Managerial Finance

The relationship between credit risk management and non-performing assets of commercial banks in India
Sirus Sharifi, Arunima Haldar, S.V.D. Nageswara Rao,

Article information:
To cite this document:
Permanent link to this document: https://doi.org/10.1108/MF-06-2018-0259

Downloaded on: 29 March 2019, At: 10:09 (PT)
References: this document contains references to 56 other documents.
To copy this document: permissions@emeraldinsight.com
The fulltext of this document has been downloaded 6 times since 2019*

Access to this document was granted through an Emerald subscription provided by emerald-srm:438851 []

For Authors
If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com
Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.
Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.
The relationship between credit risk management and non-performing assets of commercial banks in India

Sirus Sharifi
Department of Humanities and Social Sciences, Indian Institute of Technology Bombay, Mumbai, India
Arunima Haldar
S.P. Jain Institute of Management and Research, Mumbai, India, and S.V.D. Nageswara Rao
School of Management, Indian Institute of Technology Bombay, Mumbai, India

Abstract
Purpose – The purpose of this paper is to examine the impact of credit risk components on the performance of credit risk management and the growth in non-performing assets (NPAs) of commercial banks in India.
Design/methodology/approach – The data are obtained from primary and secondary sources. The primary data are collected by administering questionnaire among risk managers of Indian banks. The secondary data on NPAs of Indian banks are from annual reports and Prowess database compiled by the Centre for Monitoring Indian Economy. Multiple linear regression is used to estimate the models for the study.
Findings – The results suggest that the identification of credit risk significantly affects the credit risk performance. The results are robust as credit risk identification is negatively related to annual growth in NPAs or loans. There is evidence in support of a priori expectation of better credit risk performance of private banks compared to that of government banks.
Practical implications – The study has implications for Indian banks suffering from a high level of losses due to bad loans. In addition, it will have implications for the implementation of new Basel Accord norms (Basel III) by the Reserve Bank of India.
Social implications – The high and rising level of NPAs will have adverse consequences for credit flow in the economy in the absence of appropriate intervention by government and central bank in the form of changes in institutional and regulatory infrastructure. The problems in banking and financial services sector will lead to lower industrial and aggregate economic growth, and lower (or negative) growth in employment.
Originality/value – There is little evidence on credit risk management practices of Indian banks, and its relationship with credit risk performance and NPA growth. The need for an effective risk management system to manage credit risk assumes importance and urgency in the context of high and rising NPAs of Indian banks, and the consequences for the Indian economy.
Keywords Indian banks, Risk management, Ownership, Credit risk, Risk identification, Non-performing assets
Paper type Research paper

1. Introduction
India has been recognized as one of the rising world economic powers over the past three decades (Didier and Schmukler, 2013). Although India inherited the formal legal institutions, which date back more than two centuries, its financial market size is much smaller than the average of the country groups proposed by La Porta et al. (1997)[1]. Thus, the banking sector is small relative to the economy’s size though it is efficient (low overhead cost) but significantly underutilised (in terms of providing credit) (Allen et al., 2012).

The bank credit is the dominant form of firm financing in India (Banerjee et al., 2004; Love and Peria, 2005). With the largest commercial bank thriving for the past two hundred years and the stock exchange among the oldest in Asia (about 130 years) (Allen and Qian, 2010),
India provides an ideal setting to examine this research question. As Indian firms are growing, and expanding operations overseas, their dependence on Indian banks is expected to increase since banks are the primary source of finance. These firms require capital, which is lower in comparison to international standards and hence foreign banks may be reluctant to fund them (Banerjee \textit{et al.}, 2005). Therefore, these firms prefer home country banks, which need to improve their competitiveness by increasing their size and adapting globally accepted best practices.

The large international banks are recognized for their robust risk management practices, especially credit risk, due to the efficient classification of (risk) assets (Treacy and Carey, 2000). In comparison, the classification of non-performing (loss) assets (non-performing assets (NPAs)) by Indian banks is limited to four categories (namely, standard, sub-standard, doubtful and loss assets). Indian banks are striving to improve their risk management practices and performance to reach the internationally accepted benchmarks (Scott, 2003). Stringent provisioning requirements faced by international banks in addition to the early identification of credit risk would be a step in that direction. The present study is an attempt to identify and analyze the important elements (components) of credit risk management system implemented by Indian banks.

There is a growing theoretical and empirical analysis of credit risk management in banks (Altman and Saunders, 1997; Crouhy \textit{et al.}, 2000; Saunders and Allen, 2002; Muninarayanappa, 2004; Fatemi and Fooladi, 2006; Joetta, 2007). However, these studies are limited to its components (Al-Tamimi, 2002; Fatemi and Fooladi, 2006; Al-Tamimi and Al-Mazrooei, 2007), ownership (Al-Tamimi and Al-Mazrooei, 2007; Bhaumik and Piesse, 2007; Pennathur \textit{et al.}, 2012; Arora, 2014), NPAs (Salas and Saurina, 2002; Ranjan and Dhal, 2003; Das and Ghosh, 2007; Sanjeev, 2007) and deficiencies (gaps) in credit risk management in banks (Salas and Saurina, 2002; Sanjeev, 2007). There appears to be a lacuna in understanding the constituents of credit risk management in an emerging economy context. In addition, the extant work fails to conclusively establish the functional relationship between credit risk components and its performance.

This study assumes importance in the context of the implementation of radical reforms in the financial sector over the past decades (Miller, 1986). These developments increase the need for and complicate the function of risk measurement, management and control in banks. The new regulatory environment and increased market volatility necessitate an integrated approach to asset liability and risk management by banks. Financial institutions in general and banks in particular are realising the need to allocate required resources for risk management. Further, the identification of risks and their mitigation by senior management could have reduced the severity of “subprime” losses at banks (e.g. Citigroup, UBS and Merrill Lynch) (Hashagen \textit{et al.}, 2009; Sabato, 2010; Holland, 2010; Hull, 2012).

The banking, financial services and insurance (BFSI) sector has experienced many catastrophic situations including the global slowdown (Subprime Mortgage Crisis in USA, the Great Recession, etc.). The risk(s) faced by the Indian BFSI sector is reflected in the rising level of NPAs and corruption. In certain cases, banks have incurred significant losses due to integrity issues related to promoters (such as Mr. Vijay Mallya of Kingfisher Airlines). Typically, these high value loans are sanctioned either through multiple lending arrangements or under a consortium. These mounting bad loans could be due to operational reasons and/or unanticipated changes in business environment. Is the rise (of NPAs) due to internal lapses in due diligence by banks or is it a consequence of increasing business complexities?

1.1 Credit risk management in banks
The financial services sector has experienced several significant losses over the past two decades due to the lack of an efficient risk management and control system (Claessens and Kose, 2013). The different types of risks such as credit risk, market risk, operational risk and
other risks constantly threaten the financial sector. Among all risks, studies indicate that globally 50 percent of the total risk elements in the financial sector and, in particular, banking industry relate to credit risk (Heffernan, 2005). Banks decrease their exposure to tradable risk through derivative hedging and take larger credit risk simultaneously by extending more loans for gaining higher economic rent (Deng et al., 2016).

The recent financial crisis, which originated from US home mortgage default to other segments and countries with high leverages, became the global financial crisis since 1930s great depression (Kim and Renaud, 2009). Reputed financial services firms such as Lehman Brothers collapsed and regulators around the world are recommending strategies to restore order in financial markets. This has forced the governments and financial market regulators to focus on improving credit risk management system in the progressing world financial system (Roach, 2009).

The integration and globalization of financial markets has increased the capital flows across nations, thus making geographical borders redundant. For instance, a policy change by a European bank (e.g. Deutsche Bundesbank) will have an impact on investors in the USA. Thus, an effective risk management system should have an appropriate credit risk environment, policies and regulations to have an improved loan quality (Muninarayannappa, 2004).

The objective of the study is to examine the relationship between credit risk performance and its components (namely, credit risk perception, identification, assessment, control and capital requirements) in Indian banks. The study contributes by emphasizing the importance of credit risk management in an emerging economy context, which is characterized by increasing global competition, and rising forces of globalization, liberalization, consolidation and deregulation (Saunders and Allen, 2002). Our findings will be of interest to different stakeholders. Central banks may focus their attention on credit risk identification (CRI) to bring down the bad and doubtful assets of banks regulated by them. The risk managers will benefit by investing their efforts in critically evaluating the creditworthiness of potential borrowers to mitigate the credit risk by identifying the same at an early stage. The bank executives can benefit by sharing information (data) on credit quality of potential borrowers and their experience in the early identification of risky borrowers. This coordination among banks will help bring down the total NPA in the banking system and may improve the credit flow to different sectors of the economy. Finally, the study has implications for banks, which incur significant losses due to credit failures. It also has implications for the implementation of new Basel Accord (Basel III) norms by Reserve Bank of India (RBI)[2].

The paper is organized as follows. The motivation for the study is included in Section 2. Section 3 covers a brief review of the available evidence followed by identification of research gap. The research design is presented in Section 4, and a discussion of results is included in Section 5. The conclusions and implications of the study are included in Section 6.

2. Motivation for the study
   2.1 India as a big economy
   India has been undergoing an evolution from a planned economy to a market economy and has achieved a high economic growth rate during the past 15 years. According to the World Bank, India’s gross domestic product (GDP) was $920bn in financial year 2006, $1,657bn in 2010 and $ 2,264bn in 2016. The annual GDP growth rates were 9.26, 10.3 and 7.1 percent, respectively (World Bank, 2017).

   The main function of the financial system is to mobilize savings and allocate them efficiently among competing sectors/firms in the economy. In most emerging economies, banks play the dominant role in the financial markets, while the capital markets tend to develop later. The Indian banks are no exception as a high proportion (about 33 percent) of
household savings is held as deposits with banks and other financial intermediaries (Sharifi et al., 2016). The credit risk management in Indian banks assumes significance in the context of large number of small deposit accounts.

A direct consequence of these problems is the fragility of the Indian banking system manifested by the large NPAs, especially in the government banks (PSBs) (Azad et al., 2016). This comes in the way of healthy development of India’s economy due to the adverse impact on banks’ ability to lend. Therefore, the identification and estimation of credit risk is important for orderly growth of Indian banks and financial system.

2.2 Rising NPAs of Indian banks
A high level of NPAs has implications for banks’ net worth as they are obliged to maintain the required level of capital adequacy as per norms. The banks may draw from reserves in the absence of adequate profitability, thus slowly eroding their net worth. The Indian banks have been experiencing a high level of NPAs for the past few years. The NPA ratio was 4.1 percent in March 2014, 4.6 percent in March 2015 and 7.6 percent in March 2016 (Cashin et al., 2017).

According to RBI’s (2016) financial stability report, the macro stress tests suggest that under the baseline scenario, the gross non-performing assets (GNPA) may rise to 8.5 percent by March 2017. If the macro scenarios deteriorate in the future, the GNPA ratio may further increase to 9.3 percent by March 2017 (RBI, 2016). Among the bank groups, government banks (PSBs) may continue to register the highest GNPA ratio. However, this ratio may deteriorate significantly in the event of large decline in the credit quality of banks’ loan assets.

3. Literature review
There exists extensive evidence in the area of risk management (Joetta, 2007; Hull, 2012; Bessis and O’Kelly, 2015). However, there is a lacuna in the areas of credit risk management, in general, and credit risk management in banks, in particular (Fatemi and Fooladi, 2006).

3.1 Evidence on NPAs
The deregulation process raised the competition among banks over the past two decades (Salas and Saurina, 2003) in the Euro zone markets. Extant literature suggests that banks were facing intense pressure due to high competition which ultimately led to bad loans and high NPAs. This pressure resulted in a risky loan portfolio which led to high credit risk and NPAs (e.g. Manove et al., 2001; Bolt and Tieman, 2004; Jeong and Jung, 2013).

Salas and Saurina (2002) compared the determinants of bad loans in savings and commercial banks in Spain using macroeconomic factors from 1985 to 1997. Their results emphasize the importance of bank supervisory strategy, including the function of bank-level variables as early warning signs, the advantage of mergers of banks from different districts, and the task of banking competition and ownership, in determining credit risk.

Considering both macroeconomic and microeconomic factors, Das and Ghosh (2007) examined the factors influencing bad loans in state-owned banks in India for the period 1994–2005. Their findings suggest that at the macro level, GDP growth, and at the bank level, actual loan growth, operating expenses, and the size of banks have a significant impact on bad loans.

Sanjeev (2007) concluded that the presence (e.g. internal and external) of a risk matters more than its nature (e.g. financial and economic). His results suggest that external factors affecting bad loans are more significant than the internal factors. Economic recession and wilful default have been recognized as the most critical external factors. However, the reported evidence suggests that internal factors such as credit managers’ incentives, skills...
to assess collateral, cost reduction efforts, manpower, government and political involvement and budget limitations have lower impact on bad loans in Indian banks.

These studies identified the economic factors which influenced the NPAs of banks. However, Ranjan and Dhal (2003) concluded that financial factors in conjunction with economic factors determine the NPAs. These factors (e.g. terms of credit, bank size and macroeconomic shocks) directly influence NPAs of Indian commercial banks. Additionally, factors such as horizon of loan maturity, better credit culture, positive macroeconomic situation, and business environment lead to lowering of NPAs. Therefore, we hypothesize:

\[ H1. \text{ There is a negative relationship between growth of NPAs and credit risk perception, identification, assessment, control and capital requirements in Indian banks.} \]

### 3.2 Evidence on credit risk components

Researchers have studied the components of risk management in general (Al-Tamimi and Al-Mazrooei, 2007; Hassan, 2009) and found risk identification as an important component for improving risk management performance. Similar findings were reported by studies which specifically examined credit risk management in banks. Al-Tamimi (2002) suggested that credit risk is the most contentious risk faced by commercial banks in UAE. The reported results suggest that credit risk assessment is a critical internal factor associated with the loan assessment system. In addition, the seizure and disposal of collateral are the significant challenges in loan monitoring and controlling system in credit risk management by Indian banks.

Credit risks are identified/monitored by different methods such as physical inspection by bank managers, analyzing financial statements, audits and risk surveys (Al-Tamimi and Al-Mazrooei, 2007). Fatemi and Fooladi (2006) reported similar findings in US-based financial institutions. Their study suggests that identifying counterparty default risk is the most important parameter for modeling credit risk. In addition, risk identification was found to impact the cost of capital in case of banks in Ghana. Their banks were suffering from a high credit risk due to problems of borrower identification, insufficient collateral, and high frequency of default. Consequently, banks charged exorbitant interest rates to compensate the expected and unexpected credit losses (Kwakye, 2011).

Thus, an appropriate credit risk management system, which includes risk identification, risk assessment, risk control and monitoring, would require precise guidelines and strategies to manage credit portfolios to determine the entire process of loan allocation, appraisal, supervision and collection (Bank for International Settlements, 1999; Greuning and Bratanovic, 2003). Thus, we hypothesize that:

\[ H2. \text{ There is a positive relationship between the performance of credit risk management practices and credit risk perception, identification, assessment, control and capital requirements in Indian banks.} \]

### 3.3 Evidence on ownership

Ownership has been a contentious issue in studies of credit risk management practices of banks. Al-Tamimi and Al-Mazrooei (2007) compared the risk management practices of domestic and foreign banks. They presented evidence of significant differences between domestic and foreign banks in risk management practices such as risk assessment, analysis, monitoring and control. Domestic banks in UAE were more efficient in managing risks than foreign banks. The foreign banks expressed confidence in dealing with risk exposure owing to the staff quality. It may also be due to the fact that foreign banks are subjected to more rigorous regulatory requirements similar to those faced by their parent banks at home.
These statutory requirements might far exceed those imposed by the central bank of UAE (Abu Hussain and Al-Ajmi, 2012).

Arora (2014) presented a major difference between government and private banks in India in measuring credit risk. Pennathur et al. (2012) examined the impact of ownership on income diversification and risk in Indian banks during 2001–2009. The results suggest that bank’s ownership has a significant impact on the pursuit of non-interest income. Private domestic banks earn significantly more fee income than government banks, while foreign banks earn higher than private banks. Fee-based income considerably reduces the risk of bankruptcy and default risk in banks.

Bhaumik and Piesse (2007) employed a portfolio choice model and bank-level data from India during the period 1996–2004 to study the banks’ credit market behavior. Their results suggest that the proposed model explains the data on domestic Indian banks well, and the model does better in the case of private banks. However, the model fails to explain the behavior of foreign banks in India. In general, the proportion of risk-free government securities and risky loans in a bank’s asset portfolio is determined by its capacity to recover doubtful loans, rules regarding the treatment of NPAs, past allocation models, stock exchange listing (for private banks) and risk averseness of banks. Thus, there is little evidence on the relationship between performance of credit risk management practices in government and private Indian banks. Therefore, we hypothesize that:

$$H3. \text{ There is a significant difference between credit risk management practices of government and private banks in India.}$$

3.4 Research gap
The evidence on credit risk assessment in Indian banks and financial institutions as per Basel norms is limited. The relationship between credit risk management and ownership of Indian Banks has not been studied comprehensively. This study is an attempt to contribute to the evidence on credit risk management in Indian banks, and its relationship with ownership.

4. Research design
4.1 Data
The data are obtained from primary and secondary sources. The primary data are collected by administering questionnaire among risk managers of Indian banks. The secondary data on NPAs of Indian banks are sourced from annual reports and Prowess database compiled by the Centre for Monitoring Indian Economy[3]. The data on NPAs include annual observations for 38 Indian banks including 24 government and 14 private banks with fiscal years ending in March 2012 to 2016.

4.2 Sample size
There are 27 government banks (including nationalized banks, IDBI Bank and BharatiyaMahila Bank), 21 private banks, 37 state cooperative banks and 45 foreign banks in India. The scope of our study is limited to credit risk management practices of government and private banks. The sample includes 24 government banks and 14 private banks due to limitations on the availability of data. The state cooperative banks have been excluded as they operate in specific geographic areas, and are regulated by two regulators, namely the RBI and the Registrar of Cooperatives. Data were collected by administering a questionnaire among all the sample banks in India. We received 38 responses, which constitute an overall response rate of 79 percent. The survey was conducted with the help of National Institute of Bank Management[4] which helped in data collection by permitting us to administer the questionnaires to risk managers of Indian commercial banks.
The questionnaire was mailed to all sample banks followed by visits to meet the risk managers after several reminders. The bank names are not disclosed in this paper due to confidentiality clause.

4.2.1 Questionnaire design. The questionnaire is divided into six parts. The first part includes seven questions on risk manager’s perception regarding credit risk management in Indian banks. The second part contains eight questions related to CRI in Indian banks. The third part includes eight questions on credit risk assessment in Indian banks. The fourth part contains seven questions on credit risk control in Indian banks. The fifth part consists of ten questions related to the estimation of capital requirements based on Basel (Accord) norms. Finally, the last part contains six questions regarding the performance of credit risk management in Indian banks. The questions are close-ended and follow the five-point Likert scale (ranging from strongly disagree to strongly agree). The respondents indicated their degree of agreement with each of the questions. We have immensely benefitted from the earlier work while designing the questionnaire (Al-Tamimi and Al-Mazrooei, 2007; Masood and Fry, 2012; Shafique et al., 2013). The questionnaire was validated by four domain (academic) experts and practitioners (industry experts), as suggested by DeVellis (1991). The questionnaire was revised based on the suggestions in terms of adding, rewording, restating and excluding some questions.

4.3 Variables
We include two proxies for the dependent variable (credit risk performance), and five independent variables to analyze the credit risk management practices of Indian banks.

4.3.1 Dependent variables
- NPA growth rate: the data on NPA growth rate are sourced from Prowess database and validated by annual reports of banks. We estimated the annual average growth in Net NPA to Net Advances for five years from 2012 to 2016.
- Credit risk performance: the term “credit risk performance” denotes the performance of credit risk management system employed by Indian banks. The data on credit risk performance are collected by administering a questionnaire with six questions related to the same.

4.3.2 Independent variables. The components of credit risk management are the independent variables. These are measured by responses to questions related to the specific component, which are included in Table I.

4.4 Methodology
The models are estimated using multiple linear regression method. In the first model, NPA growth rate is regressed on five explanatory variables – credit risk perception,

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Independent variable</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Credit risk perception</td>
<td>The questionnaire has seven questions related to risk manager’s perception of credit risk management practice in his (her) bank</td>
</tr>
<tr>
<td>2</td>
<td>Credit risk identification</td>
<td>The questionnaire has eight questions regarding credit risk identification in Indian Banks</td>
</tr>
<tr>
<td>3</td>
<td>Credit risk assessment</td>
<td>The questionnaire has eight questions related to credit risk assessment in Indian Banks</td>
</tr>
<tr>
<td>4</td>
<td>Credit risk control</td>
<td>The questionnaire has seven questions regarding credit risk control in Indian Banks</td>
</tr>
<tr>
<td>5</td>
<td>Credit risk capital requirements</td>
<td>The questionnaire has ten questions related to capital requirements for credit risk (as per Basel norms) in Indian Banks</td>
</tr>
</tbody>
</table>

Table I. Independent variables
identification, assessment, control and capital requirements. The second model is an attempt to understand the impact (if any) of credit risk components on credit risk performance. We estimate the following models to test our hypotheses:

\[
NPAGR = f(CRP, CRI, CRA, CRC, CRCR),
\]

\[
CRPF = f(CRP, CRI, CRA, CRC, CRCR),
\]

where NPAGR is the NPA growth rate; CRPF the credit risk performance; CRP the credit risk perception; CRI the credit risk identification; CRA the credit risk assessment; CRC the credit risk control; CRCR the credit risk capital requirements.

5. Results and discussion

5.1 Empirical results

The reliability of scales is assessed using Cronbach’s \( \alpha \), which is a function of internal consistency and measures the interrelatedness of items in a test and its length. Thus, it estimates the reliability of a composite score, given its variance and the covariance between all its components (Crocker and Algina, 1986).

An \( \alpha \) of greater than or equal to 0.7 is considered acceptable and a good indicator of construct reliability (Nunnally, 1978). The Cronbach’s \( \alpha \) for all the six variables is approximately equal to 0.7 (Table II). The estimated \( \alpha \)s of individual variables are included in Table II. The results indicate that most of the variables are reliable.

The summary statistics of our sample banks are included in Table III. The mean values of most independent variables are high with little variance. However, the mean of CRCR is relatively low. The CRCR relates to Basel norms for estimating capital requirements for credit risk. The lower mean indicates that Indian banks continue to use basic approaches to estimate capital requirements.

The pair-wise correlations between independent variables are included in Table IV. We have tested for multicollinearity, as some correlation coefficients seem to be high. However, the maximum VIF score is within the permissible range (Myers, 1990).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cronbach’s ( \alpha )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP</td>
<td>0.67</td>
</tr>
<tr>
<td>CRI</td>
<td>0.76</td>
</tr>
<tr>
<td>CRA</td>
<td>0.75</td>
</tr>
<tr>
<td>CRC</td>
<td>0.67</td>
</tr>
<tr>
<td>CRCR</td>
<td>0.85</td>
</tr>
<tr>
<td>CRPF</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Table II. Reliability test

<table>
<thead>
<tr>
<th>Variable(s)</th>
<th>Mean</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP</td>
<td>4.35</td>
<td>0.33</td>
<td>3.71</td>
<td>5.00</td>
</tr>
<tr>
<td>CRI</td>
<td>4.36</td>
<td>0.38</td>
<td>3.38</td>
<td>5.00</td>
</tr>
<tr>
<td>CRA</td>
<td>4.38</td>
<td>0.38</td>
<td>3.63</td>
<td>5.00</td>
</tr>
<tr>
<td>CRC</td>
<td>4.28</td>
<td>0.38</td>
<td>3.57</td>
<td>5.00</td>
</tr>
<tr>
<td>CRCR</td>
<td>3.80</td>
<td>0.60</td>
<td>1.60</td>
<td>5.00</td>
</tr>
</tbody>
</table>

Table III. Summary statistics (observation: 38)
The regression results with “NPA growth” as dependent variable are included in Table IV. The estimated coefficient of the independent variable, “CRI,” is negative and significant as expected. Thus, there is evidence in support of \( H1 \).

The regression results with “credit risk performance” as dependent variable are included in Table V. The estimated coefficient of the independent variable, “CRI,” is positive and significant as expected. Thus, there is evidence in support of \( H2 \).

One-way ANOVA is used to test the final hypothesis. The ANOVA results to examine the difference(s) between Indian government and private banks are included in Table VI. The evidence suggests that there is a significant difference between “credit risk performance” of government and private banks.

The credit risk performance of private banks is significantly higher than that of government banks as indicated by the mean values of credit risk performance of government banks and private banks of 3.78 and 4.15, respectively (Table VII). Thus, there is evidence in support of \( H3 \).

The identification (of risk) is the first step in risk management by banks and financial institutions. This will help in administering other components of risk management such as risk measurement, control and mitigation, as well as business planning, performance measurement and pricing. The potential benefits of the early identification of risk include

<table>
<thead>
<tr>
<th>Variable(s)</th>
<th>CRP</th>
<th>CRI</th>
<th>CRA</th>
<th>CRC</th>
<th>CRCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRI</td>
<td>0.72</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRA</td>
<td>0.61</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRC</td>
<td>0.56</td>
<td>0.71</td>
<td>0.73</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>CRCR</td>
<td>0.23</td>
<td>0.30</td>
<td>0.51</td>
<td>0.41</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Table IV. Correlation analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>NPA growth</th>
<th>Credit risk performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.61 (1.77)</td>
<td>1.18 (1.20)</td>
</tr>
<tr>
<td>CRI</td>
<td>-0.64 (-2.53)**</td>
<td>0.70 (2.56)**</td>
</tr>
<tr>
<td>CRP</td>
<td>0.35 (1.23)</td>
<td>-0.16 (-0.50)</td>
</tr>
<tr>
<td>CRCR</td>
<td>0.04 (0.38)</td>
<td>0.09 (0.80)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>17%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Table V. Regression analysis

<table>
<thead>
<tr>
<th>F-statistics</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit risk performance</td>
<td>5.771</td>
</tr>
</tbody>
</table>

Table VI. One-way ANOVA test

<table>
<thead>
<tr>
<th>No. of observations</th>
<th>Credit risk performance</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>24</td>
<td>3.78</td>
</tr>
<tr>
<td>Private</td>
<td>14</td>
<td>4.15</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>3.92</td>
</tr>
</tbody>
</table>

Table VII. Summary statistics (ANOVA)
design of stress test scenarios, risk modeling, measurement of complicated risks, and strategic planning. The risk identification helps managers with the knowledge of bank’s key vulnerabilities. For instance, if a bank has significant credit exposure to a particular industry, identification ensures the inclusion of additional risk weights to industry-specific factors which drive credit losses. This ensures better estimation of the extent of risk.

The risk identification also helps in the modeling and measurement of complicated risks. In addition, cases with limited data are modeled through the narrative analysis of how risks might affect an event. The Basel Committee recommends the use of credit judgment and reasonable estimates to recognize and measure loan losses. Effective systems should be in place to identify credit risk through an independent evaluation of bank’s strategies, policies, procedures, and practices related to the sanctioning of credit and management of the portfolio. Prudential limits should be set to restrict bank’s exposure to an individual borrower or group of connected counterparties.

Additionally, the identification and management of credit risk should cover all products and services. In cases of novel products and services, adequate risk management protocols should be followed after due diligence and approval from the board of directors. Rigorous analysis is required to understand the inherent credit risk in cases of complex credit decisions such as loans to specific industries, asset securitization and credit derivatives. Structured procedures and controls along with basic principles of credit risk management will be required. Critical cases involving counterparty credit risk should be handled with highest standards in compliance with bank’s policies and procedures. Credit limits for individual firm and group should be set in a comparable and meaningful manner, in both the banking and trading book. The banks should invest in superior information and risk management systems to identify risk concentration in a credit portfolio. The branch managers and senior management must ensure the adequacy of systems with respect to the complexity of business on a periodic basis.

6. Conclusions

The identification of credit risk is the only important determinant of credit risk performance of Indian banks. The results are robust as CRI is negatively related to annual growth in NPAs or loans. The results are consistent with the evidence reported by Al-Tamimi and Al-Mazrooei (2007) and others. Our results are in conformity with the International Monetary Fund’s stress on developing a robust analytical framework for the early identification of risk (Cashin et al., 2016). The results support the implementation of measures by central bank of India (RBI) to ensure the early identification of credit risk by obliging banks to share information on profile and credit scores of potential borrowers.

The RBI ensures that the banks’ loan portfolio is well diversified by restricting the amount lent to a single firm and group. It also discourages lending to an industry or sector by raising the provisioning requirements whenever it senses trouble. The banks are obliged to submit fortnightly compliance reports, and RBI has powers to inspect the books of banks. The banks have freedom to lend to a firm or group of firms subject to the regulatory restrictions. Therefore, it is not surprising that CRI is the only determinant of credit risk performance of Indian banks.

The credit risk performance of private banks is significantly higher than that of government banks. This is not surprising given the operational freedom enjoyed by private banks, and their objective of achieving superior performance. The government banks suffer due to interference from different agencies of government.

6.1 Contribution(s)

The results of the study may be of interest to bank executives, regulators, and risk officers. The study has implications for banks, which incur significant losses due to credit failures. It also has implications for the implementation of Basel III norms by RBI.
The results of our study will be of interest to the central banks as they can focus their attention on CRI in their effort to bring down the bad and doubtful assets of banks regulated by them. The risk managers will also benefit by investing their efforts in critically evaluating the creditworthiness of potential borrowers to mitigate the credit risk by identifying the same at an early stage.

The bank executives can benefit by sharing information (data) on the credit quality of potential borrowers and their experience in the early identification of risky borrowers. This coordination among banks will help bring down the total NPAs in the banking system and may improve the credit flow to different sectors of the economy.

6.2 Practical implication(s)
The results suggest that CRI is negatively related to NPA growth and positively related to the credit risk performance of Indian banks. This finding has important implications for Indian banks and financial institutions as the deployment of sophisticated risk management systems to identify credit risk will improve their credit risk performance and bring down their NPAs and the provisions (capital to be set aside for NPAs). The Indian banks will benefit from sharing information on profile and credit scores of potential borrowers as it would help the early identification of credit risk.

The Credit Information Bureau of India Limited (CIBIL) was established in 2000 as Credit Information Company by banks and financial institutions. It keeps credit history (records) of individuals as “Consumer Bureau,” and that of institutions/companies as “Commercial Bureau.” The credit history is available to participating banks and others. The credit score of individual, institutional and corporate borrowers assigned by an independent entity such as CIBIL can be one of the inputs to assess the creditworthiness of borrowers to identify credit risk early to ensure that the banks do not add to their stock of NPAs.

The Indian banks and financial institutions can promote other credit information companies so that more relevant and useful information about potential borrowers is available to all the participants in the Indian financial system. This sharing of information may also improve their credit risk performance due to better risk identification and management.

The need for an effective risk management system to manage credit risk assumes importance and urgency in the context of high and rising NPAs of Indian banks, and the consequences for the Indian economy. The implementation of an effective credit risk management system will ensure that the level of NPAs is brought down to an acceptable level and is comparable to that in developed countries.

6.3 Social implication(s)
A significant proportion (e.g. 33 percent) of household savings is invested in deposits with banks and other financial institutions in India. These deposits constituted 41.3 percent of the total financial assets held by Indian households in the year 2015–2016. Thus, the failure of a bank can have serious consequences for the economy as the Indian financial system may not be equipped to deal with such situations.

The high and rising level of NPAs will have adverse consequences for credit flow in the economy in the absence of appropriate intervention by government and central bank in the form of changes in institutional and regulatory infrastructure. The problems in banking and financial services sector will lead to lower industrial and aggregate economic growth, and lower (or negative) growth in employment.

Notes
1. La Porta et al. (1997) country groups refer to the four country groups based on legal origins (namely English origin, French origin, German origin and Nordic origin).
2. The Reserve Bank of India is the central bank of India, which was established on April 1, 1935, under the Reserve Bank of India Act.

3. CMIE is broadly similar to the Compustat database of US firms.

4. National Institute of Bank Management is an autonomous institution established by RBI for education, research, training and consulting in bank management.

References


About the authors
Sirus Sharifi is a postdoctoral fellow at the Department of Humanities and Social Sciences, IIT Bombay, India. His areas of interest include finance, risk management, insurance and banking regulation. His doctoral work was published in refereed journals and presented at reputed conferences organized by Oxford University and London University. Sirus Sharifi is the corresponding author and can be contacted at: sharifi@iith.ac.in

Arunima Haldar is Assistant Professor in Finance in SP Jain Institute of Management and Research, Mumbai, India. Her areas of interest include Corporate Governance and Corporate Finance. She recently received Global Innovation Award in the category “Writing with Integrity” by Turnitin. The papers from her doctoral work received outstanding paper award twice at reputed conferences on Corporate Governance. She has also received the best research faculty award during her tenure at NMIMS University, Mumbai, India. She is Assistant Editor of International Journal of Global Business and Competitiveness, and is on the editorial review board of some reputed journals.

S.V.D. Nageswara Rao is Professor in the Finance and Economics area at School of Management, IIT Bombay. His areas of interest include corporate finance, investment banking, capital markets, mutual funds, corporate governance and financial engineering. He graduated 13 doctoral students, and is currently guiding three doctoral students. He has published his research in reputed Indian and international journals, and has also presented at reputed national and international conferences. He has offered more than 30 in-house and open management development (training) programs to participants from Indian companies, multinational corporations, and government agencies.

For instructions on how to order reprints of this article, please visit our website:
www.emeraldgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: permissions@emeraldinsight.com