Chapter II

Review of literature
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2.1 Review of literature

Before embarking on any new research, it is necessary that review of the past studies that have been made in the same area is undertaken. This has two reasons. Firstly to understand the full dimensions of the various aspects that have been already researched and secondly to focus our research in areas that are not yet researched at all or which give room for further improvement. Otherwise we may end up reinventing the wheel once over again.

Banks belonging to emerging market countries (EMC) have been perceived by International institutions, analysts and rating agencies as high risk and weak, where as banks of advanced countries like USA, UK, EU are considered as well regulated and strong. But the global financial crisis of 2008 and the sovereign debt crisis of some of the European countries proved that this perception is not correct.

Even though emerging markets have achieved better macro economic stabilization and stricter banking regulation and reforms, the IMF in 2011 continued to warn the EMC banks. There has been no consistency among the international rating agencies in their rating of EMC banks. During October – November 2011 Moody down graded Stat Bank of India rating from C – to D+ and rated the outlook for Indian banking sector as negative. But S&P said that rating of some of the Indian Banks was better than that of Government of India. But it is common knowledge that a bank cannot get a rating better than that of the sovereign. Many banks in USA and other developed countries rated by these international agencies were the banks affected in the global financial crisis. Normally the processes of international rating agencies should have undergone a change in assessing general risk and must have resulted in recalibration of measurement scales of risk. But it has not happened. Risk management in financial sector is very critical than any other sectors in the economy. Risk management aims to address the problems by identifying and managing the risks associated with banking industry.

This Literature review examines the management of risks. Particularly the review deals with credit risk. The various aspects of risk management are risk awareness or understanding, risk identification, risk assessment and analysis, risk monitoring and credit risk analysis and managing risk. The studies conducted and the research
undertaken are segmented covering different areas of risk management as listed below, to get an over all and clearer understating of the various risks bank's face and the importance of credit risk for overall risk management. Moreover risk management does not confine itself to any one particular area of business but encompasses the whole of business in all its dimensions. Therefore it is natural and common to find that certain amount of overlapping in contents and coverage in the study of risk management. However the main thrust and focus remain on credit risk and its management in banks.

2. Risk Management and profitability
3. Risk Management and capitalization
4. Various factors which affect management of risks.
5. Risk management practices
6. Risk awareness and risk identification
7. Policies and procedures for credit risk management
8. Risk control and systems
9. Identification and management of liquidity risk, interest rate risk and operational risk etc,
10. Business failures and empirical studies
11. Common risk incidents & causes for the same
12. Human factor in risk management

2.2 Reviews in the area of Risk Management and Performance of Banks

A major objective of bank management is wealth maximization by increasing shareholders' return. This is reflected in bank performance. The bank performance covers a wide spectrum of issues concerning, business growth, growth of assets, profitability, liquidity, capital adequacy, management efficiency etc. These areas pose several of risks such as interest risk, market risk, credit risk, off-balance risk, technology and operational risk, foreign exchange risk, country risk, liquidity risk, and insolvency risk. The bank's motivation for risk management comes from the cost of increasing risk and the desire to control those risks which can lead to under-performance of the bank defeating the objective.
Hakim and Simon Neaime (2001) investigated in two prominent countries in MENA - Egypt and Lebanon, where banks operate under market oriented economic regimes, the performance and risk. Analyzing 43 Lebanon banks and 62 Egyptian banks between 1993 and 1999 on an annual basis applying Time series and Cross section dimension, statistically inferred that Lebanon banks were less capitalized than Egyptian counterparts due to steep currency devaluation.

Eduardus Tandellin., et al. (2007) investigated the relationship between corporate governance, risk management, and bank performance in Indonesian banking sector. They analyzed whether the ownership structure is a key determinant of corporate governance and to explain the effect of external forces on risk management and bank performance. The study concluded that the relationships between corporate governance and risk management and between corporate governance and bank performance are sensitive to nature of bank ownership.

Marina Brogi (2008) investigated the size and performance of board and the role of committees (especially audit committee and risk committee) in risk acceptance processes of European financial intermediaries for a three year period of 2006-2008 for the study using Correlation analysis. It was found that there seems to be mixed relation between board size, composition and performance. Though financial intermediaries have large boards, size of board does not seem to negatively affect the performance.

Kent Gerard Matthews (2010) evaluated bank performance using a Network Data Envelopment Analysis (DEA) approach, constructed from a survey of risk managers in domestic banks and foreign banks operating in China an index of risk management practice and an index of risk management organization that are used as intermediate inputs in the production process. It was concluded that Non Performance Loan ratios have declined. The factors appear to be a mixture of recovery, asset management operation and expanded balance sheets. However, the training and practice of risk managers were not comparable to foreign banks operating in China.

It is clear from the studies that there is a relationship between risk management, performance and corporate governance in banks. Good corporate governance is independent and a pre requisite for both bank performance and risk management. Better
corporate governance leads to better risk management and further to better banks performance leading to increase in productive assets and higher bank profitability.

2.3 Risk Management and Profitability

For successful banking in a competitive market, the cheapest source of funds comes from Profits. It is a necessity and a prerequisite for growth. The success of a bank depends on its ability to foresee and avoid risks, possibly to cover losses due to risks undertaken and this is possible only when the bank operates profitability.

Eduardo Levy Yeyati and Alejandro Micco (2003) in their study empirically tested whether and how competition changes relate to changes in concentration and foreign participation. The result revealed concentration did not reduce the competition and foreign penetration led to a less competitive environment. But is it was found that there was a positive link between foreign penetration and bank profits.

John Goddard, et al. (2004) examined the profitability behaviour of bank-specific, industry-related macroeconomic determinants of South Eastern European (SEE) credit institutions for 1998-2002 and concluded that Banks that maintain a high capital-assets ratio tend to grow slowly, and growth of the bank is linked to macroeconomic conditions.

Alicia Garcia-Herrero, Sergio Gavilá and Daniel Santabárbara (2007) analyzed empirically the key determinants for the low profitability of Chinese banks and concluded that low profitability is mainly due to poor asset quality, low efficiency and scarce capitalization.

Kadri Mannasoo (2008) explored bank’s portfolios during lending booms and the reasons for construction of such risk entailing portfolios. Modelling an optimal split of risky and risk free assets for a bank to maximize its short term profit it was found out that bank’s risky assets. Increase during decreased risk free and debt interest rates. And a positive common stock encourages bank to enlarge its risky portfolio, increasing vulnerability to adverse idiosyncratic events.

T. Velmampy and B. Nimalathasan (2008) studied the association between profitability and organization growth of commercial bank of Ceylon Ltd from 1997 to 2006. Testing the relationship using multiple regression analysis and Correlation between profitability
and organizational growth, it was found that growth was positively associated with profitability except for operating ratio and Return on Equity.

Hsien-Chang Kuo, Yang Li and Lie-Huey Wang (2008) studied the relationship between risk and income to determine of the optimal portfolio for banks using a sample size of 240 of 49 banks from Taiwan during 1999-2003. It was found out that using weighted interest rate method to determine the portfolio was more advantageous than use liquidity risk or credit risk computations in order to maximize the efficiency. It means that increase in loan and discount interest income would improve efficiency more than an increase in investment income.

Choudhry Tanveer Shehzad (2009) examined proportionate effect of bank’s growth and profitability in European countries using a data set for 10 years from 1997-2007 and commercial banks from 65 OECD (Organization for Economic Co-operation and Development) and non OECD countries. It was found out that there was no consistency in banking growth trend but there was a significant difference between growth and profitability patterns of banking firms.

Daniel Foos, Lars Norden and Martin Weber (2009) investigated the relationship between growth of loan and the riskiness of individual banks in 16 major countries. They used Bankscope data from 1997 to 2007 for 160 individual banks. The relationship between abnormal loan growth to asset risk, bank profitability and bank solvency were tested. The conclusions were:

i. That loan growth has a positive and highly significant influence on subsequent loan loses with a lag of 2 to 4 years.

ii. That abnormal loan growth leads to a decline in relative interest income of banks and lower capital ratios indicating decrease in bank’s profitability and solvency.

Mathias Drehmann, Steffen Sorensen and Marco Stringa (2010) used a general framework simulation to measure the combined impact of interest rate and credit shocks on economic value and profitability of banks. Macroeconomic factors to the risk-free yield curve and probability of default of borrower of companies and households was analyse by simulation technique. The study showed that maturity characteristics of assets and liabilities, re-pricing and off balance sheet items have a crucial role in economic value and profitability model of the whole portfolio,
Thus, the reviews cover areas such as association between risk management, organizational growth and profitability and reasons for lower profitability in the banks.

2.4 Risk Management and Capitalization

The main purpose of risk management is to strengthen the financial position of the company which includes areas such as capital, capital structure and solvency, profitability, earning ability etc. A strong capital base is sign of better risk management. Shriebes and Dahl (1992), Jacques and Nigro (1997) Aggarwal and Jacques (1998), Rime (2001) investigated how banks adjust their capital and risk levels subsequent to introduction of risk adjusted capital requirement by Basel Accord. Peek and Rosengren (1995, 1997 and 2000) find evidence of a credit crunch due to capital based regulations and determine that a bank’s capital ratio at the time of adoption of risk based capital requirements played a key role in determining its subsequent lending activity.

Simon Kwan and Robert A. Erzenbeis (1995) studied sample of 254 large bank holding companies for 5 years from 1986 to 1991 to measure the trade-off between risk capitalization and inefficiency. The study identified asymmetries in the relationship between risk capitalization and inefficiency among the banks and suggested some guidelines for improvements of credit risk management and management practices in large banks to improve risk capitalization.

Sianyon Cebenoyan and Philip E. Strahan (2001) investigated the effect of loan trading (buying and selling of loan portfolios) on bank capital structure and lending, profit and risk taking decisions to measure the bank’s use of loan sales market to enhance risk management. The study showed that banks engaged in both buying and selling of loans are able to take advantage of positive net present value investment opportunities, and are able to increase their Criteria and Indicators for loan sale and commercial real estate loans. They are better in managing with less liquidity and less capital. The trading of loans allowed banks to be more aggressive yet flexible. The flexibility reduced need to hold more capital and the aggressiveness allowed increasing higher risk taking and consequent higher yields.

Georges Dionne and Tarek M. Harchaoui (2003) investigated the relationship between banks capital, securitization and risk in off-balance-sheet activities of Canadian
financial sector for a ten year period 1988-1998. The examined the relationship between risk based capital ratios and securitization, impact of total risk based capital ratio on securitization activity and influence of securitization on bank risk. The conclusion indicates that securitization has negative effects on both Tier 1 and Total risk-based capital ratios, but there exists a positive statistical link between securitization and banks' risk.

Bikker and Metzmakers (2004) explored the determinants of banks’ internal capital sensitivity to business cycle, using leverage ratios (i.e., equity to assets) and BIS risk-based capital ratios across banks in 29 OECD countries for 10 years between 1990 to 2001. There was a significantly negative association between the risk-based capital ratios and business cycle proxies. They conclude that it means evidence of capital management practices by in OECD banks are pro-cyclical. But when compared with US, there was no significant association between capital ratios and economic conditions. Therefore conclude that capital management practices may be only moderately pro-cyclical.

Mahammed Amiru and Robert Hinson (2006) examined the impact of credit risk on capital structure, profitability and lending decisions of Ghana banks employing a panel regression analysis. The study findings were that less than 11% of Ghana banks were exposed to credit risk. More than 86% of assets were financed by debts. The banks’ average lending rate was around 28%. Capital structure (equity to total assets) of banks was positively related to banks’ size, assets, liquidity and lending.

Dawood Ashraf (2010) estimated the effect of changes in portfolio risk on the capital adjustment in the context of risk based capital regulation using cross sectional time series of US commercial banks data set on commercial banks employing simultaneous equation model. It was found that banks increase their loan portfolio concentration in order to increase their regulatory capital ratios.

Thomas D Jeitschko and Shin Dong Jeung (2008) analyzed characteristics of risk-return profiles of a bank portfolio demonstrating that a bank’s risk can either decrease or increase with capitalization. His study empirically demonstrated (1) differences in risk-capitalization relationships across high and low capital banks and (2) across
publicly and non-publicly traded banks that risk-capitalization relationships are, sensitive to relative determinants of asset risk.

Jokipi and Milne (2008) points out those stronger banks (i.e., those with high ROE's) may be better able to increase capital ratios (e.g., through higher retained earnings). This means a positive association between profitability (return) and risk-based capital ratios.

Jon Frye and Eduard Pelz (2008) constructed a credit risk model using Bank's Capital at Risk (CAR) to forecast distribution of charge offs at Commercial Banks in United States. The main benefit of the forecast was to identify and manage inherent bank's credit risk. Outstanding loan balances in 12 categories (of loans) was analyzed with reference to Bank CAR. Outstanding loan balances which are subject to charge off rates were used to calibrate the probability model. The combination of bank's current loans and distribution of charge off rates was used to make assessments of bank's risk. The study found that credit risk was concentrated most significantly in construction lending. Increase in Bank CAR means that credit risk is raising. Therefore, Banks CAR efficiently identifies adverse combinations of credit risk and capital.

Dmyktro Holod and Yuriy Kitsul (2010) investigated in the context of capital accord by Basel Committee on banks supervision in 1996, systematic risk and its effect on risk based capital requirements for poorly and highly capitalized banks. A sample of 55 large publicly traded bank holding companies for the sample period from 1986 to 2007 was used. Using bank portfolio return was taken as market rate of return a co-efficient equation was formed. The results showed that there was a highest effect in systematic risk undercapitalized banks and market risk based capital requirements did not affect systematic risk of well capitalized banks.

Franco Fiordelisi, David Marques-Ibáñez and Phil Molyneux (2010) analyzed the relationship among efficiency, capital and risk. A data set of 26 Commercial banks of European Union countries from 1995 to 2007 was used., The ratio between net non-interest income and net operating income was used as Robustness check, Herfindahl–Hirschman Index, logarithm of total assets were also used in analyzing the relationship between capital, risk and efficiency. The findings show that lower efficiency score on
cost or revenue suggest greater future risks and long term efficiency gains to support financial stability objectives.

Thus, the study helps to find out the trade-off between risk, capital structure, profitability and lending decisions in banking sector. Various studies provide evidence that banks adjust their capital by increasing concentration in loan portfolio.

2.5 Factors Influencing Risk Management leading to risk control

Mishkin, (2007) says that banks are exposed to uncertainty and instability of the financial market due to interest rate fluctuations, exchange rate variations and economic volatility. These factors could lead to financial crisis and insolvency of borrower or bankruptcy of institutions. Under such conditions of uncertainty, there is a need for risks management in the areas of liquidity, assets, liability match, capital adequacy, credit and interest rate and the task is now more challenging than before. Hence, proper understanding on the factors that constitute banks risks exposure will help to mitigate and minimize risks and financial crisis and help in preventing banks loss in earnings and capital.

Nor Hayati Ahmad (2004) compares the factors affecting credit risk in Islamic banking operations and conventional banking in Malaysia covering a period between 1996 to 2002. He analyses with the help of descriptive statistics, independent t-test and regression to highlight similarities and differences in credit risk determinants of Islamic and conventional banking. The results indicate that both types of banking have similar effects of leverage, funding cost, risk weighted on credit risk, even though Islamic banking experiences different impact of management efficiency, regulatory capital and loan loss provisions on their credit risk.

Vasanthi Peter and Raja Peter (2006) estimates possibility of default risk associated with income and other demographic factors and issues including the level of education, occupation and migrant status and their influence on the risk of default. He tests the influence of loan-to-value-ratios and property value uncertainty and the default risk. Logistic regression and various goodness of fit measures, such as -2 log likelihood, Pseudo R2, Cox and Snell R2, Nagelkkere R2, and Hosmer and Lemeshow values to assess model fit are used. It was found that on mortgage defaults, the major driver of default risk is negative-equity risk, which is reflected in the loan-to-value ratio.
Anoop J., Prasun Banerjee, Vigil Francis (2007), applying Altman’s Z score model, develops an internal credit rating model for Indian banks to predict the financial risk factors and to access the credit worthiness using a sample of 60 defaulters and non-defaulters to predict the Z score of future defaulters. The default character of companies is estimated using Linear Probability and logit model and Linear discriminant analysis. The authors conclude Z score model proposed by Altman is relevant for Indian context as well and suggests that Indian banks could move towards such score based approaches to better predict the defaulters and non defaulters.

Madhur Malik and Lyn Thomas (2007) constructed a proportionate hazard rate model (Cox regression model) for customers probability for up to twelve months ahead using information on customers behavioral scores and values of general macro economic factors from the data of customers of a major UK bank from Jan 2001 to Dec 2005. The various variables used are age of loan, behavioral scores, macro economic variables, time loan, time out etc. The study concluded that default intensities of consumers are significantly influenced by macro economic factors and the time of origination of loan.

Bostjan Aver (2008) analyzed the macro economic factors that influence the systematic credit risk of Slovenian banks using SPSS Banking loan portfolio data from Dec 1995 to Nov 2002. They have used specific statistical methods such as multiple linear regression and factorial analysis and conclude that macro economic factors such as employment/unemployment rate, short term/Long term interest rates have important influence on the range of credit risk.

Shaikh, Salman and Jalbani, Amanat (2009) analyses the characteristics of risk management practices in Islamic Banking and conventional banks by using Return on Equity (ROE) ratios for the period of 2005 and 2006. Average ROE’s are correlated and regressed. It was found out that equity based business of Islamic banks is slightly more risky than conventional banks. But risk is well mitigated by Islamic Banks through their effective and adequate distinct risk management procedures.

Voon-Choong., et al. (2010) carried out a study on commercial bank risks sensitivity in Malaysia with a random sample size of 200 bank officers. The Factor Analysis of data indicated that liquidity, interest rates, domestic and International markets, Bank operations and credit are factors that affect Bank’s risk exposure. Formulating an
effective risk management strategy in these areas is a must to minimize possibility of loss of income and avoiding bank’s failure.
Thus, these studies identify the factors that affect the risk management practices in banking in different regions. These studies also provide effective risk management strategies to minimize the possibility of risk. They also elaborate on the risk control systems and their importance and further improvements.

2.6 Reviews in the area of Risk Management Practices in Bank
Reviews of the risk management practices and techniques in various countries are outlined below to have an overall view of risk management:
Hussein A. Hassan Al-Tamimi, Faris Mohammed and Al-Mazrooei (2007) studied the risk management practices and techniques in dealing with different types of risk of UAE banks by comparing risk management practices between the two sets of banks. This study showed that the three most important types of risk which the banks have to manage are foreign exchange risk, credit risk and operating risk. It was also found that the UAE banks are manage risk somewhat efficiently risk, but there is a significant difference between the UAE national and foreign banks in the practice of risk assessment and analysis, and in risk monitoring and controlling. The study established that risk identification, risk assessment and analysis are the most influencing variables in risk management practices.
Katarzyna Zawalinska (1999) examines the asset liability management techniques and risk management practices used at commercial banks by conducting a survey in 34 banks operating in Poland. The author analyses and accesses the safety, profitability and competitiveness of banking. The survey results indicate that foreign banks and large private Polish banks use more advanced risk management and measurement techniques and seem to be better equipped to face competition and manage foreign exchange transactions than small and big state owned banks.
Elmer Funke Kupper (2000) uses ANZ bank’s approach in studying key risks faced and how the banking sector manages them.
The bank’s approach is based on three basic elements-
a) Understanding of the relationship between risk and shareholder value by using economic value added (EVA) as the key measure
b) Stress-testing regime to assess the financial impact of potential extreme events and a breakdown in risk models

c) Decision making and performance management framework combining the results of the two.

EVA is treated as one of the dominant performance indicators and a natural incentive to focus on risk in ANZ bank. The study suggests that Banks need to adopt a more structured and top down approach to risk management.

**Christel Lane, Sigrid Quack** (2002) uses comparative survey of a sample of 12 banks (7 British and 5 German Banks) including large commercial banks operating nationwide and regionally oriented banks to analyze the role of banks in financing and managing risks of Small and Medium Enterprises. He concludes that bank strategies and institutional framework remain closely related to the existing institutional environment followed in each country.

**Paul Wachtel** and **Rainer.F.H.Haselmann** (2006) examined the risk taking and risk management in transition countries using the data of European Bank for Reconstruction and Development (EBRD), with a sample of 212 banks. Regression analysis was used to examine the various bank risks like solvency, liquidity, default probability and credit risk in relation to size, location, ownership, institutional setting and management characteristics of banks. The survey found that there was no clear relationship between bank risk taking and their institutional environment.

**Wu, Chiou-Huey, Huang** and **Chien-Sen** (2007) studied Taiwan banking industry comprising local and foreign banks for risk management practices using VaR (Value at Risk) analyses in term of the Basel rulings of good practice. They conclude that that support from top management is essential for the risk mechanism.

**Pan Song, et al.** (2008) analysed the risk management strategy of the current payment systems applying simulations and unit cost of loan guaranteed in settlement cycle to find out the cost of default that the payment service agency could bear while extending credit facilities. This study throws light on how to choose the best among various feasible risk management strategies for providing credit facilities.

**William Ardrey, Chris Perryer, Michael Kean** and **Stockport** (2009) made a study by using 15 private joint stock banking institutions in Vietnam in 2001-08, on the three
step process by reviewing Vietnamese legislation and locals best practices. The study concluded suggesting a stronger organizational plan for strengthening risk management practices and a roadmap for development of risk management information system by combining various departments within banks.

Andrew Ellul and Vijay Yeramilli (2010) constructed a Risk Management Index (RMI) to study the structure, measure the organizational strength and independence of the risk management function at Bank Holding Companies (BHC) in United States covering a period of 9 years (2000-2008). The study concluded that relationship between strength of internal risk controls and enterprise wise risk holds true not only during the crisis period, but also more generally during normal times also. It showed that there is a need for a strong and independent risk management function to effectively manage risks in banking institutions.

Don Pagoach and Richard Wars (2010) in their study of effect of adoption of enterprise risk management principles on firm long term performance examines the change of asset and market characteristics of adoption of Enterprise Risk Management (ERM) using stock price volatility and earnings volatility. It was observed that firms adopting ERM experience a reduction in earnings volatility but the results do not support the proposition that ERM creates value.

Afshin Shafeeq and Mohammed Nasr (2010) investigated risk management practices in banking sector at Pakistan applying product movement correlation (r) model to estimate the linear relationship between risk management practices and various aspects of risk management. ANOVA test was applied to find out risk management practices and financial soundness in Public Sector Banks and Local Private Banks in Pakistan. The study concluded that there was a positive relationship between risk management practices and its aspects namely risk understanding, risk identification, risk assessment and analysis, risk monitoring and credit risk analysis and managing risk.). There brought out that there was also a significant difference in risk management practices followed in Public Sector Banks and Local Private Banks in Pakistan. Incidentally study found that financial soundness indicators except return of assets on taxes differ in all commercial banks.
Romzie Rosman (2010) analyzed Islamic Banking and risk management practices by developing a conceptual framework on risk management practices and processes in relation to Islamic Banking. The study suggested that there is a positive relationship between risk management practices and aspects of risk management processes in Islamic Banking.

Thus, the above mentioned studies dealt with concepts, principles and evaluation of risk management and the role of banks in the managing and mitigating the risk in different countries.

Rekha Arun Kumar and Kotreswar (2006) studied the credit risk management practices in Indian Commercial banks to find out whether the credit management practices comply with new Basel Accord. by using the values of Non-Performing Assets and their recoveries of Public Sector banks and Private Sector Banks for the period 1994-2003. The authors conclude that the credit risk management practices of Commercial banks in India do not meet the standards set out under the new Basel Accord and concentration of risk profile is high in private banks than Public Sector Banks and there is no difference between Public Sector Banks and Private Banks as regards to credit risk management Performance.

2.7 Reviews in the area of risk awareness & risk identification

Credit risk is one of the oldest and most vital forms of risk faced by banks. As financial intermediaries Commercial banks are most likely to make a loss due to credit risk. Generally, the greater the credit risk, the higher the credit premiums to be charged by banks, leading to an improvement in the net interest margin. The first aspects of risk management are risk awareness or understanding the related studies and research undertaken is presented below.

Ashima Goyal (2012) states that Indian Banks have low structural risks. In his view “a path of gradual market development and regulatory evolution, as part of liberalizing reforms, has helped reduce structural risks in Indian banks.” This he attributes to the regulator’s shift from micro intervention to macro management based on broad parameters rather than individual transaction. However Goyal states that thin markets in India does pose a risk. He states that according to market perception, credit risk is high for Indian banks because of public sector ownership and directions for lending. Market
risk is high because of the tightening cycle of monetary policy. He further states that strong supervision by regulator, use of countercyclical prudential regulation, the higher savings by the public in the form of deposits, measures to reduce cross border exposures by limiting open positions, non-exposure to exotic derivatives or to foreign sovereign debt will all lower systemic risk and Indian banking system will escape any global banking crisis.

**R.S. Raghavan, (2003)**, a Chartered Accountant, says that the risk profile of the bank is changed by every transaction the bank undertakes and computing and understanding the impact of each transaction risk is very difficult and calls for continuous updating of risk calculation which is near impossible and therefore providing real-time risk information is one of the key challenges of risk management in banking. According to him when all the activities of a bank are regulated then operational environment would not be conducive to risk taking. And in such a situation “better insight, sharp intuition and longer experience were adequate to manage the limited risks”

Mr. Raghavan is of the view that banks have grown from being a financial intermediary into a risk intermediary and in the process, banks are exposed to severe competition and encounter various types of financial and non-financial risks. Since higher the risk, higher the reward avoiding risk is does not make business sense but a trade-off must be struck. New areas of businesses have brought along with them new types of risks. According to him the essential functions of risk management are to identify measure and more importantly monitor the risk profile of the bank. Risk management system is a proactive action to manage a change before the change occurs.

**Dr. Krishn A. Goyal & Prof. Sunita Agrawal (2010)** while expressing their views on credit risk management state that in banks and financial institutions risk is considered to be the most important factor of earnings. Since management of financial institution is nothing but managing financial risk systematically and professionally, the relationship between risk and return has to be balanced. Since risk increases with rising global competition, increasing deregulation, introduction of innovative products and delivery channels, According to them risk is an exposure to a transaction with loss, which occurs with some probability and which can be expected, measured and minimized and effective risk managers will prosper if they have ability to gauge risks and take
appropriate action. In short, risk takers will survive and risk averse perish. They have classified various the risks as financial risk and non financial risk.

Financial risk is categorized as Credit risk and Market risk and non financial risk is categorized as operational risk. We diagrammatically represent them as below:

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<tr>
<th>Financial Risks</th>
<th>Non-Financial Risks</th>
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<tbody>
<tr>
<td>Credit Risk</td>
<td>Market Risk</td>
</tr>
<tr>
<td>Counterparty or Borrower Risk</td>
<td>Interest Rate Risk</td>
</tr>
<tr>
<td>Intrinsic or Industry Risk</td>
<td>Liquidity Risk</td>
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<tr>
<td>Portfolio or Concentration Risk</td>
<td>Currency/Forex Risk</td>
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<td>Hedging Risk</td>
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Dr. Goyal (2010) defines Credit risk as the possibility of losses associated with decrease in the credit quality of the borrower or the counter parties. In the bank's portfolio, losses stem from outside default due to inability or unwillingness of the customer or the counter party to meet the commitments, losses may also result from reduction in the portfolio value arising from actual or perceived deterioration in credit quality. In his view “Risk management becomes one of the main functions of any banking “and consists of, risk identification, risk measurement or quantification, risk control, monitoring and reviewing.

According to Dr. Goyal, the basic objective of risk management is to enhance the value of the bank to the stake holders by maximizing profit and optimizing capital funds ensuring long term solvency. The risk identification involves, understanding the nature of various kinds of risks, circumstances and causes that lead to default. He suggests that diversification of the business, insurance and hedging, fixation of exposure ceiling transfer the risk to another party at right time and securitization and reconstruction are the tools of risk control. Risk monitoring involves setting up of parameters for risk identification and mitigation on which transactions have to be tested to ensure risky transactions are avoided or identified at the earliest for corrective action.

Mr. Anthony M. Santomero, (1996), at The Wharton Financial Centre conducted a year long research analyzing financial risk management processes in the financial sector, to review and evaluate the risk management systems and the process of risk
evaluation in banking sector. The author states that the report outlines "standard of practice and evaluates how and why it is conducted in the particular way chosen. But, even the best practice employed within the industry is not good enough in some areas." The report was a review of the problems which the industry finds most difficult to address, shortcomings of the current methodology used to analyze risk and the elements that are missing in the current procedures of risk management and risk control. There are enough research literature exists on the reasons for active risk management including the work of Stulz (1984), Smith, Smithson and Wolford (1990), and Froot, Sharfstein and Stein (1993). Review of risk management reported in Santomero (1995) lists at least four distinct rationales for active risk management which include managerial self-interest, the non-linearity of the tax structure, the costs of financial distress and the existence of capital market imperfections. Any one of these justification enough for the firms' concern over return variability, as the above-cited authors. The report quotes with approval, Oldfield and Santomero (1997), that risks facing all financial institutions can be segmented into three separable types, from a management perspective namely

(i) Risks that can be eliminated or avoided by simple business practices,
(ii) Risks that can be transferred to other participants, and,
(iii) Risks that must be actively managed at the firm level.

It further says that avoidable risks can be eliminated by standardization of process, contracts and procedures to prevent inefficient or incorrect financial decisions, diversification across borrowers that reduce the effects of any one loss experience and providing incentives and holding employees accountable. Risks can be eliminated, or at least substantially reduced through the technique of risk transfer like interest rate products and swaps for transfer of interest rate risk. Where the risk is central to the business like Credit risk inherent in the lending activity should be absorbed and needs to be monitored and managed efficiently by the institution. Only then will the bank systematically achieve its financial performance goal.

A bank relies on a sequence of steps to implement a risk management system established to measure exposure, define procedures to manage these exposures, limit
individual positions to acceptable levels, and encourage decision makers to manage risk in a manner that is consistent with the firm's goals and objectives. This involves
(i) Standards and reports
(ii) Position limits or rules
(iii) Investment guidelines or strategies
(iv) Incentive contracts and compensation

Chesser (1974) developed a loan surveillance model to predict default risk (non payment as well as any work-out by paying lesser amount in settlement than the original loan) with the objective to study judgments made by loan officers, credit managers, and bank examiners. A paired sample of 37 satisfactory loans and 37 unsatisfactory (non compliance) loans one year before non-compliance was selected from four commercial banks in three states over the years 1962 to 1971 and selected. The technique of logit analysis was applied to identify the important variables and classify the loans and, the regression equation consisted of seven financial ratios. The model successfully predicted roughly 75% of loans one year before compliance and 57% of loans two years before compliance.

Sinan Cebenoyan, A. and Philip E. Strahan (2004) analyses the influence of loan sales market on capital structure and lending decisions in banks and conclude that to loan sales market has low risk and high profits and banks use increasingly sophisticated risk management practices in using loan sales market to improve availability of bank credit at reduced bank risk.

Jose M. Pastor and Lorenzo Serrano (2005) used one-stage parametric stochastic procedure that allows identifying the behavior of banks towards risks to analyses the efficiency and the credit risks of the banks in European countries and conclude that the risk adjustments were important in improving the profits than in reducing the costs.

Brigitte Godbillon Camus and Christopher J. Godlewski (2005) investigated the impact of type of information on bank credit risk management in a principal-agent framework. Information is classified as hard information (Balance Sheet data produced with credit scoring- quantitative and verifiable) and soft information. (Relationship within a bank - qualitative and non-verifiable). The result using simulation confirm that
soft information gives advantage to the banks and allows the bank to reduce capital allocation for value at risk coverage and allocate more loans to increase the utility.

Ajay Pathak (2005) studied the credit risk exposure to infrastructure projects with long gestation periods. The author opines that with increased exposure to infrastructure, banks need to be cautious about the credit risks inherent in the projects with long gestation periods. Infrastructure development has a high correlation with macroeconomic factors like the GDP and growth rate of the country that influence income generation and timely recovery of the credit extended.

Ip-wing Yu, Laurence Fung and Chi-sang Tam (2006) assess the systematic credit risk of banking system in Hong Kong using monthly asset correlation between banks and multiple default risk index for a period of 10 years between 1997 - 2006. The study confirmed that the most stressful period of the banking system was during the Asian financial crisis and that the index jumped in advance of the crisis. (This could have been used for risk mitigation) The study indicates that due to economic recovery in Hong Kong and consolidation in the banking sector, the systemic risk of the banks has declined steadily since 1999.

Benedikt Goderis, et al. (2007) explains the implications of developments in credit risk transfer markets on banks’ lending behavior and states that banks that have issued at least one collateralized loan agreement utilize the advanced credit management techniques fully.

Evelyn Richard, et al., (2008) developed a conceptual model for understanding credit risk management of commercial banks in Tanzania, an economy with less developed financial sector. It was found that components of credit risk management differ in commercial banks operating in a less developed economy from those in a developed economy.

Shin Chio Fukuda, Minenusa Kasuria and Kentaro Akashi (2008) examine the measures of bank health and the probability of bankruptcy among medium size firms in Japan. Using - (i) ratio of non- performing loans (ii) a relative measure of bank stock valuation and (iii) bank failures and to test the hypothesis. Data from unlisted 6266 small and medium firms in the late 1990s and early 2000 were collected for the study. The results indicated that bank specific financial health measures impacted borrower’s
probability on bankruptcy while a close bank-firm relationship reduces the probability on bankruptcy.

Christina Palfi (2008) in her study identified changes in the banking system to enhance the risk management techniques in Romanian banking system in the era of globalization. Adopting ARIMA technique on secondary data of different types of national banks she analysed using multiple regression analysis and capital ball approach to estimate the level of risk involved in credit, interest rates and operations. The study indicated that if credit risk and interest risk are positively correlated then risk management strategies make significant improvement non-performing assets, deposit mobilization and credit operations of banks.

Takang Felix Achou and Ntui Claudine (2008) researched the tools and techniques used for proper credit risk management policies and extent of management of Qatar banks’ credit. Performance indicators such as profitability (ROE and ROA separately) and loan losses (NPL/TL) which represent the credit risk management effectiveness were used to validate the hypothesis through Simple Regression analysis that better credit risk management results in better bank performance. The study confirmed the hypothesis that there is a significant relationship between performance (in terms of Profitability) and credit risk management (in terms of performance).

Miao Jianchun, Gary Tian and Shyam Bhati (2009) investigated the relationship between corporate credit risk and borrower’s collateral and loan term structure under the new banking regulatory system in China. Using a modified version of the logit models used in Estrella et al (1998) and data on Chinese companies listed on the Shanghai Stock Exchange between 2002-2007 the relationship between credit risk of borrowers and loan characteristics were tested. Corporate credit risk was measured by financial ratio variables, like TL/TA (total liability/total asset), I/TS (inventory/total sale), TS (total sale), EBITA (earning before tax and interest) and macroeconomic variables such as YC (Yield Curve), OG (Output Gap), and CE (Customer Expectation). Loan characteristics variables included the LTL/TL (long term loan/total loan) CL/RL (collateralized loan in the total loan). This study found that new banking regulatory system has changed the way banks design loan contracts in China. The credit risk of a firm is positively correlated to the proportion of collateralized loan, but
negatively correlated to proportion of the long term loan. However, that the borrowers’
long term loan and collateralized loan are positively correlated to credit risk.

Tobias Michalak and André Uhde (2009) studied the impact of credit risk
securitization on banking stability using a sample of 743 securitization transactions
made by 55 banks in Western Europe and Switzerland for a period from 1997-2007.
Regression Analysis and Z score technique were applied. The conclusion was that the
credit risk securitization had a negative impact on financial soundness of Western
European Banks. While credit risk securitization had a positive impact on bank
leverage and return volatility, negative relationship existed between securitization and
bank’s profitability.

Bodla B.S and Richa Verma (2009) studied the implementation of the Credit Risk
Management Framework by Commercial Banks in India by conducting survey. The
results show that 94.4% of the loans in case of public sector banks and 62.5% of the
loans in case of private sector banks were approved for Credit Risk by the ‘Board of
Directors’, But in other banks, this authority was with the ‘Credit Policy Committee’.
In managing credit risk, most of the banks undertook steps like industry study, periodic
credit calls, periodic plant visits, developing Management Information System, risk
scoring and annual review of accounts. However, use of derivative products as risk
hedging tool has not been practiced by banks in India. The survey has brought out that
irrespective of sector and size of bank, Credit Risk Management in India is fully based
on the RBI’s guidelines only.

Aisyah A. Rahman, Mansor Ibrahim and Ahamad Kameel Mydin Merae (2009)
examine the lending structure and bank insolvency risk exposure for the case of the
Islamic and conventional banks in Malaysia. Both Islamic and conventional banks show
a negative relationship between capital buffer and bank insolvency risk (positive
relationship – if looking at the index) confirming empirical findings and conclude that
when capital increases, (the cushion against loss increases), risk to become insolvent
decreases. An offshoot of the study was the inference that bigger banks tend to embark
into risky activities, either through lending in risky sectors or entering into non-
traditional banking activities (fee-based transaction and off-balance sheet activities).
Yener Altunbas, Leonardo Gambacorta and David Marques-Ibanez (2009) evaluated whether bank lending as transmission mechanism of monetary policy was affected by securitization activity in the euro area. Growth in securitization activity and interest rate taken as the monetary policy indicator as variables and covered a sample from 1999 to 2005. Approximating default probability by means of a cluster analysis and by estimating the missing expected default frequency (EDF) values using a regression model. The results showed that asset securitization significantly reduces the importance of the bank lending. In the event of monetary tightening this effect reduced banks' funding needs and allowed banks to transfer a part of their credit risk to other players in the market including institutional investors such as hedge funds, insurance companies and pension funds to reduce banks’ regulatory requirements on capital.

Powell, R.J and D.E. Allen (2009) researched the link between credit risk and current financial crisis (2007-10) using CVAR (Conditional Value at Risk market approach) with Meriton KMV credit model to measure credit risk under extreme market conditions. The data was taken from entities listed on the Australian Stock Exchange (ASX) all ordinaries index (all ordi) and author divided into 3 periods namely pre financial crises that was for 7 years prior to 2007. Second and third period related to 2007 and 2008, the financial crisis years. The study showed that there was a significant increase in default probabilities across all industries during the financial crisis and Industries with low equity were the ones most affected. Surprisingly industries that were more riskier prior to the financial crisis were not the same industries that were most risky during financial crisis.

Rasmus Kattai (2010) analyses the credit risk model that has been developed for Estonian banking system. The model incorporates non performing assets and loan loss provision of largest banks and economic conditions like economic growth, unemployment, interest rates, inflation, indebtedness and credit growth. Sensitivity tests were performed to determine profitability of bank clients servicing their debts. Scenario analysis and stochastic scenario analysis were performed to find out credit market improvements. The model emphasized the importance of economic growth as the most influential factor behind the soundness of banking sector in the latest downturn.
Olaf Weber (2010) analyzed a global comparative study on sustainability and environmental risk management in Canadian Banks and financial institutions to assess risk in lending and impact on credit management process. All analyzed institutions took into account environmental risks in credit management to avoid financial risks and some incorporated in their business strategies also. Analysis of global ranking of Canadian banks for their environmental and social performance among the ranking of 189 banks and financial institutions with respect to business ethics, product responsibility, labour issues, environment, human rights and corporate governance was done. The analysis showed that in the field of human rights, business ethics and product responsibility Canadian banks were not located in top 10% rank indicating that there is good scope for improvement to establish and extend the sustainability lead.

The research studies in this area clearly bring out the awareness about various kinds of risks a banker encounters and the need and importance of risk identification for better risk control and management. The studies have dealt with understanding of credit risk, credit risk during financial crisis and relationship between long term loan structure and credit risk etc. The studies also have suggested various tools and techniques for credit risk management and framing credit risk model for effective credit risk management.

2.8 Reviews in the area of Risk Policies & Risk Procedures

Discussing about the Bank Risk Management Systems, Mr. Santomero (2008), states that “banking industry has long viewed the problem of risk management as the need to control four of the above risks which make up most, if not all, of their risk exposure, viz., credit, interest rate, foreign exchange and liquidity risk. While they recognize counterparty and legal risks, they view them as less central to their concerns. Accordingly, the study of bank risk management processes is essentially an investigation of how they manage these four risks. In each case, the procedure outlined above is adapted to the risk considered so as to standardize, measure, constrain and manage each of these risks.” Risks such as legal risk, regulatory or reputation risk assume lesser priority in general.

The commercial banking sector does not consider or analyze systemic risk like merchant bankers are mutual funds. But this trend is changing with the use of industry group and concentration measurement. Unlike a market index bench mark for
securities, there is no benchmark for loan portfolios. However, this is gradually changing with exposure limits and maximum and minimum exposure to industry groupings. Commenting on the overall risk management by the banks, Santomero observes that his evaluation of credit rating continues to be an imprecise process and this approach needs to be standardized across institutions and across borrowers. In addition, its rating procedures need to be aligned with rating systems used in the capital market. Credit losses, relationship to ratings is currently vague and credit pricing, credit rating and expected loss ought to be correlated more precisely. However, he observes that the industry currently does not have a sufficiently broad database on which to perform the migration analysis that has been studied in the bond market.

David M. Rowe, (2006), group Executive for risk management at Sungard in his presentation on “The future of credit risk management in historical perspective” in April 2006 stated that Micro analysis alone is progressively becoming insufficient for fully effective credit decisions. Portfolio information will be an essential input for best practice credit decision at all levels (both strategic and tactical). Nevertheless micro analysis will remain an essential core competence and the need for seasoned judgment will continue, informed by a richer and more complex set of analytic information.

Dennis Glennon and Peter Nigro (2005) in their research on Small Business Administration (SBA) guaranteed loans using a survival analysis/hazard model approach identified a link between the risk of default and regional and industry economic conditions. According to them “the success and failure of small loans are closely tied to both the regional and industry-specific economic conditions in which the borrower operates” and supported by earlier similar studies also. They are of the view that small-business lending is unique and may require a high degree of expertise gained over time.

They found that loans with government or other guarantees were more risk prone and carry greater possibility of default. This appear to be logical and consistent with economic intuition, borrowers with less stake in the business are likely to have less incentive to run the business efficiently and lenders with less at stake are more likely to make riskier loans and have less incentive to monitor them on an ongoing basis. Their research also found that the “corporate structure does not affect the odds of default. The
odds of default for loans to corporations or to partnerships are statistically the same (all else equal) as those to individuals irrespective of model specification. A borrower's industrial classification, however, does influence the odds of default. Loans to firms in the retail industry sector are more likely, and those to firms in the service industry sector are less likely, to default (all else equal) relative to firms in other industries—a result that reflects the higher default rate for retail firms, and the lower default rate for service firms’.

David H. Pyle (1997) discusses the need for risk management in banks and while discussing the issue why risk management is needed, lists out a few reasons. Financial disasters and misadventures in financial and non-financial firms and in governmental agencies point up the need for various forms of risk management. The regulatory requirement to fulfill capital adequacy requirements due to the BIS prescriptions is another strong reason. However, banks need reliable risk management systems to direct available capital to activities with the best risk/reward ratios and to estimates and limit the size of potential losses within the constraints imposed by readily available liquidity, by creditors, customers, and regulators.

According to him, “Risk management is the process by which managers satisfy these needs by identifying key risks, obtaining consistent, understandable, operational risk measures, choosing which risks to reduce and which to increase and by what means and establishing procedures to monitor the resulting risk position.”

Though much of his work in that article discuss about market risk, he certainly make a few observations on credit risk management. Ideally, he says that a bank risk management system would integrate credit risk with market risk to produce an overall of measure of the bank's loss potential. Traditionally, banks have used a number of methods like credit scoring, ratings, and credit committees etc., to assess the credit risk.

These approaches do not appear to be compatible with the market risk methods and current bank regulations treat these two sources of risk quite differently subjecting credit risk to arbitrary capital requirements that have no scientific validity and may result in capital misallocation and imprudent risk-taking. He suggests that “If banks can "score" loans, they can determine how loan values change as scores change. If codified, these changes would produce over time a probability distribution of value changes due to credit
risk. With such a distribution, the time series of credit risk changes could be related to the market risk and we would be able to integrating market risk and credit risk into a single estimate of value change over a given horizon."

The difficulties and strain faced by the banks during global financial crisis has highlighted the need for better methods to measure, monitor and control risk, particularly credit risk. **D. E. Allen and R. J. Powella (2011)** analyze in their article ‘Credit risk measurement methodologies’ the various methods of credit risk measurement models, particularly four widely used popular models and compare them bringing out the relative advantages and shortcomings of each methodology. The authors have analyzed external ratings approaches, financial statement analysis models, the Merton / KMV structural model, and the transition based models of Credit Metrics and Credit Portfolio View. The authors have analyses the most prominent of the ratings services in the west namely Standard & Poor’s (S&P), Moody’s & Fitch even though Dun and Broad street (D&B) and Duff & Pheff are also renowned rating agencies. However in the Indian context we have CRISIL, ICRA.CARE and SAMERA as premier rating agencies.

**Paul Glasserman and Jingyi Li (2005)** remarks on the importance of sampling for portfolio credit risk, that modern credit risk management takes a portfolio view in the sense that it tries to capture the effect of dependence across sources of credit risk to which a bank or other financial institution is exposed. This is mainly due to the developments in markets, banking supervision and the methods of transferring risk. This change has led the industry to develop new tools to transferring and trading credit risk, measure and manage. According to the author Monte Carlo simulation is among the most widely used computational tools in risk management which the has the advantage of being very general and the disadvantage of being rather slow and has motivated researchers to find better methods of simulation through variance reduction.

**External rating services**

These rating agencies take into account a wide range of factors such as environmental conditions, competitive position, management quality, and the financial strength of the business and provide a measure of the relative creditworthiness of the entity from extremely strong capacity to meet financial commitments to payment default on financial commitments.
Financial statement analysis models:
Financial statement analysis models which provide a rating based on the analysis of financial statements of individual borrowers, such as the Altman Z score and Moody's RiskCalc. Many bankruptcy prediction models are financial statement analysis models only.

Structural models
These models compute from a combination of asset values, and debt using the standard deviation of asset value fluctuations, the default probabilities (DP) and measure the changes to default probabilities based on the distance to default (DD). When the debt values exceed the asset value and the volatility of assets is greater then it is considered as point of default.

Transition models:
Credit Metrics model measures the probability of credit grade of a borrower changing from one grade to another based on historical data. Credit Portfolio View (CPV) supposes that the transition probability is not equal among borrowers of the same credit grade. Uses a transition matrix approach, as is assumed by Credit Metrics and creates migration adjustment ratios by linking macroeconomic factors to migration probability, such as GDP growth, unemployment rates and interest rates.

While on the subject of rating by external agencies, it is important to note that there is a growing concern and some disquiet is expressed about the ratings assigned by the rating agencies. The expertise and independence of rating agencies is a major of the concern. The investment-grade ratings assigned to Enron Corporation by both Standard and Poor's Ratings Services (S&P’s) and Moody’s Investors Service just before its failure and not warning or predicting the collapse of the other major corporations, failure to predict the Asian crisis at the beginning of 1997 have resulted in concerns about potential ‘conflicts of interest’ .(Golin, 2001). While the main users are banks and investors, the rating agencies earn their income by fees paid by the companies or issuers of securities and the subscription fees paid by banks are not significant. According to Baker and Mansi, 2002 The heavy dependence on client fees therefore raises questions about the independence of the agencies in assigning grades. When a company seeks a rating and pays for it the rating is known as “solicited”. In assigning and computing the
ratings, the rating agency undertakes detailed discussions with the firm’s management about the business plan, risks, funding plans, and so on (Golin, 2001). Some times even though a company has not asked for a rating a rating agency will rate the company mainly from publicly available information even though the company’s management may supplement by information given by company also. This rating is known as ‘unsolicited’ ratings or shadow or Pi ratings. This is the main reason for the concern whether ratings vary between solicited and unsolicited? and the motives of the agency in making unsolicited ratings? According to Department of Justice such ‘unsolicited’ ratings may not be as accurate as ratings by retained agencies . . . When unsolicited ratings are not based on the same type of information as solicited ones, the ratings agency runs the risk that its rating is not accurate (DOJ, 1998). The study by the authors in respect of rating of banks establishes that there is a significant difference in the distributions of shadow and non-shadow ratings, and the shadow group has lower ratings. However the same can be explained that the rating agency may not use the same level of information in rating in the shadow and non-shadow rating groups. Second, some rating agencies may be more ‘conservative’ in assigning unsolicited or shadow ratings because these ratings may be largely based on public information

Mr. Ludovic Dubrana, (2010), in his credit risk model, uses a credit default risk module that uses portfolio approach for calculating credit default risk and combines it with a credit migration risk module that uses a Merton model for calculating the credit migration risk. The model includes various applications in the areas of portfolio management, scenario analysis, provisioning and setting risk-based credit limits. Such applications are possible due to the credit default risk model that provides information on the distribution of possible losses in the performing credit portfolio.

Exposures and Default Probabilities Recovery Rates and Default Probability Volatilities Systematic Risk Factors and Confidence Level are used as inputs to derive Loss Distribution, Value-at-Risk Contribution in the credit risk model. In the migration model the author uses

According to the author, the credit risk model developed is fully compliant with the Internal Rating-Based (IRB) approach of the Basel II framework.
The attractiveness of the model lies in the fact that the model makes no assumptions on default event and very few inputs are needed to calculate. Mr. Ludovic Dubrana\textsuperscript{7} states that the model can be easily extended to some other risk categories such as operational risk where no attempts are made on the causes of default or migration for quantifying an economic capital.

Richard R.W. Brooks, (2006), in his essay Credit past due, analyses the plight of borrowers with poor credit record who do not approach banks for their credit needs but go to private lenders whom he describes as fringe creditors. While dealing with the subject he observes that credit records or histories is one key mechanism that banks use to assure repayment of most consumer loans, from small, short-term credit card advances to multimillion-dollar mortgages. According to him the credit histories serve two distinct functions. Before sanctioning loans, banks use applicants’ credit histories to determine default risks. After the loan is sanctioned credit histories are employed to discourage defaults by an explicit threat to damage the borrower’s credit record if the loan is not repaid as per repayment schedule in a timely manner. The real threat is that it makes the future borrowing more costly and some time even denial of credit. This may prompt the borrower to repay the loan on time and the bank also has an incentive to lend to him again. However, he admits that coercive threats operate only in traditional lending markets like banks and an absence of such a threat would increase the costs of lending in these markets leading to reduced loans both in numbers and size.

Iftekhar Hasan and Cristiano Zazzara (2006) acknowledge that measurement of credit risk (bank’s counter party risk) is a widely discussed topic among bankers and academicians. According to them recognition of individual credit risk through internal rating systems based Basel II and measuring portfolio risk using a mathematical formula,” make the estimation and pricing of credit risk official in banking environment.” Despite criticisms of Basel II rules by academic, financial communities and by leading Institutions, the fact is that undeniably Basel Committee has created increased risk awareness in the financial world. The author’s view that banks are bound to create value for their shareholders and other stake holders and therefore, must correctly measure risk and price it accordingly. This is more so because the need of risk adjusted pricing and, consequently, of risk adjusted performance measures are due to
Basel II requirements. Since the capital requirements are directly related to risk and to avoid unnecessary increase in capital credit exposure risk needs to be correctly estimated. Further shareholders expect a specific business policy aimed at creating value to maximize their returns. Their research concludes that "all financial, behavioral and qualitative information being equal, a larger company's rating will usually be better than that of a smaller company, since banks develop different internal rating systems for borrower segments, 'calibrated' at different average levels of probability of default (so-called 'anchor points')." This according to them is due to the fact that "larger companies are able to offer more qualified guarantees and collaterals compared to smaller companies, benefiting from lower expected and unexpected losses.

Alex Stomper (2006) analyzes Banks' Industry Expertise, Market Power and Credit Risk since industry expertise is valuable to make credit decisions. He observes that many banks hire industry experts and create "industry groups" dedicated to providing industry knowledge to the bank and also its clients. He further examines banks' incentives to acquire expertise in judging the creditworthiness of borrowers in an industry with uncertain business conditions. To acquire industry expertise, banks frequently resort to in-house data collection and analysis. In loans to borrowers in nascent industries, banks use loan covenants to gather information. Borrower's report on the achievement of certain cash flow or sales targets in a specific time capture industry-wide business conditions, and banks use this to assess industry specific determinants of credit risk. He quotes with approval, Kroszner and Strahan (2001) who analyzed banks' board representation and found that banks lend more to industries of firms on whose boards they are represented. This in his view indicates that such board representation allows the banks to gain and benefit from industry knowledge in their lending decisions. The Basel Committee (2001) states that "formal industry analysis plays a significant role in assigning ratings" to banks' borrowers, and that "such analysis is provided by internal economic analysis units." Such expertise helps banks to derive market power from their exposure to industry-specific credit risk. An increased awareness of the industry and related credit risk increases the concentration of the banks' lending to the industry. The concentration of exposure to an industry is based on the industry structure and increases in the typical size of the firms in the industry and
also the structure of bank lending to withstand the credit risk exogenous deterioration of the business conditions. He concludes that “the more concentrated the banks’ supply of loans to the industry, the smaller the probability with which adverse business conditions force the banks’ borrowers to default on their loans and the higher the expected recovery rate of the loans in the event of a default. In summation his analysis suggests that default rates and recovery rates are negatively correlated.

**Dorota Witkowska, (2006),** in his paper discussing the application of classification functions and artificial neural networks (such as multilayer perception and radial basis function) to recognize the risk category of financial institutions such as banks, leasing companies, investment and pension funds, emphasizes that financial risk is a combination of credit, market, liquidity, and operational risks. According to him to reduce credit risk, the institutions undertake an analysis of economic performance of a multi dimensional nature which measures turnover, profit, credit history etc. and credit is traditionally granted based on the past experience the credit officers and their judgment. They opine that this method suffers from various shortcomings such as high cost of training, frequent incorrect decisions, time taken for evaluation of risk and grant of sanction and non uniformity of decisions by different credit officers for he same set of facts.

He is also aware that banks also evaluate (and quantify) several qualitative factors, such as market potential, marketing activity, human resource competency and efficiency of company management and companies” development perspectives. The author lays down a frame work for solving the problem of the credit risk evaluation by applying methods that transform the multidimensional problem of monitoring the financial performance of the analyzed firm into a one dimensional classification problem of categories like creditworthy client, average risk client, high risk client, and un-credit worthy client etc., to ensure that credit is granted only to the clients of credit worthy risk category. He concludes “that neural networks and classification functions have the ability to generalize knowledge since the training and testing errors are comparable”

**Patrick Behr and André Güttler, (2007),** estimates a logit scoring model for the prediction of the probability of default by German small and medium-sized enterprises
(SME’s), using a unique data set on SME loans in Germany. According to them the scoring model helps SME’s to gain knowledge about their default risk and approximate risk cost of debt and help them in their bank relationships, which in turn help SME’s to monitor bank’s pricing behavior and aids future financing decisions toward capital market-based financing. This is important because SME’s usually do not have access to organized capital markets and bank financing often remains the main alternative. They have tested a series of hypothesis namely Firms with a higher equity ratio bear a lower default risk. A positive growth rate of the equity ratio reduces a firm’s default risk. Firms with external equity financing pose a higher default risk than firms without. The higher the return on sales, the lower the default risk is. A positive growth rate of the return on sales reduces default risk. The higher the depreciation ratio, the lower the default probability is. Firms with temporary liquidity problems are riskier than firms without. Firms whose headquarters are located in eastern Germany pose a higher default risk. Small companies represent a higher default risk than large companies. Firms belonging to the construction sector exhibit a higher default probability. Companies that are organized as partnerships and corporations pose a higher default risk.

The model validates that SME’s with higher equity ratio, higher return on sales, positive growth rate of the equity and return on sales results in lower default risk and improves the stability of the company. An SME with external funding is riskier than a comparable company without external equity. Firms with temporary liquidity problems are riskier than firms without. However the model does not validate that small size represents a higher default risk but confirms that construction sector is more risky and organized companies pose a greater risk than individuals. The logit model developed by them validates not their entire hypothesis. They disclaim that model does not allow to directly infer the strength of the influence of the independent variables but only the direction of influence and its relative strength.

**Alastair Clark, (2006)**, Adviser to the Governor of the Bank of England, in the context of Basel II accord has analyzed capital requirements, cyclicality of credit conditions, increased credit risk transfer and liquidity in banks' overall financial position. In his view banks are still a dominant, major channel for provision of credit and therefore
bank capital requirements against credit risk remains important. He concludes that, theoretically pro cyclical might increase, but practical significance of that is unclear and more research is needed. He is of the view that it might make sense to establish international standards for liquidity, paralleling those for capital. (Today under Basel III this has been addressed).

Discussing the significance of shift in banking practice, from 'initiate-and-hold' to 'initiate-and distribute' in terms of the overall management of credit risk he lays emphasis on “an infrastructure which ensures that transactions once entered into are completed in a reliable and timely way, and an approach to disclosure which provides accurate information promptly to all interested parties.” He stresses that “one of the key functions of banks is the assessment of credit risk based on a good knowledge of borrowers.” Information about large companies is in the public domain and credit assessment may be limited and easy, but for smaller borrowers detailed credit assessment capacity of the banks has a real role to play. He lays emphasis on risk identification, risk measurement and risk management and states that these have become increasing challenges in an ever more complex and interconnected global financial system.

Gabriele Sabato (2010) focused and studied credit scoring models and gave an overview of their assessment, implementation and usage. New Basel accord has stirred, Banks to develop or modify internal credit models to confirm with the new rules and best practices. Several indices have been developed and used to assess the performance of the models. Banks that have adopted or willing to adopt Advanced approach under Basel II by moving to IRB (Internal Rating Based). Models are monitored and tested for model performance, stability and outputs. The simple type I and type II error, which rates the quantity and the accuracy of each model in correctly classifying default and non-default observations have been the first testing measure applied to scoring models. Of late, accuracy ratio (AR) and the Gini index have become popular measures. The recommendation from the study was that banks planning most advanced approach to calculate their capital requirements under Basel II will need to pay more attention and consideration of credit scoring models.
2.9 Reviews in the area of Risk Control and Systems

Antony M. Santomero (1996) reviews and evaluates risk management systems in North America’s super regionals and quasi money centre commercial banks. The author discusses the problems which the industry finds most difficult to address, like the shortcomings of the current methodology and the elements that are missing in current procedures in managing and controlling risks.

In the words of Mr. Raghavan, (2003), Credit Risk is the potential that a bank borrower/counter party fails to meet the obligations on agreed terms. This would result in default to the bank and consequent losses on account of either loss of interest due or some times even the principal. According to him Credit risk is a combined outcome of Default Risk and Exposure Risk. He suggests that the management of credit risk includes a) measurement through credit rating scoring, b) quantification through estimate of expected loan losses, c) Pricing on a scientific basis and d) Controlling through effective Loan Review Mechanism and Portfolio Management.

He indicates instruments and tools, through which credit risk management is carried out, includes,

- Prudential Limits per borrower, industry or sector linked to Capital Funds
- Multi-tier Credit Approving Authority,
- Delegation of powers linked to rating of borrowers
- Discriminatory time schedule for review/renewal,
- Hurdle rates and Bench marks for linked to rating on pricing of loans
- Comprehensive risk scoring system defining rating thresholds
- Periodic review of ratings to map migration to understand changes in asset quality
- The entire loan book is treated as a portfolio with management of diversification and concentration of exposures to a particular borrower, sector or industry.
- Continuous tracking of non-performing loans and not merely around the balance sheet date
- Independent Loan Review Mechanism (Credit audit)
- Use of risk rating methodologies like
  - Altman’s Z score Model involving forecasting the probability of a company entering bankruptcy
Credit Metrics tracking rating migration which is the probability that a borrower migrates from one risk rating to another risk rating,

Credit Risk +, a statistical method based on the insurance industry, is for measuring credit risk,

KMV, through its Expected Default Frequency (EDF)

Mckinsey’s credit portfolio view a multi factor model which is used to stimulate the distribution of default probabilities,

Credit Risk is measured through Probability of Default (POD) and Loss Given Default (LGD).

Christian E. Weller, (2007), analyses the growth of multinational banks in emerging economies in the context of supply and quality of credit. It is generally believed that the presence of multinational banks will result in

more capital at better quality, i.e. a reduced chance of financial crises.

less credit because domestic banks will reduce their loans to riskier market segments and foreign banks will limit their activities to a select number of groups of clients,

the quality of credit not necessarily improving if domestic banking systems have inadequate capital, lower interest margins and increased international competition.

After a detailed analysis of above assumptions Weller concludes Credit supply declines in response to increased competition from multinational banks but decreases with the size of multinational banks.

Domestic banks gain experience and capital that competitive pressures among domestic and multinational banks ultimately force increase of credit into new and previously financially neglected sectors.

A greater multinational bank presence may be associated with more banking sector stability but a direct link to quality of credit is ambiguous.

Dischel (1998) states that worldwide around 75% of the companies have a need to manage the financial consequences of weather related risks. Considering that product demand in the energy and power industries, production and financing of agriculture, growth and return on recreational businesses like (skiing, scuba diving, etc.), other economic sectors such as insurance, tourism, airlines, and retail businesses are directly
or indirectly affected by weather (draught, floods, cyclones and snow) the whether related risk is certainly an important risk for consideration by bankers. In an economy like India where whether related agriculture dominates around 55% of the economic activity, banks’ risk management should necessarily include and consider whether related risks and their management.

Linda L. Golden, Mulong Wang, Chuanhou Yang (2007) view that the traditional way of management of whether related risk by transfer of risk by insurance is not adequate in the present context. They have analyzed the management of whether related risk by using financial instruments to transfer and hedge some of these risks.

Use of new instruments adds two new risks namely basis risk (the risk that the return from financial derivative is a function of weather at a geographical location other than the location of the company) and credit risk (the risk that the counterparty to the derivative contract may not perform).

They have chosen the U.S. power market analyzing the risk sharing efficiency effects due to the “joint use of the standardized exchange traded weather derivatives and some OTC weather derivatives for hedging basis risk, with consideration of hedgeable basis risk and nonhedgeable credit risk conducted simulations to illustrate the determinants of hedge ratios and hedging effectiveness.

They conclude that linear and nonlinear basis hedging strategies using both exchange traded weather contracts and OTC basis weather contracts are much effective when basis risk is low and weather risk is high. According to them credit risk generally does not have much impact on linear basis hedging effectiveness when weather risk is not too low and basis risk is not too high, while nonlinear basis hedging effectiveness increases significantly in credit risk unless weather risk is very high.

Chiou-Huey Wu and Chien-Sen Huang, (2007) have stated that Central Bank of Taiwan encouraged local banks to develop their own mechanisms for managing risks after examining the risk management systems of foreign and local banks and to adopt appropriately either basic internal evaluation method when evaluating capital for credit risk, or to adopt the standard method. Based on a questionnaire survey of 26 local banks conducted at the end of March 2002 by the Central Bank in Taiwan, in relation to responses by local banks to the new 2001 Capital Accord model for managing risks, the
authors have conducted a study and conclude that top management support is essential for the risk mechanism. Provision of global VaR and EaR summaries are essential for risk management of the market risk. They recommended that banks carefully select a multiplier factor for capital adequacy, make asset combination data available, compile comprehensive historical market data, adopt internal model approach, and strengthen the role of the bank's risk management team.

Edward I. Altman and Gabriele Sabato, (2007), realizing that Small and medium sized enterprises (SME’s) play a significant role in the economy of many countries and considerable attention is paid to financing SME’s in the new Basel Capital Accord, have investigated whether banks should consider small and medium sized firms separately from large corporates when they set up credit risk systems and strategies. They have developed a distress prediction model specifically for the SME sector and analyzed its effectiveness compared to a generic corporate model.

Their analysis has revealed that managing credit risk for SME’s requires models and procedures specifically focused on the SME segment. They have developed a default prediction model using well known statistical techniques, and identified five financial ratios that are found in combination to be the best predictors of SME default. Further they demonstrate that modeling credit risk specifically for SME’s helps to lower, even though slightly, capital requirements (around 0.5 per cent) for banks under the A-IRB approach of Basel II when compared to applying a generic corporate model.

They conclude that this is true irrespective of the percentage of SME firms classified as retail or as corporates. Their study has reiterated the conclusion of some other studies that small and medium sized enterprises are significantly different from large corporates from a credit risk point of view. They recommend that banks should not only apply different procedures (in the application and behavioural process) to manage SME’s compared to large corporate firms, but these organizations should also use instruments, such as scoring and rating systems, specifically addressed to the SME portfolio when setting their internal systems and procedures to manage credit risk for SME’s.

Aron A. Gottesman And Gordon S. Roberts (2007) have conducted a study on the effect of collateral and loan rates in US business loans. They have quoted Berger and
Udell (1990, 1995) and Dennis, Nandy, and Sharpe (2000) for bank loans and by John, Lynch, and Puri (2003) for U.S. corporate bonds to establish that over 70% of the loans are collateralized. They indicate that prior studies empirically establish that collateralized debt carries a higher yield than non-collateralized debt and riskier borrowers were required to furnish collateral by lenders. (Noted by Orgler (1970), Hester (1979), Berger and Udell (1990, 1995), Carey, Post, and Sharpe (1998), Harhoff and Korting (1998), and Roberts and Siddiqi (2004).) According to them several theoretical papers have predicted that borrower risk and the presence of collateral have a positive association. (Boot, Thakor, and Udell, 1991; Bester, 1994; Coco, 1999; Pozzolo, 2002). They quote researchers who state that collateral characterizes the borrowings of less risky companies (possibly meaning lower collateral for less risky borrowers) (Bester, 1985, 1987, 1994; Chan and Kanatas, 1985; and Besanko and Thakor, 1987). In conclusion they state that loan spreads are positively related to riskiness, as measured by probability of default. Their study suggests that credit rating is not fully reflective of actual riskiness, (validating their inclusion of probability of default as a control variable) and indicate that the inclusion of performance pricing covenants reduces spreads.

2.10 (a) Identification and Management of Interest Rate Risk

Interest rate risk is a major concern for Banks due to nature and realization time for assets and nature and maturity of their liabilities causing asset–liability maturity mismatch. The cost of meeting liabilities on time by other sources of funding is quite high and a drain on profits of the bank. Since term of asset is a key factor in credit risk management, it is advisable to learn about the implications of interest rate risk in maintaining profitability and growth of the bank.

Han week and Ryu, (2004); Hyde, (2007) emphasized that higher interest rates had positive impact on banks.

Hendricks and Hirtle, (1997) observed that a bank’s market risk exposure is determined by both the volatility of underlying risk factors and the sensitivity of the bank’s portfolio to those risk factors

Ilia Patnaik and Ajay Shah (2002) researched Interest Rate Risk in the Indian Banking System measuring interest rate risk of a sample of major banks in India estimating the
impact upon equity capital. It was found that roughly 66% of the banks in the sample stood to gain or lose over 25% of equity capital in the event of 320 bps move in interest rates. Measuring the elasticity of bank stock prices to fluctuation in interest rates it was found that the stock prices of roughly one third of the banks in the sample had significant sensitiveness.

Marc.D.Hayford and A.G.Malliaris (2008) discussed risk management of financial instabilities due to asset price crashes and role of central banks reducing interest rates and relaxing monitory policy. The study concluded that sub prime crisis that was partially caused by housing bubble burst and resulted in financial instability was due to failure of responsibilities of central banks in managing such risk.

Ravikant Bhatt (2005) attempted to find out the magnitude of the interest rate risk, causes and ways to control in some select Indian Banks in his report titled “The incidence of interest rate risk in Indian Banks.” majoriy of the studies dealt with Interest rate risk to Capital. But studying interest rate risk to earnings using the gap analysis technique recommended by RBI is much preferable.

Amadou Sy (2005) measures and assesses the management of interest rate risk of banks government securities portfolio in India and concludes using duration and value at risk models that some public sector banks and old private sector banks are most vulnerable to interest rate risk.

Brandon Lockhart, G. (2006) studies using firm fixed effect regression analysis the market benefits of interest rate risk management at US commercial banks. It study found that use of derivatives and listing in NYSE or AMEX needs employing derivatives to hedge their interest rate exposure. However the market does not seem to appreciate the hedging effects of derivatives.

Luis Vasco Pinheiro and Miguel A. Ferrera (2008) studied 371 banks from 1980-2003 as sample to investigate hedging practices efficiency of forecasting interest rate movements and managing duration gaps. The success of bank’s interest rate. The study showed that average managers are not good forecasters and majority of banks should focus more on core business (loans and deposits) instead of viewing asset and liability management as profit center.
Charumathi Balakrishnan (2010) measured the Interest Rate Risk in Indian Bank, one of the public sector banks in India using Gap Analysis Technique. The findings revealed that the bank is exposed to interest rate risk despite management of interest rate risk.

Oliver Entrop, Christoph Memmel, Marco Wilkens and Alexander Zeisler (2011) proposed estimating interest rate from the perspective of bank outsiders. He used Time Series Accounting Based Model for more than 1000 German universal banks from Jan 1999 to Oct 2005 to estimate then maturity and cash flow structure of bank’s assets and liabilities and concluded that cross sectional variation of interest rate risks of banks are significantly better than that of benchmark module in differentiating between high risk and low risk banks.

From the studies, it can be noted that most of the studies have dealt with interest risk management practices, interest risk volatility, hedging practices, measurement of interest rate risk in banking sector. As interest rates are key to advances as well as deposits, the understanding and proficiency in managing them through treasury operations will add strength to credit risk management.

2.10 (b) Identification and Management of Liquidity Risk

Banks accept deposits (liabilities) for various maturities and lend to create assets of various maturities. When the bank has to repay a liability on maturity, if at the same time, an asset has also matured (that is a loan repaid), bank will not have any difficulty in meeting the obligation on liability. But most of the time it may not be so as loans carry longer maturity and normally deposits are for shorter duration to take advantage of interest rates.

Diamond (1999); Allen and Jagtiani, (1996) state that Bank’s liquidity management means matching liquidity of asset to meet the bank’s obligation to depositors. Maturity mismatch exposes banks to liquidity risk. If banks have more liquid assets such excess liquidity does not earn any income for the bank and there are possibilities of losses. The aim of liquidity management is to mitigate the risk of losses associated with having to dispose of illiquid assets to meet the liquidity demands of depositors.
Lev Ratnovski (2007) studied the options for bank’s liquidity risk management and suggested that both liquidity and transparency are important hedges, and can be combined in risk management subject to banks policy on leverage, and policy response on multi-tasking. The study found that more liquid banks will be resilient to small shocks, while more transparent banks are able to withstand large shocks as well.

Yoram Landskroner and Jacob Paroush (2008) constructed a stylized model of bank management with asset and liabilities liquidity structure for determining the bank’s exposure to liquidity risk. Using comparative statistics analysis of bank’s competitive environment concluded that increased competition in credit market will increase the liquidity shortage but increasing competition in deposit market will reduce the liquidity shortage.

Jian Cai and Anjan V. Thakor (2008) examined the impact of inter-bank competition on the liquidity risk and credit risk. Risk free interest rate was used as benchmark. Credit risk through stochastic loan returns were analyzed to know study the effect on loan market. The results show that use of bank deposits to meet liquidity gap may worsen liquidity risk and inter-bank competition increases loan liquidity and reduces credit and liquidity risks reducing bank’s overall risk.

Gianfranco A. Vento and Pasquale La Ganga (2008) analyses liquidity risk management frame work to achieve an integrated supervisory framework for global markets. Various Value at Risk (VAR) models, long term funding ratio and cash capital position are analyzed to draw practical lessons from recent financial crisis concerning liquidity management.

Evan Gatev Til Schuermann Philip E. Strahan (2009) provides a systematic analysis, using 100 large banks based on market capitalization from 1990 to 2002 for regression specification, conditional mean volatility and robustness tests to analyse reduction of bank liquidity risk by combining deposit taking and commitment lending and conclude that combining deposits and commitment lending provide liquidity risk hedge for banks.

Gatev, (2006), Bengt Holmstrom and Jean Tirole (2000 ; 2001) state that banks who commit to lend are exposed to the risk of unexpected liquidity demands
from their borrowers and to reduce this risk is to hold excess cash reserves, which can be expensive in practice.

The reviews highlight effective liquidity risk management practices in banks by systematic analysis of risk and risk management practices.

2.10 (c) Identification and Management of Operational Risk

King, (1998), states that Operational risk include failures in the bank’s operation and also the causes of failures, such as terrorist attacks, management failures, competitive action and natural disasters which can be largely uncontrollable and unpredictable.

Medova, (2001) adds to the list of operational risks events such as human or technology errors, lack of control to prevent unauthorized or inappropriate transactions being made, fraud and faulty reporting caused by internal process, people and operating system. These may lead to further losses.

Carol Alexander (2002) used Baysian Belief Networks (BBNs) and influence diagrams for measuring and managing certain operational risks such as traditional processing risks and human risks. Simulating scenarios on market risk factors and credit risk factors are performed and it was concluded that operational risks are integrated with market risk and credit risk.

Silvan Ebnöther, Paolo Vanini, Alexander McNeil, and Pierre Antolinez (2002) studied to show 103 production processes at Zürcher Kantonal bank, identifying risk factors for quantification of operational risk (OR) to adapt to the needs of business units. His conclusions state that all processes need not be defined, most important are selected and the cost of monitoring the objects can be kept at reasonable level to attain precise results.

GRK Murty, K Seethapathi and N Rajasekhar (2003) have conducted a study to identify and manage sources of operational risk in Indian Banks. Expansion in the range of activities increases operational risk. It was identified that increase in operational risk management assumed importance because of reaction to major loss due to internal events, increased competition, falling spreads, management commitment for enterprise-wide risk management, regulatory attention etc.
Benedikt Wahler (2005), using Probabilistic based methods and stochastic measures on likelihood of occurrence and severity of loss computed Value-at-Risk for main processes. Based on that specifies the nature of operational risk processes management, for identifying, evaluating, prioritizing, preventing, mitigating and controlling and claims that these lessons are applicable to any business operation including the banks.

Gunther Helbock and Chrisrian Wagner (2006) investigated operational risk disclosure practices of banks during the period of 1998 to 200 when the same was not mandatory in annual reports with a sample of 142 banks from the North America, Asia and Europe, excluding non commercial banks. Bank disclosure levels were categorized using descriptive statistics and econometric model to analyze the influence of equity/assets and profitability on management decisions with respect to the levels of disclosure. The empirical evidence suggests that low capital or/and less profitable institution prefer high level of operational risk disclosure in their annual reports.

Anna-Maria Kessler (2007) described essential systems features of operational risk (OR) in banking in a framework called “A Systemic Approach Framework for Operational Risk” (SAFOR) to manage and mitigate the risk-around-loss. The framework also includes methods for decision making in addition to computation of Value at Risk (VaR) and Conditional Value at Risk (CVaR). The application of advanced OR model in the bank shows that the technique holds as validation of the SAFOR modules.

Maike Sundmacher (2007) explored the relationship between bank capital and operational risk and suggested alternative measurement methodologies for assessing operational risk levels in banks. He concluded that institutions will self-select into the appropriate category depending on their risk measurement / management capabilities. The more sophisticated a bank’s risk measurement systems, less costly the imposed capital charge.

Carla Angel., et al. (2009) measured operational risk in financial institutions to quantify the operational risk applying Loss Distribution Approach (LDA), a frequency/severity approach widely used in the actuarial models. Necessary risk capital to cover the operational risk was determined using Risk measures like Value at Risk (VaR) and Expected Shortfall (ES). Tools like Student copula, Extreme Value Theory
(EVT) and Expectation and Maximization (EM) algorithm were also used. It was concluded that with a numerical application, the model was successful in evaluating risk capital for a single financial institution.

Izah Mohd Tahir and Abdul Mongid (2009) studied the operational risk capital charges for Indonesian rural banks under new Basel Capital accord with a sample of 77 rural banks in the Kediri area for the period of three years 2006 to 2008 compared the result of the three different approaches -Basic Indicator Approach (BIA), Standardised Approach (SA) and Alternative Standardised Approach (ASA) for calculating operational capital charges. The study concluded that banks using more advanced model require less capital charge and save on capital requirement.

Ioan Trenca and Iulia Neag (2010) analysed operational risk of financial institutions in Romania in the context of the Basel II Agreement using basic indicator approach, standardized approach and the advanced measurement approach to suggest adequate capital requirements for functioning of the bank. The study insist on the importance of identifying, measuring and modeling operational risk and the benefits on continuously improving the instruments, methodology and techniques of operational risk management. The conclusions are that operational risk management is a must and requires advanced methods to effectively contribute to the development of the banking. Major Banks in advanced countries have made considerable progress in operational risk management. Awareness of operational risk is improving in emerging markets. The above studies specify the nature of operational risk and provide various models for measurement and management operational risks in banks. It is to be clearly understood that Credit risk management alone is not sufficient and all these risks need to be managed in an integrated way to achieve the goal of a healthy banking Institution.

2.11 (a) Risk Management and Business Failures

Business failures result in loss to the banks who have lent to them. The understanding of causes for business failures, methods to predict and mitigate the failure would help the banks to manage their credit risk better. One of the objectives of a sound credit risk management is to anticipate and identify potential business failures to initiate action and recover loans on time and avoid credit defaults to minimize losses and consequent
capital charges. As Management inefficiency of owner-managers seems to be the root causes of small firm failure. However experience indicates that this extends to large and corporate forms of business also.

Cover (1933) said that 'discernible errors in management' were a major cause of retail bankruptcies in the US, and during 1930 management deficiencies were claimed to be related to business failure.

Peacock (1985) states that Dun and Bradstreet studies have consistently found that causes due to poor management were predominate in failures. Out of the 17000 business failures analyzed in US 94% was due to management. I Canada also 96% of the 2598 business failures studies 96% was due to failure of management.

Williams (1986); McMahon et al (1993) analysing the national annual reports under the Bankruptcy Act, report that internal factors relating to the quality of management is the main cause of business failure. It appears that that 90% of business failures were due to management inadequacy (48% incompetence and 42% inexperience).

René Stulz (2008) examined various types of risk management during business failures using scenario analysis to assess financial health and survival. Impact of liquidity was analyzed using Economic analysis of problems experienced by hedge funds Long Term Capital Management (LTCM) in 1998. It was concluded that financial institutions should use scenario for managing creditable financial crisis threats even if probability of event is extremely small.

Thus the above studies analyze the reason for business failure, risk attached to it and the measurement of risk.

2.11 (b) Empirical Studies to Measure Corporate Failure

The turmoil in financial institutions during 2007-2010 was the most serious financial crisis since the Great Depression of 1930. Analyzing corporate failures gained importance and various empirical studies were done.

Ramser and Foster (1931) conducted a study of successful and non successful firms using a sample of 173 firms in the state of Illinois by analyzing 11 types of ratios and found that firms that failed had ratios that were lower than that of successful firms.

Beaver (1966) was among the first to use the analysis of ratios to predict corporate failure. His selected a sample of 79 failed and 79 non failed firms using paired sample
technique. (i.e., from the same industry for every failed firm in the sample, a non failed firm of similar asset size was included). Beaver defined corporate failure rather in a broad sense to include firms failed as bankrupt, not paid dividend on preferred stock/bond and defaulted or overdrawn bank account. For a period of 5 years prior to the year of failure, he computed 30 financial ratios from the various conventional ratio categories for each firm. Though a comparison of the mean ratios for the failed and non failed firms corroborated that there is a difference in the ratio of failed and non failed firms they did not suggest the existence and extent of failures as a predictive power. Employing various predictability tests such as the dichotomous classification technique which predicts a firm’s failure status solely on the basis of a given financial ratio he refined his findings and concluded that the most successful predictor was the cash flow to total debt ratio and the second best predictor was net income to total asset ratio (success rates of 88% and 75% respectively for two time periods). Current ratio was found to be of least importance in predicting the business failures.

Altman, E.I (1968) did pioneering work using multivariate approach to financial analysis employing statistical technique of multiple discriminant analysis (a technique used to identify a set of variables that best discriminates between two or more groups). To predict bankruptcy, selecting a paired sample using industry and size as pairing criteria on a satisfied random basis consisting of 33 pairs of failed and non failed manufacturing firms. Starting with 22 financial ratios, he identified a combination of 5 ratios which did the best overall job in discriminating the bankruptcy status of the sampled firms. His model is known as Altman’s Z Score Model.

The model was tested to estimate the predictive power of the Z score using data from one to five years prior to bankruptcy. Decline in Predictive accuracy of the model with increase in years prior to bankruptcy and possibility of misclassification when Z score fell within the range of 1.81 to 2.99, (which Altman referred as the “zone of ignorance”) are major shortcomings of the model. Z score model is as follows:

\[ Z = 0.12X_1 + 0.014X_2 + 0.33X_3 + 0.006X_4 + 0.999X_5 \]

\[ Z = \text{Overall Index} \]

\[ X_1 = \text{Working Capital/Total assets} \]
\[ X_2 = \text{Retained Earnings/Total Assets} \]
\[ X_3 = \text{Earnings before Interest and Taxes/ Total Assets} \]
\[ X_4 = \text{Market Value of Equity/Book value of Total Debt} \]
\[ X_5 = \text{Sales/Total Assets} \]

The classification rule for the above discriminant function was:

If \( Z > 2.675 \), assign to the bankrupt group

If \( Z \leq 2.675 \), assign to the non bankrupt group

**Summary of Business Failure Classification Models in various countries**

Economists and financial professionals in various countries have been working on various methods to predict Business failure and early warnings of impending financial crises. Different approaches using different rations have been used to predict the failure.

A bird’s eye view of a few studies is listed with details of variables used to identify the business failure:

**Table 8: Classification of Business failure models**

<table>
<thead>
<tr>
<th>County</th>
<th>Year</th>
<th>Author</th>
<th>Variables used</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>1968</td>
<td>Altman</td>
<td>EBIT / assets; Retained Earnings / assets; working capital / assets; sales / assets; market value (MV) equity/book value of debt</td>
</tr>
<tr>
<td>Japan</td>
<td>1982</td>
<td>Ko</td>
<td>EBIT/sales; Working Capital/debt; inventory turnover 2 year prior/inventory turnover 3 years prior; MV equity/debt; Standard error of net income(4 years)</td>
</tr>
<tr>
<td>Japan</td>
<td>1979</td>
<td>Takashi Kurokawa and Watase</td>
<td>Net worth/Fixed Assets, Current liabilities/assets; voluntary reserves plus un-appropriated surplus/assets; interest expense/sales; earned surplus; increase in residual value/sales; ordinary profit/sales; sales-variable cost</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1973</td>
<td>Weibel</td>
<td>Liquidity (near monetary resource asset-current liabilities)/ operating expenses prior to depreciation; inventory turnover; debt /assets.</td>
</tr>
<tr>
<td>Germany</td>
<td>1988</td>
<td>Baetge, Huss and Neihaus</td>
<td>Net worth / (Total assets-quick assets-Property &amp; Plant); (Operating income + ordinary depreciation + addition to pension reserves)/assets;</td>
</tr>
<tr>
<td></td>
<td>1984</td>
<td>Von Stein and Ziegler</td>
<td>(Cash income/expenses)/short term liabilities.</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
<td>----------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td></td>
<td>Capital borrowed/total capital; short term borrowed capital/output; accounts payable for purchases &amp; deliveries/material costs; (bill of exchange liabilities+ accounts payable/output; Equity/total assets-liquid assets-real estate); equity/(tangible property-real estate); short term borrowed capital/current assets; (working expenditure-depreciation on tangible property)/liquid assets +accounts receivable-short term borrowed capital); Operational result/capital; (Operational result + depreciation)/net turnover; (Operational result + depreciation)/short term borrowed capital; (Operational result + depreciation)/total capital borrowed</td>
</tr>
<tr>
<td>England</td>
<td>1979</td>
<td>Marais (1979)</td>
<td>Current assets/gross total assets; 1/gross total assets; cash flow/current liabilities; (funds generated from operations-net change in working capital)/debt</td>
</tr>
<tr>
<td>England</td>
<td>1982</td>
<td>Earl and Marais</td>
<td>Current assets/gross total assets; 1/gross total assets; cash flow/current liabilities; (funds generated from operations-net change in working capital)/debt</td>
</tr>
<tr>
<td>Canada</td>
<td>1981</td>
<td>Altman and Lavallee</td>
<td>Current assets/Current Liabilities; net after tax profits/debt; rate of growth of equity-rate of asset growth; debt/assets; sales/assets</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1979</td>
<td>Bilderbeek</td>
<td>Retained Earnings/assets; accounts payable/sales; added value/assets; sales/assets; net profit/equity</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>1978</td>
<td>Van Frederikslust</td>
<td>Liquidity ratio(change in short term debt over time); Profitability ratio(rate of return on equity)</td>
</tr>
<tr>
<td>Spain</td>
<td>1988</td>
<td>Fernandez</td>
<td>Return on Investment, Cash flow/Current liabilities; quick ratio/industrial value; before tax earnings/sales; cash flow/sales</td>
</tr>
<tr>
<td>Country</td>
<td>Year</td>
<td>Authors</td>
<td>Measures</td>
</tr>
<tr>
<td>-----------</td>
<td>------</td>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Italy</td>
<td>1994</td>
<td>Altman, Marco and Varetto</td>
<td>Ability to bear cost of debt; liquidity; ability to bear financial debt; profitabiliy; assets/liabilities; Profit accumulation; trade indebtedness; efficiency</td>
</tr>
<tr>
<td>Australia</td>
<td>1984</td>
<td>Izan (1984)</td>
<td>EBIT/Interest; MV equity/liabilities; EBIT/assets; Funded debt/share holder’s funds; current assets/current liabilities</td>
</tr>
<tr>
<td>Greece</td>
<td>1988</td>
<td>Gloubos and Grammatikos</td>
<td>Gross income/current liabilities; debt/assets; net working capital/assets; gross income/assets; current assets/current liabilities</td>
</tr>
<tr>
<td>Brazil</td>
<td>1979</td>
<td>Altman, Baidya and Riberio-Dias</td>
<td>Retained Earnings/assets; EBIT /assets; sales/assets, MV equity/book value of liabilities</td>
</tr>
<tr>
<td>India</td>
<td>1988</td>
<td>Bhatia</td>
<td>Cash Flow/debt, Current Ratio, Profit after tax/net worth, Interest /Output, Sales/assets, Stock of finished goods/sales, Working capital management ratio</td>
</tr>
<tr>
<td>Korea</td>
<td>1995</td>
<td>Altman, Kim and Eom</td>
<td>Log (assets); Log(sales/assets);retained earning by assets; MV of equity/liabilities</td>
</tr>
<tr>
<td>Singapore</td>
<td>1981</td>
<td>Ta and Seah</td>
<td>Operating Profit/liabilities; Current assets/Current Liabilities; EAIT/Paid up capital; Sales/Working Capital; (Current Assets-Stocks-Current Liabilities)/ EBIT; Total share holders funds/liabilities; Ordinary Shareholder’s fund/capital used</td>
</tr>
<tr>
<td>Finland</td>
<td>1988</td>
<td>Suominen</td>
<td>assets; liabilities/assets Profitability; quick flow-direct taxes)/assets; liquidity; quick assets/total</td>
</tr>
<tr>
<td>Uruguay</td>
<td>1988</td>
<td>Pascale</td>
<td>Sales/debt; net earnings/assets; long-term debt/total debt</td>
</tr>
<tr>
<td>Turkey</td>
<td>1988</td>
<td>Unal</td>
<td>EBIT/assets; quick assets/current debt; net working capital/sales; quick assets/inventory; debt/assets; long term debt/assets</td>
</tr>
</tbody>
</table>

Source: Altman and Narayan (1997)
2.12 Recurring Common risk incidences & causes for the same

Banks have been experiencing credit risk for a very long time. In fact is inherent in banking business. The banks have been time and again have been looking into the factors which result in default. A few of the studies in these areas are given below:

Gunjan M. Sanjeev (2007) has done a study on Non performing assets (NPAs) otherwise commonly known as bad loans, to find out the causative factors for such loans, with particular reference to Indian banks. Non-performing assets (NPAs) have been detrimental to the performance of the banks and is a precursor for bank failures. Research in the field indicates the impact of bad loans on the efficiencies of the bank is negative (Resti, 1995) and. “Increase in non-performing loans tend to be followed by decrease in measured cost efficiency, suggesting that high levels of problem loans cause banks to increase spending on monitoring, working out, and / or selling off these loans, and possibly become more diligent in administering the portion of their existing loan portfolio that is currently performing” (Berger, et al. 1997). The study listed out following internal and external factors which contribute for bad loans.

**Internal**

- Appraisal
- Managers have poor skills in credit scoring
- Managers have lack of motivation
- Managers are not fully competent in appraising the value of collateral
- No administrative penalties
- Target completion

**Monitoring & Controlling**

- Effort to reduce costs
- Lack of effort on part of managers
- Lack of manpower
- Lack of focus of the top management
- Seizing and disposing of collateral
External

- Influence from the Central Government
- Interference from the local government
- Economic downturns
- Political intervention
- Willful default by borrowers
- Soft budget constraints

The study concluded that the external factors have a higher influence compared to the internal factors. The study revealed “Economic downturn and willful default have been found to be most critical. Poor credit scoring skills of managers, absence of suitable administrative penalties and target completion have been found to have a significant influence amongst factors related with the loan appraisal mechanism. Seizure and disposal of collateral have been found to be the toughest challenges amongst the factors related with the loan monitoring and controlling mechanism. Loan managers’ levels of motivation, manpower, skills to appraise collateral, efforts to reduce costs, government and political intervention and soft budget constraints have been found to have a lower influence.” The author suggested that “although both appraisal and monitoring & controlling factors are playing a role in increasing bad loans, monitoring and controlling aspects need greater attention at present.”

Abhiman Das and Saibal Ghosh, (2007), have empirically investigated the Determinants of Credit Risk in Indian State owned Banks. The study was to determine the factors affecting problem loans of Indian state-owned banks for the period 1994-2005. The analysis examines the proximate causes of credit risk in state owned banks taking into account both macroeconomic and microeconomic variables.

Empirical research provides strong evidence of the contribution of banking development to economic growth. Credits to private sector and bank’s asset growth are positively correlated with economic growth. (King and Levine, 1993; Levine and Zervos, 1998; Aghion et al, 2005). Research has also revealed that in financially developed countries firms are able to get more external funds and thereby grow faster (Demirguc-Kunt and Maksimovic, 1998). In short the health of the banking system is key to development process and any deterioration of banks health will disrupt
development. Generally major economic crisis always have their origins in a banking crisis.

The banking crisis of 1990s is a case in point. Years of bad policies and practices of lending coupled with poor monitoring and inadequate regulatory control have led to faster growth of risky assets. (Lindgren et al, 1996; Caprio and FQingeibiel, 2003). However the authors feel that determinants of the credit risk of banks in emerging economies have received limited attention in the literature.

The authors were aware of the various preventive, remedial and legal strategies in containing problem loans like corporate debt restructuring mechanism, introduction of One Time Settlement (OTS) schemes and passing of an Act to strengthen creditor rights.

In analyzing the determinants of banks' problem loans the authors have taken note of Disaster myopia, herding behaviour, perverse incentives and principal-agent problems that contribute to mistakes in bank credit policy in an expansionary phase. They have factored in macroeconomic factors, such as downturns in aggregate economic activity and consequent credit crunch policies and their impact on loan quality and the time lag structure of the effects of economic activity on problem loans. They have noted that high real interest rates could raise the cost of capital for borrowers and make it difficult for them to repay their loans on time. They have relied on the observation that Rapid credit expansion is considered one of the most important causes of problem loans (Caprio et al, 1994). They have identified under micro economic factors moral hazard, ownership structure and regulatory actions as the primary factors influencing bank risk-taking behaviour (Kwan and Eisenbis, 1997) and translated the bank risk-taking determinants into observable variables, such as credit growth, operating efficiency and solvency.

The authors conclude that credit risk is significantly influenced by individual bank-level variables. Even after controlling for macroeconomic conditions. A rapid expansion of lending by banks often leads to poor loan quality, albeit with a lag, because the growth of lending may outstrip the lender's capacity to appraise and monitor its borrowers. Bigger banks tend to have higher problem loans. This suggests that the potential risk-reducing benefit of diversification may need to be traded-off
against the paucity of adequate skills in credit evaluation in big banks. Finally, the authors suggest that from the supervisory standpoint, excessive rapid loan growth, as well as sharp declines in bank capital levels, are useful pointers to the deterioration in the financial health of banks and can be employed as early warning indicators of future problem loans. In short, their findings reveal that at the macro level, GDP growth and at the bank level, real loan growth and bank size play an important role in influencing problem loans.

2.13 Human factor in building credit risk management system

Boston Consulting Group, (2001) conducted a study and found that the determining success factor is not the technical development but the ability to understand risk strategically and also the ability to handle and control risk organizationally. In order to realize a risk-based management philosophy, the attitude and mindset of the employees need to be changed and they must be made to understand that well-managed risk is crucial for success. This requires a commitment to change, willingness to shoulder responsibilities, clearly defined structures and intensive training to employees. Banks in North America and Australia concentrate on risk management primarily to enhance their competitive positions where as in Europe, Asia and particularly in South America, risk management is considered as a primary factor from the perspective of regulatory requirements.

Catherine Soke Funho and Nurul Izza Yusoff (2009) investigated current credit risk management practices of Malaysian Financial institutions to provide suggestions to reduce broad bank risk to the regulators using Primary data in credit risk management. The study found that diversification of loan services; risk mitigation, training and development of staff as well as guidelines for loan approval are important strategies practices in banks to manage credit risk.

2.14 Identification of research gap and point of entry for thesis

There are enough literature available explaining fluctuations in the credit policies of banks. Management compensation structures and perverse incentives problems, principal agency relationship, managers having limited liability, and hence a propensity to favour high risk-return strategies (i.e., over extension of credit) bank managers
enlarging their social presence and power in an enlarging organization, have all been well documented by research.

Strong competition among banks, entry of multi national banks and other financial intermediaries result in erosion of margins and puts pressure on banks’ bottom lines. This in turn forces banks to compensate for declining profitability. Banks tend to improve profitability by sacrificing objectivity in credit evaluation standards to increase loan growth indiscriminately at the expense of the (future) quality of their loan portfolios is also well known.

Loans turn out to be non-performing only with a time lag, and hence encouraging loan growth may miss out on estimating future loan losses. Herd behaviour during bank business expansions may result in unviable projects being financed. Economic bust and booms, inexperience of officers or non availability of skilled credit personnel for credit appraisal and judging adequately credit risk, resulting in a build-up of problem loans. Adequacy of collateral (fluctuations in value over a period of time) might also play a role in influencing bad loans. These aspects have been well covered by earlier studies.

The review reveals that extant research is mostly centered on evaluation of ex-ante risks of individual borrowers and individual loan operations, and the response of lenders. Enough literature is available on credit spreads, collateral, loan term structures and commitments between borrowers and lenders over time (relational lending) as these are widely investigated topics.

The available research materials in this area are mainly concerned with US banking industry and a few also deal with other countries like Mexican banking sector. There have been very few studies made in the Indian banking scenario. Only a few like Rajaraman (1999) examined the problem of non-performing loans in a limited way and Abhiman Das and Saibal Ghosh (2007) investigated the Determinants of Credit Risk in Indian State owned Banks. Though variety of articles appeared in various professional journals, the problem of increasing non performing loans, the role and effectiveness or causes and constraints of credit risk management systems have not been discussed in the Indian context. Particularly research on failure of established systems even after experience of bad loan losses at the micro-level of financial institutions have been rare possibly due to lack of reliable data on loan losses and cause for failure of systems.
India is one of the most important developing countries with a history of banking over centuries. The Central Bank of the country i.e., Reserve Bank of India has initiated various steps since 1980s to strengthen banking system. The role and control of the state is stronger in the arena of banking. The banking in India is under going a make over by deregulation and liberalization for over two decades to pay a crucial role in the international financial markets.

Therefore a study on the existing risk management system of banks in India covering the practices followed, it effectiveness, constraints in implementation was thought to be needed and appropriate.