

Loan products and Credit Scoring Methods by Commercial Banks

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Abstract - This study describes the loan products offered by the commercial banks and credit scoring techniques used for classifying risks and granting credit to the applicants in India. The loan products offered by commercial banks are: Housing loans, Personal loans, Business loan, Education loans, Vehicle loans etc. All the loan products are categorized as secured and unsecured loans. Credit scoring techniques used for both secured as well as unsecured loans are broadly divided into two categories as Advanced Statistical Methods and Traditional Statistical Methods.

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

1. Retail Banking in India

A good banking system is very important for sustained economic development. Indian economy is among the fastest growing economies; the main reason behind this is financial and banking sector reforms since 1991. Banking sector growth has seen many ups and downs in the post independence era. Retail banking has always been important in India where banks were nationalized with the objective of reaching the masses. However, 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. Retail banking has vast opportunity as well as challenges in a growing economy like India. A.T. Kearney, a global management-consulting firm, identified India as the second most attractive retail destination out of 30 emergent markets. The major policy issues relevant to retail banking are financial capability, consumer protection, regulation and responsible lending.

Retail banking is the innovation of the 21st Century. India has experienced a fast growth in retail banking. Retail banking is a banking service that is increased primarily toward individual customer. It focuses mainly on buyer markets. Retail banking used mass-market strategy where the target is individual customer. The individual customer use local branches of larger commercial banks. The main services offered by the retail banks are saving and checking accounts, mortgages, *personal loans*, debit cards, credit cards etc. Moreover, it takes care of the various banking needs of customers. Retail banking provides features i.e. multiple products, channels and customer groups. In India most of the banks are providing retail banking services. The retail banking in India is in growing and same is to be expected in future also. The reasons for its growth are: Technology, Introduction Private and foreign banks, Increased competition, Innovation in banking products and services, Economic growth, Deregulation of interest rates, Consumerism, Changes in life style of working/middle class, Focus on productivity and profitability, Drive towards low NPAs, Changing consumer demographics.

Retail banking sector in the banking industry is continuously undergoing innovations, product reengineering, adjustments and alignments. Indian retail banking segment includes: Cards- credit, debit and ATM, *Housing loans, Personal loans, Consumption loans, Education loans, Vehicle loans*, Insurance, Demat services, Online services etc. This study is focused on the loan products so we will discuss only *loan products* in next section.

Retail lending is the exhortation in India. Most banks have retail as of around 20% of their total lending portfolio and these are 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 with savings account and fixed deposits with cheque based/deposit slip based

transactions. Retail loans were usually restricted to housing loans. This has changed considerably in the last decade, especially in India. The RBI's report on Trend and Progress of India (2003-04) has shown that the retail lending ranges between Rs.20000 to Rs. 100 Lakh, 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 in accumulating NPAs in banking sector and may accentuate the indebtedness of households in the medium term.

2. 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 objective, 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).

3. Review of Literature

David J Hand and Martin J Crowde (2005) used latent-variable technique for measuring underlying aspect of credit customer behavior. The *latent-variable model* separates the observed variables into primary characteristics (x) and behavioral characteristics (y) and summarizes them into overall measure of credit consumer scores.

Asia 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.

Xiao-Lin Li, Yu Zhong (2012) introduced *ensemble learning model* for credit scoring. It points out moving from static credit scoring to dynamic behavioral scoring and maximizing revenue by decreasing the *Type I and Type II error*. 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 *confusion 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.

T Bellotti and J 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.

Rehan Azam et al., (2012) evaluated 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 facilitate the establishment of a vibrant credit-referencing bureau in order to provide credit history of customers of the banks.

Hian (2006) illustrated the use of *data mining techniques* to construct credit scoring models. The construction of model has five steps: define objective, select variable, select sample and collect data, select modeling tools and construct models, validate and assess 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. Loan applicant information will be checked from RBI willful defaulters lists.

4. Statement of the Problem

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 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, bank have developed the loan application screening methods, which distinguishes applicants as bad and good applicants, which are called credit scoring methods. Almost all the 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 of loan products offered to customers.

5. Objectives

To know different types of retail loans offered by banks.

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

6. Types of Retail Loans

Retail banks offer different types of loan to the individual customer to meet their diverse needs. The different types of loan offered by the retail banks to the individual customer are as home loan, loan against property, education loan, personal loan, business loan, gold loan, credit card loan etc. the description of all types of the loans offered by the retail banks are given as:

Home Loan is available for Purchase of new/old dwelling unit, Construction of house, Purchase of plot of land for construction of a house. Banks have also designed housing loan facility for NRI / PIO. Customer opt for Flexi Rate plan to hedge the interest rate risk by breaking the loan into two separate accounts, Free property insurance and personal accident insurance. Borrower does not pay pre payment / foreclosure charges for part as well as full prepayment (when repaid from own sources by the borrower). Education is the most important investment one makes in life. Higher studies and specialization in certain fields call for additional financial support from time to time. Whether customers are planning for their child for school education (nursery to standard XII) pursuing a graduate or post-graduate degree, the bank gives Education Loans, to fulfill customers' ambitions and goals.

In today's fast paced world, a vehicle is a necessity. Yet other expenses and plans in life take priority and the dream of owning a car takes a back seat. Whether as a comfortable and dependable means of transport or as a status symbol in society, it is believed that customer deserve ownership of a vehicle. Benefits of this loan are - available up to ` 15 Lakhs for any car make/model (Inclusive of Gas-Kit), Loans can be availed for new and second-hand vehicles (Not more than 3 years old). Repayment period of 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 loan.

Banks give loan to professional persons like doctor, engineer, CA. This loan is designed specially to cater to the financial needs of the professional. The loan can be availed as a demand / term loan or overdraft as per customer's preference. The loan is available for Purchase of office equipments viz. computers, fax, air-conditioners and furniture, etc. Also, loan is available for Expansion /

renovation / modernization of existing premises. Traders Loan facility enables 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. Dealers in gold / silver jewellery are get benefit of this 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 its high time for the person to surprise the spouse with a priceless gift. The people simply need to pamper his family with an extended vacation. These are the times when a person may need a helping hand. Bank offers personal loan to meet the personal requirements. Bank helps customer to take care of all kinds of expenses at a short notice. The Loan may be availed to meet expenses related to marriage, travel, honeymoon, holiday and medical expenditure or for any other personal use. It is also available to Pensioners / Defense Pensioners. Loan is also available for Earnest Money Deposits for buyers of home / flat / plot. Bank gives loan to the customer an innovative combination of a loan and over draft facility with flexible repayment options against the security of customer is immovable property. Benefits of this loan are ideal use of idle property - generate additional income from idle property, customer withdraw money as per their need and save on interest cost, deposit surplus money / regular income / salary and save interest, flexibility to withdraw money deposited earlier. Banks also provide either as overdraft or demand loan as per the customer's need.

7. Credit Scoring Procedures and Techniques

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 (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, 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 (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 the 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. One of the most important kit, 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 being 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 classification analysis probably the earliest use of statistical scoring to distinguish between "good" and "bad" applicants was 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 the scoring models. Most of these statistical, and some of these non-linear, models are applicable to build an efficient and effective credit scoring system that are 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.

8. 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). However, a range of sophisticated algorithms for neural nets training, making them an attractive alternative to the more conventional techniques, has become available (Palisade, 2005). Also, genetic programming is one of the most successful alternatives to traditional techniques recently used in the 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. Different credit scoring tools and techniques used by banks and discussed in existing literature are present below

Credit Scoring Methods

In the following section the from the existing literature the authors with year of publication has been grouped based on the method used for credit scoring.

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,

Discriminant Analysis: Durand (1941), Altman (1968), Boyle et al.,1992, Henley 1995, Desai et al., 1996, Desai et al.,1997, Hand and Henley, 1997; Caouette et al., 1998; Hand 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), Thomas (2000), 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; ZekicSusac 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.

9. Current Credit Scoring Procedure

The different types of loans offered by our bank are Home Loan, Auto loan, Personal Loan, Business loan, loan against property, gold loan and credit card. The process of loan sanctioning involves personal loan product promotions, customer contacting the bank, fill up the application form. The physical evidences for the support of the loan process are application forms, agreement, loan balance statement and acknowledgement of repayment. The interface (people) responsible for carrying the whole loan process are bank branch, bank loan executive, bank manager, credit scoring executive, CIBIL and credit manager. The customer requirements are availability of different loan products, low interest rate, low EMI, Maximum repayment time period, diminishing rate of interest, easy documentation, Higher LTV and credit scoring. Once the 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 same for all the banks. The CIBIL scores varies from 300-900 or NA (Not applicable) or NH (No History), 300 being the lowest and 900 as highest, banks prefer applicant with score more 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 is having 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 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 by: (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 account balance frequently. There are 4 main factors which mainly affect score: payment history, high utilization of credit limit, higher percentage of credit cards or personal finance and many new accounts opened recently.

10. Conclusion

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 limit expansion or for marketing of 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 the banks could be achieved through the adoption of the 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, the models have to be validated so as to ensure that the model performance is compatible in meeting the business as well as the regulatory requirements. Thus, the above issues have to be considered while developing and implementing credit scoring models for retail loan products within a new or emerging markets.

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