Loan Products and Credit Scoring by Commercial Banks (India)

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Abstract - **This study describes the loan products offered by commercial banks and credit scoring techniques used for classifying risks and granting credit to applicants in India. Loan products offered by commercial banks are from several kinds, since housing loans, personal loans, business loans until education loans or vehicle loans, among many other types. All loan products are categorized either as secured or unsecured loans. Credit scoring techniques used for both secured and unsecured loans are broadly divided into two categories: Advanced Statistical Methods and Traditional Statistical Methods. Some methodologies are presented to discuss Indian situation and understand the different kind on retail loans offered by banks and the different credit scoring methods for personal finance used by commercial banks in India.**

Keywords – Retail banks, Secured and Unsecured Loans, Credit Scoring Techniques.

1. Introduction

1.1 Initial Considerations

The human History allows well to understand the risks of lending money. Borrowing and lending have long history related to human behavior (Thomas et al., 2002). A credit risk component may be associated with lending transactions, in order to reduce credit risk. Credit scoring methods may be used to assess the credit worthiness of borrower. The information filled in the personal finance application form is used to develop a numerical score for each applicant (Lewis, 1992; Hand and Jacks, 1998; Thomas et al., 2002) and these scores may be used to discriminate on bad and good loans (Durand, 1941). Credit scores are broadly classified into two categories based on the method used to obtain scores, i.e. deductive or judgmental credit scoring and empirical or statistical credit scoring (Muller, 1997; Liu, 2001; Caire, 2004).

1.2 Retail Banking In India

Any national economy has to have a good banking system. It is very important for sustaining

the economic development. Indian economy is among the fastest growing economies; and probably the main reason behind this was the financial and banking sector reforms that have taken place after 1991. Banking sector has faced many circumstances where growth has taken place but others with more difficult situations. This kind of ups and downs were verified several times in the post independence era. Retail banking has always been important in India, coming back to the times when banks were nationalized with the objective of reaching the masses.

The growth in retail banking has been quite prominent retail in the recent years. Retail banking has been supported by growth in banking technology and automation of the banking process. Technological development has played the main role for the rapid growth and spread of retail banking. This banking segment has vast opportunity as well as challenges in a growing economy as it is the case of Indian economy. The company A.T. Kearney, a global management consulting firm, has identified India as the second most attractive retail destination out of 30 emergent markets.

The major relevant policy issues to retail banking may be pointed as financial capability, consumer protection, regulation and responsible lending.

Retail banking is an interesting innovation in the 21st century in India and has experienced a fast growth. As retail banking is a banking service that has increased primarily towards individual customer, it focuses mainly on buyer markets. Retail banking uses to apply mass-market strategy being the target the individual customer. The individual customer uses local branches of larger commercial banks. The main services offered by retail banks are saving and checking accounts, mortgages, personal loans, debit cards, credit cards, among others. Moreover, it deals also with various customers' banking needs. Retail banking provides several kind of features related to

multiple products, channels and customer groups. In India most of the banks are providing retail banking services.

The considerable recent retail banking growth in India is expected to continue in the future. There are some consistent reasons for this growth since technological factors, private and foreign banks introduced in India, the increased competition, the significant innovation in banking products and services, the economic growth, the interest rates deregulation, the consumerism, changes in life style of working/middle class, the focus on productivity and profitability, the driving towards low NPAs, the changing consumer demographics.

Retail banking sector in the banking industry is continuously undergoing innovations, product reengineering, adjustments and alignments. As mentioned above, Indian retail banking segment is developing considerably and includes nowadays many services. Besides credit cards, debit and ATM, housing loans, personal loans, consumption loans, education loans, vehicle loans, it includes also for example insurance services, online services, among many other services.

For the purposes of this study, a restriction of analysis is made being the study focused basically on loan products.

Retail lending is the exhortation in India. Most banks have the retail segment on around 20% of their total lending portfolio, being this segment growing at an unnatural rate of 30 to 35% per annum. Retail lending has been the key profit driver in the banking sector in recent times. Retail banking used to be synonymous of savings account and fixed deposits with cheque based/deposit slip based transactions. Retail loans were usually restricted to housing loans. This situation has changed considerably in the last decade in India.

RBI's report on Trend and Progress of India (2003-04) has shown that the retail lending ranges between Rs.[1] 20000 to Rs. 100 Lakh[2], which are generally for the duration of 5-7 years with housing loans granted for 15 years. It reveals some new trends in growth of credit. There is upsurge in retail credit as against corporate advances, which may reveal itself

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[1] 1 USD= 59.310 Indian Rupees (27th October 2014).
[2]A lakh or lac is a unit in the Indian numbering system equal to one hundred thousand (100,000; scientific notation: 10^5). In the Indian convention of digit grouping, it is written as 1,00,000. For example, in India 150,000 rupees becomes 1.5 lakh rupees.

in accumulating NPAs in banking sector and may accentuate the indebtedness of households in the medium term.

1.3 Credit Scoring

Credit evaluation is one of the most crucial processes in banks credit management decisions. This process includes collecting, analyzing and classifying different credit elements and variables to assess the credit decisions. The quality of bank loans is the key determinant of competition, survival and profitability. One of the most important kits, to classify bank customers, as a part of the credit evaluation process to reduce the current and the expected risk of a customer being bad credit, is credit scoring. Hand & Jacka (1998) stated that "the process of modeling creditworthiness by financial institutions is referred to as credit scoring". It is also useful to provide further definitions of credit scoring.

Anderson (2007) suggested that to define credit scoring, the term should be broken down into two components, credit and scoring. Firstly, simply the word credit means "buy now, pay later". It is derived from the Latin word "credo", which means "I believe" or "I trust in". Secondly, the word "scoring" refers to "the use of a numerical tool to rank order cases according to some real or perceived quality in order to discriminate between them, and ensure objective and consistent decisions". Therefore, scores might be presented as "numbers" to represent a single quality, or "grades" which may be presented as "letters" or "labels" to represent one or more qualities (Anderson, 2007). Consequently, credit scoring can be simply defined as "the use of statistical models to transform relevant data into numerical measures that guide credit decisions. It is the industrialization of trust; a logical future development of the subjective credit ratings (Beynon, 2005) first provided by nineteenth century credit bureau, that has been driven by a need for objectives, fast and consistent decisions, and made possible by advances in technology" (Anderson, 2007). Furthermore, "credit scoring is the use of statistical models to determine the likelihood that a prospective borrower will default on a loan. Credit scoring models are widely used to evaluate business, real estate, and consumer loans" (Gup & Kolari, 2005). Also, "credit scoring is the set of decision models and their underlying techniques that aid lenders in the granting of consumer credit. These techniques decide who will get credit, how much credit they should get and what operational strategies will enhance the profitability of the borrowers to the lenders" (Thomas et al., 2002).

Credit scoring models (Lewis, 1992; Bailey, 2001; Mays, 2001; Malhotra & Malhotra, 2003; Thomas et al., 2004; Chuang & Lin, 2009; Sustersic et al, 2009) are some of the most successful applications of research modeling in finance and banking, as reflected in the number of scoring analysts in the industry, which is continually increasing. "However, credit scoring has been important in allowing the phenomenal growth in consumer credit over the last five decades. Without credit scoring techniques, as an accurate and automatically operated risk assessment tool, lenders of consumer credit could not have expanded their loan effectively" (Thomas et al, 2002).

2   Literature Review

There are many studies developing this subject. Some studies are particularly interesting in order to frame the analysis and to create some references for the developments that are intended to develop in this study. Some modelling cases follow around studies on this area.

Hand and Crowde (2005), for example, used latent-variable technique for measuring underlying aspects of credit customer behavior. The latent-variable model separates the observed variables into primary characteristics (x) and behavioral characteristics (y). Then the study summarizes them into overall measure of credit consumer scores.

Samreen et al. (2013) summarized the development of a credit scoring model known as Credit Scoring Model for Corporations (CSMC), which could be used to evaluate the creditworthiness of corporate borrowers before granting loan. Type I and type II errors of proposed model (CSMC) have more accuracy rate with no errors as compared to LR and DA.

Li and Zhong (2012) introduced ensemble learning model for credit scoring. This model points out moving from static credit scoring to dynamic behavioral scoring and maximizing revenue by decreasing Type I and Type II errors. The challenges faced in building credit scoring models are half-baked applicant's information, missing values and inaccurate information.

Hussein and Pointon (2011) reviewed 214 articles/books of credit scoring applications. The important and key determinants of credit scoring models have been investigated. The matrix (ACC rate criterion) measures the proportion of correctly classified cases. ACC rate is a significant criterion in

evaluating the classification capacity of proposed scoring model. ROC curves also known as Lorentz curves is a two dimensional graph that represents the proposition of sensitivity (1-type II error) on y-axis and specificity (1-type I error) on x-axis. The maximum distance between ROC and diagonal is equal to constant times K-S statistics.

Bellotti and Crook (2009) developed a credit score model with inclusion of time varying macro-variables like interest rate and unemployment rate using Survival Analysis. Survival Analysis is competitive in comparison to LR as a credit scoring method for prediction. The inclusion of macro-variables gave a statistically significant improvement in predictive performance.

Kessy (2011) examined the link between the loan processing and monitoring in banks, and asset growth and empowerment of individual customers. Findings revealed that better allocation and utilization of financial institution's economic capital not only facilitates outreach to more under banked and unbanked productive poor people but also empowering them by stimulating investments and increasing productivity in a cost-effective way for poverty reduction.

Azam et al. (2012) evaluated the significance of loan applicant socioeconomic attributes on personal loan decision in banks using descriptive statistics and logistic regression. The model identified that out of six independent variables only three variables (region, residence status and year with the current organization) have significant impact on personal loan decision.

Matthew and Sarah (2013) investigated credit risk and default among Ghanaian banks. It was suggested that banks should tighten their credit assessment tool, i.e. CAMPARI (Character, Ability, Model, Purpose, Amount, Repayment and Insurance) model. It was recommended that the Central Bank should facilitate the establishment of a vibrant credit-referencing bureau in order to provide the credit history for banks customers.

Koh et al. (2006) illustrated the use of data mining techniques to construct credit scoring models. The construction of this model has five steps: defining the objective, selecting variables, selecting sample and collecting data, selecting modelling tools and constructing models, validating and assessing models.

Nancy et al. (2013) studied the Credit Risk Assessment Model of SBI Bank. SBI loan norms are

flexible and differ from case to case. Loans applicant information will be checked from RBI willful defaulters lists.

3   Types of Retail Loans

Retail banks offer different types of loan to the individual customer to meet their diverse needs. The different types of loans offered by a retail banks to an individual customer may be home loans, loans against property, education loans, personal loans, business loans, gold loans, credit card loans, or yet even others.

Description of some loan types offered by retail banks is given below:

1. Home Loan - available for purchasing new/old dwelling unit, construction of a house, purchasing a plot of land for construction of a house. Banks have also designed housing loans facilities for NRI/PIO. Customer opt for Flexi Rate plan to hedge the interest rate risk by breaking a loan into two separate accounts, free property insurance and personal accident insurance. Borrower does not pay pre-payment/foreclosure charges for a part as well as full prepayment (when repaid from own sources by the borrower).

2. Education is the most important investment one may make in life. Higher studies and specialization in certain fields call for additional financial support from time to time. Whether customers are planning school education for their children (nursery to standard XII) pursuing a graduate or post-graduate degree, the bank gives Education Loans, to fulfill customers' ambitions and goals.

3. In nowadays fast paced world, a vehicle is a common necessity. Yet there are some expenses and plans in life that take priority, the dream of owning a car is now also important. Whether as a comfortable and dependable means of transport or as a status symbol in society, it is believed that anyone deserves today to have a vehicle. There are benefits for this kind of loans. Available up to `15 Lakhs for any car model (inclusive of gas-kit), loans can be availed for new and second-hand vehicles (not more than 3 years old). Repayment period of a loan is as long as 7 years. For those individuals who prefer to travel more conservatively or to get to their destinations faster, a two-wheeler is as much a boon as it is to a car owner. With newer models coming out each year, the options available to the customer are both attractive as well as convenient. All resident Indians, salaried people, professionals, self-employed, businessmen and farmers can apply for this kind of loan.

4. Banks give loans to professional people like doctors or engineers, for example. These loans are designed specially to cater to the financial needs of the professional. A loan can be availed as a demand/term loan or overdraft as per customer's preference. The loan is available for purchasing office equipments viz. computers, fax, air-conditioners, furniture, etc.

5. Also, loans are available for expansion/renovation/modernization of existing premises. Traders loan facilities enable individuals, proprietorships, bodies such as partnership firms and co-operative societies to avail of working capital or undertake development of shop by way of loan/overdraft.

6. Dealers in gold/silver jewellary may get benefit of a loan. The loan is provided against the security of tangible collateral securities in the form of mortgage of land (not agricultural land) and building. There is wedding in the family. May be a person likes to surprise the spouse with a priceless gift. People simply may like to pamper their family with an extended vacation. These are situations for which a person may need a helping hand.

A bank offers personal loans to meet personal requirements. A bank helps a customer to take care of all kind of expenses at a short notice. A loan may be availed to meet expenses related to marriage, a travel, the honeymoon, a holiday or medical expenditures or yet for any other personal use. It is also available to pensioners/defense pensioners. A loan is also available for Earnest Money Deposits for buyers of home/flat/plot. A bank gives loans to a customer as an innovative combination of a loan and over draft facility with flexible repayment options against the immovable property security of the customer. Benefits of this loan are an ideal use of idle property - generating additional income from idle property, customer withdraw money as per their needs and save on interest costs, deposit surplus money/regular income/salary and save interest, flexibility to withdraw money deposited earlier. Banks also provide either as overdraft or demand loans as per the customer's need.

4   Credit   Scoring   Procedures   and   Techniques

4.1 Credit Scoring Methodology

Credit scoring was primarily dedicated to assessing individuals who were granted loans, both existing and new customers. Credit analysts, based on pre-determined scores, reviewed customers' credit history and creditworthiness to minimize the probability of delinquency and default.

Basically, credit scoring is a method which can be used to classify or quantify the risk factors relevant for a borrower's ability and willingness to repay the loan. Credit scoring allows lenders to predict likely loan outcomes based on the use of statistical techniques, which allow objective predictions as to whether a loan will produce a good or bad outcome. Credit scoring can be used on a standalone basis or as a part of the credit evaluation process. When used on a standalone basis, credit scoring assists in classifying applicants into accept/reject groups or good/bad credits; when used as part of the credit evaluation process, credit scoring can help to measure the credit risk of the applicants (Thomas et al, 2002; Bhatia, 2006).

Durand (1941) was the first to recognise that one could use the same techniques to discriminate between good and bad loans. "*Credit scoring is essentially a way of recognizing the different groups in a population when one cannot see the characteristic that separates the groups*" (Thomas, 2000). Commercially, the credit scoring was first developed in the 1950s by Bill Fair and Earl Isaac, but has only come into increasing use in the last two decades (Thomas, 2000). The main aim of the credit scoring model is to build a single aggregate risk indicator for a set of risk factors from analysis of data representative of the lender's own previous lending experience (Thomas, 2000; Bhatia, 2006).

As per the information collected from the bankers, the credit scoring for personal loans is done in line with the RBI guidelines. Almost all banks are following BASEL II and III guidelines. As per the experience of bankers, credit scoring process includes collecting, analyzing and classifying different credit elements and variables to assess the credit decisions. The quality of bank loans is the key determinant of competition, survival and profitability. It is one of the most important kits, to classify a bank's customers, as a part of the credit evaluation process to reduce the current and the expected risk of a customer as being a bad credit. The objective of credit scoring models is to assign loan customers to either good credit or bad credit or predict the bad creditors. Therefore, scoring problems are related to the classification analysis.

Probably the earliest use of statistical scoring to distinguish between "good" and "bad" applicants was made by Durand. Bankers will assign some weight age to the loan application form filled by borrower. Every bank has its own credit score cut points, which will cluster the customer into different risk groups.

A wide range of statistical techniques are used in building scoring models. Most of these models are statistical, being some of them non-linear; models are applicable to build an efficient and effective credit scoring system that is effectively used for predictive purposes. Techniques, such as weight of evidence measure, regression analysis, discriminant analysis, probit analysis, logistic regression, linear programming, Cox's proportional hazard model, support vector machines, decision trees, neural networks, k-nearest-neighbour, genetic algorithms and genetic programming, are all widely used techniques in building credit scoring models by credit analysts, bankers, lenders and computer software developers and providers.

4.2 Advanced statistical methods vs. traditional statistical methods

Advanced statistical techniques, such neural networks and genetic programming, provide an alternative to conventional statistical techniques, such as discriminant analysis, Probit analysis and logistic regression. The point of using sophisticated techniques, such as neural nets, is their capability of modeling extremely complex functions, and, of course, this stands in contrast to traditional linear techniques, such as linear regression and linear discriminant analysis. Probabilistic neural nets usually trains presented cases faster than multi-layer feed-forward nets, and classifies them in the same way or better than multi-layer feed-forward nets, even through multi-layer feed-forward nets have been shown to be excellent classifiers (Palisade, 2005; Irwin, et al., 1995). However, a range of sophisticated algorithms for neural nets training - making them an attractive alternative to the more conventional techniques - has become available (Masters, 1995; Palisade, 2005). Also, genetic programming is one of the most successful alternatives to traditional techniques recently used in this field. Genetic programming is utilized to automatically determine the sufficient discriminant functions and the applicable features simultaneously. Dissimilar neural networks may only suit large datasets, but genetic programming can positively perform well even with small data-sets (Nath et al, 1997). Different credit

scoring tools and techniques used by banks are discussed in existing literature.

4.3 Credit Scoring Tools and Techniques in the Literature

Follows some references which are important where this topic is developed by pursuing some different scoring tools and techniques:

- Logistic Regression: Orgler (1971), Lucas 1992, Henley, 1995; Arminger et al.,1997, Desai et al.,1997, Hand and Henley, 1997; Hand and Jacka, 1998, West 2000, Baesens et al., 2003, Abdou et al.,2009c

- Discriminant Analysis: Durand (1941), Altman (1968), Boyle et al. (1992), Henley (1995), Desai et al. (1997), Hand and Henley (1997); Caouette et al. (1998); West (2000), Baesens et al. (2003), Malhotra and Malhotra (2003), Sarlija et al. (2004); Abdou and Pointon (2009).

- Probit Analysis: Grablowsky and Talley (1981), Guillen and Artis (1992), Pindyck and Rubinfeld (1997), Maddala (2001).

- DT or CART or recursive partitioning: Baesens et al. (2003), Stefanowski and Wilk (2001), Fritz and Hosemann (2000), Hand and Jacka (1998), Henley and Hand (1996) and Coffman (1986), Paleologo et al. (2010), Breiman et al. (1984); Arminger et al. (1997), Breiman et al. (1984), Rosenberg and Gleit (1994).

- Neural Network: Bishop (1995); Masters (1995); Arminger et al. (1997), Stefanowski and Wilk (2001), Lee et al. (2002), Malhotra and Malhotra (2003), Kim and Sohn (2004), Zekic Susac et al. (2004), Lee and Chen (2005), Yim and Mitchell (2005), Blochlinger and Leippold (2006), Seow and Thomas (2006), Trinkle and Baldwin (2007).

- Genetic Programming: Koza (1994); Teller and Veloso (2000), Xia et al. (2000), McKee and Lensberg (2002), Nunez Letamendia (2002), Chen and Huang (2003), Zhang and Bhattacharyya (2004), Ong et al. (2005), Lensberg et al. (2006), Huang et al. (2006), Huang et al. (2007), Etemadi et al. (2009).

5 Methodology

5.1 Statement of the Problem

Considering the exposed above, it can be said that the main income for retail banking is the interest generated for the loans and advances. If this interest or loans are not paid regularly it becomes a big problem for the bank. When a borrower fails to meet the legal obligations (or conditions) of a loan, he is said to have defaulted on his/her loan. These defaults increase the level of non-performing assets. In order to decrease the level of non-performing assets, the bank has to develop loan application screening methods, which distinguishes applicants as bad and good applicants, considering the credit scoring methods. Almost all banks have credit scoring methods, but still they have non-performing assets. This study is carried out to know the credit scoring methods used by banks and list loan products offered to customers.

5.2 Objectives

The main objectives of the present study are the following ones:

1. To know different types of retail loans offered by banks.

2. To know the different credit scoring methods for personal finance available and used by commercial banks.

6 Current Credit Scoring Procedure

The different types of loans offered by Indian banks are home loans, auto loans, personal loans, business loans, loans against property, gold loans and credit cards loans. The process of loans sanctioning involves personal loans product promotions, customers contacting the bank, filling up the application form. Physical evidences for the support of a loan process are application forms, agreement, loan balance statement, and acknowledgement of repayment.

The interface (people) responsible for carrying the whole loan process is a bank branch, a bank loan executive, a bank manager, a credit scoring executive, a CIBIL and a credit manager. Customer requirements are: availability for different loan products, low interest rates, low EMI, maximum repayment time periods, diminishing rates of interests, easy documentation, higher LTV and the credit scoring. Once banks receive the filled application form of applicant for personal finance, it undergoes through various stages. The application form will be sent to the credit risk department where credit scores are calculated.

There are two types of credit scoring done by banks in India i.e. internal and external scoring. The ranges as well as groups vary from bank to bank, while as the external CIBIL scores are the same for all banks. The CIBIL scores vary from 300 to 900 or NA (Not applicable) or NH (No History), 300 being

the lowest and 900 the highest. Banks prefer applicants with a score higher than 700. The external scoring is carried out to check the applicant's banking with other banks and other financial institutions. The components of the CIBIL credit score and credit report are payment history (35%), Amount Owed (30%), Length of Credit History (15%), New Credit (10%) and types of Credit used (10%) for scoring the applicant. CIBIL has all the transaction details of all borrowers. Normally the whole process will take place within 10 working days.

The commonly assessed customer details are: bank history, income, banking (Annual Quarterly Balance AQB), stability, etc. The whole processing fee will be paid by banks. The internal credit scoring will be done within the bank, while as for the external scoring bank has to pay towards CIBIL. Bank will not charge the processing fee to the applicant. The credit score can be improved considering the following principles:

1.   Always pay your dues on time.

2.   Always keep your credit balance low on your credit card.

3.   Maintain a healthy mix of credit

4.   Monitor your and your guarantor accounts balance frequently.

There are 4 main factors which mainly affect the score:

1.   payment history,

2.   high utilization of credit limit,

3.   higher percentage of credit cards or personal finance and

4.   many new accounts opened recently.

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7   Final Notes

In a new or emerging market, the operational, technical, business and cultural issues should be considered with the implementation of the credit scoring models for retail loan products. The operational issues relate to the use of the model and it is imperative that the staff and the management of the bank understand the purpose of the model. Application scoring models should be used for making credit decisions on new applications and behavioral models for retail loan products to supervise existing borrowers for limiting the expansion or for marketing new products. The technical issues relate to the development of proper infrastructure, maintenance of historical data and software needed to build a credit scoring model for retail loan products within the bank. The business issues relate to whether the soundness and safety of banks could be achieved through the adoption of quantitative credit decision models, which would send a positive impact in the banking sector. The cultural issues relate to making credit irrespective of race, colour, sex, religion, marital status, age or ethnic origin. Further, models have to be validated so as to ensure that the model performance is compatible in meeting the business as well as regulatory requirements.

Thus, the above issues have to be considered while developing and implementing credit scoring models for retail loan products.

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