also established that approved credit limit for a card holder is a significant risk factor in credit default. The odds ratio for this factor was even (odds = 1) for high and low amounts of approved credit limit. The results showing significance of credit limit as a risk factor are consistent with those of Kocenda & Vojtek (2009), Scott (2007) and Stauffer (2003) that credit limit is significantly related to credit default. However, these results vary from those of Jacobson & Roszbach (2003) which posited that loan size and credit limits have no influence on default risk.

Further the study established that though economic factors have influence on credit cards default, the magnitude of the effect varied.

For instance, income and occupation of a cardholder were found to be insignificant in credit cards default but residential status was found to be significant in influencing credit cards default. Credit cardholders who owned residences were found to be approximately six times less likely to default compared with those who do not own residences. These results were consistent with the findings of Steenackers & Goovaerts (1989) and Agarwal *et al.*, (2009) where the latter study provided evidence that a cardholder who owns residence is 17% less likely to default in credit and 25% less likely to file for bankruptcy.

Contrary to the findings of of Autio *et al.*, (2009) and Erdem (2008) which postulated that employment type or occupation of a cardholder are suitable proxies for credit default, the current study established that occupation is not significant in credit card default. The study further established that income of a cardholder is not significantly related to the credit default. These findings vindicated those of Jacobson & Roszbach (2003) which showed that income of a cardholder is insignificant in credit default prediction.

5.4 Recommendations

From this study findings the commonly held notion that socio-demographic characteristics of a credit cardholder significantly influences credit card performance in terms of default or non- default is found not to be necessarily true. Indeed, the findings of this study clearly showed that gender, marital status and education level of a cardholder do not affect credit cards performance.

The socio-demographic factor that was found to have significant influence on credit cards default was age of a cardholder with results showing younger cardholders having higher default risk than older cardholders. From these findings there is need for commercial banks and other independent financial institutions to invest in development of training programmes to sensitize young credit card holders on the best industry practice for credit cards usage so that they can leverage on their benefits and reduce credit cards default rate.

In addition, the study also established that residential ownership and the number of loans a cardholder is paying significantly affected credit cards default. Following these findings, this study recommends that commercial banks and other independent financial institutions develop and implement policies on the maximum number of credit cards a cardholder can hold at any given time based on his or her repayment ability.

Further, commercial banks and independent financial institutions should create and provide special lending incentives for residential ownership. Further, this study established that the approved credit limit for a cardholder significantly affected credit cards default. The study therefore recommends that commercial banks and independent financial institutions strengthen their credit lending evaluation criteria to ensure that approved credit limits do not exceed the cardholder's repayment abilities.

5.5 Implications on Theory

The results of the current study have offered new insights and contributions to the literature on influence of socio-demographic, behavioral and economic factors on credit cards default. First, and as is vindicated by Belloti and Crook (2013), there have been conflicting findings on the influence of various factors of credit cards default and what constitutes significant explanatory variables for credit cards default has not been fully established. This study has clearly provided the relevant and significant factors for credit cards default. In particular, it has been shown within the context of commercial banks in Kenya that gender, marital status, education level, occupation and income of a cardholder are not significant in credit cards default. On the other hand, age, approved credit limits, payments of other loans and residential status have been found to significantly influence credit cards default.

In addition, the current study has shed new insights in the understanding of marginal effects in terms of odds ratios for each of the studied explanatory variables for credit cards default. This is a significant contribution to the literature on credit default as these results provide the distinct effects of each determinant on credit cards default when studied individually and the interactive effects when studied collectively. From a research perspective, these findings have enriched the currently available literature on the influence of various factors on credit cards default.

5.6 Implications on Practice

The current study generally sought to establish the influence of various socio-demographic, behavioral and economic determinants on credit cards default. From the findings of the study, some important recommendations for practice by credit risk managers, government and other stakeholders are warranted. First, after the credit cards default risk factors have been identified credit risk managers will be able to devise methods to quantify these risks using appropriate models in order to understand the risk profile of credit cards as payment instruments. Once a general framework of risk identification and management is developed, the techniques can be applied to different situations, products, instruments and institutions.

The Government of Kenya (GoK) in consultation with banking industry players and regulators such as Central Bank of Kenya (CBK) and the Kenya Bankers Association (KBA) should provide an optimal lending environment and formulate strategies to lower the cost of borrowing. Lower lending (interest) rates for instance will increase access to credit and generally lower the cost of doing business which in turn mitigates against credit default. These in turn will result in an efficient allocation of credit, more efficient banking industry, higher economic growth and development.

The government in consultation with other players in the finance sector should invest on various programmes and campaign efforts on credit cards financial planning and management.

For instance, the government could establish a Credit Management and Debt Management Agency with an industry mandate to offer financial education on the responsible use of credit. Other skills could be counselling and advice on financial management as well as debt management programmes which could be offered free of charge. In addition, the government should initiate a number of campaigns to promote financial wellness among Kenyans so that at all times they are aware of their debt burdens.

5.7 Implications on Policy

The findings from the study will inform development and implementation of important policies for commercial banks and other independent financial institutions in credit risk management. First, following the dramatic growth in consumer credit market in Kenya and the heightened attention to credit risk management as outlined in Basel II framework, the policies on credit cards application processing and evaluation based on risk factors of a cardholder will need to be aligned to the identified significant risk factors for credit default.

From the study findings, payment of other loans which was proxy for servicing of more than one credit card was found to be significant in credit cards default. Commercial banks and other credit issuers should formulate and enforce specific bank policies on the maximum number of cards permissible for a cardholder.

In addition, it may be timely for commercial banks to formulate and approve policies that provide for incentives to cardholders who pay excess or those who have subscribed to the credit card facility over long time without defaulting. Such incentives may include waiver of some charges on the credit card use or greater discounts on certain goods bought using the credit card.

5.8 Suggestions for Further Research

The current study provides important insights in understanding of the influence of socio-demographic, behavioral and economic factors on credit cards default in commercial banks. Given the important role that micro-finance institutions and SACCOs play in the national economy, future studies could focus on them and find out whether there could be any new dimensions on the influence of the various determinants credit cards default. Future studies may also apply other research designs such as case study design for bigger credit cards issuers to further obtain insights on the influence of various determinants of credit cards default.

The current study investigated influence of nine explanatory variables for credit cards default namely age, gender, marital status, education level, approved credit limit, payment of other loans, income, residential status and occupation of cardholder.

Future studies could consider inclusion of additional variables especially moderating and intervening variables such as cost of living and credit cards interest rates, loyalty and financial numeracy among others.

This would ensure that a more holistic understanding of the influence of various factors of credit cards default is obtained and additional effective recommendations arrived at.

Also replication of this study in other countries, particularly emerging market economies, may yield new and interesting insights as well as lend greater generalizability to the results obtained from the current study.

The current study used logistic regression to investigate the influence of socio-demographic, behavioral and economic determinants on credit cards default in commercial banks in Kenya. The focus was to obtain a set of explanatory variables with highest predictive probabilities of default in credit cards as loan assets. To further strengthen the commercial banks' credit risk management and in line with the Basel II framework and requirements, future studies may focus on other components of expected loss for credit cards which includes; Loss Given Default (LGD), Exposure at Default (EAD) and Maturity of Exposures (M).

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APPENDIX II**List of Licensed Commercial Banks Issuing Credit Cards in Kenya as at 2014**

1. Equity Bank
2. Co-operative Bank of Kenya
3. Kenya Commercial Bank
4. National Bank of Kenya
5. Post-bank
6. Barclays Bank of Kenya
7. Standard Chartered
8. CFC Stanbic
9. I&M Bank**
10. Diamond Trust
11. NIC Bank**
12. Imperial Bank**
13. Commercial Bank of Africa**
14. Equatorial Bank**
15. Prime bank**
16. Fidelity Bank
17. Paramount Bank**
18. Citibank**

Source: Kenya Credit and Debit
Card Association (2013)

APPENDIX III

Table 4.3: Gender of Cardholder and Default Status Cross Tabulation

			Default status		Total
			not defaulted	defaulted	
Gender of cardholder	Male	Count	35	26	61
		% within Gender of cardholder	57.4%	42.6%	100.0%
		% within Default status	62.5%	66.7%	64.2%
		% of Total	36.8%	27.4%	64.2%
	Female	Count	21	13	34
		% within Gender of cardholder	61.8%	38.2%	100.0%
		% within Default status	37.5%	33.3%	35.8%
		% of Total	22.1%	13.7%	35.8%
Total	Count	56	39	95	
	% within Gender of cardholder	58.9%	41.1%	100.0%	
	% within Default status	100.0%	100.0%	100.0%	
	% of Total	58.9%	41.1%	100.0%	

APPENDIX IV

Table 4.5: Marital Status of Cardholder and Default Status Cross Tabulation

			Default status		Total
			not defaulted	defaulted	
Marital status of cardholder	Other Marital Status	Count	10	9	19
		% within Marital status of cardholder	52.6%	47.4%	100.0%
		% within Default status	17.9%	23.1%	20.0%
		% of Total	10.5%	9.5%	20.0%
	Married	Count	46	30	76
		% within Marital status of cardholder	60.5%	39.5%	100.0%
		% within Default status	82.1%	76.9%	80.0%
		% of Total	48.4%	31.6%	80.0%
Total	Count	56	39	95	
	% within Marital status of cardholder	58.9%	41.1%	100.0%	
	% within Default status	100.0%	100.0%	100.0%	
	% of Total	58.9%	41.1%	100.0%	

APPENDIX V

Table 4.7: Education Level of Cardholder and Default Status Cross Tabulation

		Default status		Total
		not defaulted	defaulted	
Education level of cardholder Lower than University	Count	22	23	45
	% within Education level of cardholder	48.9%	51.1%	100.0%
	% within Default status	39.3%	59.0%	47.4%
	% of Total	23.2%	24.2%	47.4%
University	Count	34	16	50
	% within Education level of cardholder	68.0%	32.0%	100.0%
	% within Default status	60.7%	41.0%	52.6%
	% of Total	35.8%	16.8%	52.6%
Total	Count	56	39	95
	% within Education level of cardholder	58.9%	41.1%	100.0%
	% within Default status	100.0%	100.0%	100.0%
	% of Total	58.9%	41.1%	100.0%

APPENDIX VI

Table 4.10: Any Other Loan Repayment and Default Status Cross Tabulation

			Default status		Total
			not defaulted	defaulted	
Any other loan repayment amount	no	Count	11	3	14
		% within Any other loan repayment amount	78.6%	21.4%	100.0%
		% within Default status	19.6%	7.7%	14.7%
		% of Total	11.6%	3.2%	14.7%
	yes	Count	45	36	81
		% within Any other loan repayment amount	55.6%	44.4%	100.0%
		% within Default status	80.4%	92.3%	85.3%
		% of Total	47.4%	37.9%	85.3%
Total	Count	56	39	95	
	% within Any other loan repayment amount	58.9%	41.1%	100.0%	
	% within Default status	100.0%	100.0%	100.0%	
	% of Total	58.9%	41.1%	100.0%	

APPENDIX VII

Table 4.13: Residential Status of Cardholder and Default Status Cross Tabulation

			Default status		Total
			not defaulted	defaulted	
Residential status of cardholder	Not Owned	Count	29	18	47
		% within Residential status of cardholder	61.7%	38.3%	100.0%
		% within Default status	51.8%	46.2%	49.5%
		% of Total	30.5%	18.9%	49.5%
	Owned	Count	27	21	48
		% within Residential status of cardholder	56.2%	43.8%	100.0%
		% within Default status	48.2%	53.8%	50.5%
		% of Total	28.4%	22.1%	50.5%
Total	Count	56	39	95	
	% within Residential status of cardholder	58.9%	41.1%	100.0%	
	% within Default status	100.0%	100.0%	100.0%	
	% of Total	58.9%	41.1%	100.0%	

APPENDIX VIII

Table 4.17: Occupation of Cardholder and Default Status Cross Tabulation

			Default status		Total
			not defaulted	defaulted	
Occupation of cardholder	Self Employed	Count	37	25	62
		% within Occupation of cardholder	59.7%	40.3%	100.0%
		% within Default status	66.1%	64.1%	65.3%
		% of Total	38.9%	26.3%	65.3%
	Employed	Count	19	14	33
		% within Occupation of cardholder	57.6%	42.4%	100.0%
		% within Default status	33.9%	35.9%	34.7%
		% of Total	20.0%	14.7%	34.7%
Total	Count	56	39	95	
	% within Occupation of cardholder	58.9%	41.1%	100.0%	
	% within Default status	100.0%	100.0%	100.0%	
	% of Total	58.9%	41.1%	100.0%	

APPENDIX IX

Research Approval



KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 14th August, 2014

TO: Mr. Francis K. Kiarie
C/o Management Science Dept.
Kenyatta University

REF: D86/12688/09

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board at its meeting of 13th August, 2014 approved your Research Proposal for the Ph.D. Degree, entitled "Influence of Socio-Demographic, Behavioral and Economic Determinants on Credit Cards Default Risk in Commercial Banks in Kenya".

You may now proceed with your Data collection, subject to clearance with the Principal Secretary, Higher Education, Science and Technology.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking Forms per semester. The form has been developed to replace the progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

JOSEPHINE KENDI
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Management Sciences Dept.

Supervisors:

1. Dr. David M. Nzuki
C/o Management Sciences Dept.
KENYATTA UNIVERSITY
2. Dr. Anthony G. Waititu
C/o Statistics & Actuarial Science Dept.
KENYATTA UNIVERSITY

JK/cao

APPENDIX X
Research Authorization



**NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:
25th August, 2014

NACOSTI/P/14/6982/3111

Francis Kanyi Kiarie
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Influence of socio-demographic, behavioural and economic determinants on credit cards default risk in Commercial Banks in Kenya,*" I am pleased to inform you that you have been authorized to undertake research in **Mombasa County** for a period ending **30th July, 2015.**

You are advised to report to the **Chief Executive Officers of selected Commercial Banks, the County Commissioner and the County Director of Education, Mombasa County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


SAID HUSSEIN
FOR: SECRETARY/CEO

Copy to:

The Chief Executive Officers
Selected Commercial Banks.

The County Commissioner
The County Director of Education
Mombasa County.




APPENDIX XI

Research Permit


THIS IS TO CERTIFY THAT:
MR. FRANCIS KANYI KIARIE
of **KENYATTA UNIVERSITY, 16778-80100**
MOMBASA, has been permitted to
conduct research in **Mombasa County**


on the topic: **INFLUENCE OF**
SOCIO-DEMOGRAPHIC, BEHAVIORAL
AND ECONOMIC DETERMINANTS ON
CREDIT CARDS DEFAULT RISK IN
COMMERCIAL BANKS IN KENYA

for the period ending:
30th July, 2015


Applicant's
Signature

Permit No : **NACOSTI/P/14/6982/3111**
Date Of Issue : **25th August, 2014**
Fee Received : **Ksh 2,000**




Secretary
National Commission for Science,
Technology & Innovation