Are Bank Stock Prices Sensitive to Risk Management? Evidence from India[+]

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Abstract

Sound risk management practice is the backbone of present day commercial banking. A bank has to manage several risks in the course of production and delivery of various financial services. This study attempts to summarize the information contained in bank financial statements on the diverse risks faced by banks and then ascertain whether stock markets respond to risk management behaviour. To this end, we compute risk management scores for Indian commercial banks for the period 1999-2006 by summarizing accounting ratios through the application of multivariate statistical techniques. Our computed scores show that risk management performance of banks has been improving over time with a recent drop in the last few years. Finally we examine whether returns on bank stocks are sensitive to the risk management scores developed in our study. The main finding is that banks with good risk management behaviour reward their shareholders with higher wealth.

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1. Introduction

Commercial banking is a combination of different activities such as providing products and services to the customers, engaging in financial intermediation and management of risk. In recent years, risk management has received increasing focus as a central activity of commercial banks. The justification for studying banks' activities by focusing on risk management can be traced to Merton (1995) who argues that financial systems should be analyzed in terms of a 'functional perspective' rather than an 'institutional perspective' since over long periods of time functions have been much more stable than institutions.[1] Applying this functional approach to the financial sector, the literature tends to explain banks' activities by focusing on one or the other function performed by them. Merton (1989) argues that among all functions, the central feature of a financial institution (FI) is its ability to distribute risk across different participants. According to Saunders and Cornett (2006), modern FIs are in the risk management business as FIs provide the positive function of bearing and managing risk on behalf of their customers through the pooling of risks and the sale of their services as risk specialists.

Given the importance of risk management in a bank's functioning, the efficiency of risk management is expected to significantly influence its financial performance (Harker and

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[1] A functional perspective is based on the services provided by the financial system, such as providing a way to transfer economic resources through time. In contrast an institutional perspective is one where the central focus is on the activities of existing institutions such as banks and insurance companies.

Zanios, 1998). An extensive body of banking literature (see e.g. Santomero and Babbel, 1997) argues that risk management matters for financial performance of banking firms. According to Pagano (2001), risk management is the central function of FIs in terms of creating value for shareholders and customers. The corporate finance literature interprets the role of risk management in line with the shareholder value maximisation hypothesis. This hypothesis suggests that a firm will engage in risk management policies if they enhance the firm's value and its shareholder's value (Ali and Luft, 2002). Thus effective risk management either in non-banking firms or in banking entities should enhance the value for the firm and its shareholders. The objective of this paper is to analyse the risk management practices of commercial banks and to examine the impact of risk management on stock market returns of the banks.

We chose Indian banking as the case study for our analysis. Our choice is driven by the recent emphasis on risk management in Indian banking driven by the Reserve Bank of India (RBI)'s guidelines as well as banks' own concerns. This recent emphasis can be attributed to several reasons. Prior to 1992, Indian banks were subject to a regime of strict control enforced by the RBI. A process of financial liberalization was initiated in 1992 to make the banking system profitable, efficient and resilient. The liberalization measures consisted of deregulation of entry, interest rates, branch-delicensing and encouragement to state owned banks to get listed on stock exchanges. While banks took some time to adjust to the new operating environment, the year 1998 saw a second phase of reforms in the banking industry marked by the introduction of several prudential measures and the first set of comprehensive guidelines for Asset-Liability management and risk management. Thus the period after 1998

in Indian banking offers a suitable set-up for an analysis of risk management and its impact on banks' stock returns. During this period, the RBI also issued a comprehensive framework for implementation of integrative risk management systems and lately Indian banks have been preparing for the implementation of Basel-II norms, which in turn is a move towards better risk management practices.

In this study we attempt to take an overall view of the risk management performance of banks that encompasses different aspects of risks being managed by a bank. A commercial bank deals with five important categories of risks in its basic function of production and delivery of financial services, viz. credit risk, interest rate risk, liquidity risk, solvency risk, and, operational risk. Risk management refers to the overall process that a financial institution follows to define a business strategy, to identify the risks to which it is exposed, quantify those risks and control the nature of the risks it faces. While there may be several factors representing risk management that can be combined to form one representative measure, we follow what we believe is a novel approach by deriving the risk management indicators based on the basic accounting framework of a bank. While traditional studies of bank performance (e.g. Berger and Humphrey, 1997; Leightner and Lovell, 1998) have addressed the performance and efficiency of banks from technical and allocative dimensions, our emphasis is on the performance of risk management practices followed by banks. While our approach can be related to some of the existing approaches in the literature on risk management (e.g. Sinkey, 1997; Hannan and Hanweck, 1988), we differ in the way we derive our measures from basic identities of bank's financial statements and build a framework for evaluating risk management performance of commercial banks by using

accounting ratios. Based on this framework, we develop risk management scores of banks and then study the stock market response to banks' risk management.

We study four risk management variables by observing their trends, proposing summary measures of risk management based on them and finally examining implications of risk management for the shareholders' wealth. Such summary measures of risk management also assumes importance in view of the fact that the available attempts of developing overall risk measures in the banking literature have been limited to market-based measures of risk drawing from stock market perception of the bank's riskiness (Pagano, 2001). Empirical studies have either considered market based measures of risk (see e.g. Baele et al 2004 and Baele et al, forthcoming) or separate risk factors in isolation. A number of studies (e.g. Saunders, Strock, and Travols, 1990; Schrand and Unal, 1998) in the banking literature have focused on risk taking behaviour rather than risk management behaviour. Our study, on the other hand, focuses on risk management behaviour of banks rather than risk taking behaviour. It is to our knowledge the first attempt at developing a comprehensive measure of risk management drawing on bank financial accounts data. It would help to point out here that we intend to measure neither bank risk nor risk of a bank scrip but simply risk management performance of a bank.

We adopt a two-dimensional approach; at the first stage, we theoretically motivate a risk management perspective to bank performance which we derive from balance sheet identity of banks. At the second stage, we conduct empirical analysis to evaluate the performance of banks in terms of the risk management perspective. At this latter stage, we conduct three

specific empirical studies as follows. First, we employ the multivariate technique of factor analysis for developing risk management scores. Secondly, we apply discriminant analysis technique to develop Z Scores for banks on the basis of risk management indicators. Finally we use regression technique to investigate the stock market's response to risk management scores of banks.

The rest of the study is organized as follows. In section 2 we discuss the basic theoretical framework wherein we derive our risk management indicators from a commercial bank's accounting identity. In section 3, we present the empirical methodology for computing risk management scores and then examine their trends in section 4. Section 5 studies the impact of risk management scores on bank stocks by using regression analysis. Finally section 6 summarizes and concludes.

2.   The Theoretical Framework

We start outlying our basic framework with the basic objective of any firm, viz. maximization of share holders' return or the Return on Equity (ROE). ROE measures profitability from the shareholder's perspective. Accounting ROE however is different from investment profitability as measured by dividends and stock price appreciation in the sense that ROE measures bank accounting profits per unit of bank's book value of equity. Therefore, it is the ratio of bank's profit after tax to its equity.

We adopt the standard Du Pont identity to decompose ROE into operating efficiency (measured by profit margin), asset use efficiency (measured by asset turnover) and financial

leverage (measured by equity multiplier). The product of operating efficiency and asset turnover can be expressed as Return on Assets (ROA). The equity multiplier is assets divided by equity, i.e. the reciprocal of the capital to assets ratio. Equity-multiplier is a surrogate measure of capital adequacy also. It provides a gauge of a bank's leverage or the amount of assets pyramided on the bank's base of equity capital. For example, a bank with an ROA of one percent and an equity multiplier of 10 generates an ROE of 10 percent. The EM of 10 implies equity–to-assets ratio of 1/10, or debt to assets ratio of 90 percent. However our focus is on going beyond the profit margin and decomposing its sources. We begin by decomposing ROE as a product of Return on Assets (ROA) and the Equity multiplier (EM)

$$ROE = \frac{\Pr ofit\ after\ tax}{Total\ assets} X \frac{Total\ assets}{Equity} \quad ------------(1)$$

The sources of Return on Assets (ROA) can be further identified as follows:

$$ROA = \frac{II - IE}{TA} + \frac{NII - NIE}{TA} - \frac{\Pr ovisions}{TA} \quad ------------(2)$$

Here, II = Interest Income, IE = Interest Expense, NII = Non Interest Income, NIE = Non Interest Expense, TA = Total Assets.

Identity (2) can be re-written as follows:

$$ROA = Net\ Interest\ M\arg in + Non\ Interest\ M\arg in - \Pr ovisions\ to\ Total\ Assets\ ---(3)$$

Substituting identity (3) in (1), we obtain:

$$ROE = (NETIM + NONIM - PROV)*(EM)\ ----------(4)$$

Here, NETIM = Net Interest Margin, NONIM = Non Interest Margin, PROV = Provisions to Total Assets, and EM = Equity Multiplier.

Identity (4) suggests that a banking firm can achieve its objective of maximizing share holder returns by either of the following, viz. maximizing NETIM which shows management of interest rate risk, maximizing NONIM i.e. a proxy for natural hedging and risk management strategy of a bank, minimizing PROV i.e. a surrogate measure for credit risk, and maximizing equity-to-assets ratio which represents protection against solvency risk. Figure 1 depicts how each of these factors represents a specific aspect of risk management practice of a commercial bank. These are further explained as follows.

Take Figure-1

Interest rate risk: Interest rate risk refers to decline in net interest income (difference between interest income and interest expenditure) of a bank due to volatility of interest rates in the economy. Banks in India are operating in a volatile interest rate environment and balance sheets of these institutions are embedded with interest rate risk on most of the assets and liabilities. Indian banks are locked up with fixed rate deposits on liabilities side and floating rate loans on assets side. Hence both upward or down ward moment in interest rates effect bank's net interest margin (NETIM) and therefore overall ROA. NETIM of an asset sensitive bank reduces in the falling interest rate scenario whereas for a liability sensitive bank reduction in NETIM takes place in a rising interest rate scenario. Thus volatility in NETIM of a bank over a period is expected to impact on performance of a bank and its shareholder's return. To manage interest rate risk banks have installed Asset-Liability Management Systems, adopting duration gap approach, and risk control measures based on Value at Risk techniques. Many banks have started using derivative contracts like futures and

swaps to mitigate price risk or interest rate risk. Therefore, the maximization of NETIM in a volatile interest rate environment can be considered as effectiveness of bank's management of interest rate risk. In our study the ratio of net interest income to total assets i.e. NETIM is taken an indicator of interest rate risk management.

Credit risk: Intermediation activity of a bank is the main source of credit risk. It indicates the failure of bank to receive interest and principal amount from loans and non-treasury securities. Credit risk also arises when a bank gives commitment or guarantees on behalf of customers and credit risk is present in all counterparty exposures like interest rate swaps. In most cases a bank's poor performance can be traced to excessive and mismanaged credit risk. Banks can use both on and off balance sheet strategies for management of credit risk. 'On the balance sheet' strategies include increasing provisions for all the anticipated loan losses. Banks follow stringent prudential accounting norms for recognition of risky loans and other exposures and provisions are made to mitigate all anticipated losses. Current prudential norms in vogue also emphasize on huge amount of provisions both on standard assets and sub-standard assets. A higher provision reduces the profitability of the bank; however higher provisions as percentage of total assets or advances indicates that a bank is mitigating credit risk by adopting 'on the balance sheet' measures. Reduction in non performing assets (NPAs) also indicates effective management of credit risk. One of the ways of reducing NPAs is writing off the loans with 100 percent provisions. Thus provisions as percentage of total assets provide an indication of the extent of credit risk management. Hence percentage of provisions to total assets (PROV) is considered in this study as a surrogate measure of credit risk management.

Solvency risk or Capital risk: It is the risk arising out of lack of sufficient funds to pay depositors in the event of failure. Basel Accord of 1989 suggested that every bank should maintain a minimum level of capital funds against the risk weighted assets. In India, it is mandatory for all commercial banks to maintain a floor level capital adequacy ratio of 9 percent on risk weighted assets of a bank. Risk weighted assets are determined by following a portfolio approach. Capital adequacy ratio indicates cushion available to a bank against all unexpected losses and implicitly protect the interests of uninsured depositors. Higher capital adequacy ratio builds confidence to the bank depositors. However higher capital adequacy ratio may reduces the value to the shareholders. Thus maximisation of ROE is often a trade off-between returns expressed in terms of ROA and solvency risk (EM). Banks with higher EM may increase the ROE for shareholders but higher EM indicates low capital adequacy ratio and therefore higher solvency risk. Management of solvency risk and increasing the confidence of depositors is an essential function of a commercial bank. Capital deficient banks may ultimately lose their existence. In India a few government forced mergers have taken place in the last few years where capital deficient banks were taken over by government owned banks at the intervention of the Reserve Bank of India (RBI). The CAMEL[2] approach of evaluation of banks also considers capital adequacy ratio as a crucial factor in evaluating performance of a bank. We argue that shareholders with an eye on long term sustainability of a bank and continued distribution of profits may therefore desire minimization of solvency risk. In this study we consider capital adequacy ratio (CAR) to measure the management of solvency risk of a bank. For this purpose we consider regulatory capital adequacy ratios of banks.

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[2] CAMEL means Capital adequacy, Asset quality, Management, Earnings and Liquidity

Natural hedging strategy: Banks can adopt the strategy of natural hedging against all types of risks by increasing the proportion of non-interest income out of total income. Non-interest income is generated out of various activities. First, by providing services like safety lockers, transfer of funds and offering other payment services which increases ROA without any corresponding increase in risks. Second, banks may generate income from issuing Letters of Credit and other guarantees; although this is accounted as non-interest income but these activities may increase credit risk of banks. In the Indian context majority of the banks deliver these products by maintaining a huge amount of cash margin or keeping government securities as collaterals. Hence this may be considered as risk-free income. The third source is income from usage of derivative contracts such as forwards, futures, and swaps. As a prudent practice income is recognized only after netting out any losses, hence this is another source of risk free-income. Finally banks earn other income by trading in government securities. Although trading is exposed to price risk which may lead to trading losses but as a prudent practice all losses are netted out before recognition of income. We argue that consistent increase in non-interest income by banks shows that the banks are adopting natural hedging strategies to improve the profitability and shareholder's rate of return. In this study we consider proportion of net non-interest income to total assets (i.e. NONIM) as an indicator of natural hedging and risk mitigation strategy of a bank which is expected to have a positive bearing on the ROA of a bank.[3]

Banks may encounter other risks like liquidity risk and operational risk. The basic accounting identity we have selected above does not consider these risks; hence the risk management

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[3] Koch and Macdonald (2004) refer to this ratio as the burden ratio.

behaviour of banks with reference to credit risk, interest rate risk, and solvency risks are the only ones analyzed in this study and other risks are excluded.

In sum, the identity (4) suggests how ROE is linked to the four risk management indictors that we intend to examine. These indicators may often be in conflict with one another. For instance, there can be situations where one bank may have a high NETIM but a low PROV whereas another bank may have a low NETIM but a high PROV. In such a case, it is obvious that the former bank will have a higher ROE than the latter. But in terms of risk management, it is not very clear which bank is a better risk manager. The former may be managing its interest rate risk better whereas the latter may have an edge in terms of credit risk. Schrand and Unal (1998) found negative correlation between interest rate and credit risks thus suggesting that financial intermediaries may substitute one form of risk for another. Clearly such phenomena indicate the need for combining the above identified variables into a single comprehensive measure of risk management practice of a bank. In this paper we study the above identified four risk management variables by analysing their trends, proposing measures of risk management scores based on them, and finally examining implications of risk management for shareholders' wealth.

3.   Developing Risk Management Scores

We develop risk management scores for banks by combining the above identified four risk management variables into one measure. The importance of data reduction techniques for the purpose of summarizing information contained in financial reporting has been highlighted in several studies such as Fertakis (1969), Boatsman et al. (1976) and Elgers (1980). Although we do not have a large number of variables which we intend to summarize, our objective is

similar insofar as we want to combine the four risk management variables into one summary measure. Hence following the above cited studies from the Accounting literature, we adopt data reduction techniques to address our problem. We develop our summary measure of risk management in several alternative ways. First we compute the simple mean of the four variables and refer to it as AVERAGE. Thus we are able to compute the scores for each bank in each year based on balance sheet data and thus assess the risk management performance of the banks. Second, we employ the multivariate technique of principal components analysis and identify the first principal component that explains the maximum variation in the data as the risk management score. This approach is similar to Elgers (1980) who used principle components analysis to summarize a set of risk-relevant accounting indicators. While Elgers (1980) employed the summary measure to study its correlation with market measure of risk (beta), our objective is to use the summary measure as an indicator of risk management by banks. We refer to the indicator obtained from the first principle component as the PRIN1.

Third, we employ the multivariate technique of discriminant analysis. However we are constrained by the absence of any a priori classification which can help us to estimate a discriminant function. We resolve this problem in two ways. First, we take the mid-point of the AVERAGE as the cut-off and classify all banks with higher AVERAGE value than the mid-point (median value) as lower risk banks and those below as higher risk banks. The justification for using the mid-point is that any bank with 'average' risk indicators above the mid-point should be at least better than the centrally located bank. Thus this can be a simple way to classify banks into risky and safe groups.[4] Using this classification, we estimate the

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[4] Since we endogenously derive the benchmarks for classifying banks into risky and safe groups, our classifications are strictly dependent on the sample being studied.

Fisher's linear discriminant function (Anderson, 2003) whose corresponding values we use as our risk measurement indicator. We refer to it as the ZSCORE1. Alternatively, we select a capital adequacy ratio of 10 per cent as the cut-off and classify banks with higher CAR as lower risk banks and those below as higher risk banks. This benchmark is motivated by the Reserve Bank of India's recent move towards rewarding banks with higher than 10 per cent CAR with the freedom to venture into various other activities like insurance business. Thus, we follow the regulator's benchmark of sound banks as our classifying variable. Accordingly, we estimate the Fisher's linear discriminant function whose value for each bank for each year is used as a risk management indicator. We refer to the score thus obtained as ZSCORE2.

We collect data for all state owned (public sector) and domestic private sector banks operating in India for the period 1998-1999 to 2005-2006 for this study. Our sample excludes foreign banks operating in India because of several reasons. First, a foreign bank operating in India is not strictly a bank but a branch of its foreign parent and hence is not comparable with the domestic banks. Second, foreign banks face several additional restrictions on their operations imposed by the RBI and hence have different business models. Finally, they are not listed on Indian stock exchanges as a result of which we cannot undertake a comparable analysis of the impact of risk management on the banks' stock returns. Based on the above criteria, we have covered all the 62 public and private sector banks in existence during the study period and the financial data is collected from *Capitaline* which is a database of Indian company finances similar to the *Compustat* database. From this data base of financial statements we computed four accounting ratios depicting the risk management behaviour of

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banks. From the annual reports of banks we have culled out the variable capital adequacy ratio. To measure the performance of risk management scores on shareholders' return, we have computed annualized compounded returns from the daily share price data of listed banks available in *Capitaline*.

4.   Analysis of Results

Risk management indicators: Trends

We begin with analyzing the trends in risk management variables. Figure 2 shows that NONIM exhibits a rising trend over the time period under study except for a fall in the last two years, which may have been caused by trading losses due to the regime of rising interest rates. NETIM shows a rising trend. While PROV has been rising through the period in line with the change in prudential accounting norms (which have become more stringent), CAR shows a rising trend except for a fall in the last two years. The reason for the recent decline in CAR could be rise in risk weighted assets and rapid loan growth in the last few years.

Take Figure 2

Analysis of average risk scores

Average of the four risk management variables (AVERAGE) provide us with a crude but simple representative measure of risk management. Trend behaviour of this measure shows that risk management behaviour has improved during 1999-2004 but declined subsequently (Figure 3). This may be occurring due to the recent decline in NONIM and CAR. This shows banks are becoming more risky and their ability in management of risks have come down. The plausible explanation is poor natural hedging and increase in risk weighted assets which reduced the capital adequacy ratio.

Principal components analysis

The disadvantage of the simple average measure is that we impose equal weights on each variable in computing our risk management measure. Therefore we employ methods from multivariate statistics to endogenously determine weights from the data which would give us the relative importance of each variable in the overall measure. We start with principal component analysis as a technique for developing a summary measure of risk management.

Factor loadings in PRIN1 indicate positive value for NONIM and PROV but negative for NETIM and very small for CAR (Table 1). Thus, PRIN1 represents bank's focus on fee-based income and credit risk management. On the other hand, PRIN2 represents overall risk management by banks including management of interest risk and solvency risk. We interpret these two principal components based on the relative importance given by banks to managing the various risks. According to Das (1999), while Indian banks emphasize on non-interest income they tend to show risk-averse behaviour by opting for risk-free products over risky loans. The importance of NONIM in the principal components analysis suggests that during our sample period, Indian banks continued to lay emphasis on non-interest income. In other words, risk awareness among banks has increased and this is manifested by the building of natural hedges through increase in off-balance sheet portfolio and fee based services. Moreover, subsequent to the introduction of prudential accounting norms, especially after 1994, one of the main concerns of the Indian banking sector has been the reduction of NPAs. Since then banks have actively taken up several legal and strategic measures to reduce the quantum of bad loans and the message of management of credit risk

was sent across to each unit of the banks.[5] Thus, credit risk management (proxied here by PROV) has been an important feature of risk management by Indian banks during the sample period. Therefore, PRIN1 represents the risk management practices of primary importance accorded by Indian banks.

Take Table 1

On the other hand, banks had relatively less leeway in interest risk management during the period under study even though falling interest rate scenario during the late 1990s adversely impacted cost of funds of many banks as the banks were locked up in long-term fixed rate liabilities and short-term floating rate assets. The only strategy for banks for reduction of interest rate risk was by re-pricing assets and liabilities which many banks could not implement on a dynamic basis due to the presence of several rigidities in Indian banking. Similarly, less importance was given by Indian banks to the capital adequacy ratio as banks viewed maintenance of capital in terms of regulatory compliance rather than as an internal step towards risk management. Banks did not focus on increasing capital adequacy ratio to meet solvency risk arising from increased use of leveraged funds. Capital raising opportunities for many banks were also very few during the period under study. The low level of capital market activity was another constraining factor on raising capital adequacy ratio. Banks are the major savings mobilisation institutions in the Indian economy and lack of other savings channels have increased the growth rate of deposits during the period under examination. However Indian banking activity is dominated by the state owned banks and the government provides an implicit guarantee on the safety of deposits to the deposit holders. Therefore, irrespective of the risk of insolvency most banks were able to mobilise significant

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[5] At the end of 1998 gross NPAs of Indian commercial banks were 16.88% of advances and net of provisions the figure was 8.91 % (RBI, 1999). By the end of 2006 the gross NPAs as percentage of advances had declined to 3.30% while net NPAs came down to 1.20% (RBI, 2006).

amount of deposits. Thus banks paid little attention to the management of solvency risk and hence CAR turns out to be a less important factor in the first principal component. In other words, NETIM and CAR appear to have received less importance by banks as risk management strategies. Not surprisingly, these two variables do not appear to be important in PRIN1 but receive positive weights in PRIN2 which represents the overall risk management by banks. It may be noted that even in PRIN2, NONIM has a higher factor loading compared to NETIM which suggests that banks have paid higher attention to fee based income and building up of natural hedges as compared with management of interest risk.

Take Figure 4

Figure 4 shows the trends in the two principal components and suggests that PRIN1 and PRIN2 have increased over the time period except for a decline in 2006. Therefore, the risk management practices of primary importance as well as the overall risk management score of the banks have improved over the time period with the exception of 2006 which may be due to fall in NONIM and CAR in the last few years.

Discriminant analysis

Since the Principal components explain only the maximum variation in the data, we try to use discriminant analysis which would classify banks into good risk management and poor risk management categories thereby resulting in an overall risk score. However, we are constrained by the absence of any a priori classifying variable. We attempt to resolve this problem in two ways. First, we take the mid-point of the AVERAGE as the cut-off and classify all banks with higher AVERAGE value than the mid-point (median value) as lower risk banks and those below as higher risk banks. The justification for using the mid-point is

that any bank with 'average' risk indicators above the mid-point should be at least better than the centrally located bank. Thus this can be a simple way to classify banks into risky and safe groups. Using this classification, we estimate the Fisher's linear discriminant function whose corresponding values we use as our risk measurement indicator. We refer to it as the ZSCORE1 (see Table 2). Alternatively, we select a capital adequacy ratio of 10 percent as the cut-off and classify banks with higher CAR as lower risk banks and those below as higher risk banks. This benchmark is motivated by the RBI's recent move towards rewarding banks with higher than 10 percent CAR with the freedom to venture into various risk taking activities like insurance business. Thus, we follow the regulator's benchmark of sound banks as our classifying variable. Accordingly, we estimate the Fisher's linear discriminant function whose value for each bank for each year is used as a risk management indicator. We refer to the score thus obtained as ZSCORE2.

Take Table 2

Figure 5 reveals that both ZSCORE1 and ZSCORE2 show a rising trend throughout the time period except for a decline in the last two years, once again possibly because of the decline in NONIM and CAR during 2005-2006.

Take Figure 5

5.   Stock Market Response to Risk Management Scores

Examination of determinants of stock market returns is probably one of the most well researched issues in Finance. Accounting research has extensively dealt with extracting information about stock returns from financial statements (Lev, 1989). The seminal work by Ball and Brown (1968) and subsequent papers have identified earnings as one of the main

value-relevant accounting indicators. A simple framework to explain this phenomenon is given by Ou and Penman (1989). Consider the following valuation model:

$$V = \frac{E(d)}{r}$$

Where V is a stock's value (or price in an efficient market), E(d) is expected future dividends, and 'r' is the discount rate which also incorporates security risk. Thus for determining firm value, it is critical that value enhancing attributes in E(d) and value reducing attributes in 'r' are identified. While the factors contributing to E(d) are well researched, those contributing to risk are not well understood (Ou and Penman, 1989). Our strategy will be to use a standard approach to capture the former and to introduce a novel approach to capture the latter.

Accounting earnings have been widely found to be valued positively by investors (Ball and Brown, 1968) because future dividends are paid out of earnings (Ou and Penman, 1989). While different studies have used various indicators to represent earnings,[6] it is unexpected earnings (UE) that should affect value since stock prices reflect expectations about future earnings rather than reported earnings. Accordingly we use a naïve model for computing unexpected earnings which is simply the difference between current and past reported net profit. Thus, our estimable regression for determinants of stock returns is as follows:

$$RET_{it} = \alpha + \beta RET_{market(t)} + \gamma UE_{it} + \delta RISKMGMT_{it} + \varepsilon_{it} \quad - - - - - - (5)$$

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[6] Lev (1989) provides a comprehensive survey of the usefulness of earnings indicators.

where, RET_{it} is returns on the ith bank's stock in year t, RET_{market} is returns on the market which controls for systematic movements in the individual bank returns, UE is unexpected earnings measured by change in profits, RISKMGMT is indicator of risk management score or variables and ε is a random error. To proxy for the risk factors, we return to the four variables identified by us from the accounting framework discussed before. We have two alternatives at this point. We can either use the four risk management variables identified by us earlier as regressors in the stock market regression or use risk management scores as the regressor. We turn to each case one by one, the results of which are presented in Table 3. In each case, we regress bank stock returns on systematic risk (RET_{MARKET}), unexpected earnings (UE represented by change in net profits) and risk management variables. For systematic risk, we employ three market indices, viz. and BSE Sensex, NIFTY and NSE Bank Index (NSEBI). [7] However we report the results only for BSE Sensex as there was no qualitative change in results from using the other market indices (the results for NIFTY and NSEBI are available on request). We include bank-specific fixed effects in all the regressions (as Hausman tests rejected the possibility of random effects).

Using all four variables

The first set of results in Table 3 indicates that except for CAR, all other variables are statistically insignificant at conventional levels of significance. One problem with this set of regressions is that the four risk management variables may be correlated among themselves, causing problems of multi-collinearity. To check this, we computed variance inflation factors (VIF) which indicate the presence of multi-collinearity as the value of VIF was greater than 2

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[7] NIFTY and BSE Sensex are popular stock market indices of two stock exchanges National Stock Exchange and Mumbai Stock Exchange operating in India, while NSE Bank Index is the National Stock Exchange index of banking companies.

for NETIM and NONIM. Thus to avoid the problem of multi-collinearity we need to either drop some variables from the regressions or capture the information contained in the four variables through some transformation (Elgers, 1980). We take recourse to our risk management scores developed earlier for this purpose. This is also in line with our objective of studying risk management scores and its implication for shareholders' returns. Thus we try to examine whether banks with better risk management scores are rewarding the shareholders.

Regression on Average Score

The regression result (see second panel of Table 3) shows that the coefficient of market returns is significant which indicates that systematic risk is important in determining stock returns. The coefficient of UE is also positive and significant as expected. Finally the coefficient of AVERAGE is positive and significant. This indicates that banks with good risk management practices are rewarding the shareholders.

Take Table 3

Regression on Principal Components

The coefficient of PRIN1 is insignificant in all cases whereas that of PRIN2 is positive and significant. This indicates that while the primary risk management strategies alone were not factored in by the markets, overall risk management of the bank appears to have been significant in determining stock returns. Thus, banks with good overall risk management score were enhancing shareholders' value.

Regression on Z Scores

The coefficients of ZSCORE1 and ZSCORE2 in the respective regressions (last panel of Table 3) are positive and statistically significant. This once again suggests that banks with high risk management scores were contributing to increase in shareholder's wealth.

The estimated models were free from the problem of auto-correlation as evidenced by value of the Durbin-Watson test statistic being close to 2 in each case. All the above regression results remained qualitatively unchanged when we replace BSE Sensex with NIFTY or NSEBI as the market index. Our results are also robust to an alternative definition of unexpected earnings i.e. by replacing change in profits by change in total income. In sum, the results of the empirical analysis indicate that our summary measures of risk management practice of banks turned out to be a significant determinant of stock returns, after controlling for other factors. Bank stock returns appear to respond positively to sound risk management practices.

6.   Conclusions

This study focuses on risk management behaviour of commercial banks and its impact on stock market returns. We tried to integrate several issues from the Accounting and Economics literatures. We computed risk management scores of commercial banks for the period 1999-2006 by summarizing information contained in financial statements with the help of factor analysis technique and discriminant analysis. Our computed scores show that risk management performance of banks has been improving over time with a recent drop in the last few years. Finally we examined the impact of risk management scores on stock market returns of banks and found that stock market returns are sensitive to the risk

management practices. This study attempts to makes several contributions. First, it suggests a different way of looking at bank financial statements, i.e. from the risk management perspective. To this end we demonstrate a decomposition of ROE of commercial banks into risk management variables. Second, the study develops quantitative summaries of risk management performance of banks by using several alterative multivariate techniques. Third, risk management is shown to be an important determinant of stock returns of banks, over and above standard factors used in the literature such as market returns and earnings growth. Fourth, the findings of the paper suggest that those banks that have good risk management practices reward their shareholders with enhanced wealth. Finally, this exercise can be of value to all the different stakeholders in the banking system. Bank managers can employ the suggested approach at the micro level for introspecting on their corporate policies, investors for developing trading strategies and the regulator for developing quantitative indicators of soundness of the banking system.

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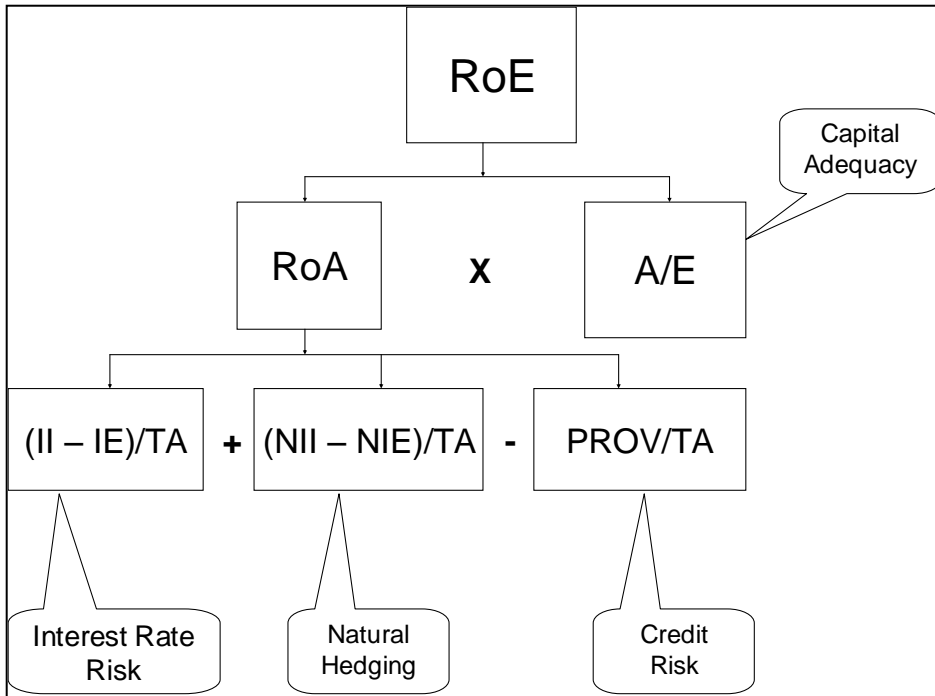
Figure 1: Profitability Decomposition of Commercial Banks into Risk Management Variables
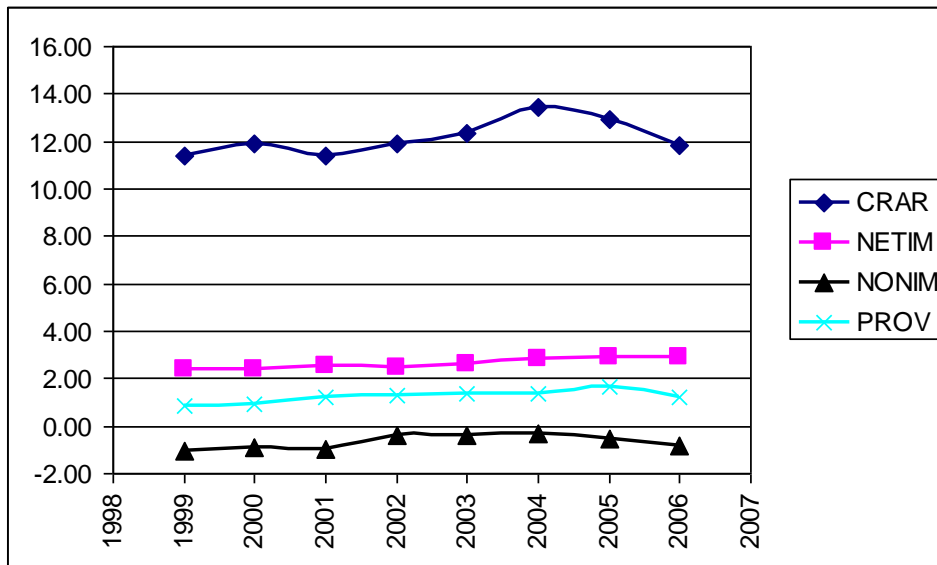

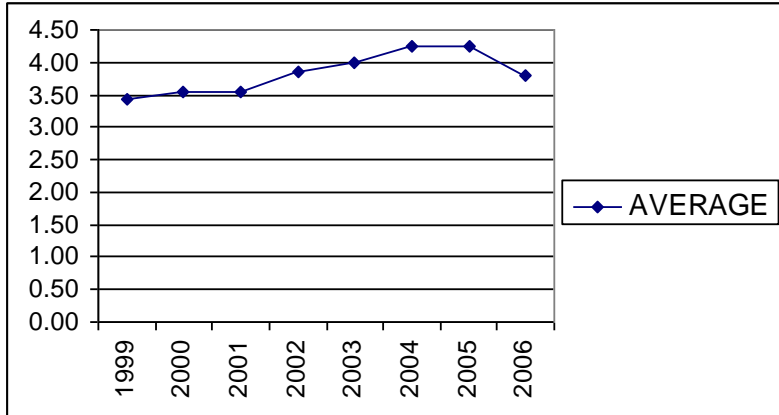Figure 2: Trend of Risk Management Variables

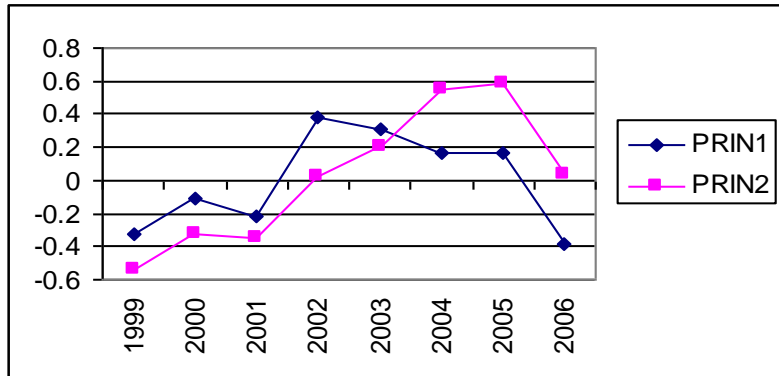Figure 3: Trend in Average Score of all the Risk Management Variables

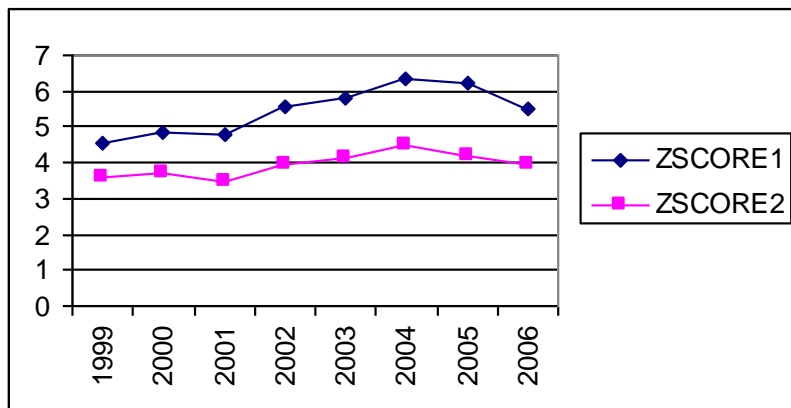Figure 4: Trend in Principal Components

Figure 5: Trend in Z Scores

Table 1: Results of Principal Components Analysis

Principal Component Analysis				
	PRIN1	**PRIN2**	**PRIN3**	**PRIN4**
NETIM	-0.5706	0.3921	0.4678	0.5494
NONIM	0.6845	0.2753	-0.1647	0.6547
PROV	0.4435	0.2607	0.7687	-0.3800
CAR	-0.0958	0.8382	-0.4039	-0.3539

Table 2: Discriminant Analysis Results

With mid-point of Average score as cut-off	ZSCORE 1= 1.1034NETIM+1.0354NONIM+ 0.2386CAR+0.2794PROV
	Wilk's Lamda F-statistic = 0.5122 (p<0.0001)
With CAR of 10% as cut-off	ZSCORE 2= 0.6859NETIM+0.6407NONIM+ 0.2652CAR-0.5274PROV
	Wilk's Lamda F-statistic = 0.6719 (p<0.0001)

Table 3: Fixed Effects Regression Results for Impact of Risk Management on Stock Market Returns

Regression of Stock Returns on all Risk Management Variables		
	Estimate	**p-value**
Intercept	-313.9070	0.1096
RET$_{MARKET}$	232.3326	<0.0001
UE	-0.2323	0.2064
NETIM	14.8676	0.8603
NONIM	-16.5630	0.8190
CAR	24.2437	0.0154
PROV	54.7364	0.4177
Adjusted R-Square	0.1452	
F-statistic	1.6631	0.0169
Durbin Watson test statistic	1.9134	

Regression of Stock Returns on Average Risk Management Score		
	Estimate	**p-value**
Intercept	-254.6090	0.0555
RET$_{MARKET}$	229.7804	<0.0001
UE	-0.2739	0.1013
AVERAGE	91.6696	0.0077
Adjusted R-Square	0.1625	
F-statistic	1.8159	0.0072
Durbin Watson test statistic	1.9322	

Regression of Stock Returns on Principal Components		
	Estimate	**p-value**
Intercept	97.4120	0.0019
RET$_{MARKET}$	226.7563	<0.0001
UE	-0.2730	0.1087
PRIN1	-10.5494	0.7935
PRIN2	85.6721	0.0125
Adjusted R-Square	0.1563	
F-statistic	1.7593	0.0099
Durbin Watson test statistic	1.9362	

Table 3: Fixed Effects Regression Results for Impact of Risk Management on Stock Market Returns (continued)

Regression of Stock Returns on Z SCORE1	Estimate	p-value
Intercept	-268.0810	0.0794
RET$_{MARKET}$	222.0458	0.0000
UE	-0.3128	0.0681
ZSCORE1	66.4925	0.0165
Adjusted R-Square	0.1533	
F-statistic	1.7615	0.0101
Durbin Watson test statistic	1.9345	

Regression of Stock Returns on Z SCORE2	Estimate	p-value
Intercept	-151.6280	0.1615
RET$_{MARKET}$	232.2981	0.0000
UE	-0.2949	0.0831
ZSCORE2	63.6145	0.0194
Adjusted R-Square	0.1514	
F-statistic	1.7500	0.0109
Durbin Watson test statistic	1.9530	