RESEARCH PROJECT

TOPIC: ASSESSING THE IMPACT OF THE CREDIT REFERENCE BUREAU ON NON PERFORMING LOANS IN COMMERCIAL BANKS IN KENYA.

BY

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Declaration

This is to confirm that this research project is my original work and has not been presented for a degree in any other university

Signed: ..... Date: 9/11/2012

Antonina Oogo

D61/61927/2010

This project has been presented for examination with my approval as the University Supervisor.

Signed: ..... Date: 11.11.2012.

Otieno O. Luther

Supervisor

Acknowledgment

I wish to thank the almighty God for his goodness and mercy in my life and seeing me through this project.

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Dedication

I would like to dedicate this work to my family for the moral and financial support they have always accorded me throughout my academic life.

Abstract

The objective of the study was to assess the impact of the credit reference bureaus on non-performing loans of commercial banks in Kenya. The research Therefore, set out to answer the question: What is the impact of introduction of CRB on non-performing loans in commercial banks? Loan delinquencies arise due to debt default. Debt default threatens the soundness of financial systems of any economy and specifically\ banks. They also constitute a potential source of systemic failure of the particular financial systems as well as of the global financial system. Systems that mitigate debt default are necessary for any financial system. In the recent past, the banking sector in Kenya was saddled in a momentous non-performing loans (NPLs) portfolio. This invariably led to the collapse of some banks.

Secondary data were collected from the financial statements of the commercial banks over the period of study. A discriminant analysis was conducted using discriminant analysis to predict whether the use of Credit reference Bureau by commercial banks has any impact on Non-performing loans. The predictor variables were, NPL/Advances, advances/Deposits and Return on Assets for both periods. The log determinants for the periods were different thus explaining the impact of the credit reference bureau on non-Performing loans. The other credit control measures adopted by banks have been held constant and further represented by the ROA, Advances/Deposits variables in the model.

The research findings tell us that the use of credit reference bureaus has an impact on non-performing loans. Banks should implement in their lending policies the use of the credit reference bureaus in making credit decisions as well as recovery of bad debts. The Credit reference bureaus have a positive impact on the reduction of non- performing loans and therefore their use should be adopted by all banks and other lending institutions like Saccos in order to curtail the serial defaulters. Since the introduction of the CRB's in 2008, banks have been able to reduce the level of non-performing loans to advances ratio compared to the periods prior to 2008.

The regulator of the financial institutions that is the central bank should enact policies that guide the use of the credit reference bureau information by banks as well as the consumers. There also needs to be an elaborate effort to educate the public on the importance of paying debts, the impact that bad information has on one's financial status as well as the effect of good information.

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Abbreviations

APT-Arbitrage Pricing Theory

ATM- Automated Teller Machine

CAPM-Capital Asset Pricing Model

CBK- Central Bank of Kenya

CIBIL- Credit Information Bureau (India) Limited

CRA-Credit Reference Agency

CRB- Credit Reference Bureau

KCB-Kenya Commercial Bank

KNBS-Kenya National Bureau of Statistics

MPT-Modern Portfolio Theory

NPL-Non-Performing Loan

PAR-Portfolio at Risk

ROA-Return on Assets

RTGS-Real Time Gross Settlement

SWIFT-Society for Worldwide Interbank Financial Telecommunication

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CHAPTER ONE

INTRODUCTION

1.1 .0 Background of the Study

Banks play a key role in the economy and as such, a financially healthy banking sector is essential to the nation's economic well-being (Thomas, 2006). By issuing its own financial claims, commercial banks transform a longer-term asset into a shorter-term asset by giving loans to borrowers for longer periods and the depositor saves/invests their financial asset for the desired investment period (Fabozzi & Modigliani, 2009). Commercial banks provide various methods for making payments for example cheques, credit cards, debit cards and electronic transfers of funds (Swift, RTGS). Today, banks are where we keep our valuable items for safekeeping. By collecting and processing standardized information, banks reduce the problems information asymmetries create (Cecchetti, 2008). Economies of scale can be realized in contracting and processing information required by depositors and borrowers commercial banks also tend to increase the rate of economic performance-(pay high taxes from their huge profits) (Fabozzi &Modigliani, 2002).

1.1.1Risk Management in Banks

Risk Management is a discipline at the core of every financial institution and encompasses all activities that affect its risk profile. The management of financial institutions should attach considerable importance to improve the ability to identify measure, monitor and control the overall levels of risks undertaken. (CBK Risk Management Guidelines, 2005).Credit managers need to adopt appropriate mitigation measures to curb the risks. (Brealey & Myers, 1998).A sound credit extension process, maintaining appropriate credit administration, measurement and monitoring process and ensuring adequate credit controls enhances credit management.(Ngare, 2008). Once a firm has measured its level of risk, it has to decide whether it is optimal for that level to be maintained, increased, or decreased. (Madura, 2009)

1.1.2 Non Performing Loans , Bank Performance And The Economy

Loans are the largest single source of income for banks, providing more than 50 percent of total bank revenue (Thomas, 2006). "A loan is nonperforming when payments of interest and principal are past due by 90 days or more, or at least 90 days of interest payments have been capitalized, refinanced or delayed by agreement, or payments are less than 90 days

overdue, but there are other good reasons to doubt that payments will be made in full" (IMF). (Brealey & Myers, 1998)). For the bank to make profits, borrowers must repay their loans. Provision for loan losses is an expense item that adds to a bank's loan loss reserve. In his study, Wahome, (2010) noted that non-performing loans should be treated as costs to a lending bank as it decreases the bank's profit.

A research carried out by Kiragu in 2010, concluded that management of non-performing loans for commercial banks helps to improve the financial performance of banks as interest on loans is the biggest income of banks and increases the liquidity position of banks, leading to quality loan portfolio for better return to the shareholders. The immediate consequence of large NPLs in the banking system is banks failure. The eradication of NPLs is a necessary condition to improve the economic status of a country and render commercial banks profitable.(Kiragu, 2010). There is evidence that even among banks that do not fail; there exist a negative relationship between the non-performing loans and performance efficiency. (Krueger et al., 1999).As the non-performing loan ration increases, it results to a decrease on the return on equity. The study done by Murira Moses in 2010 recommended that the level of loan asset allocation for banking institutions should be balanced against risk and financial performance (Murira, 2010).

1.1.3 Credit Reference Bureaus in the Banking Sector

In the U.S., credit bureaus collect and aggregate personal information, financial data, and alternative data on individuals from a variety of sources called data furnishers with which the bureaus have a relationship. This information is made available on request to customers of the credit bureau for the purposes of credit risk assessment, credit scoring or for other purposes such as employment or leasing an apartment. ((Saunders & Cornett, 2008).In the United Kingdom, Most banks and other credit-granting organizations subscribe to one or more of these credit bureaus to ensure the quality of their lending. In India, the establishment of Credit Information Bureau (India) Limited (CIBIL), is meant to improve the functionality and stability of the Indian financial system by containing NPAs while improving lenders' portfolio quality (Pandey,2004). Ferretti, Federico (2003) examined the existing legal framework and standing of consumer credit reporting in the European Community; concluding that Credit Reference Agencies (CRAs) are profit-seeking private companies that provide service to the credit industry to solve the problem of asymmetric information in financial markets (Banking Law Journal; Oct2006, vol. 123).

1.1.4 Banking industry in Kenya

Currently there are 43licensed commercial banks and 1 mortgage finance company as at December 2011. 5 banks are foreign owned, 9 are foreign owned but locally incorporated, and 24 are locally owned.6 banks have Government participation. Out of the 43 banks, only 10 are listed at the Nairobi stock exchange. The Companies Act, the Central Bank of Kenya (CBK) Act and the Banking Act are the main regulators and governors of banking Industry in Kenya. These Acts are used together with the prudential guidelines that Central bank of Kenya issues from time to time. CBK requires commercial banks to build up their minimum core capital requirement to Kenya shillings 1 Billion by December 2012. To address issues that affect the Banking industry in Kenya, banks have come together and formed a forum under the Kenya Bankers Association.(CBK Annual report,2010).

Kenyan Banks have realized tremendous growth in the last five years and have expanded to the east African region, e.g. KCB has subsidiary branches in Sudan, Uganda, Tanzania Rwanda and Burundi. The banking industry in Kenya has also involved itself in automation to meet the growing complex needs of their customer and globalization challenges. The banking sector is expected to sustain its growth momentum largely driven by adoption of cost effective delivery channels and increased presence of Kenyan banks in the East African Community Partner States and South Sudan.(CBK Annual report, 2011). Loans are the dominant asset in most banks; they generate the largest share of operating income and represent the bank's greatest risk exposure. In Kenya, total credit expanded by 31.1 per cent to stand at 1,193.8 Billion Kenya shillings in December 2011 up from 910.6 Billion Kenya shillings in 2010. (KNBS 2012).

1.2 Problem Statement

Loan delinquencies arise due to debt default. Debt default threatens the soundness of financial systems of any economy and specific banks. They also constitute a potential source of systemic failure of the particular financial systems as well as of the global financial system. Systems that mitigate debt default are necessary for any financial system. In the recent past, the banking sector in Kenya was saddled in a momentous non-performing loans (NPLs) portfolio. This invariably led to the collapse of some banks. The catalysts in this scenario were "Serial defaulters", who borrowed from various banks with no intention of repaying the loans. Undoubtedly, these defaulters thrived in the "information asymmetry" environment that prevailed due to lack of a credit information sharing mechanism (CBK

Annual report 2010). A response to this significant loan delinquency was the introduction of CRBs in Kenya in 2008 to reduce information asymmetry about borrowers and fraud by bank officials.

The CRB's help in identification of credit worthy customers. However, the banks must pay for the services provided by a CRB. For every basic enquiry on customer information made by a bank to the credit reference bureaus, banks pay KSh. 70, while for a comprehensive inquiry banks pay KSh.170 per inquiry, thus adding to the costs of lending. For the country as a whole, this translates to millions of shillings in a month.It is mandatory for banks to give a listing of all their bad debtors' information to the Kenya credit reference bureau. It is seen as a way to ensure that bad debts reduce. The bad debts in banks have meant that profits have been limited, since the bad debts have to be provided for in the financial statements of the banks. (Central bank, 2011).

Banks and other FI's supply data to the reference bureaus and as per the KNBS, the number of credit reports has grown significantly to stand at 1,306,439 as at December 2011 (KNBS 2012). This cost decreases the shareholder wealth and must derive highest benefits derivable. Various studies have been done on Non-performing loans in commercial banks but no local studies have been done to assess the impact of the CRB on non-performing loans in commercial banks in Kenya. Oduor Jacob et al, 2011 in their paper carried out a cross-country analysis of the determinants of financial market efficiency using panel cointegration with a view to recommending policy options for improving the efficiency of the financial sector intermediation process in Kenya. The study finds that the major contributors to the differences in financial sector inefficiency in Kenya compared to the other countries are high bank operating costs, default risk and financial market structure. The study recommends, among other measures, that the government through the Central Bank need to collaborate with the commercial banks and establish a working credit reference bureau to enable easy identification of credit worthy customers in order to reduce default risk (Journal of Policy Modeling; Mar2011). Therefore, this study seeks to answer the question: What is the impact of introduction of CRB on non-performing loans in commercial banks?

1.3 Objectives of the Study

To establish the impact of the advice from credit reference bureau on non-performing loans in commercial banks.

1.4 Research Hypothesis

Use of Credit Reference Bureau has no impact on Non -performing Loans in commercial banks.

Use of Credit Reference Bureau has an impact on Non-performing loans in Commercial Banks

1.5 Value Of the study

Banking industry: This study will be relevant to the commercial Banks in Kenya in that they will be able to know how effectively they are using the CRB, the impact of the CRB in their non-performing loans. To the Industry Regulator and the Government, The study will prove relevant to the CBK to assess the impact of CRB on NPLs of commercial banks and the effectiveness of the CRB in managing credit risk thereof. The government, through the relevant authorities will also be able to put up mechanisms to enable commercial banks deal with the problem of credit risk.

To Academicians: Researchers who have interest in the field of credit management in commercial banks and other financial institutions will also find this study relevant as it will form a basis for future research as well as reference material in the field of study. In addition, the Consumers\Borrowers and the public will gain insights on the information requirements that are used in the assessment of their credit worthiness. They will be able to assess their accessibility to credit and where necessary realign their portfolios to meet lending requirements.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter has two parts; theoretical review and empirical review of literature. The theoretical review explains asset and liability management for efficient banking operations, it also discusses the implementation of the Credit reference bureaus and how they impact on non performing loans. The chapter also talks about credit risk management by commercial banks through diversification of their loan portfolios. The empirical review looks at previous studies done relating to credit risk management as well as credit reference bureaus.

2.2 Theoretical Review

Modern Portfolio Theory teaches us that; by taking advantage of its size, a commercial bank can diversify considerable amounts of credit risk as long as the returns on different assets are imperfectly correlated with respect to their default risk adjusted returns (Saunders & Cornett, 2008). While the expected return of a portfolio is the simple weighted average of the expected returns of its component securities, portfolio risk must also consider the correlation among the individual securities' returns. In the commercial banking sector, this theory is applicable to the extent that banks should diversify their loan portfolios by lending to businesses in various industries as well as individuals in various sectors of employment. Capital Asset Pricing Theory (CAPM); the implications of CAPM are that investors will always combine a risk-free asset with a market portfolio of risky assets; investors will be compensated only for that risk which they cannot diversify; and investors can expect returns from their investment according to the risk. The concepts of risk and return as developed by CAPM is used by commercial banks to diversify the loan portfolios such that they lend to individuals and businesses in different sectors of the economy.(Pandey, 2004). CAPM is therefore a useful tool for understanding the risk-return relationship as it provides a logical and quantitative approach for estimating risk and thus banks are able to price their loans in line with the risks faced.

Arbitrage Pricing Theory; In APT, the return of an asset is assumed to have two components: expected and uncertain return. The expected return depends on the information available to decicion makers. The uncertain return arises from the future information. This information may be firm specific or market related. In commercial banks, this relates to the availability of

information on their customers when appraising loan facilities. They need to know the customers borrowing history given by the previous borrowing records, which the CRB can provide but does not tell about future behavior of the customers after being granted the loans. (Pandey, 2004). Information cost theory tells us that we should only go for information if the value derived from it exceeds its cost. In this study, this theory is applicable in the sense that commercial banks have to weigh the value or benefits of the information received from the CRB's against the its cost in terms of payments to access data as well as time spent gathering data to furnish the CRB with NPLs.(Horne, 2001)

2.3 Asset and Liability Management

Asset Management: For profit maximization, a bank must seek the highest returns possible on loans and securities; reduce risk and make sufficient provisions for liquidity. These can be achieved through; prudent lending to reduce the adverse selection problem, purchase securities with low risk and high returns, engage in diversification to reduce risk and managing liquidity to meet reserve requirements at low costs.(Mishkin, 2010). Bank assets are categorized into; cash, securities, loans and others. Banks hold a very small percentage of their assets in cash because it does not earn interest and has a high opportunity cost. Hence, they turn most of their assets into profitable securities and loans. Return on Assets is an important measure of how efficiently a particular bank uses its assets. Well run banks have high net interest income and a high net interest margin that also tells us of future profitability (Cecchetti, 2008).

Liability Management: Bank managers have various options in the liability management; borrow overnight from other banks or the central bank at low costs, they can also use the transaction and non-transaction accounts for cheaper deposits. The flexibility in liability management and the desire for more profits has pushed banks to increase the proportion of their assets held in loans (Mishkin, 2010). Banks obtain their funds from individual depositors, businesses and other financial institutions, which they use to make loans, purchase marketable securities and hold cash. Borrowings include bonds and short term borrowing from the central bank or other banks commonly termed overnight loan at negotiated interest rates (Cecchetti, 2008).

2.4Factor Constituting Poor Management and Result of Poor Management

The bank regulators assess the financial condition of each bank and specific risk faced. The factors considered in examining a banks condition and the degree of management are; capital adequacy which signals the banks' ability to maintain capital commensurate with the nature and extent of all types of risks and the ability of management to identify, measure, monitor and control these risks (Mishkin, 2010). Secondly, asset quality reflects the amount of existing credit risk associated with the loan and investment, portfolio and off-balance sheet activities. Thirdly is the management quality that reflects the ability of the board of directors, senior management, systems and procedures put in place for effective, efficient management of the bank activities. The fourth factor is earnings of the bank where its sustainability and quality of the earnings is analyzed. Another factor is liquidity that reflects the banks current and prospective sources of liquidity and funds management practices. Lastly, sensitivity to market risk which reflects the degree to which changes in interest rates, foreign exchange rates, commodity prices and equity prices can adversely affect earnings or economic capital of the bank. A rating of 4 or 5 on each of the factors indicates a problem bank with some potential for failure. Each strategic decision is closely tied with a bank's profitability (MacDonald & Koch, 2006).

Holding relatively small amounts of liquid assets exposes a bank to enhanced illiquidity and risk of a bank run. Excessive illiquidity can on the extreme lead to insolvency (Saunders, 2008). Financial institutions must be in a position of analyzing the various situations in the economy or certain sectors to determine the event that could lead to substantial losses or liquidity problem (Central Bank Annual Report, 2006). Adequate capital is necessary to prevent bank failure. Poor management of banks may lead to acquisitions that may not be beneficial to the shareholders; Tightening of regulations by the bank regulators is also another result of poor management; the regulators may de-license the banks when poor management is due to inefficient operations mainly by not adhering to the policies from the regulators (Horne, 2001).

2.5 Credit Reference Bureau And Reduction Of Non-Performing Loans

NPLS in commercial banks are due to moral hazard and adverse selection, which form a framework within which managers follow to minimize credit risk yet make loans. Adverse selection refers to the fact that those individuals and institutions with the highest credit risk have the biggest incentive to borrow from others. Moral hazard refers to the fact that once a

borrower has a loan, he or she has an incentive to engage in risky projects to produce the highest payoffs, especially if the project is financed with debt. (Mishkin & Eakins, 2006). In the mid-90s, there was a wakeup call as major banks struggled with non-performing loans that were greatly affecting their bottom line. The government of Kenya had to bailout some banks where it was the major shareholder to prevent obvious closure. So when the suggestion to have a Credit Rating Bureau was made many welcomed the idea. (Central Bank Annual Report, 2006).

In Kenya to this day only two credit bureaus have been licensed by the Central Bank, namely CRB Africa Limited and Metropol CRB. In his press briefing on the roll out of credit information sharing,The CBK Governor, Prof Njuguna Ndungu noted that, "whereas the CRB regulations mandate the sharing of NPL's information, they also provide for positive information that reduce information asymmetry between banks and borrowers. Information asymmetry has for long constrained innovation and financial intermediation. This led to the front-loading i.e. search costs and a risk premium in the cost of credit" (Central Bank Annual Report, 2009).

The information to be shared among banks includes information on non-performing loans; dishonored cheques other than for technical reasons; accounts compulsorily closed other than for administrative reasons. In addition proven cases of frauds and forgeries; proven cases of cheque kitting; false declarations and statements; receiverships, bankruptcies and liquidations; credit defaults or late payments on all types of facilities; tendering of false securities; and misapplication of borrowed funds will ba captured and shared across banks (CBK, credit information sharing, 2010).

2.6 Banks Internal Rating and Credit Bureaus Ratings

Some banks have formalized their internal credit systems by use of grids and structures to identify relevant risk factors and their weights leading to a more appropriate rating and analysis as a wider array of risk factors are considered. (Banking &Finance Journal, 2000; vol.24). Banks use internal ratings in two broad categories of activity: analysis and reporting, and administration. Analytic uses include reporting of risk postures to senior management and boards of directors; loan loss reserving; and economic capital allocation, profitability measurement, and product pricing. Administrative uses include guiding loan origination and loan monitoring processes and regulatory compliance. At Moody's investors Service, Ratings are meant to indicate potential credit loss because of failure to pay, delay in payment or

partial payment. The rating of an applicant influences the approval process since the loan limits and approval conditions depend on the rating (Banking &Finance Journal, 2000; vol.24))

2.7 Diversification

Modern Portfolio Theory tells us that a commercial bank can diversify considerable amounts of credit risk as long as the returns on its assets are imperfectly correlated with respect to their default risk adjusted returns (Saunders & Cornett, 2008). Banks should diversify their loan portfolios by lending to businesses in various industries as well as individuals in various sectors of employment.(Muthee, 2010) . Lending to a small number of borrowers or kinds of borrowers expose a bank to high degree of unsystematic credit risk called concentration risk. Lenders reduce this risk by diversifying the borrowers' pool. (Mishkin & Eakins, 2006). Types of bank loans in order of magnitude include; Real estate loans which are long term mortgages on residential and business properties, short term loans to building contractors and home equity loans (KCB-S&L, Housing Finance Specialize on this type of loan). These mortgage loans finance the purchase, construction and remodeling of both residential housing and commercial facilities. (Kidwell David, et al 2008).

Business loans are short-term loans and credit lines extended to business customers. They are for use as working capital as well as purchase of some business movable and fixed assets and machinery. (Thomas, 2006).Agricultural loans are both short term and long-term loans to farmers to finance farming activities. Short-term agricultural loans are meant to provide working capital for farmers e.g. purchase of seeds, fertilizers, harvesting etc. (Kidwell David, et al 2008).Consumer loans are granted to individuals through several arrangements (Different banks use various terms e.g. for KCB, they are termed as, Check-off and Non-check off) credit card loans is a form of consumer loan. (Thomas, 2006) They are loans to individuals with varying maturities and conditions depending on the use of funds. (Kidwell David, et al 2008)

2.4.0 Empirical review

In his study; on the relationship between loan portfolio composition and financial performance; Murira (2010) concluded that; there exists a relationship between loan portfolio and financial performance of commercial banks in Kenya; given that the value of the loan portfolio is dependent on the interest rate earned on the loans and default rate. The study further recommends that commercial banks should have loan portfolio management for

making prudent decisions on loan investment mix and policy in order for the commercial banks to remain profitable.

Muthee (2010) did a study whose objective was to establish the relationship between credit risk management and profitability in commercial banks in Kenya. The findings of the study were that as the non-performing loan ration increases it leads to a decreased return on equity. This is to say that as a commercial bank's non-performing loan book grows, it reduces the bank's profitability. The study recommended that commercial banks should prudently manage their loan books through effective credit risk management tools, and close portfolio supervision if they have to be highly profitable.

A study done by Chege,(2010) on the relationship between credit risk management practices and financial performance among MFI's in Kenya; concluded that FI's should adopt best credit risk management practices to be assured of protection against credit risks and its effects on profitability. The Kenyan economic survey done by the KNBS in 2012, Banks and other FI's have been supplying data to the reference bureaus and as per the KNBS, the number of credit reports has grown significantly to stand at 1,306,439 as at December 2011.(KNBS Economic Survey 2012)

2.5Conclusion

The factors considered in examining a banks condition and the degree of management are; capital adequacy which signals the banks' ability to maintain capital commensurate with the nature and extent of all types of risks and the ability of management to identify, measure, monitor and control these risks (Mishkin, 2010). Proper asset management requires that a bank acquire assets with a low rate of default and diversifying asset holdings. Management of non-performing loans for commercial banks helps to improve the financial performance of banks as interest on loans is the biggest income of banks and increases the liquidity position of banks, leading to quality loan portfolio for better return to the shareholders. Credit reference bureaus are seen as a means of providing the relevant information for credit decisions thus helping commercial banks to reduce their non- performing loans.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives a description of the research design, research variables and provides a broad view of the description of the population sample. The research instruments, data collection techniques and data analysis procedure are also discussed

3.2 Research Design

Research design is the plan and structure of investigation so conceived to obtain answers to research question (Kerlinger, 1986). This research study will employ causal research and survey research method to show the impact of the CRB on Non-performing loans. Causal research will be able to give relationship between CRB and non-performing loans. Surveys are popular as they allow the collection of a large amount of data from a sizeable population in a highly economical way. (Saunders et al. 2007).

3.3 Population and Sampling

The target population for this study will consist of all commercial banks in Kenya registered and licensed by the CBK as at 31December 2011. Currently there are 43 licensed commercial banks and 1 mortgage finance company as at December 2011. (Central Bank Annual Report, 2011) (see appendix 1). Therefore, there will be no sampling, as the entire target population will be used for the study.

3.4 Data collection Validity and Reliability

This study will use secondary data that will be collected from the CBK and the commercial banks websites, annual reports, and newspapers supplements covering similar topics. (Cooper and Schindler, 2003) secondary data is a useful quantitative source of data for evaluating historical or contemporary confidential or public records, reports, government documents and opinions. Validity boils down to whether the research is really measuring what it claims to be measuring. Reliability is chiefly concerned with making sure the method of data gathering leads to consistent results. As much as possible, only official sources will be relied on for information. From the data collected 0.5 % error margin will be allowed. (Lafaille R. & Hans W.1995)

The data collected relates to level of nonperforming loans before and after the introduction of CRB. Data relating to the following variables was collected from the annual reports over period 2007 to 2011: three continuous, numeric variables (Non Performing Loans/Advances (NPLA), Advances/Deposits (A/D) and Return on Assets (ROA)) (these are discriminating variable) and one categorical variable (Period) with two levels: Before and after the introduction of CRB.

3.5 Data Analysis

The objective of this study was to find out the impact of the credit reference bureau on delinquency and non-performing loans in commercial banks; and the null hypothesis is that use of credit reference bureau has no impact on non -performing loans in commercial banks. This requires that we compare the indicators for nonperforming loans along with other performance variables before and after the introduction of CRB. The choice of analysis procedures therefore depends on how well the techniques match the objective of the study to the scale of measurement of the research variables (Ochola, 2010). In this study, there is a need to establish whether non-performing loan is a discriminating variable between the two periods, i.e. periods before and after the introduction of CRB.

The variables model is as below:

The variables include three continuous, numeric variables (Non-Performing Loans/Advances (NPLA), Advances/Deposits (A/D) and Return on Assets (ROA)) (these are discriminating variable) and one categorical variable (Period) with two levels: after the introduction of CRB 0) before introduction of CRB, 1). The variables model is as below:

$$Period = \alpha + \beta_1 NP/LA_1 + \beta_2 A/D_2 + \beta_3 ROA_3 + \varepsilon_i$$

Where:

Period = after the introduction of CRB 0 or before introduction of CRB, 1)

NPLA = Non Performing Loans to Advances Ratio

A/D = Advances to Deposits Ratio

ROA = Return on Assets Ratio

By relying on the above relationship, we can predict a classification based on the continuous variables namely, NPLA, A/D and ROA to assess how well the continuous variables separate the categories (Type) in the classification. This enables us discuss the degree to which the continuous variable can be used to discriminate between the two periods, before and after the introduction of CRB.

The discriminant command in SPSS performs canonical linear discriminant analysis, which is the classical form of discriminant analysis and is appropriate in this study. The output by command will be analysis case processing summary and group statistics. Analysis case processing summarizes the analysis dataset in terms of valid and excluded cases. The group statistics report the distribution of observations into the two classes within the period. The variables are further explained as;

ROA-this ratio tells us how the firm used its assets to achieve a given level of income. In this regard, it explains the impact of other factors that affect non-performing loans in commercial banks. Some of these factors include; lending policies that are unique to each bank, use of collateral in credit, credit scoring, relationship with customers, conditions given r agreements made with the customers e.t.c

Advances/Deposits-This explains the Capital element in the five c's of credit management. Since banks use customer deposits to lend as loans, this ratio is relevant in our model as it shows the impact of Non-performing loans to the liquidity position of the banks. If monies lent out are not collected then the bank will not have sufficient funds to lend and also meet short term demands for cash like withdrawals.

Eigenvalue- was used in describing how much discriminating ability a function possesses. The magnitudes of the eigenvalues are indicative of the functions' discriminating abilities. In addition, a predicted summary report is generated. Predicted summary report is similar to the analysis case processing summary but in this table, "Processed" cases are those that were successfully classified based on the analysis.

There is also predicted group membership report that shows the predicted frequencies of groups from the analysis. The numbers going down each column indicate how many were correctly and incorrectly classified.

The discriminant analysis model was used to test the hypothesis using the F-statistic.

CHAPTER FOUR

DATA ANALYSIS RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter deals with the analysis of the research findings on data collected on the impact of the Credit Reference Bureaus on Non performing loans in commercial banks in Kenya. Secondary data was collected from the financial statements of commercial banks during the period of study. The data was analyzed by SPSS model, and presented in tables and graphs for easy analysis. A list of commercial banks used for the study is attached in the appendix.

4.2 Overview of data collected

There are 43 registered commercial banks in Kenya as at December 2011. Out of this data was collected from 33 commercial banks since some came into existence after 2008 and therefore were left out for purposes of uniformity and consistency, data for some banks was also not available for the entire period under consideration. This represents 76.7% of the target population and therefore a good representation.

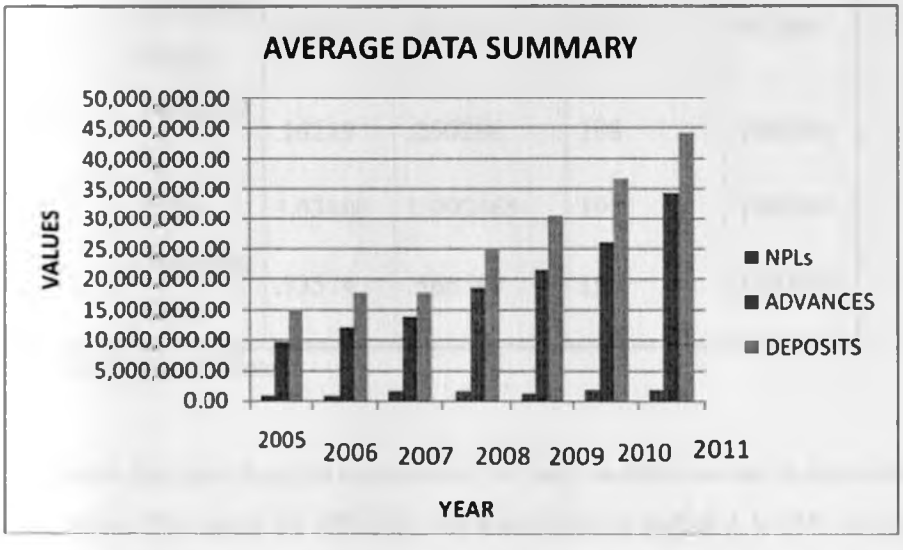
Table 1 Average of variables per year

Year	NPL	Advances	Deposits	NPL/Advances	ROA	Advances/ deposits
2005	938,768.88	9,901,038.24	15,021,994.27	0.20	2.46	0.69
2006	1,030,809.00	12,104,075.70	17,912,535.24	0.17	2.36	0.69
2007	1,721,852.48	13,992,699.39	17,840,818.15	0.27	3.36	0.92
2008	1,669,619.15	18,681,163.79	25,180,615.33	0.20	2.99	0.71
2009	1,352,066.52	21,642,869.79	30,385,744.03	0.12	2.73	0.70
2010	1,874,890.27	26,047,324.58	36,717,424.45	0.13	3.64	0.67

2011	2,002,789.30	34,250,995.42	44,128,535.33	0.09	3.63	0.75

Source: Research Data

Banks' Asset book (Advances) and Liability book (Deposits) have grown each year for the period under study. This is attributed to the growth of commercial banks and their efforts to reach more of the unbanked population. (Fig1)The NPLs value also grew over the years. Of major concern is The NPLs to advances ratio which stood at 0.2 in the year 2005 compared to 0.09 in 2011. This shows a major reduction of NPLs shows an improvement in collection of debt through prudent lending by commercial banks by making use of the CRBs when making credit decisions.



Source: Research Data (Fig1)

The graph shows that there has been growth in the banking industry hence the growing values for each variable annually.

Table: 2-Group Statistics

Class		Mean	Std. Deviation	Valid N (list wise)	
				Un-weighted	Weighted
1	NPL/ADV	.21152	.329324	99	99.000
	ROA	2.72747	1.841455	99	99.000
	Adv/Dep Ratio	.76464	.786544	99	99.000
2	NPL/ADV	.11286	.112094	99	99.000
	ROA	3.33465	2.098374	99	99.000
	Adv/Dep Ratio	.70684	.157437	99	99.000
Total	NPL/ADV	.16219	.250296	198	198.000
	ROA	3.03106	1.992465	198	198.000
	Adv/Dep Ratio	.73574	.566503	198	198.000

(Source: Research Data)

This table displays descriptive statistics for each variable across the periods and for the total population. The mean for NPLs to Advances ratio in period 1 is 21% in period while that of period 2 is 11%. This shows that the NPL value over the value of advances has gone down since the introduction of CRB. The standard deviation measures the variability of the values and from the table above, the variance is higher in period 1 at 0.32 and lower in period 2 at 0.11. This is a positive indicator on the impact of the CRB on Non-performing loans.

Table 3 Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
NPL/ADV	.961	7.962	1	196	.005
ROA	.977	4.683	1	196	.032
Adv/Dep Ratio	.997	.514	1	196	.474

(Source: Research Data)

This table contains Wilk's Lambda, the F-statistic, its degrees of freedom and significance level. Wilk's lambda is the ratio of the within- groups (periods) sum of squares to the total sum of squares. In this case, there are no within-group differences in period 1 and period 2 with lambdas of 0.961, 0.977 and 0.997 for NPL/Advances, ROA and Advances/Deposits ratios respectively. With the F-statistic, the significance level for the variables NPL/Advances and ROA are 0.05 and 0.032 respectively which indicates that the difference of variables in period 1 and period 2 are significant while that of Advances/Deposits ratio is not significant between the two periods.

4.3 Box's Test of Equality of Covariance Matrices

Table 4 Log Determinants

Class	Rank	Log Determinant
1	3	-1.483
2	3	-6.781
Pooled within-groups	3	-2.591

(Source: Research Data)

The ranks and natural logarithms of determinants printed are those of the group covariance matrices. In the multi group model, log determinant values provide an indication of which periods covariance matrices differ the most. From the data, the log determinant for period 2 is very small compared to that of period 1. This in essence means that the values of the variables for the two periods are not equal thus showing the impact of the CRB between the periods.

4.4 Hypothesis Testing

Table 5 Box's Test of Equality of Covariance Matrices

Box's M		301.925
F	Approx.	49.485
	df1	6
	df2	278334.792
	Sig.	.000

(Source: Research Data)

Box's M Statistic tests null hypothesis of equal population covariance matrices. From the data, we get that the significance level of the equal covariance matrix is 0.00 and therefore we reject the null hypothesis that the use of Credit Reference Bureau has no impact on non-performing loans in commercial banks and accept the alternative hypothesis that the use of credit reference bureau has an impact on Non-performing loans in Commercial Banks

Canonical discriminant Functions

Table 6 Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.063(a)	100.0	100.0	.243

(Source: Research Data)

The above table displays Eigen values, the percentage of variance, the cumulative percentage and canonical correlations for each Canonical variable. Canonical correlation measures the association between the discriminate scores and the periods. The value 0.243 indicates a weak correlation between the discriminant scores in the periods.

Table 7 Prior Probabilities for Groups

Class	Prior	Cases Used in Analysis	
		Unweighted	Weighted
1	.500	99	99.000
2	.500	99	99.000
Total	1.000	198	198.000

(Source: Research Data)

This table displays the prior probabilities for membership to periods. A prior probability is an estimate of the likelihood that a case belongs to a particular group when no other information is available. An assumption was made that a case is equally likely to be a member of any period thus a prior probability value of 0.5 is given for each of the periods.

Table 8 Classification Function Coefficients

	Class	
	1	2
NPL/ADV	4.412	2.857
ROA	.754	.891
Adv/Dep Ratio	2.497	2.278
(Constant)	-3.143	-3.146

(Source: Research Data)

Fisher's linear discriminant functions, each column contains estimates of the coefficients for a classification function for each period. Going by our earlier model, we get the following output

period = $\alpha + \beta_1 NP/LA_1 + \beta_2 A/D_2 + ß_3 ROA_3 + \varepsilon_i$

Where:

Period = after the introduction of CRB2 or before introduction of CRB, 1)

NPLA = Non Performing Loans to Advances Ratio

A/D = Advances to Deposits Ratio

ROA = Return on Assets Ratio

Period 1=0.5+ (4.412x0.212) + (0.754x2.727) + (2.497x 0.765)- 1.483

= 0.5+ 0.935 + 2.056+ 1.910- 1.483

= 3.918

Period 2= 0.5 + (2.857 x 0.113) + (0.891 x 3.335) + (2.278 x 0.707) -6.781

= 0.5 +0.323 + 2.971 + 0.197- 6.781

= - 2.79

From the model above it is clear that the NPLs have gone down given the positive value of 3.918 in period 1 and a negative value of 2.79 in period 2.

4.5 Summary of the results and analysis

Table 9 Classification Results

			Predicted Group Membership		
		Class	1	2	Total
Original	Count	1	55	44	99
		2	36	63	99
		Ungrouped cases	15	18	33
	%	1	55.6	44.4	100.0
		2	36.4	63.6	100.0
		Ungrouped cases	45.5	54.5	100.0
Cross-validated(a)	Count	1	52	47	99
		2	36	63	99
	%	1	52.5	47.5	100.0
		2	36.4	63.6	100.0

This table measures the degree of success of the classification for the data used form the target population. Cross validation was done only for those cases in the analysis. In cross validation, each case was classified by the functions derived from all cases other than that case. 59.6% of original grouped cases correctly classified. 58.1% of cross-validated grouped cases correctly classified.

A discriminant analysis was conducted using SPSS model to predict whether the use of Credit reference Bureau by commercial banks has any impact on Non-performing loans. The predictor variables were, NPL/Advances, advances/Deposits and Return on Assets for both periods. The log determinants for the periods were different thus explaining the impact of the credit reference bureau on non-Performing loans. Canonical correlations showed weak correlation between the discriminant scores in the periods.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the research objectives, research methodology and the findings of the research thereof. The limitations and recommendations for further studies have also been highlighted.

5.2 Summary of the Findings and conclusion

The objective of the research was to assess the impact of the Credit Reference Bureaus on Non-performing loans in commercial banks in Kenya. A model was formulated to guide in finding the relevant data to suit the research. The variables of the model included the Non-performing loans to advances ratio, the Advances to Deposits ratio and the Return on assets of the commercial banks over the period under consideration. Secondary data was collected from the annual financial statements of the commercial banks for the entire period. Out of the 43 registered commercial banks in Kenya as at December 2011, the researcher was able to collect from 76.7%, which was found to be an adequate representation of the target population.

The data collected was run through an SPSS model for analysis of the data. The variables were used in the research model and it was found that in deed there is a reduction in Non-performing loans since the banks adopted the use of the credit reference bureaus in the year 2008 compared to the earlier periods. The research hypothesis was also tested using the F-Statistic and the results were a rejection of the null hypothesis that the use of credit reference bureau has no impact on non-performing loans and the alternative hypothesis which stated that, the use of credit reference bureau has an impact on non-performing loans was accepted.

5.3 Conclusions

Since the inception of the Credit Reference Bureaus, Banks have been making reference to the CRB on credit applications by their customers. Banks have been supplying data to the credit bureaus which is a condition they have to meet in order to access information from the Credit Reference Bureaus. The research findings tell us that the use of credit reference bureaus has an impact on non-performing loans. Banks should implement in their lending policies the use of the credit reference bureaus in making credit decisions as well as recovery

of bad debts. The Credit reference bureaus have a positive impact on the reduction of non-performing loans and therefore their use should be adopted by all banks and other lending institutions like Saccos in order to curtail the serial defaulters. Since the introduction of the CRB's in 2008, banks have been able to reduce the level of non-performing loans to advances ratio compared to the periods prior to 2008.

Banks with high non-performing loan portfolios are considered being non- efficient as could be seen from the lower return on assets posted by them. This happens due to the fact that bad debts is considered an expense and also the non-performing loan portfolio has some provisions made which affects the income as well as the profitability of commercial banks. Currently bank s have to weigh the options of minimizing on collection of debt costs by use of the CRB in guiding them to make informed credit decisions and only lend to credit worthy customers with a good borrowing history.

5.4 Recommendations

Banks have been struggling with Non-performing loans for a long time in the history of Kenyan Banking. The introduction of the credit reference bureaus is one of the methods intended to help banks reduce the value of non-performing loans attributed to 'serial defaulters'. The Credit reference bureaus have a positive impact on the reduction of non-performing loans and therefore all banks and other lending institutions like Sacco's should adopt their use in order to curtail the serial defaulters. The information on credit history should also touch on utility payments like electricity, water bills as well as rent payments for apartments.

The regulator of the financial institutions that is the central bank should enact policies that guide the use of the credit reference bureau information by banks as well as the consumers. There also needs to be an elaborate effort to educate the public on the importance of paying debts, the impact that bad information has on one's financial status as well as the effect of good information.

Accessibility of the information from the Credit reference bureaus by the public should also be easily accessible so that one may know the kind of information that has been supplied to the bureaus about them. Proper use of the bureaus is expected to bring some financial discipline among the public. This requires cooperation and coordination from the regulators, the financial institutions and the public. A suggestion is put forward that more bureaus should

be licensed since with competition they will be able to supply more reliable data on borrowers.

5.5Limitations of the Study

During the conduct of the research some limitations were encountered by the researcher. The target population was 43 commercial banks but data was only collected from 33 this is because some private banks do not avail their financial statements to the public and reaching them did not bear fruits.

Another limitation was time; the researcher did not have sufficient time to collect primary data using questionnaires and interviews. The primary data would have helped in gaining more insight on the impact of the credit reference bureaus on a bank-to-bank basis. The secondary data was only able to give the general impact for all commercial banks.

5.6 Suggestions for further Research

This study focused on the impact of the Credit reference bureaus on non-performing loans in commercial banks in Kenya. Given that the reference bureaus have not been in existence for a longer period, future research could be carried o the same topic say after seven to ten years to gauge the long- term effect.

Other areas of study would be to find out how banks use the credit reference bureaus in making credit decisions.

Another area of further study would be to assess the benefits of good credit reference information to the borrowers and how banks use such information.

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Appendices

Appendix 1: List of Commercial banks in Kenya

1	African Banking Corporation Ltd.
2	Bank of Africa (K) Ltd.
3	Bank of Baroda (K) Ltd.
4	Bank of India
5	Barclays Bank of Kenya Ltd.
6	CFC Stanbic Bank Ltd.
7	Chase Bank (K) Ltd.
8	Commercial Bank of Africa Ltd.
9	Consolidated Bank of Kenya Ltd.
10	Co-operative Bank of Kenya Ltd.
11	Credit Bank Ltd.
12	Development Bank of Kenya Ltd.
13	Diamond Trust Bank Kenya Ltd.
14	Dubai Bank Kenya Ltd
15	Eco bank Ltd
16	Equatorial Commercial Bank Ltd.
17	Equity Bank Ltd.
18	Family Bank Ltd.
19	Fidelity Commercial Bank Ltd.
20	Fina Bank Ltd.
21	Gulf Africa Bank (K) Ltd
22	Imperial Bank Ltd.
23	Investment & Mortgages Bank Ltd.
24	Kenya Commercial Bank Ltd.
25	K-Rep Bank Ltd.
26	Middle East Bank (K) Ltd.
27	National Bank of Kenya Ltd.
28	NIC Bank Ltd.
29	Oriental Commercial Bank Ltd.
30	Prime Bank Ltd.
31	Standard Chartered Bank (K) Ltd.
32	Trans-National Bank Ltd.
33	Victoria Commercial Bank Ltd.

Appendix 2

BANK	Year	NPL	ADVANCES	DEPOSITS	NPLtoADV	ROA	AdvDepRatio	Class
African Banking Corporation Ltd.	2005	488779	2610000	4290000	0.187	2.41	0.608	1
Bank of Africa (K) Ltd.	2005	422621	4162789	6832615	0.102	1.95	0.609	1
Bank of Baroda (K) Ltd.	2005	528349	5228384	9788107	0.101	2.83	0.534	1
Bank of India	2005	318317	788708	1522609	0.404	3.5	0.518	1
Barclays Bank of Kenya Ltd.	2005	4327092	65562000	81800000	0.066	3	0.801	1
CFC Stanbic Bank Ltd.	2005	1325808	12874556	15698376	0.103	0.18	0.820	1
Chase Bank (K) Ltd.	2005	792281	2003678	4996004	0.395	2.7	0.401	1
Commercial Bank of Africa Ltd.	2005	679277	11388002	25699744	0.060	2.1	0.443	1
Consolidated Bank of Kenya Ltd.	2005	508612	998276	1723812	0.509	0.57	0.579	1
Co-operative Bank of Kenya Ltd.	2005	1169385	27195000	43602000	0.043	1.4	0.624	1
Credit Bank Ltd.	2005	372925	1183609	1568817	0.315	2.65	0.754	1
Development Bank of Kenya Ltd.	2005	232900	1267200	1162300	0.184	-0.4	1.090	1
Diamond Trust Bank Kenya Ltd.	2005	82545	10318103	13846171	0.008	2.1	0.745	1
Dubai Bank Kenya Ltd	2005	118060	501677	883427	0.235	2.4	0.568	1
Eco bank Ltd	2005	1528418	4973220	6122504	0.307	1.3	0.812	1
Equatorial Commercial Bank Ltd.	2005	276315	982683	1836781	0.281	5.3	0.535	1
Equity Bank Ltd.	2005	519377	5524360	9047765	0.094	4.37	0.611	1
Family Bank Ltd.	2005	570075	1700000	2800000	0.335	0.29	0.607	1
Fidelity Commercial Bank Ltd.	2005	355609	1120068	2178966	0.317	0.77	0.514	1
Fina Bank Ltd.	2005	357586	39500000	64300000	0.009	1.28	0.614	1
Gulf Africa Bank (K) Ltd	2005	623844	1238802	2884270	0.504	3.2	0.430	1
Imperial Bank Ltd.	2005	427171	4677812	6432593	0.091	4.49	0.727	1
Investment & Mortgages Bank Ltd.	2005	838904	11088701	14798796	0.076	2.71	0.749	1
Kenya Commercial Bank Ltd.	2005	5608212	36000000	64000000	0.156	6.54	0.563	1
K-Rep Bank Ltd.	2005	388909	1566234	2013886	0.248	2.3	0.778	1
Middle East Bank (K) Ltd.	2005	188307	528637	1008307	0.356	3.7	0.524	1
National Bank of Kenya Ltd.	2005	3782006	13688312	17814952	0.276	1.63	0.768	1
NIC Bank Ltd.	2005	705865	14259286	16575398	0.050	1.95	0.860	1
Oriental Commercial Bank Ltd.	2005	107919	688175	887601	0.157	0.97	0.775	1
Prime Bank Ltd.	2005	459269	3228856	6798177	0.142	1.77	0.475	1
Standard Chartered Bank (K) Ltd.	2005	2478137	35401962	59683127	0.070	4.8	0.593	1
Trans-National Bank Ltd.	2005	365160	900588	1217706	0.405	3.53	0.740	1
Victoria Commercial Bank Ltd.	2005	31339	3584584	1911000	0.009	2.94	1.876	1
African Banking Corporation Ltd.	2006	382726	2840000	4080000	0.135	2.61	0.696	1
Bank of Africa (K) Ltd.	2006	377648	5784223	7923655	0.065	0.85	0.730	1
Bank of Baroda (K) Ltd.	2006	429324	6039010	10251017	0.071	2.09	0.589	1
Bank of India	2006	322918	934706	1807118	0.345	3.01	0.517	1
Barclays Bank of Kenya Ltd.	2006	4212699	73907000	93837000	0.057	4	0.788	1
CFC Stanbic Bank Ltd.	2006	123850	15119208	16732025	0.008	0.54	0.904	1
Chase Bank (K) Ltd.	2006	579437	2538775	5443779	0.228	1.54	0.466	1
Commercial Bank of Africa Ltd.	2006	865213	14621043	32667150	0.059	3.68	0.448	1
Consolidated Bank of Kenya Ltd.	2006	641539	1117202	2038123	0.574	0.4	0.548	1
Co-operative Bank of Kenya Ltd.	2006	2279292	44692000	50462000	0.051	2.2	0.886	1
Credit Bank Ltd.	2006	354428	1422495	1960198	0.249	3.44	0.726	1
Development Bank of Kenya Ltd.	2006	211700	1577200	1807600	0.134	2.8	0.873	1
Diamond Trust Bank Kenya Ltd.	2006	110662	13832756	16952462	0.008	2.6	0.816	1
Dubai Bank Kenya Ltd	2006	173420	559325	443117	0.310	0.49	1.262	1
Eco bank Ltd	2006	925210	3492701	6437527	0.265	0.32	0.543	1
Equatorial Commercial Bank Ltd.	2006	421242	1073077	2525773	0.393	3.01	0.425	1
Equity Bank Ltd.	2006	559348	10930523	16337217	0.051	5.5	0.669	1
Family Bank Ltd.	2006	435441	2573878	4160405	0.169	4.8	0.619	1
Fidelity Commercial Bank Ltd.	2006	46032	1400127	2432728	0.033	0.25	0.576	1
Fina Bank Ltd.	2006	786316	44500000	79800000	0.018	1.69	0.558	1
Gulf Africa Bank (K) Ltd	2006	753771	1599237	3703278	0.471	2.1	0.432	1
Imperial Bank Ltd.	2006	465097	5920511	7732754	0.079	4.5	0.766	1
Investment & Mortgages Bank Ltd.	2006	357918	14702497	18220103	0.024	4.2	0.807	1
Kenya Commercial Bank Ltd.	2006	7923814	45000000	77000000	0.176	6.77	0.584	1
K-Rep Bank Ltd.	2006	422787	1993725	2438019	0.212	0.6	0.818	1
Middle East Bank (K) Ltd.	2006	152811	727371	1412729	0.210	2.1	0.515	1

National Bank of Kenya Ltd.	2006	4572721	17245290	21472375	0.265	1.25	0.803	1
NIC Bank Ltd.	2006	1270942	16570116	21978078	0.077	2.6	0.754	1
Oriental Commercial Bank Ltd.	2006	261712	876477	992803	0.299	-4	0.883	1
Prime Bank Ltd.	2006	501387	4956125	8267074	0.101	1.69	0.600	1
Standard Chartered Bank (K) Ltd.	2006	2619096	37415666	64879129	0.070	4.7	0.577	1
Trans-National Bank Ltd.	2006	463676	1304234	1264090	0.356	2.55	1.032	1
Victoria Commercial Bank Ltd.	2006	12520	2168000	3654337	0.006	2.98	0.593	1
African Banking Corporation Ltd.	2007	674228	3340000	5080000	0.202	3.01	0.657	1
Bank of Africa (K) Ltd.	2007	243637	6431487	9274377	0.038	2	0.693	1
Bank of Baroda (K) Ltd.	2007	622809	7093178	12733208	0.088	3.06	0.557	1
Bank of India	2007	422347	1399408	5297781	0.302	4.03	0.264	1
Barclays Bank of Kenya Ltd.	2007	3265726	105346000	109097000	0.031	3.1	0.966	1
CFC Stanbic Bank Ltd.	2007	2266209	18926529	22070935	0.120	0.83	0.858	1
Chase Bank (K) Ltd.	2007	1003373	4977875	8778740	0.202	2.92	0.567	1
Commercial Bank of Africa Ltd.	2007	1071618	17681671	36101131	0.061	3.49	0.490	1
Consolidated Bank of Kenya Ltd.	2007	724822	2245007	2851349	0.323	0.6	0.787	1
Co-operative Bank of Kenya Ltd.	2007	5783709	45412000	5500000	0.127	3.5	8.257	1
Credit Bank Ltd.	2007	335738	1631962	2656919	0.206	3.9	0.614	1
Development Bank of Kenya Ltd.	2007	194438	2477517	2752118	0.078	3.34	0.900	1
Diamond Trust Bank Kenya Ltd.	2007	5686942	23181871	29347307	0.245	2.4	0.790	1
Dubai Bank Kenya Ltd	2007	357040	748352	999697	0.477	0.89	0.749	1
Eco bank Ltd	2007	2021071	4000158	6448218	0.505	0.54	0.620	1
Equatorial Commercial Bank Ltd.	2007	308520	1998375	2866766	0.154	6.3	0.697	1
Equity Bank Ltd.	2007	830422	21836200	31536276	0.038	4.48	0.692	1
Family Bank Ltd.	2007	540036	4102130	6023878	0.132	3.12	0.681	1
Fidelity Commercial Bank Ltd.	2007	318622	1997002	3100998	0.160	0.34	0.644	1
Fina Bank Ltd.	2007	551952	4912545	6670006	0.112	1.3	0.737	1
Gulf Africa Bank (K) Ltd	2007	298796	2862213	5562823	0.104	4.37	0.515	1
Imperial Bank Ltd.	2007	573773	7721557	9749898	0.074	5	0.792	1
Investment & Mortgages Bank Ltd.	2007	418889	19214789	23625870	0.022	4.4	0.813	1
Kenya Commercial Bank Ltd.	2007	9519435	56477448	85638139	0.169	3.5	0.659	1
K-Rep Bank Ltd.	2007	556288	2760933	3217008	0.201	1	0.858	1
Middle East Bank (K) Ltd.	2007	267408	986349	1577626	0.271	3.8	0.625	1
National Bank of Kenya Ltd.	2007	5466614	17843915	34721680	0.306	3.89	0.514	1
NIC Bank Ltd.	2007	1156255	22209186	24805595	0.052	3.36	0.895	1
Oriental Commercial Bank Ltd.	2007	388723	1023725	1233700	0.380	8.5	0.830	1
Prime Bank Ltd.	2007	561505	6298203	10357691	0.089	3.6	0.608	1
Standard Chartered Bank (K) Ltd.	2007	2512678	41025357	73840563	0.061	5.4	0.556	1
Trans-National Bank Ltd.	2007	353509	1208138	1799905	0.293	7.3	0.671	1
Victoria Commercial Bank Ltd.	2007	7524000	2388000	3429797	3.151	3.66	0.696	1
African Banking Corporation Ltd.	2008	460671	3550000	5380000	0.130	3.45	0.660	0
Bank of Africa (K) Ltd.	2008	517696	7927814	11628714	0.065	0.98	0.682	0
Bank of Baroda (K) Ltd.	2008	508007	8937671	15164904	0.057	3.45	0.589	0
Bank of India	2008	342728	3262741	7281940	0.105	4.8	0.448	0
Barclays Bank of Kenya Ltd.	2008	3242580	108086000	126562000	0.030	3.3	0.854	0
CFC Stanbic Bank Ltd.	2008	2966400	65210086	73071678	0.045	0.66	0.892	0
Chase Bank (K) Ltd.	2008	1522666	6648825	9768710	0.229	3.02	0.681	0
Commercial Bank of Africa Ltd.	2008	1982458	17681671	48245739	0.112	3.26	0.366	0
Consolidated Bank of Kenya Ltd.	2008	572433	2751343	3279800	0.208	1.86	0.839	0
Co-operative Bank of Kenya Ltd.	2008	7538099	60417500	66000000	0.125	4	0.915	0
Credit Bank Ltd.	2008	341700	1809656	2773917	0.189	2.18	0.652	0
Development Bank of Kenya Ltd.	2008	407191	3438979	3804882	0.118	2.62	0.904	0
Diamond Trust Bank Kenya Ltd.	2008	6678640	34063359	45803320	0.196	2.2	0.744	0
Dubai Bank Kenya Ltd	2008	487713	957275	1031794	0.509	0.41	0.928	0
Eco bank Ltd	2008	2889816	5125851	8341460	0.564	0.64	0.615	0
Equatorial Commercial Bank Ltd.	2008	215162	2306663	3667553	0.093	0.79	0.629	0
Equity Bank Ltd.	2008	2444342	40857106	48977424	0.060	6.37	0.834	0
Family Bank Ltd.	2008	467876	5889836	7404069	0.079	5.1	0.795	0
Fidelity Commercial Bank Ltd.	2008	261946	2800000	3800000	0.094	0.17	0.737	0
Fina Bank Ltd.	2008	531093	6189638	8113365	0.086	0.96	0.763	0
Gulf Africa Bank (K) Ltd	2008	377461	4164278	6347900	0.091	5.23	0.656	0

Imperial Bank Ltd.	2008	560674	9020787	11211236	0.062	5	0.805	0
Investment & Mortgages Bank Ltd.	2008	1930125	25886893	28354657	0.075	4.42	0.913	0
Kenya Commercial Bank Ltd.	2008	9638119	79343099	109844869	0.121	3.1	0.722	0
K-Rep Bank Ltd.	2008	622827	328790	4178122	1.894	1.03	0.079	0
Middle East Bank (K) Ltd.	2008	301766	1214427	1973188	0.248	4.4	0.615	0
National Bank of Kenya Ltd.	2008	2434520	18950145	34277654	0.128	4.21	0.553	0
NIC Bank Ltd.	2008	1315902	29954948	35238381	0.044	3.48	0.850	0
Oriental Commercial Bank Ltd.	2008	577607	1200840	1400329	0.481	3.13	0.858	0
Prime Bank Ltd.	2008	756954	9425710	15661930	0.080	2.3	0.602	0
Standard Chartered Bank (K) Ltd.	2008	1794310	44857772	76898456	0.040	4.8	0.583	0
Trans-National Bank Ltd.	2008	397759	1440702	1890623	0.276	3.55	0.762	0
Victoria Commercial Bank Ltd.	2008	10191	2778000	3581692	0.004	3.81	0.776	0
African Banking Corporation Ltd.	2009	388342	4030000	7180000	0.096	2.74	0.561	2
Bank of Africa (K) Ltd.	2009	741822	10458603	15113791	0.071	1.5	0.692	2
Bank of Baroda (K) Ltd.	2009	1022049	9064430	18633568	0.113	3.31	0.486	2
Bank of India	2009	216782	3844923	10229142	0.056	5.3	0.376	2
Barclays Bank of Kenya Ltd.	2009	513000	93543000	125869000	0.005	3.7	0.743	2
CFC Stanbic Bank Ltd.	2009	1580447	70922412	82534005	0.022	0.05	0.859	2
Chase Bank (K) Ltd.	2009	2182742	9008766	13622873	0.242	2.03	0.661	2
Commercial Bank of Africa Ltd.	2009	1501119	34478744	57492717	0.044	2.99	0.600	2
Consolidated Bank of Kenya Ltd.	2009	923383	3868472	5300608	0.239	1.7	0.730	2
Co-operative Bank of Kenya Ltd.	2009	4172700	66620477	91552508	0.063	3.4	0.728	2
Credit Bank Ltd.	2009	289787	1880943	2793111	0.154	2.25	0.673	2
Development Bank of Kenya Ltd.	2009	648276	4768579	4222384	0.136	2.31	1.129	2
Diamond Trust Bank Kenya Ltd.	2009	6697584	41518135	54885695	0.161	2	0.756	2
Dubai Bank Kenya Ltd	2009	654879	8744992	10932107	0.075	1.03	0.800	2
Eco bank Ltd	2009	1939372	6444336	10818797	0.301	-8.2	0.596	2
Equatorial Commercial Bank Ltd.	2009	993590	1953299	4307696	0.509	5.7	0.453	2
Equity Bank Ltd.	2009	4565227	59868317	65825331	0.076	5.24	0.910	2
Family Bank Ltd.	2009	493516	7675806	10490293	0.064	2.57	0.732	2
Fidelity Commercial Bank Ltd.	2009	156449	3293085	4888219	0.048	0.81	0.674	2
Fina Bank Ltd.	2009	865753	5937140	9985823	0.146	0.87	0.595	2
Gulf Africa Bank (K) Ltd	2009	433684	5972614	7279327	0.073	5.73	0.820	2
Imperial Bank Ltd.	2009	663508	10399447	12862282	0.064	6	0.809	2
Investment & Mortgages Bank Ltd.	2009	1073199	24591500	34799005	0.044	3.98	0.707	2
Kenya Commercial Bank Ltd.	2009	4875000	98749618	138452731	0.049	3.2	0.713	2
K-Rep Bank Ltd.	2009	926378	4168388	4922814	0.222	1.36	0.847	2
Middle East Bank (K) Ltd.	2009	35627	1728449	2338176	0.021	4.9	0.739	2
National Bank of Kenya Ltd.	2009	1301757	13156455	41995446	0.099	4.2	0.313	2
NIC Bank Ltd.	2009	1548270	32511082	39514275	0.048	3.21	0.823	2
Oriental Commercial Bank Ltd.	2009	328259	1518545	2011798	0.216	1.55	0.755	2
Prime Bank Ltd.	2009	619381	10615380	19184208	0.058	2.38	0.553	2
Standard Chartered Bank (K) Ltd.	2009	1740480	58016010	86773652	0.030	5.44	0.669	2
Trans-National Bank Ltd.	2009	504296	1688664	1844938	0.299	2.6	0.915	2
Victoria Commercial Bank Ltd.	2009	21537	3174092	4073233	0.007	4.22	0.779	2
African Banking Corporation Ltd.	2010	313794	5290000	8310000	0.059	4.67	0.637	2
Bank of Africa (K) Ltd.	2010	1248411	14122485	19784311	0.088	1.8	0.714	2
Bank of Baroda (K) Ltd.	2010	512840	13434458	25806279	0.038	5.65	0.521	2
Bank of India	2010	130652	5923970	16076467	0.022	5.04	0.368	2
Barclays Bank of Kenya Ltd.	2010	6177000	87147000	123826000	0.071	4.2	0.704	2
CFC Stanbic Bank Ltd.	2010	1742322	75224630	85694598	0.023	1.28	0.878	2
Chase Bank (K) Ltd.	2010	2827942	11131009	16880006	0.254	2.45	0.659	2

Commercial Bank of Africa Ltd.	2010	3937296	38642621	65355881	0.102	3.94	0.591	2
Consolidated Bank of Kenya Ltd.	2010	1006384	6047276	8008438	0.166	2.53	0.755	2
Co-operative Bank of Kenya Ltd.	2010	1862652	90965000	124226000	0.020	3	0.732	2
Credit Bank Ltd.	2010	500894	1926918	3258488	0.260	0.74	0.591	2
Development Bank of Kenya Ltd.	2010	785223	5392436	6334331	0.146	2.22	0.851	2
Diamond Trust Bank Kenya Ltd.	2010	8328291	51260068	68604930	0.162	3.3	0.747	2
Dubai Bank Kenya Ltd	2010	742827	1028476	12378141	0.722	0.97	0.083	2
Eco bank Ltd	2010	2166315	9693275	16493841	0.223	0.7	0.588	2
Equatorial Commercial Bank Ltd.	2010	1198108	4792435	8036584	0.250	6.06	0.596	2
Equity Bank Ltd.	2010	3470313	72902189	95204318	0.048	6.3	0.766	2
Family Bank Ltd.	2010	1000180	10298791	15731247	0.097	2.48	0.655	2
Fidelity Commercial Bank Ltd.	2010	466831	4472541	7204224	0.104	4.5	0.621	2
Fina Bank Ltd.	2010	1072386	6718235	11590423	0.160	1.07	0.580	2
Gulf Africa Bank (K) Ltd	2010	314324	7011725	9515932	0.045	6.01	0.737	2
Imperial Bank Ltd.	2010	776665	12173088	15839364	0.064	7	0.769	2
Investment & Mortgages Bank Ltd.	2010	1184405	35658053	45994961	0.033	4.8	0.775	2
Kenya Commercial Bank Ltd.	2010	13053727	137344568	163188681	0.095	3.89	0.842	2
K-Rep Bank Ltd.	2010	1236539	5252438	5454468	0.235	1.44	0.963	2
Middle East Bank (K) Ltd.	2010	39859	2213290	2527249	0.018	5.1	0.876	2
National Bank of Kenya Ltd.	2010	936290	20844636	47804607	0.045	4.5	0.436	2
NIC Bank Ltd.	2010	1570797	38340879	45317661	0.041	4.42	0.846	2
Oriental Commercial Bank Ltd.	2010	328259	2450600	3266148	0.134	4.5	0.750	2
Prime Bank Ltd.	2010	607023	14836692	25512133	0.041	2.37	0.582	2
Standard Chartered Bank (K) Ltd.	2010	1231988	61599405	100504065	0.020	5.38	0.613	2
Trans-National Bank Ltd.	2010	536624	1937580	3010470	0.277	3.33	0.644	2
Victoria Commercial Bank Ltd.	2010	564218	3484944	4934761	0.162	4.48	0.706	2
African Banking Corporation Ltd.	2011	280010	7070000	10440000	0.040	4.12	0.677	2
Bank of Africa (K) Ltd.	2011	2081730	21639691	23986396	0.096	1.43	0.902	2
Bank of Baroda (K) Ltd.	2011	714342	16923630	30427618	0.042	5.8	0.556	2
Bank of India	2011	149005	6252898	17529858	0.024	2.45	0.357	2
Barclays Bank of Kenya Ltd.	2011	6520000	99072000	124207000	0.066	4.8	0.798	2
CFC Stanbic Bank Ltd.	2011	862748	94884596	107681320	0.009	1.22	0.881	2
Chase Bank (K) Ltd.	2011	4316326	18243804	24923911	0.237	2.33	0.732	2
Commercial Bank of Africa Ltd.	2011	4102315	40234126	70535117	0.102	4.01	0.570	2
Consolidated Bank of Kenya Ltd.	2011	813243	9197024	12010250	0.088	1.6	0.766	2
Co-operative Bank of Kenya Ltd.	2011	2066450	114101000	144514000	0.018	3	0.790	2
Credit Bank Ltd.	2011	440337	2883261	3937417	0.153	0.95	0.732	2
Development Bank of Kenya Ltd.	2011	1145246	5901794	6556165	0.194	1.37	0.900	2
Diamond Trust Bank Kenya Ltd.	2011	13095332	71297721	88131356	0.184	3.1	0.809	2
Dubai Bank Kenya Ltd	2011	628344	1284915	1433622	0.489	1.2	0.896	2
Eco bank Ltd	2011	1016404	11380592	16566403	0.089	0.45	0.687	2
Equatorial Commercial Bank Ltd.	2011	589038	6635194	9833985	0.089	5.61	0.675	2
Equity Bank Ltd.	2011	3092187	106486344	125492301	0.029	6.5	0.849	2
Family Bank Ltd.	2011	1824592	16332359	21443926	0.112	3.21	0.762	2
Fidelity Commercial Bank Ltd.	2011	600422	6274415	8422547	0.096	4.93	0.745	2
Fina Bank Ltd.	2011	603287	7276704	12395095	0.083	2.12	0.587	2
Gulf Africa Bank (K) Ltd	2011	478955	7439551	10865268	0.064	6.17	0.685	2
Imperial Bank Ltd.	2011	829205	16849490	22963403	0.049	6	0.734	2
Investment & Mortgages Bank Ltd.	2011	1004454	46778935	56943706	0.021	5.8	0.821	2
Kenya Commercial Bank Ltd.	2011	10414948	179843987	210173514	0.058	4.57	0.856	2
K-Rep Bank Ltd.	2011	900874	6754243	6446016	0.133	2.75	1.048	2
Middle East Bank (K) Ltd.	2011	64345	2564178	2702760	0.025	2	0.949	2
National Bank of Kenya Ltd.	2011	1196826	28068218	56728163	0.043	3.56	0.495	2
NIC Bank Ltd.	2011	1961277	52025475	62008953	0.038	4.56	0.839	2
Oriental Commercial Bank Ltd.	2011	410453	2798853	3694362	0.147	6.88	0.758	2
Prime Bank Ltd.	2011	779113	18393706	28871682	0.042	3.07	0.637	2
Standard Chartered Bank (K) Ltd.	2011	2267508	97417343	122323049	0.023	5.03	0.796	2
Trans-National Bank Ltd.	2011	380176	3381980	5283169	0.112	4.05	0.640	2
Victoria Commercial Bank Ltd.	2011	462555	4594822	6769334	0.101	5.3	0.679	2

Appendix 3

Casewise Statistics

	Case Number	Actual Group	Highest Group					Second Highest Group			Discriminant Scores
			Predicted Group	P(D>d | G=g)		P(G=g | D=d)	Squared Mahalanobis Distance to Centroid	Group	P(G=g | D=d)	Squared Mahalanobis Distance to Centroid	Function 1
				p	df						
Original	1	1	1	.955	1	.524	.003	2	.476	.196	.193
	2	1	1	.844	1	.507	.039	2	.493	.091	.053
	3	1	2(**)	.979	1	.528	.001	1	.472	.224	-.223
	4	1	1	.781	1	.566	.077	2	.434	.605	.528
	5	1	2(**)	.990	1	.533	.000	1	.467	.262	-.262
	6	1	1	.699	1	.579	.149	2	.421	.784	.636
	7	1	1	.673	1	.583	.178	2	.417	.848	.671
	8	1	2(**)	.954	1	.524	.003	1	.476	.195	-.191
	9	1	1	.150	1	.699	2.073	2	.301	3.760	1.689
	10	1	1	.824	1	.503	.049	2	.497	.077	.028
	11	1	1	.734	1	.573	.115	2	.427	.703	.589
	12	1	1	.360	1	.641	.837	2	.359	2.000	1.165
	13	1	2(**)	.977	1	.527	.001	1	.473	.221	-.220
	14	1	1	.938	1	.541	.006	2	.459	.333	.328
	15	1	1	.477	1	.618	.506	2	.382	1.466	.961
	16	1	2(**)	.928	1	.542	.008	1	.458	.348	-.340
	17	1	2(**)	.700	1	.579	.148	1	.421	.782	-.635
	18	1	1	.324	1	.650	.973	2	.350	2.207	1.236
	19	1	1	.448	1	.623	.575	2	.377	1.582	1.008
	20	1	2(**)	.841	1	.506	.040	1	.494	.089	-.049
	21	1	1	.526	1	.608	.401	2	.392	1.283	.883
	22	1	2(**)	.707	1	.577	.141	1	.423	.765	-.625
	23	1	2(**)	.941	1	.522	.006	1	.478	.181	-.175
	24	1	2(**)	.418	1	.629	.656	1	.371	1.714	-1.060
	25	1	1	.812	1	.561	.057	2	.439	.543	.487
	26	1	1	.937	1	.541	.006	2	.459	.334	.328
	27	1	1	.614	1	.593	.255	2	.407	1.008	.755
	28	1	1	.803	1	.500	.062	2	.500	.063	.000
	29	1	1	.751	1	.570	.101	2	.430	.667	.567
	30	1	1	.937	1	.521	.006	2	.479	.176	.170
	31	1	2(**)	.558	1	.603	.343	1	.397	1.177	-.835

32	1	1	.709	1	.577	.139	2	.423	.760	.622
33	1	1	.838	1	.506	.042	2	.494	.087	.045
35	1	1	.813	1	.502	.056	2	.498	.069	.013
36	1	1	.964	1	.537	.002	2	.463	.296	.295
37	1	2(**)	.873	1	.511	.026	1	.489	.115	-.089
38	1	1	.817	1	.560	.054	2	.440	.534	.481
39	1	2(**)	.748	1	.571	.103	1	.429	.674	-.571
40	1	1	.977	1	.535	.001	2	.465	.278	.278
41	1	1	.804	1	.562	.061	2	.438	.558	.498
42	1	2(**)	.707	1	.577	.141	1	.423	.765	-.625
43	1	1	.094	1	.723	2.804	2	.277	4.726	1.924
44	1	2(**)	.844	1	.507	.039	1	.493	.091	-.053
45	1	1	.924	1	.519	.009	2	.481	.163	.154
46	1	1	.831	1	.505	.046	2	.495	.082	.036
47	1	2(**)	.939	1	.541	.006	1	.459	.332	-.327
48	1	1	.255	1	.667	1.297	2	.333	2.684	1.389
49	1	1	.465	1	.620	.534	2	.380	1.513	.980
50	1	1	.736	1	.573	.114	2	.427	.701	.587
51	1	2(**)	.422	1	.629	.646	1	.371	1.697	-1.053
52	1	2(**)	.791	1	.564	.071	1	.436	.585	-.515
53	1	1	.967	1	.536	.002	2	.464	.293	.291
54	1	2(**)	.928	1	.520	.008	1	.480	.167	-.160
55	1	1	.403	1	.632	.699	2	.368	1.784	1.086
56	1	2(**)	.688	1	.581	.161	1	.419	.811	-.651
57	1	2(**)	.639	1	.589	.221	1	.411	.939	-.719
58	1	2(**)	.424	1	.628	.640	1	.372	1.689	-1.050
59	1	1	.542	1	.606	.371	2	.394	1.229	.859
60	1	1	.953	1	.538	.003	2	.462	.311	.308
61	1	1	.555	1	.603	.348	2	.397	1.186	.839
62	1	2(**)	.913	1	.517	.012	1	.483	.152	-.140
63	1	1	.030	1	.770	4.713	2	.230	7.130	2.421
64	1	1	.896	1	.515	.017	2	.485	.136	.119
65	1	2(**)	.572	1	.600	.320	1	.400	1.134	-.815
66	1	1	.539	1	.606	.377	2	.394	1.239	.864
67	1	2(**)	.775	1	.566	.082	1	.434	.616	-.535
68	1	1	.877	1	.512	.024	2	.488	.119	.095
69	1	2(**)	.899	1	.515	.016	1	.485	.138	-.122
70	1	2(**)	.946	1	.540	.005	1	.460	.322	-.318
71	1	2(**)	.838	1	.506	.042	1	.494	.087	-.046
72	1	2(**)	.938	1	.541	.006	1	.459	.333	-.327
73	1	1	.783	1	.565	.076	2	.435	.601	.526
74	1	1	.865	1	.510	.029	2	.490	.108	.079
75	1	2(**)	.764	1	.568	.090	1	.432	.639	-.550
76	1	1	.347	1	.644	.886	2	.356	2.075	1.191
77	1	1	.005	1	.821	7.835	2	.179	10.880	3.049
78	1	2(**)	.926	1	.519	.009	1	.481	.165	-.156

79	1	2(**)	.981	1	.534	.001	1	.466	.274	-.274
80	1	1	.837	1	.557	.043	2	.443	.498	.456
81	1	1	.185	1	.687	1.755	2	.313	3.328	1.575
82	1	1	.146	1	.701	2.110	2	.299	3.811	1.702
83	1	2(**)	.490	1	.615	.475	1	.385	1.413	-.939
84	1	2(**)	.580	1	.599	.307	1	.401	1.109	-.804
85	1	2(**)	.915	1	.518	.011	1	.482	.155	-.143
86	1	1	.659	1	.585	.195	2	.415	.885	.691
87	1	1	.943	1	.540	.005	2	.460	.325	.321
88	1	2(**)	.693	1	.580	.156	1	.420	.799	-.644
89	1	2(**)	.589	1	.597	.292	1	.403	1.081	-.790
90	1	2(**)	.596	1	.596	.281	1	.404	1.059	-.779
91	1	2(**)	.915	1	.518	.012	1	.482	.154	-.142
92	1	1	.628	1	.591	.234	2	.409	.967	.734
93	1	1	.865	1	.510	.029	2	.490	.108	.080
94	1	1	.894	1	.514	.018	2	.486	.134	.116
95	1	2(**)	.909	1	.545	.013	1	.455	.376	-.364
96	1	2(**)	.593	1	.597	.285	1	.403	1.068	-.784
97	1	2(**)	.849	1	.555	.036	1	.445	.475	-.440
98	1	2(**)	.427	1	.627	.631	1	.373	1.673	-1.044
99	1	2(**)	.586	1	.598	.297	1	.402	1.091	-.795
100	1	1	.000	1	.990	78.651	2	.010	87.757	9.118
101	ungrouped	2	1.000	1	.531	.000	1	.469	.249	-.249
102	ungrouped	1	.991	1	.530	.000	2	.470	.238	.238
103	ungrouped	2	.797	1	.563	.066	1	.437	.573	-.507
104	ungrouped	2	.589	1	.597	.292	1	.403	1.080	-.790
105	ungrouped	2	.854	1	.554	.034	1	.446	.467	-.434
106	ungrouped	1	.915	1	.544	.011	2	.456	.367	.356
107	ungrouped	1	.950	1	.523	.004	2	.477	.191	.187
108	ungrouped	2	.896	1	.547	.017	1	.453	.397	-.380
109	ungrouped	1	.795	1	.563	.068	2	.437	.577	.510

110	ungro uped	2	.956	1	.538	.003	1	.462	.307	-.304
111	ungro uped	1	.976	1	.535	.001	2	.465	.281	.280
112	ungro uped	1	.842	1	.506	.040	2	.494	.090	.050
113	ungro uped	1	.930	1	.542	.008	2	.458	.345	.337
114	ungro uped	1	.102	1	.719	2.676	2	.281	4.559	1.886
115	ungro uped	1	.108	1	.716	2.576	2	.284	4.428	1.855
116	ungro uped	1	.917	1	.544	.011	2	.456	.365	.354
117	ungro uped	2	.345	1	.645	.890	1	.355	2.081	-1.193
118	ungro uped	2	.582	1	.599	.303	1	.401	1.102	-.800
119	ungro uped	1	.747	1	.571	.104	2	.429	.676	.573
120	ungro uped	1	.926	1	.543	.009	2	.457	.351	.343
121	ungro uped	2	.540	1	.606	.375	1	.394	1.235	-.862
122	ungro uped	2	.567	1	.601	.328	1	.399	1.149	-.822
123	ungro uped	2	.743	1	.572	.107	1	.428	.683	-.577
124	ungro uped	2	.922	1	.519	.010	1	.481	.161	-.152
125	ungro uped	1	.000	1	.944	29.245	2	.056	34.894	5.657
126	ungro uped	2	.928	1	.520	.008	1	.480	.168	-.160

127	ungro uped	2	.796	1	.563	.067	1	.437	.575	-.509
128	ungro uped	2	.848	1	.555	.037	1	.445	.478	-.442
129	ungro uped	1	.442	1	.625	.592	2	.375	1.610	1.019
130	ungro uped	2	.891	1	.514	.019	1	.486	.131	-.113
131	ungro uped	2	.494	1	.614	.467	1	.386	1.399	-.933
132	ungro uped	1	.979	1	.528	.001	2	.472	.224	.224
133	ungro uped	2	.659	1	.585	.194	1	.415	.883	-.690
134	2	2	.961	1	.525	.002	1	.475	.203	-.201
135	2	1(**)	.895	1	.515	.018	2	.485	.135	.117
136	2	2	.928	1	.542	.008	1	.458	.347	-.340
137	2	2	.390	1	.635	.740	1	.365	1.849	-1.110
138	2	2	.675	1	.583	.175	1	.417	.843	-.669
139	2	1(**)	.851	1	.554	.035	2	.446	.472	.437
140	2	1(**)	.809	1	.561	.059	2	.439	.550	.492
141	2	2	.867	1	.552	.028	1	.448	.445	-.418
142	2	1(**)	.725	1	.575	.124	2	.425	.724	.601
143	2	2	.869	1	.552	.027	1	.448	.442	-.415
144	2	1(**)	.930	1	.520	.008	2	.480	.169	.162
145	2	1(**)	.969	1	.536	.001	2	.464	.289	.288
146	2	1(**)	.968	1	.536	.002	2	.464	.291	.290
147	2	1(**)	.955	1	.538	.003	2	.462	.309	.306
148	2	1(**)	.001	1	.849	10.282	2	.151	13.733	3.456
149	2	1(**)	.978	1	.528	.001	2	.472	.223	.223
150	2	2	.583	1	.598	.301	1	.402	1.099	-.799
151	2	2	.944	1	.522	.005	1	.478	.185	-.180
152	2	1(**)	.981	1	.528	.001	2	.472	.226	.226
153	2	1(**)	.817	1	.560	.054	2	.440	.534	.481
154	2	2	.463	1	.620	.538	1	.380	1.520	-.983
155	2	2	.401	1	.633	.707	1	.367	1.795	-1.090
156	2	2	.694	1	.580	.154	1	.420	.796	-.643
157	2	2	.874	1	.551	.025	1	.449	.432	-.408
158	2	1(**)	.656	1	.586	.198	2	.414	.892	.695
159	2	2	.482	1	.617	.494	1	.383	1.446	-.953
160	2	2	.651	1	.587	.205	1	.413	.907	-.703
161	2	2	.906	1	.546	.014	1	.454	.381	-.368

162	2	1(**)	.739	1	.572	.111	2	.428	.694	.583
163	2	2	.980	1	.528	.001	1	.472	.225	-.224
164	2	2	.394	1	.634	.728	1	.366	1.829	-1.103
165	2	1(**)	.710	1	.577	.139	2	.423	.760	.622
166	2	2	.588	1	.598	.294	1	.402	1.084	-.792
167	2	2	.573	1	.600	.318	1	.400	1.131	-.814
168	2	1(**)	.880	1	.512	.023	2	.488	.121	.099
169	2	2	.342	1	.645	.903	1	.355	2.101	-1.200
170	2	2	.369	1	.640	.808	1	.360	1.956	-1.149
171	2	2	.712	1	.577	.137	1	.423	.755	-.619
172	2	1(**)	.889	1	.514	.019	2	.486	.129	.110
173	2	1(**)	.871	1	.551	.026	2	.449	.438	.412
174	2	2	.802	1	.562	.063	1	.438	.563	-.501
175	2	1(**)	.928	1	.520	.008	2	.480	.167	.159
176	2	2	.853	1	.554	.034	1	.446	.468	-.434
177	2	1(**)	.535	1	.607	.386	2	.393	1.255	.871
178	2	1(**)	.978	1	.528	.001	2	.472	.222	.222
179	2	2	.856	1	.508	.033	1	.492	.101	-.068
180	2	1(**)	.076	1	.733	3.153	2	.267	5.176	2.025
181	2	1(**)	.605	1	.595	.267	2	.405	1.033	.767
182	2	2	.712	1	.577	.137	1	.423	.755	-.619
183	2	2	.321	1	.650	.984	1	.350	2.224	-1.242
184	2	2	.871	1	.511	.027	1	.489	.113	-.087
185	2	2	.701	1	.578	.148	1	.422	.780	-.634
186	2	1(**)	.831	1	.557	.045	2	.443	.507	.463
187	2	2	.350	1	.644	.872	1	.356	2.054	-1.183
188	2	2	.257	1	.666	1.283	1	.334	2.664	-1.382
189	2	2	.535	1	.607	.385	1	.393	1.254	-.870
190	2	2	.881	1	.550	.022	1	.450	.421	-.399
191	2	1(**)	.607	1	.594	.265	2	.406	1.028	.764
192	2	2	.480	1	.617	.499	1	.383	1.454	-.956
193	2	2	.516	1	.610	.423	1	.390	1.321	-.900
194	2	2	.645	1	.588	.213	1	.412	.923	-.711
195	2	2	.814	1	.560	.055	1	.440	.540	-.485
196	2	2	.989	1	.533	.000	1	.467	.263	-.263
197	2	2	.372	1	.639	.796	1	.361	1.936	-1.142
198	2	1(**)	.988	1	.529	.000	2	.471	.235	.235
199	2	2	.871	1	.551	.026	1	.449	.438	-.412
200	2	2	.648	1	.587	.209	1	.413	.914	-.707
201	2	1(**)	.954	1	.538	.003	2	.462	.310	.307
202	2	2	.335	1	.647	.928	1	.353	2.139	-1.213
203	2	2	.851	1	.554	.035	1	.446	.471	-.437
204	2	2	.610	1	.594	.259	1	.406	1.018	-.759
205	2	1(**)	.869	1	.511	.027	2	.489	.111	.084
206	2	1(**)	.863	1	.553	.030	2	.447	.452	.423
207	2	2	.780	1	.566	.078	1	.434	.606	-.529
208	2	1(**)	.942	1	.522	.005	2	.478	.182	.176

	209	2	2	.867	1	.552	.028	1	.448	.444	-.417
	210	2	1(**)	.771	1	.567	.085	2	.433	.625	.541
	211	2	1(**)	.706	1	.578	.143	2	.422	.769	.627
	212	2	1(**)	.865	1	.510	.029	2	.490	.109	.080
	213	2	1(**)	.180	1	.689	1.799	2	.311	3.388	1.591
	214	2	1(**)	.833	1	.557	.045	2	.443	.505	.461
	215	2	2	.475	1	.618	.510	1	.382	1.472	-.964
	216	2	2	.285	1	.659	1.142	1	.341	2.459	-1.318
	217	2	2	.956	1	.524	.003	1	.476	.198	-.195
	218	2	2	.635	1	.589	.226	1	.411	.949	-.725
	219	2	2	.851	1	.508	.035	1	.492	.097	-.062
	220	2	2	.347	1	.644	.883	1	.356	2.070	-1.189
	221	2	2	.358	1	.642	.844	1	.358	2.011	-1.168
	222	2	2	.362	1	.641	.831	1	.359	1.991	-1.161
	223	2	2	.656	1	.586	.198	1	.414	.893	-.695
	224	2	1(**)	.900	1	.515	.016	2	.485	.140	.124
	225	2	2	.842	1	.506	.040	1	.494	.090	-.051
	226	2	2	.709	1	.577	.139	1	.423	.761	-.623
	227	2	2	.608	1	.594	.263	1	.406	1.025	-.763
	228	2	2	.397	1	.634	.717	1	.366	1.811	-1.096
	229	2	2	.859	1	.553	.031	1	.447	.458	-.427
	230	2	2	.480	1	.617	.498	1	.383	1.452	-.955
	231	2	2	.820	1	.559	.052	1	.441	.528	-.477
	232	2	2	.555	1	.603	.348	1	.397	1.187	-.840
Cross-validated (a)	1	1	1	.989	3	.524	.121	2	.476	.310	
	2	1	1	.920	3	.505	.494	2	.495	.536	
	3	1	2(**)	.983	3	.529	.166	1	.471	.396	
	4	1	1	.802	3	.563	.997	2	.437	1.503	
	5	1	2(**)	.992	3	.534	.095	1	.466	.364	
	6	1	1	.564	3	.574	2.042	2	.426	2.636	
	7	1	1	.816	3	.581	.938	2	.419	1.588	
	8	1	2(**)	.873	3	.526	.701	1	.474	.911	
	9	1	1	.462	3	.695	2.573	2	.305	4.221	
	10	1	1	.770	3	.500	1.129	2	.500	1.133	
	11	1	1	.981	3	.572	.180	2	.428	.762	
	12	1	1	.395	3	.636	2.977	2	.364	4.089	
	13	1	2(**)	.890	3	.530	.629	1	.470	.868	
	14	1	1	.985	3	.540	.154	2	.460	.477	
	15	1	1	.885	3	.616	.649	2	.384	1.594	
	16	1	2(**)	.642	3	.548	1.675	1	.452	2.060	
	17	1	2(**)	.959	3	.581	.304	1	.419	.958	
	18	1	1	.618	3	.646	1.784	2	.354	2.987	
	19	1	1	.728	3	.620	1.306	2	.380	2.287	
	20	1	2(**)	.706	3	.510	1.398	1	.490	1.478	
	21	1	1	.604	3	.604	1.849	2	.396	2.696	
	22	1	2(**)	.951	3	.580	.345	1	.420	.989	
	23	1	2(**)	.987	3	.523	.137	1	.477	.318	

24	1	2(**)	.417	3	.641	2.839	1	.359	3.996
25	1	1	.996	3	.560	.066	2	.440	.549
26	1	1	.846	3	.539	.814	2	.461	1.124
27	1	1	.948	3	.592	.360	2	.408	1.104
28	1	2(**)	.883	3	.502	.659	1	.498	.672
29	1	1	.824	3	.568	.906	2	.432	1.452
30	1	1	.887	3	.520	.639	2	.480	.795
31	1	2(**)	.895	3	.607	.605	1	.393	1.471
32	1	1	.832	3	.575	.873	2	.425	1.475
33	1	2(**)	.216	3	.506	4.461	1	.494	4.511
35	1	1	.988	3	.501	.127	2	.499	.137
36	1	1	.701	3	.533	1.421	2	.467	1.685
37	1	2(**)	.919	3	.513	.499	1	.487	.601
38	1	1	.917	3	.558	.506	2	.442	.975
39	1	2(**)	.982	3	.573	.169	1	.427	.754
40	1	1	.533	3	.529	2.197	2	.471	2.429
41	1	1	.884	3	.560	.652	2	.440	1.135
42	1	2(**)	.962	3	.580	.292	1	.420	.935
43	1	1	.325	3	.719	3.466	2	.281	5.341
44	1	2(**)	.917	3	.508	.511	1	.492	.575
45	1	1	.982	3	.519	.172	2	.481	.321
46	1	1	.988	3	.504	.130	2	.496	.164
47	1	2(**)	.944	3	.542	.380	1	.458	.720
48	1	1	.527	3	.663	2.227	2	.337	3.577
49	1	1	.639	3	.616	1.689	2	.384	2.636
50	1	1	.822	3	.570	.913	2	.430	1.480
51	1	2(**)	.744	3	.635	1.238	1	.365	2.344
52	1	2(**)	.883	3	.567	.660	1	.433	1.200
53	1	1	.472	3	.530	2.517	2	.470	2.756
54	1	2(**)	.801	3	.523	.999	1	.477	1.184
55	1	1	.688	3	.629	1.474	2	.371	2.530
56	1	2(**)	.947	3	.583	.365	1	.417	1.037
57	1	2(**)	.956	3	.591	.319	1	.409	1.059
58	1	2(**)	.348	3	.641	3.297	1	.359	4.456
59	1	1	.752	3	.603	1.204	2	.397	2.038
60	1	1	.959	3	.537	.305	2	.463	.605
61	1	1	.897	3	.602	.598	2	.398	1.422
62	1	2(**)	.981	3	.518	.176	1	.482	.322
63	1	1	.006	3	.759	12.590	2	.241	14.886
64	1	1	.886	3	.513	.643	2	.487	.748
65	1	2(**)	.909	3	.604	.546	1	.396	1.390
66	1	1	.894	3	.604	.611	2	.396	1.459
67	1	2(**)	.962	3	.568	.290	1	.432	.842
68	1	1	.996	3	.512	.058	2	.488	.152
69	1	2(**)	.897	3	.517	.595	1	.483	.733
70	1	2(**)	.991	3	.541	.106	1	.459	.431

71	1	2(**)	.727	3	.509	1.311	1	.491	1.386
72	1	2(**)	.956	3	.542	.323	1	.458	.663
73	1	1	.757	3	.562	1.184	2	.438	1.685
74	1	1	.987	3	.510	.136	2	.490	.212
75	1	2(**)	.977	3	.570	.205	1	.430	.769
76	1	1	.725	3	.642	1.317	2	.358	2.481
77	1	2(**)	.000	3	.979	1792.880	1	.021	1800.520
78	1	2(**)	.966	3	.521	.265	1	.479	.430
79	1	2(**)	.988	3	.535	.130	1	.465	.411
80	1	1	.997	3	.556	.046	2	.444	.498
81	1	1	.592	3	.684	1.905	2	.316	3.446
82	1	1	.470	3	.697	2.530	2	.303	4.192
83	1	2(**)	.497	3	.625	2.381	1	.375	3.401
84	1	2(**)	.940	3	.602	.401	1	.398	1.229
85	1	2(**)	.999	3	.518	.018	1	.482	.164
86	1	1	.645	3	.581	1.665	2	.419	2.322
87	1	1	.857	3	.538	.769	2	.462	1.072
88	1	2(**)	.943	3	.582	.389	1	.418	1.054
89	1	2(**)	.864	3	.601	.741	1	.399	1.564
90	1	2(**)	.935	3	.599	.423	1	.401	1.227
91	1	2(**)	.995	3	.518	.067	1	.482	.213
92	1	1	.844	3	.588	.821	2	.412	1.536
93	1	1	.932	3	.509	.442	2	.491	.512
94	1	1	.866	3	.513	.729	2	.487	.830
95	1	2(**)	.983	3	.547	.162	1	.453	.535
96	1	2(**)	.028	3	.627	9.128	1	.373	10.162
97	1	2(**)	.996	3	.556	.057	1	.444	.505
98	1	2(**)	.756	3	.634	1.187	1	.366	2.283
99	1	2(**)	.171	3	.615	5.009	1	.385	5.948
100	1	1	.000	3	1.000	594.810	2	.000	618.924
134	2	2	.982	3	.525	.172	1	.475	.369
135	2	1(**)	.846	3	.517	.815	2	.483	.952
136	2	2	.985	3	.542	.154	1	.458	.489
137	2	2	.708	3	.632	1.388	1	.368	2.470
138	2	2	.975	3	.582	.216	1	.418	.877
139	2	1(**)	.442	3	.563	2.692	2	.437	3.202
140	2	1(**)	.983	3	.563	.165	2	.437	.669
141	2	2	.983	3	.551	.166	1	.449	.578
142	2	1(**)	.964	3	.577	.278	2	.423	.896
143	2	2	.998	3	.551	.043	1	.449	.455
144	2	1(**)	.984	3	.521	.156	2	.479	.324
145	2	1(**)	.910	3	.538	.541	2	.462	.846
146	2	1(**)	.979	3	.537	.194	2	.463	.492
147	2	1(**)	.765	3	.542	1.151	2	.458	1.489
148	2	1(**)	.000	3	.926	37.141	2	.074	42.190
149	2	1(**)	.221	3	.541	4.402	2	.459	4.729
150	2	2	.781	3	.596	1.085	1	.404	1.860
151	2	2	.976	3	.522	.210	1	.478	.384
152	2	1(**)	.665	3	.533	1.573	2	.467	1.839
153	2	1(**)	.772	3	.564	1.121	2	.436	1.637

154	2	2	.671	3	.617	1.550	1	.383	2.503
155	2	2	.592	3	.629	1.907	1	.371	2.961
156	2	2	.982	3	.579	.173	1	.421	.809
157	2	2	.994	3	.550	.077	1	.450	.480
158	2	1(**)	.919	3	.589	.501	2	.411	1.220
159	2	2	.865	3	.615	.735	1	.385	1.670
160	2	2	.876	3	.585	.688	1	.415	1.374
161	2	2	.990	3	.545	.115	1	.455	.479
162	2	1(**)	.949	3	.575	.357	2	.425	.959
163	2	2	.941	3	.527	.396	1	.473	.611
164	2	2	.747	3	.631	1.225	1	.369	2.303
165	2	1(**)	.976	3	.579	.208	2	.421	.846
166	2	2	.946	3	.596	.371	1	.404	1.151
167	2	2	.917	3	.599	.507	1	.401	1.308
168	2	1(**)	.911	3	.514	.534	2	.486	.647
169	2	2	.668	3	.642	1.562	1	.358	2.731
170	2	2	.746	3	.637	1.230	1	.363	2.354
171	2	2	.976	3	.576	.212	1	.424	.824
172	2	1(**)	.737	3	.517	1.265	2	.483	1.405
173	2	1(**)	.995	3	.552	.076	2	.448	.497
174	2	2	.987	3	.562	.138	1	.438	.633
175	2	1(**)	.997	3	.520	.048	]□.4	.480	.211
176	2	2	.980	3	.553	.187	1	.447	.615
177	2	1(**)	.772	3	.613	1.120	2	.387	2.036
178	2	1(**)	.982	3	.529	.170	2	.471	.399
179	2	2	.997	3	.508	.048	1	.492	.115
180	2	1(**)	.102	3	.757	6.198	2	.243	8.470
181	2	1(**)	.762	3	.600	1.163	2	.400	1.973
182	2	2	.480	3	.571	2.475	1	.429	3.046
183	2	2	.504	3	.646	2.344	1	.354	3.544
184	2	2	.976	3	.510	.212	1	.490	.294
185	2	2	.945	3	.577	.378	1	.423	1.001
186	2	1(**)	.823	3	.561	.911	2	.439	1.403
187	2	2	.592	3	.640	1.908	1	.360	3.055
188	2	2	.311	3	.660	3.577	1	.340	4.901
189	2	2	.887	3	.605	.639	1	.395	1.493
190	2	2	.987	3	.549	.139	1	.451	.533
191	2	1(**)	.908	3	.598	.550	2	.402	1.342
192	2	2	.804	3	.615	.991	1	.385	1.925
193	2	2	.885	3	.609	.649	1	.391	1.533
194	2	2	.936	3	.587	.422	1	.413	1.121
195	2	2	.944	3	.559	.383	1	.441	.858
196	2	2	.936	3	.532	.421	1	.468	.674
197	2	2	.751	3	.636	1.210	1	.364	2.326
198	2	1(**)	.975	3	.530	.218	2	.470	.462
199	2	2	.938	3	.550	.409	1	.450	.811
200	2	2	.972	3	.586	.235	1	.414	.933
201	2	1(**)	.859	3	.541	.760	2	.459	1.090
202	2	2	.636	3	.643	1.703	1	.357	2.883
203	2	2	.850	3	.552	.796	1	.448	1.215

204	2	2	.896	3	.592	.601	1	.408	1.345
205	2	1(**)	.702	3	.515	1.417	2	.485	1.534
206	2	1(**)	.997	3	.554	.050	2	.446	.481
207	2	2	.981	3	.565	.178	1	.435	.700
208	2	1(**)	.888	3	.524	.637	2	.476	.830
209	2	2	.976	3	.551	.209	1	.449	.619
210	2	1(**)	.819	3	.571	.925	2	.429	1.497
211	2	1(**)	.909	3	.581	.544	2	.419	1.196
212	2	1(**)	.997	3	.510	.050	2	.490	.132
213	2	1(**)	.609	3	.698	1.830	2	.302	3.509
214	2	1(**)	.628	3	.563	1.742	2	.437	2.253
215	2	2	.715	3	.615	1.361	1	.385	2.297
216	2	2	.433	3	.654	2.744	1	.346	4.015
217	2	2	1.000	3	.524	.014	1	.476	.207
218	2	2	.880	3	.588	.670	1	.412	1.379
219	2	2	.925	3	.506	.470	1	.494	.521
220	2	2	.547	3	.640	2.122	1	.360	3.272
221	2	2	.596	3	.638	1.888	1	.362	3.021
222	2	2	.637	3	.637	1.700	1	.363	2.829
223	2	2	.921	3	.584	.492	1	.416	1.174
224	2	1(**)	.954	3	.517	.331	2	.483	.465
225	2	2	.847	3	.504	.812	1	.496	.845
226	2	2	.970	3	.576	.246	1	.424	.860
227	2	2	.918	3	.593	.504	1	.407	1.253
228	2	2	.328	3	.627	3.444	1	.373	4.480
229	2	2	.988	3	.553	.130	1	.447	.552
230	2	2	.836	3	.615	.855	1	.385	1.791
231	2	2	.986	3	.559	.148	1	.441	.619
232	2	2	.797	3	.601	1.016	1	.399	1.833

For the original data, squared Mahalanobis distance is based on canonical functions. For the cross-validated data, squared Mahalanobis distance is based on observations.

** Misclassified case

a Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions deri from all cases other than that case.

Appendix 4
Discriminant

Notes

Output Created		11-OCT-2012 16:49:38
Comments		
Input	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	232
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing in the analysis phase.
	Cases Used	In the analysis phase, cases with no user- or system-missing values for any predictor variable are used. Cases with user-, system-missing, or out-of-range values for the grouping variable are always excluded.
Syntax		DISCRIMINANT /GROUPS=Class(1 2) /VARIABLES=NPLtoADV ROA AdvDepRatio /ANALYSIS ALL /OUTFILE=MODEL('E:\MBA PROJECTS 2012\ANTONINA\DISCRIMINANT RESULTS.xml') /SAVE=CLASS SCORES PROBS /PRIORS EQUAL /STATISTICS=MEAN STDDEV UNIVF BOXM COEFF RAW CORR COV GCOV TCOV TABLE CROSSVALID /PLOT=CASES /CLASSIFY=NONMISSING POOLED .

Files Saved	Model Information	E:\MBA PROJECTS 2012\ANTONINA\DISCRIMINANT RESULTS.xml
	Number of unweighted cases written to the working file after classification	232

Analysis Case Processing Summary

Unweighted Cases		N	Percent
Valid		198	85.3
Excluded	Missing or out-of-range group codes	33	14.2
	At least one missing discriminating variable	1	.4
	Both missing or out-of-range group codes and at least one missing discriminating variable	0	.0
	Total	34	14.7
Total		232	100.0

Group Statistics

Class		Mean	Std. Deviation	Valid N (listwise)	
				Unweighted	Weighted
1	NPLtoADV	.21152	.329324	99	99.000
	ROA	2.72747	1.841455	99	99.000
	AdvDepRatio	.76464	.786544	99	99.000
2	NPLtoADV	.11286	.112094	99	99.000
	ROA	3.33465	2.098374	99	99.000
	AdvDepRatio	.70684	.157437	99	99.000
Total	NPLtoADV	.16219	.250296	198	198.000
	ROA	3.03106	1.992465	198	198.000
	AdvDepRatio	.73574	.566503	198	198.000

Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
NPLtoADV	.961	7.962	1	196	.005
ROA	.977	4.683	1	196	.032
AdvDepRatio	.997	.514	1	196	.474

Test Results

Box's M		301.925
F	Approx.	49.485
	df1	6
	df2	278334.792
	Sig.	.000

Tests null hypothesis of equal population covariance matrices.

Summary of Canonical Discriminant Functions

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.063(a)	100.0	100.0	.243

a First 1 canonical discriminant functions were used in the analysis.

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.941	11.877	3	.008

Standardized Canonical Discriminant Function Coefficients

	Function
	1
NPLtoADV	.766
ROA	-.542
AdvDepRatio	.248

Structure Matrix

	Function
	1
NPLtoADV	.803
ROA	-.616
AdvDepRatio	.204

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions
Variables ordered by absolute size of correlation within function.

Canonical Discriminant Function Coefficients

	Function
	1
NPLtoADV	3.115
ROA	-.275
AdvDepRatio	.437
(Constant)	.006

Unstandardized coefficients

Functions at Group Centroids

	Function
Class	1
1	.250
2	-.250

Unstandardized canonical discriminant functions evaluated at group means

Classification Statistics

Classification Processing Summary

Processed		232
Excluded	Missing or out-of-range group codes	0
	At least one missing discriminating variable	1
Used in Output		231

Pooled Within-Groups Matrices(a)

		NPLtoADV	ROA	AdvDepRatio
Covariance	NPLtoADV	.061	-.046	-.008
	ROA	-.046	3.897	-.003
	AdvDepRatio	-.008	-.003	.322
Correlation	NPLtoADV	1.000	-.095	-.059
	ROA	-.095	1.000	-.003
	AdvDepRatio	-.059	-.003	1.000

a The covariance matrix has 196 degrees of freedom.

Covariance Matrices(a)

Class		NPLtoADV	ROA	AdvDepRatio
1	NPLtoADV	.108	-.011	-.013
	ROA	-.011	3.391	.000
	AdvDepRatio	-.013	.000	.619
2	NPLtoADV	.013	-.082	-.004
	ROA	-.082	4.403	-.006
	AdvDepRatio	-.004	-.006	.025
Total	NPLtoADV	.063	-.061	-.007
	ROA	-.061	3.970	-.012
	AdvDepRatio	-.007	-.012	.321

a The total covariance matrix has 197 degrees of freedom.

Analysis 1

Box's Test of Equality of Covariance Matrices

Log Determinants

Class	Rank	Log Determinant
1	3	-1.483
2	3	-6.781
Pooled within-groups	3	-2.591

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.