

**Essays on Bank Lending Behaviour and Non-performing Assets in the
Indian Banking System**



Thesis

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by

Dilawar Ahmad Bhat

Under the supervision of

Prof. Udayan Chanda

&

Under the co-supervision of

Prof. Anil K. Bhat

Department of Management

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

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CERTIFICATE

This is to certify that the thesis entitled, “**Essays on Bank Lending Behaviour and Non-performing Assets in the Indian Banking System**” submitted by Dilawar Ahmad Bhat, ID No. 2014PHXF0415P for the award of the Ph.D. degree of the institute embodies original work done by him under our supervision.

Signature of Supervisor

Name: Udayan Chanda

Designation: Associate Professor

Department of Management

BITS Pilani

Rajasthan, 3330311

Date -05-2023

Signature of co- supervisor

Name: Anil K. Bhat

Designation: Professor

Department of Management

BITS Pilani

Rajasthan, 3330311

Date -05-203

Dedicated to
My beloved parents

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ABSTRACT

The post-crisis bad loan surge in the Indian banking system, especially public sector banks has raised a serious policy concern about the financial stability in India. Being a bank-based economy, public sector banks are at the forefront of providing credit to industry and agriculture. However, their government ownership & control has often been a subject of debate. On the one hand, government ownership is thought to provide stability in times of crisis by ensuring depositor confidence besides providing credit to certain neglected but important areas like agriculture where private banks would normally hesitate to invest. On the other hand, government ownership is thought to promote soft budget constraints (SBC) through lax credit monitoring and appraisal practices, weakening of market discipline, political abuse and rent-seeking, bailouts, and loan waivers which often lead to the emergence of bad loans. The experience of erstwhile socialist economies provides overwhelming evidence about the emergence of SBC syndrome through government ownership. In this study, we intend to investigate bank lending behaviour and the post-crisis bad loan build-up in the Indian banking system from soft budget constraints and market discipline perspectives.

First, we study the linkage between corporate leverage and non-performing loans at an aggregate level. We find that increase in corporate leverage leads to an increase in banking system risk (non-performing loans). We also attempt an indirect inference of the lending behaviour of banks from the debt financing of the corporate sector in India and explore how lending (borrowing) is related to the size of the borrower. The usage of bank borrowings by firms in India is a crude indicator of where bank loans go because bank borrowings constitute a substantial part of firms' total debt. We use a large dataset of 3164 firms spreading across manufacturing, infrastructure, mining, construction & real estate, electricity, and related non-financial services to examine the relationship between bank lending and firm size. The findings suggest that overall, the firms in India develop their capital structure according to the pecking order theory when leverage is measured as a sum of bank and capital market borrowings. However, when the leverage is measured by bank borrowings to total assets ratio, we find that firm size has a positive relation with leverage indicating that bank lending in India is skewed towards larger borrowers. This has been reflected in the post-crisis non-performing loan build-up in the Indian banking system where a significant amount of bad loans has come from big-ticket loans from large borrowers.

Next, we empirically examine the lending behaviour of Indian banks and how far is their lending SBC-driven. We then examine whether bank lending is biased towards government and group firms amid the presence of soft budget constraints and whether banks ration credit according to the riskiness of the borrowers. Biased lending and lack of credit rationing are manifestations of SBC which leads to the build-up of bad loans in the banking system. We find evidence for the presence of soft budget syndrome in the economy which makes bank lending biased in favour of government and group firms as against individual private firms. This inherent bias seems to have been exacerbated after the 2008 financial crisis. Moreover, banks do not ration credit according to borrower riskiness and are lending more to government and group firms as their risk increases.

Finally, we investigate how effectively the market disciplinary forces, proxied by information disclosure and interbank deposits, incentivize the Indian banks to adopt prudential risk management by enhancing their risk-weighted capital ratio. We find evidence that non-performing assets lead to erosion of bank capital and information disclosure and interbank deposits do not induce prudential risk behaviour among banks in India. However, we find evidence that with increasing concentration in the banking sector, a higher level of information disclosure effectively induces banks to maintain higher capital ratios, but interbank deposits do not have any significant effect on bank capital. This seems to confirm the fact that a more consolidated banking sector would be more stable and resilient. We also observe that government banks maintain lower capital ratios as compared to private banks. The main reason behind the lower capital of government banks seems to be the expectation of a bailout by the government in the event of financial problems.

The main findings of our study show that bank lending is more skewed towards larger firms. Bank lending is biased in favour of government and group firms as against individual private firms. This inherent bias seems to have been exacerbated after the 2008 financial crisis. Moreover, banks in India do not stick to strict credit rationing based on the riskiness of borrowers. Finally, there is no evidence of strong market discipline operating in the banking system of India. The study has implications for financial and banking system stability. Strict enforcement of guidelines with regard to credit appraisal and monitoring of borrowed funds, strengthening of bankruptcy resolution process to harden the budget constraints, and reduction of government ownership and control in the banking system are some of the policy steps that should be prioritized by the Indian policy makers.

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1.3 The concept of Soft Budget Constraints

The term ‘soft budget constraint’ was coined by Janos Kornai in 1979 to describe economic behaviour in socialist economies marked by shortage. Kornai first observed the SBC phenomenon in socialist Hungary after market reforms were introduced there (Kornai, 1979; Kornai, 1980). Since then, the concept has been frequently used to explain the transition from socialism to capitalism. In the Hungarian economy, Kornai observed that the chronic loss-making firms were kept alive through support by the state and were always rescued with financial assistance in the form of subsidies and other interventions. This made the firms complacent as the threat of bankruptcy was attenuated. Since Kornai conceptualized SBC, its role in the poor efficiency of socialist economies has been widely accepted. Several phenomena in market-based economies have also been discussed in terms of SBC (e.g., the US government’s bailouts in the Savings and Loans crisis and the Long-Term Capital Management crisis, East Asian financial crisis, etc). The theory of soft budget constraint was formalized by (Dewatripont & Maskin, 1995) and most of the subsequent work has evolved from their work. Soft budget constraint is a concept in microeconomics, and it has been extended to the behaviour of firms and economic agents in a macroeconomic setting.

Soft budget constraint refers to a situation where an economic entity expects to obtain economic assistance when in financial difficulties. Softening of budget constraints ensures the continued operation of loss-making firms because they are rescued from existential threats by some other entity.

“The ‘softening’ of the budget constraint appears when the strict relationship between expenditure and earnings has been relaxed, because excess expenditure over earnings will be paid by some other institution, typically by the State. A further condition of ‘softening’ is that the decision-maker expects such external financial assistance with high probability and this probability is firmly built into his behaviour” (Kornai, 1986)

1.3.1 Description of the SBC phenomenon

An organization does not operate in a vacuum. It is embedded in its environment which may be categorized into micro-environment and macro-environment. Micro-environment comprises those entities which directly affect the functioning of the organization e.g., suppliers, financiers, customers, competitors, and public and market intermediaries whereas the macro-environment is the broader background factors like natural, social, political, legal, and technological environment. This embeddedness of the organization in the environment, under certain circumstances, can give rise to a relationship between the organization and its

environment which ensures its survival even when the expenditures exceed revenues. Such a situation is a soft budget constraint (SBC) situation.

To explain the SBC phenomenon, let us suppose that there is a budget-constrained firm (BCF) with initial investment I . It must earn sufficient revenue, R to cover its expenditures, E otherwise it will not be able to survive unless some external intervention is made. The upper limit of the financial deficit is determined by some sort of constraint on debt, solvency, or liquidity. For survival,

$$I + R \geq E$$

Now, if the probability of external intervention is zero or close to zero, the firm is facing a hard budget constraint (HBC).

The SBC phenomenon occurs if one or more entities in the firm's environment are ready to cover all or part of the deficit. This supporting role may be played by other firms whose business depends upon the budget-constrained firm (BCF), banks/financial institutions, or government. Thus, the SBC phenomenon may occur in a one-to-one or a one-to-many relationship.

1.3.2 Example scenarios for SBC

SBC arises in case a state-owned firm is rescued or subsidized by the state. SBC is not specific only to socialist economies. It is also found in capitalistic economies. SBC also arises quite often in the banking industry. Mostly, governments worldwide do not let the banks, especially larger ones, fail because they care about the larger macro-economic stability. This has been termed the "Too Big to Fail" hypothesis. Government plays a rescuing role in such cases (Aghion et al., 1999; Berglof & Roland, 1998; Mitchell, 2001). Local governments may be rescued by central governments (Wildasin, 1997). Even countries may be rescued by agencies like IMF from bankruptcy.

1.3.3 What motivates a 'Rescuer' to bail out a budget-constrained firm (BCF)?

The primary motivation of managers of a failing firm is that they want to secure their jobs and so they view their firm's work as important. This motivates them to ask for support from the rescuing entity. But what explains the rescuer's behaviour? Why should a rescuing entity be bothered about the survival of the BCF? Several motives can be there to explain the rescuing firm's behaviour. The most simplistic explanation yet a quite probable one is that the rescuing organization may have "crony" relationships with the financially troubled organization, or it may be under political pressure to bail out the failing firm (Kornai et al., 2003). The rescuing

firm may also be motivated by its own best interests to help a failing firm to save previous investments it has made. This idea is at the heart of Dewatripont & Maskin, (1995) model and other subsequent models. This idea has been most thoroughly investigated in SBC literature. In the case of a multi-business firm, an underperforming business may be cross-subsidized by profits from other units (s) to avoid a bad managerial reputation. Paternalistic behaviour on behalf of the rescuer, especially if it is a state may also lead to a bailout of failing firms/budget-constrained firms. Also, a rescuer may bail out a budget-constrained firm to avoid the bankruptcy contagion triggered by a failing/budget-constrained firm (BCF) that has linkages with other firms in the value chain. If the rescuing firm does not act timely the result could be the collapse of the entire industry leading to a demand slump in the economy. This fear of not letting a substantially big and important organization fail is described as ‘too big to fail’. This is usually the case with banks or insurance companies.

In the SBC phenomenon, rescue can be undertaken through fiscal means (subsidies from the state budget or tax concessions) or some form of soft credit. For instance, loans may be provided to financially distressed firms that are not otherwise eligible for credit. Loans already made may be restructured when the borrowing firm faces difficulties in servicing or repayment of the loan. However, credit per se is consistent with an HBC.

Soft budget constraint (SBC) syndrome is an outcome of the SBC mindset. This mindset is formed from expectations of support from the rescuing organization. The more frequent the bailouts, the stronger the expectations. If, however, the support received by the budget-constrained firm is totally unanticipated, then such action can’t be attributed to soft budget constraints. It is only when the management of the financially troubled organization anticipates the support from the rescuing agency/entity that we say the SBC phenomenon is at work.

1.3.4 Soft budget constraint measures

The simplest measure of SBC in an economy is the extent to which poorly performing firms are allowed to fail. So, the frequency of firm bankruptcies can be a good indicator of the soft budget syndrome. Some of the well-known indicators of SBC used by researchers are as follows:

1. Percentage of firms reporting subsidies as an indicator of SBC (Earle & Estrin, 2003). This indicator shows how much market distortion is present as a result of state intervention through subsidies and how competition is discouraged.

2. Tax arrears as a percentage of GDP or total budget measures soft taxation policy practiced by the state (Frydman et al., 2000; Pinto et al., 2000; Schaffer, 1998; Sjöberg & Gang, 1996). This shows a lenient tax policy that helps maintain profitability at levels not warranted by actual firm performance.
3. Subsidies as a percentage of GDP or total budget depicts the hardness or softness of the budget constraint. The more this ratio, the softer the budget constraint in the economy (Gao & Schaffer, 2000; Raiser, 1994).
4. Percentage of firms reporting tax arrears (EBRD, 1999) or a survey capturing perception of soft taxation can also be used
5. The existence of soft bank credit has also been measured through a *preference for distressed firms in credit allocation* (Brana et al., 1999; Budina et al., 2000; Gao & Schaffer, 2000; Schaffer, 1998).
6. Percentage of Non-performing loans (Gao & Schaffer, 2000)
7. Unusual debt/equity ratio or debt/asset ratio (Budina et al., 2000; Gao & Schaffer, 2000; Majumdar, 1998)
8. Unusual cash-flow/debt ratio (Pohl et al., 1997)

1.3.5 Consequences of soft budget constraints

Soft budget constraint syndrome interferes with the principle of economic natural selection. When SBC syndrome is present in an economy, it prolongs the survival of loss-making entities and thus gives birth to inefficiency in the whole economic system. The prevalence of SBC syndrome explains the deviations from Schumpeter's theory of creative destruction (Schumpeter, 1942). SBC syndrome induces behavioural changes like the lackadaisical attitude of management towards achieving higher profitability or reducing costs. The drive to innovate is considerably weakened resulting in technological stagnation. Another problem as identified by Kornai is the problem of shortage (Kornai, 1980). When the firms receiving expenditure support from other entities start buying their inputs, it creates more demand for such inputs from the market. The other consumers of these inputs experience shortage of these products. Another problem associated with SBC syndrome is the problem of overinvestment. When investors feel that the firm is going to receive support in case of any trouble, they overinvest knowing that their funds are insured by the rescuing organization. This type of behaviour leads to economic overexpansion

1.3.6 Sources of Soft Budget Constraints

a) Soft subsidies and policies

Soft administrative prices, soft credit, and soft taxation are provided by the central or state government. Under soft taxation firms in financial trouble are given tax concessions or allowed to postpone payment of their taxes.

b) Too-big-to-fail (TBTF) and moral hazard

As the financial institutions become large, they tend to enjoy insurance against the risk of failure because of the implicit government guarantees as governments can't afford to see such institutions going bust threatening the entire financial system. This gives the TBTF institutions a competitive edge over smaller counterparts and hence they tend to take additional risks. Moreover, regulatory labeling of these institutions as systemically important banks (SIBs) can also signal to these institutions the implicit government guarantees. Although such banks may be asked to maintain additional capital for increasing their loss-absorbing capacity, they may start taking excessive risks which negate the role of additional capital. If investors perceive these TBTF institutions as relatively less risky, they will offer them funding at a cheaper cost. Smaller banks find it difficult to compete with these large banks, and if they try to, they engage in taking undue risks making the entire financial system riskier. Thus, TBTF status tends to soften the budget constraint of SIBs which can exacerbate the riskiness of the entire financial system. So, it becomes more important to have intrusive supervisory oversight over SIBs.

c) Government ownership across borrowing and lending entities

The government ownership of banks and borrowers tends to foster the problem of SBC. Banks tend to bail out loss-making firms by rolling over bad loans because they expect to be bailed out by the government through recapitalizations when they are in financial trouble (Berglöf & Roland, 1995). In India, the rollover and restructuring of bad loans were encouraged by India's central bank, the Reserve Bank of India (RB) to minimize the impact of the 2008 financial crisis on the economy. This regulatory forbearance has heavily been misused by banks and borrowers alike leading to amassing of bad loans in the banking system

CHAPTER 1. INTRODUCTION

The global financial crisis of 2008 had a delayed negative effect on the financial services sector of India because the predominant government ownership of the banking sector helped maintain depositor confidence (Acharya & Kulkarni, 2012; Eichengreen & Gupta, 2013). During the crisis banks, especially government banks, kept funding the corporate sector at a robust pace. However, the corporate sector, due to falling global demand, found it increasingly difficult to repay the debts taken during the preceding boom period. What appeared to be a recovery during the initial years of the post-crisis period, proved to be an illusion when the stress in the corporate sector started appearing on the balance sheets of banks, especially public sector banks (PSBs). The banking stress was further worsened due to corruption scandals and frauds, wilful defaults, and scams involving the loans granted by public sector banks (Rajan, 2018). This has called into question the lending mechanism and credit appraisal practices of public sector banks on the one hand and the integrity of company promoters on the other. Currently, the most difficult challenge facing the Indian banking system is the mounting bad loans in public sector banks. The dominance of public sector banks in India seems to have given rise to a sense of impunity among public sector undertakings, large private companies, and politically connected businesses regarding the repayment of debt to PSBs. Collectively, the share of loans by PSBs stands at 70 per cent while their share of impaired assets stands at 90 per cent. At the start of the Asset Quality Review (AQR) in October 2015, stressed assets, and Gross Non-performing assets of PSBs stood at 14 per cent and 6.2 per cent, respectively. As on March 31, 2018, the total amount of loans written off by public and private banks since 2009 stood at Rs 4,800 billion out of which 83.4 per cent belonged to PSBs¹. According to a CRISIL report, in financial year 2018, gross NPAs have risen to Rs 10.3 trillion (11.2 per cent of advances). The loan recovery rate continues to be around 15-20 per cent while write-offs and recapitalizations are continuously going up².

Most of the bad loans in Indian banks are owed by large companies in power, steel, mining, aviation, and textiles and were made during the economic boom of 2002 to 2008. Before 2002 long-term lending was done by development finance institutions (DFIs). When

¹ <https://indianexpress.com/article/business/banking-and-finance/rs-1-44-lakh-crore-thats-the-record-bad-loan-write-off-by-banks-in-2017-18-bad-debt-npas-5218043/>

² <https://indianexpress.com/article/business/banking-and-finance/bad-loans-80-per-cent-of-write-offs-in-decade-came-in-last-five-years-5673420/>

commercial banks undertook their role, they had no experience in project financing which may have led to faulty project appraisal.

Table 1.1: Bad loan write-offs in Indian banks (Rs in million)

Year	Private Banks	PSBs	Total
2009	5700	15940	21650
2010	72400	78280	150680
2011	25700	177290	202990
2012	36630	146140	182480
2013	50250	265240	315490
2014	65040	289200	354240
2015	67670	461790	529470
2016	101330	611210	712530
2017	131190	759290	890480
2018	239280	1201650	1440930
Total	794900	4005840	4800930

Source: Author compilation from ICRA data.

Table 1.1 shows the year-wise bad debt write-offs across public and private banks since 2009. The data clearly shows that the epicenter of the bad loan problem is within the public sector banking system of India.

1.2 Magnitude and seriousness of non-performing assets (NPAs) crisis in India

Since 2013, the incidence of defaulted loans in the Indian banking sector has increased (Das & Rawat, 2018a). The ratio of non-performing loans to total bank advances started increasing from 2009-10 although the rate was pretty low in comparison to the world average. From 2009-

10 to 2013-14, bad loans as a percentage of gross advances in India stood at 3 per cent while the world average stood at 4 per cent. However, things started changing after 2013-14 when the rate of NPA started spiraling out of control in the Indian banking system. By 2016-17, the ratio of NPAs stood at 9.6 per cent. In absolute terms, the non-performing loans reached Rs 7,90,2680 million in 2016-17 from 5,94,000 million in 2004-05. The continuous increase in the accumulation of NPAs from 2011 has led to a decline in credit growth to 8.8 per cent. This indicates the banks' reluctance to increase their risk exposure due to the accumulated stress. The number of borrowers failing to repay their debt obligations has also gone up since 2012 adding to the banks' NPAs. The level of gross NPAs reached 11.75 per cent in March 2018 from 4.1 per cent in 2014. Such a high rise in NPAs has raised policy concerns about bank stability and the financial health of banks in India.

While corporates pin the blame on the global and domestic economic slowdown, independent audits have revealed a different story. Wilful defaults and funds diversion have contributed hugely to this bad loan mess (Das & Rawat, 2018b). This has compelled the regulator to keep an eye on the pre-and post-sanction due diligence and internal controls of banks. Large ticket loans made through consortium arrangements have turned into NPAs. This calls for unearthing the real reasons behind the NPA problem because loan frauds have recently played havoc on the Indian banking system. Emerging technologies like Blockchain can bring the desired transparency and accountability to prevent fraud and embezzlement (Kashyap & Saurav, 2021).

Being a bank-based economy with central bank control, the majority share of the debt market is in the hands of the government and the remaining share is controlled by large industrial houses (Thukral et al., 2015). This puts a lot of burden on the banks, especially public sector banks to meet the credit needs of the corporate sector. The underdevelopment of the corporate debt market makes any problems in the banking sector critical for the stability of the economy. The negative impact of the banking crisis has badly dented the GDP growth rate. In the second quarter of 2019, the Indian economy grew only by 5 percent, showing a contraction of 0.8 per cent compared to the previous quarter. It was the slowest growth rate since 2013, driven by a slowdown in the construction and manufacturing sectors. This slowdown has been partly driven by a lack of fresh credit amid high NPAs in these sectors. This NPA problem has its epicenter in the PSBs. Being dominant players in the country's banking system, any trouble in public sector banks is likely to bring the entire economy to a halt as bank credit is essential to keep the investment cycle running. Out of all bank groups, PSBs have seen higher levels of NPAs since 2012 (see *Figure 1.1*).

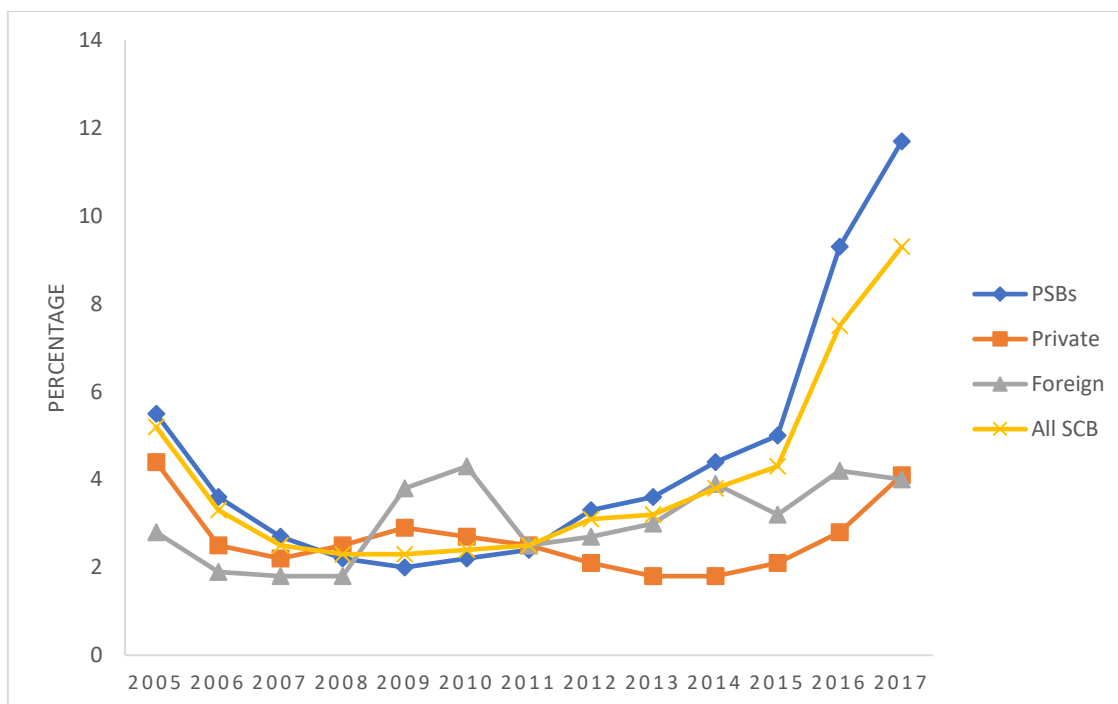


Figure 1.1 Gross NPAs as a percentage of Gross advances

Source: Author calculations from RBI data

At the aggregate level, from 2013 onwards the gross NPAs are higher than doubtful advances followed by substandard advances and loss advances (see Figure 1.2). Figures 1.3 and 1.4 provide the asset classification of public and private sector banks which have similar trends but different magnitudes.

In comparison to private banks (PVBs), the NPAs are substantially high in PSBs. From 2007-08 to 2010-11, the gross NPA rate of private and foreign banks was worse than PSBs. However, after 2011 the scenario changed and PSBs became the epicenter of bad loans. This worsening of the NPA level in government-controlled banks raises questions about government ownership and its impact on lending practices.

A disaggregated analysis of loan assets of the Indian banking system shows that the share of Sub-standard Assets and Doubtful Advances and loss Advances has gone up significantly from 2015 onwards substantially along with a decline in standard assets. From a peak of 97.5 per cent in 2011, the ratio of standard advances to total advances has gone down to 90.68 per cent in 2017. Likewise, the sub-standard, doubtful, and loss advances have shown an opposite trend.

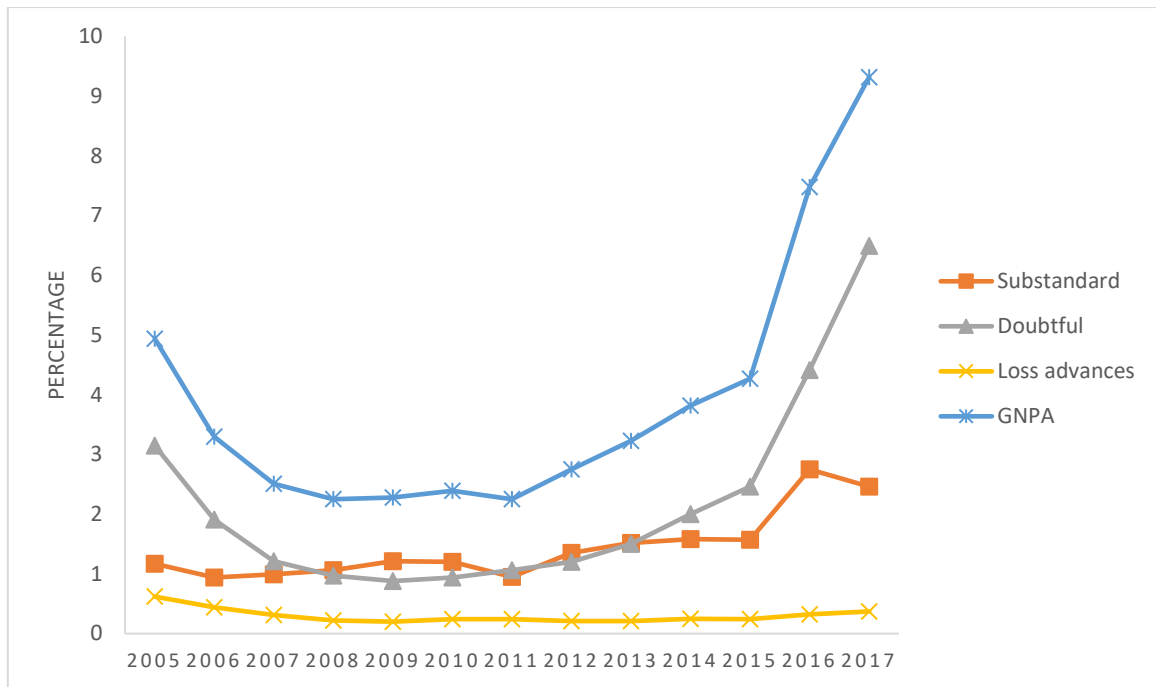


Figure 1.2 Loan classification of all scheduled commercial banks (in per cent)

Source: Author compilation from RBI data

While all commercial banks' asset quality has shown a deterioration in general, the case of PSBs is extremely worrying as their asset quality has plummeted substantially and at a much faster rate. From March 2015 to March 2017, the share of standard assets went down by 6.7 per cent from 95 per cent to 88.3 per cent while as the share of doubtful advances increased by 5.4 per cent from 2.9 to 8.36 per cent.

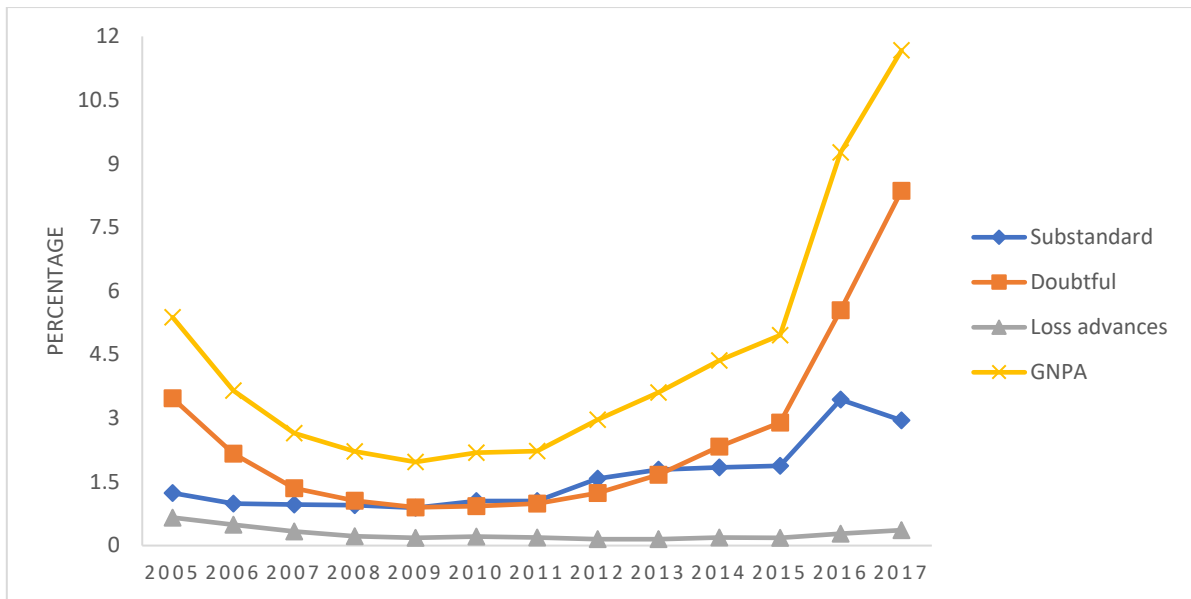


Figure 1.3 Loan classification of PSBs (in per cent)

Source: Author compilation from RBI data

The asset classification of PVBs (see Figure 1.4) shows a similar pattern as that of PSBs. But the rate of deterioration in asset quality as reflected in different asset categories is not as high as in the case of PSBs. There is a wide gap between PSBs and PVBs in terms of asset quality.

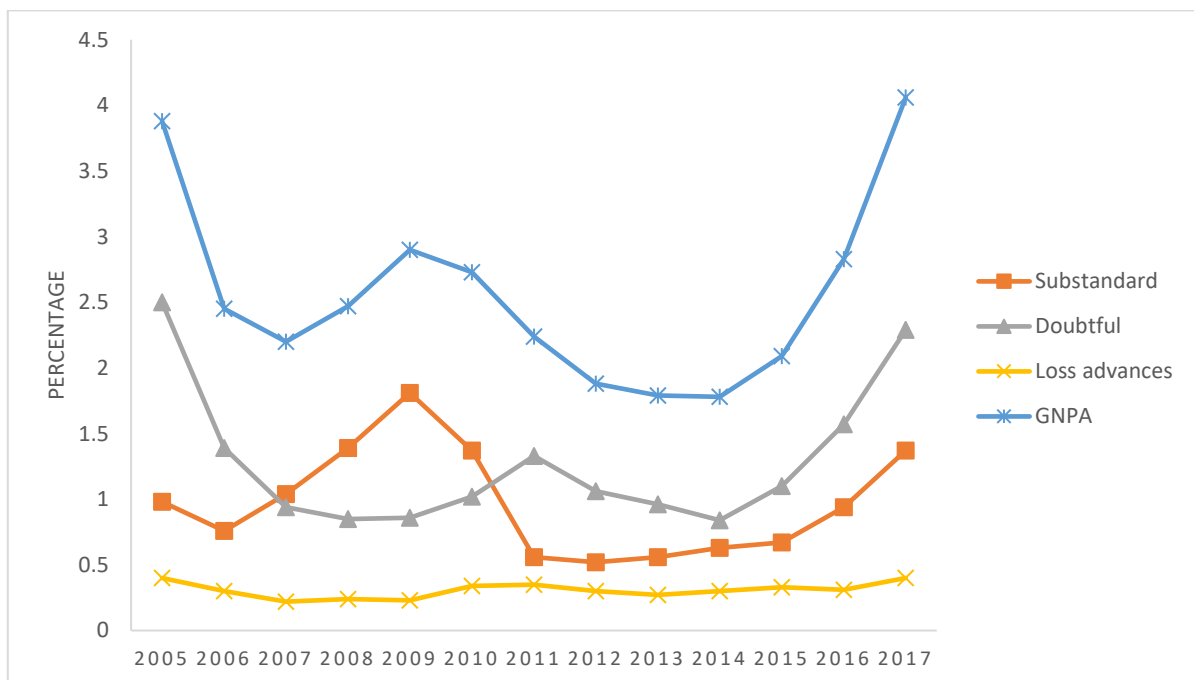


Figure 1.4 Loan classification of private banks (in per cent)

Source: Author compilation from RBI data

Figure 1.5 presents the breakdown of NPAs in priority, non-priority, and public sectors. The current NPA crisis is mostly due to the non-priority sector, unlike the earlier crisis episode of the 1990s.

A disaggregated comparison of NPAs of PSBs from the priority vs non-priority sector shows that post-2012, NPAs have majorly come from the non-priority sector. Priority sector NPAs have declined to 23.5 per cent in 2017 from a high of 61.5 per cent in 2008. In the same period, the share of NPAs from non-priority sector has gone up to 74.2 per cent from 37.1 percent.

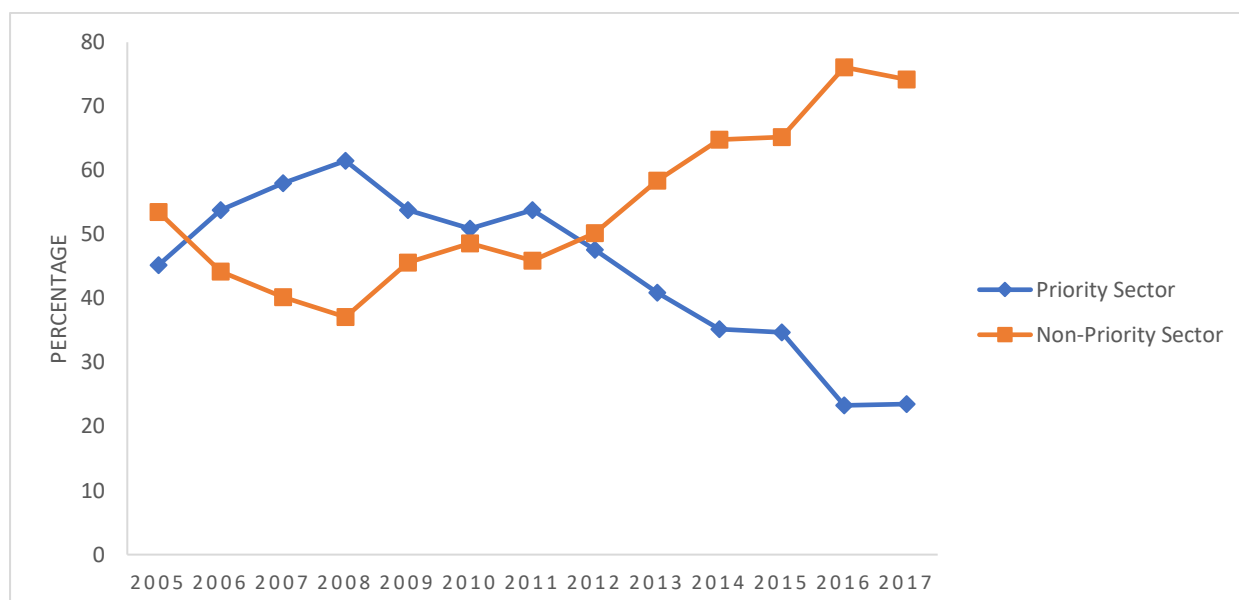


Figure 1.5 Sector-wise contribution to NPAs of PSBs

Source: Author compilation from RBI data

Sector-wise distribution of major industry sectors with large credit share for 2016 and 2017 is given in *Figure 1.6*. It is evident that infrastructure, construction, and basic metals take a large part of the credit. Since the financing and gestation period is longer in these industries, it becomes necessary to have sufficient expertise in lending to such sectors. PSBs have assumed the role of long-term financing after the demise of development financial institutions. Earlier PSBs focussed on retail loans and short-term working capital loans. Thus, the lack of expertise in project financing could also be a potential cause of non-performing loans in PSBs from these sectors.

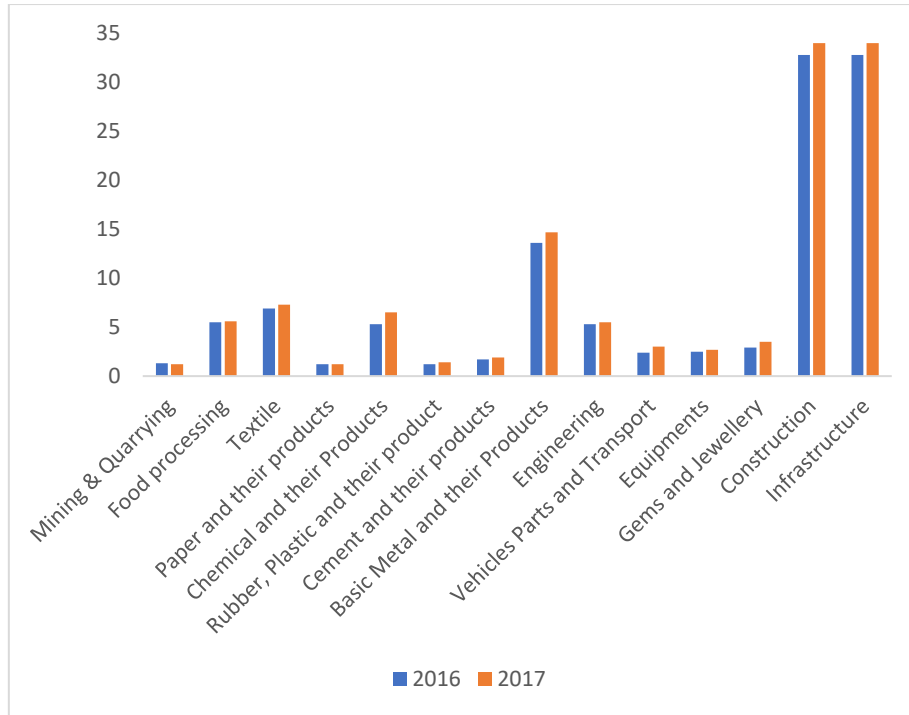


Figure 1.6 Credit share of major industry sectors in 2016 and 2017

Source: Author compilation from RBI data

The share of stressed advances of banks for 2016 and 2017 from the major industry sectors is given in Figure 1.7.

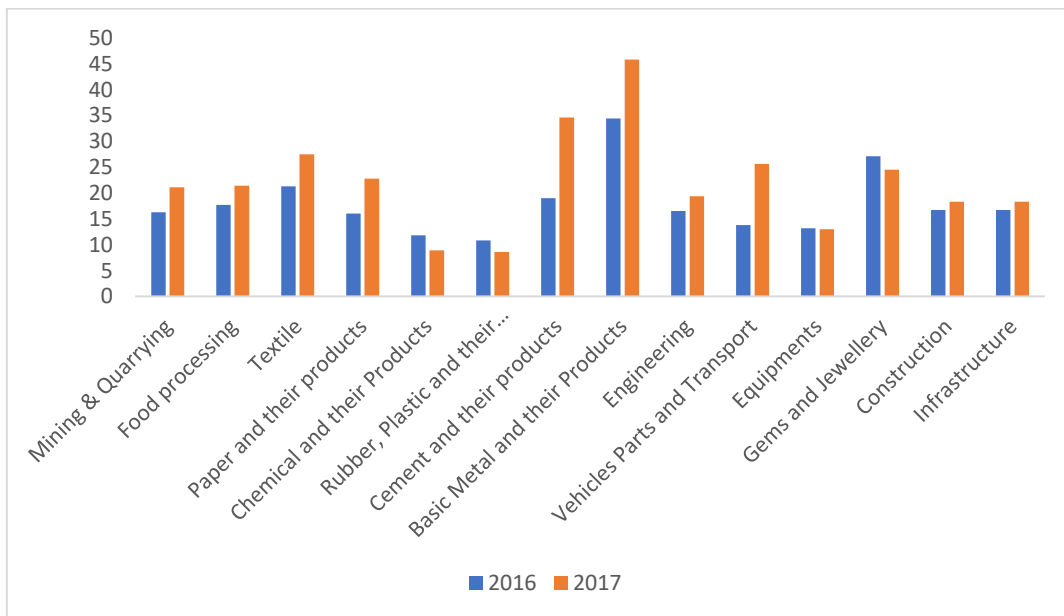


Figure 1.7 Share of stressed advances in 2016 and 2017

Source: Author compilation from RBI data

The data and figures presented above show that the NPA crisis is located in public sector banks, and it is mostly the non-priority industry sector that has contributed to the stress build-up in the public sector banks. Earlier in the late 1990s also a similar bad loan crisis had engulfed Indian banks during the Asian financial crisis. To come out of that crisis episode the Indian economy mostly relied on the global economic boom which started in 2002 and lasted up to 2008. However, the reliance on external favourable economic conditions is not a good sign for the banking system's stability and health.

Until Oct 2015, the government, banks, and the regulator (RBI) had been restructuring and rolling over these bad loans rather than writing them off. Such a restructuring and roll-over of bad loans is itself an indication of soft budget constraint syndrome on the one hand and these actions further soften the budget constraints of borrowers and lenders on the other. This hampers the market discipline which ultimately creates an environment where risk accumulates in the entire banking system.

The data on the magnitude of bad loans in the PSBs as against PVBs seems to suggest that government ownership may be fostering softening of budget constraints (SBC) and weakening of market discipline as was the case in erstwhile transition economies (Du & Li, 2007).

There is evidence of government guarantees in the Indian banking system (Acharya & Kulkarni, 2019). Government guarantees have been thought to be the reason behind the relatively better performance of vulnerable public sector banks during the global financial crisis of 2008. But these guarantees have led to more politically directed lending which has resulted in greater non-performing and restructured loans. This shows that bank lending decisions can become distorted in the absence of market disciplinary forces during economic crisis periods. (Acharya & Kulkarni, 2019). Thus, an investigation into the working of market discipline in the Indian banking system is warranted. Also, government support has been associated with softening of budget constraints and the emergence of zombie lending and zombie firms. Such firms generally carry an extra policy burden like being an important job provider which may explain the patronizing attitude of the government towards them (Zhang et al., 2020).

In the following sections, we discuss the concepts of soft budget constraints before building the case for analyzing bad loan problems from SBC and market discipline angle.

1.4 Related literature

A soft budget constraint refers to a situation where a financial institution, such as a bank, can incur losses without facing the full consequences of its actions. This can occur when the institution is protected from the normal market discipline process by external factors, such as government intervention or implicit guarantees. Government interventions can foster soft budget constraints in the banking system in several ways. One way is through the use of explicit guarantees, such as deposit insurance or bailouts, which protect depositors and other creditors from losses in the event of a bank failure. These guarantees can create moral hazard, as they may reduce the incentives for banks to manage their risks properly and can lead to excessive risk-taking. Government interventions can also foster soft budget constraints through the use of regulatory forbearance, which refers to the practice of allowing struggling banks to continue operating despite not meeting regulatory requirements or capital adequacy standards. This can create a false sense of security and can lead to a build-up of risks in the banking system. In addition, government interventions can foster soft budget constraints through the use of implicit guarantees, such as the expectation that the government will bail out struggling banks to prevent systemic risks. This can lead to a lack of market discipline, as investors and depositors may not have the proper incentives to assess the true financial health of banks and allocate their funds accordingly. Overall, government interventions can foster soft budget constraints in the banking system by reducing the consequences of risky behaviour and undermining the market discipline process. This can lead to a build-up of risks in the financial system and can ultimately increase the likelihood of financial instability.

The recent evidence in the literature shows that supportive interventions by government and regulatory authorities become conducive to softening budget constraints which gives rise to ‘zombie firms’ who survive purely based on these interventions and negatively affect the overall industrial efficiency and productivity fostering further softening of budget constraints (Chang et al., 2020; Imai, 2016; Woo, 2019). In the Indian context, the forbearance lending measures have incentivized banks to hide their asset quality. Forbearance acts as an indirect measure of recapitalization and makes banks extend credit to low-solvency borrowers (Chari et al., 2021)

Underdevelopment of financial markets along with government interventions also give rise to and exacerbate the softening of budget constraints which makes economic downturns steeper and long-lasting (Toyofuku, 2013). For banks, the interventions in the form of loan restructuring may badly affect their efficiency as well (Mamatzakis et al., 2016). When the financial system is dominated by state-owned banks, it becomes conducive to the emergence of soft budget constraints syndrome (Megginson et al., 2014). In the government-controlled financial sector, the bailout expectations by banks and their borrowers tend to soften budget constraints (Du & Li, 2007) and weaken the market disciplinary forces during and after crisis periods. State ownership of banks is in general associated with higher risk-taking (Zhu & Yang, 2016) as they always have the implicit state support to fall back upon in case things go awry for them. In the Indian context, Gopalakrishnan et al., (2018) have shown that PSBs take more risks in lending than private counterparts. Therefore, the government ownership of the banking sector has connections with bad loan build-up.

The SBC syndrome is generally reflected in the piling up of bad loans which further encourages riskier lending by banks and thus leads to moral hazard type of lending and an increase in overall financial system instability (Zhang et al., 2016). Moreover, state-owned banks may be politically influenced to grant financing to firms with low creditworthiness (La Porta et al., 2002; Shleifer & Vishny, 1994); Kornai, 1979; Boubakri et al., 2017). In such a situation, banks do not stick to prudential lending and may not ration credit according to the riskiness of the borrowers. Since in India state-owned banks mostly undertake financing of long-term projects, it is pertinent to investigate whether banks have rationed credit according to borrowers' riskiness.

Another factor closely associated with financial system stability is market discipline which in simple words is defined as a process of checking the excessive risk-taking of banks and financial institutions by market participants. Market discipline is the process by which market participants, such as investors and depositors, exert pressure on financial institutions to operate in a safe and sound manner. This process is an important component of a well-functioning financial system, as it helps to ensure that financial institutions are held accountable for their actions and that incentives are aligned to minimize risk-taking.

However, the market discipline process can be impaired in the Indian banking system due to several factors. One issue is the high level of state ownership in the banking sector, which can lead to political interference and a lack of accountability. In addition, the Indian banking system

is characterized by a high degree of concentration, with a few large banks dominating the market. This can limit competition and reduce the incentives for these banks to adhere to sound risk management practices. Another problem is the lack of transparency in the Indian banking sector, which makes it difficult for market participants to assess the true financial health of banks. This can lead to a lack of market discipline, as investors and depositors may not have sufficient information to make informed decisions about where to place their funds. Finally, the regulatory and supervisory framework in India has been criticized for being weak and ineffective at enforcing compliance with sound risk management practices. This can further undermine market discipline and contribute to the emergence of systemic risks in the banking sector. Overall, the market discipline process in the Indian banking system is hindered by several structural and regulatory issues. These problems need to be addressed in order to enhance the resilience of the financial system and protect against the potential negative consequences of impaired market discipline. Bad loans are the consequence of imprudential lending behaviour. To control the banking system from taking excessive risks, the regulators need to focus on the ways and means to improve the effectiveness of market discipline. Realizing the importance of market discipline, Basle III in its third pillar mandates the disclosure of risk-related information of banks to their stakeholders so that they can keep a check on banks' risk-taking behaviour (Ayadi, 2013; BCBS, 2011). Since the 1990s most of the studies on market discipline have been carried out in developed countries and they mostly evidenced the existence of market discipline to some degree in their banking systems (Flannery, 1998; Flannery & Bliss, 2019b). After the 2008 global financial crisis and consequent bank bailouts across the developed economies of the EU and the US, market discipline received a renewed focus from researchers (Arnold et al., 2016; Ben-David et al., 2017; Berger & Turk-Ariss, 2015; Flannery & Bliss, 2019a; Hasan et al., 2015; Tovar-García, 2016). Banks failed during the financial crisis despite some evidence of the presence of market discipline. This brought to the fore the "too big to fail" syndrome which if not effectively addressed may lead to "too big to save" syndrome (Demirgüç-Kunt & Huizinga, 2013). Market discipline is still being tested and in the case of developing countries, the empirical literature is scarce. The literature in the context of developing countries presents little or no evidence in support of effective market discipline (Hamid & Yunus, 2017; Tovar-García, 2016; Wu & Bowe, 2010) which has been often cited as the reason for unbridled risk-taking by banks leading to accumulation of non-performing loans on their balance sheets. Market discipline has been especially found to be weaker for government-owned banks and systematically important institutions than private investment banks (Borisova & Megginson, 2011; Hett & Schmidt,

2017). Government-owned banks are not disciplined by market forces because they enjoy implicit government insurance against bankruptcy. Bankruptcy resolution approaches and policies have a strong bearing on market discipline besides institutional and legal factors. A strong regulatory discipline may also hamper market discipline because depositors and other stakeholders of the bank rely on regulatory authorities to keep the banks under check. (Distinguin et al., 2013).

In the Indian context, there is little or no literature available on NPAs from SBC and market discipline perspective. The existence of soft budget constraint-driven lending and weak market discipline is a recipe for a banking disaster. Such a scenario may be manifested in the form of biased lending to bigger and government-owned companies by banks (Lu et al., 2005), lack of effective credit rationing (Lu et al., 2001), and ineffectiveness of market discipline on bank risk-taking (Hamid & Yunus, 2017; Wu & Bowe, 2010) which leads to the emergence of bad loans in the banking system.

1.5 Research gaps

There are no studies in the Indian context which investigate bank lending behaviour in terms of market distortions (e.g., biased lending, weak market discipline, SBC-driven lending) created by predominant government ownership and control of the banking system which reflects in the form of piling up of bad loans.

1.6 Research questions

Keeping the foregoing background in mind we wish to investigate:

- a) Whether bank lending in India is soft budget constraint driven?
- b) Whether banks in India prefer lending to larger firms and take firm size as a signal of creditworthiness instead of engaging in risk-based lending?
- c) Whether banks operate with a lending bias towards government and group firms as against individual private firms? Such a bias would be an indicator of SBC-driven lending behaviour.
- d) Whether banks ration credit according to the riskiness of the borrowers?
- e) Whether market disciplinary forces are effective in inducing the banks in India to adopt prudential risk management by enhancing the risk-weighted capital ratio?

Thus, we outline the following objectives for the study:

1.7 Objectives

1. To examine the linkage between corporate leverage and bank NPAs
2. To examine whether bank lending in India is skewed towards larger firms
3. To examine whether bank lending is SBC-driven
4. To examine whether bank lending is biased towards government-owned and group-affiliated firms as against individual private firms
5. To examine whether banks ration credit according to riskiness of borrowers
6. To examine the strength and effectiveness of market disciplinary forces on banks' risk-taking behaviour

The chapter scheme for addressing these research questions and objectives is as follows. Chapter 2 focusses on examining the linkage of bad loans in the banks and corporate leverage, and assessing the lending behaviour of banks indirectly from the debt financing of the corporate sector in India to know how lending(borrowing) is related to the size of the borrower. The usage of bank borrowings by firms in India is a crude indicator of where bank loans go because bank borrowings constitute a substantial part of firms' total debt. The findings suggest that firms in India develop their capital structure according to the pecking order theory when leverage is measured as a sum of bank and capital market borrowings. However, when the leverage is measured by bank borrowings to total assets ratio only, we find that firm size has a positive relation with leverage indicating that bank lending in India is skewed towards larger borrowers. This has been reflected in the post-crisis non-performing loan build-up in the Indian banking system where a significant amount of bad loans has come from big-ticket loans from large borrowers.

Chapter 3 investigates the lending behaviour of Indian banks and how far is their lending behaviour driven by soft budget constraints. We also examine whether the banks operate with a lending bias towards government and group firms and whether banks ration credit according to the riskiness of the borrowers. Biased lending and lack of credit rationing are manifestations of SBC which can explain the build-up of bad loans in the banking system. We find bank lending is SBC-driven and banks prefer lending to government and group-affiliated firms. Our findings also suggest that banks do not follow strict credit rationing in India.

Chapter 4 focuses on market discipline and investigates how effectively the market disciplinary forces, proxied by information disclosure and interbank deposits, incentivize the Indian banks to adopt prudential risk management by enhancing their risk-weighted capital ratio. We test whether the increased use of interbank deposits and more information disclosure check the risk-taking behaviour of banks in India. We find evidence that non-performing assets lead to erosion of bank capital and information disclosure and interbank deposits do not induce prudential risk behaviour among banks in India. However, when the interaction of banking sector concentration and market discipline measures (information disclosure and interbank deposits) is used in the model, we find that with increasing concentration in the banking sector, a higher level of information disclosure effectively induces banks to maintain higher capital ratios but interbank deposits do not have any significant effect on bank capital. We also observe that government banks maintain lower capital ratios as compared to private banks. We argue that the main reason behind the lower capital of government banks is the expectation of a bailout by the government in the event of financial problems.

Chapter 5 presents the general conclusions, recommendations, limitations, and future scope of the study.

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CHAPTER 2: BORROWER SIZE AND DEBT FINANCING IN INDIA

Abstract

The chapter has two objectives. First, it examines the relationship between corporate leverage and the non-performing assets of banks. Second, it focuses on inferring the lending behaviour of banks from the debt financing of the corporate sector in India and how lending (borrowing) is related to the size of the borrower. The usage of bank borrowings by firms in India is a crude indicator of where bank loans go because bank borrowings constitute a substantial part of firms' total debt. We use data from 2002 to 2018 for a large sample of 3164 firms spreading across manufacturing, infrastructure, mining, construction & real estate, electricity & related, and non-financial services to examine the relationship between bank lending and firm size. Our finds show that lagged leverage is strongly associated with bad loans from banks. A 10-percentage point change in leverage leads to a 1.7 percentage point rise in bad loans after a lag of one period. The findings also suggest that overall, the firms in India develop their capital structure according to the pecking order theory when leverage is measured as a sum of bank and capital market borrowings. However, when the leverage is measured by bank borrowings to total assets ratio, we find that firm size has a positive relation with leverage indicating that bank lending in India is skewed towards larger borrowers. This has been reflected in the post-crisis non-performing loan build-up in the Indian banking system where a significant amount of bad loans has come from big-ticket loans from large borrowers. In terms of policy implications, the analysis suggests that the leverage ratios of large borrowers if monitored properly, can provide a diagnosis about the asset quality in the overall financial system.

2.1 Introduction

The banking system loan quality is directly influenced by the profitability and financial health of the borrowers, especially the non-financial sector borrowers. For example, during the 1992-1997 crisis in South Korea, the build-up of high leverage (debt ratios over 300per cent) in large corporate conglomerates (Chaebols) led to liquidity problems and the cross-subsidization of poorly performing subsidiaries. The excessive use of debt accelerated the bankruptcies and increased the non-performing loans to 13.6per cent in 1999 (Chopra et al., 2001). This episode has shown how corporate sector balance-sheets and financial stability are inter-connected and this linkage needs to be studied further. With capital market liberalization already in place, it

is an interesting question to explore how corporate financing behaviour is related to non-performing loans in the banking system from an emerging market perspective.

Furthermore, the increasing corporatization of the globalized world is largely driven by the growing size of corporations that spread their operations across different continents and countries. The growth in the size of such corporations drives global economic growth and output. Approximately two-thirds of global economic output is attributable to the growth in the size of existing firms (Kumar, Rajan, & Zingales, 2001). The nature of the relationship of a firm with its environment is significantly affected by its size. Larger firms exert a lot of influence on their immediate stakeholders (e.g., banks) than small firms. The growth in the size of a corporation causes an anatomical change in its internal organization and financing. The relationship between firm size and corporate finance has received a lot of attention in corporate finance literature. A notable study in this direction is Graham and Harvey (2002). Surveying a sample of 392 chief financial officers (CFOs), their study found that the practice of corporate finance is significantly affected by firm size. The size provides a firm with reputation benefit which, in turn, influences the firm's financing choices (Berger & Udell, 1995). The implication from their view is that firm size affects the use of bank debt and factors affecting leverage are likely to differ across different sized groups of firms. Among the determinants of financial leverage, firm size is perhaps the most theorized variable. The relationship between financial leverage and firm size runs through almost all theories of capital structure (Schoubben & van Hulle, 2004). Yet, the size leverage relationship is still being tested by researchers across the world to ascertain whether the direction of the relationship significantly differs across small and large firms. Our study is an attempt to contribute to the existing debate from an emerging market perspective with a large panel data set. We argue that capital structure is greatly influenced by the firm's external environment. A bank-based economy having government ownership of banks will constrain firms to rely more on banks for debt financing. This debt financing has implications for the banking system. The financing behaviour of firms and the lending behaviour of banks have a direct bearing on the loan portfolios of banks and overall financial stability in an economy. In the wake of the post-financial crisis non-performing assets build-up in the Indian banking system, especially in public sector banks, it becomes necessary to ascertain the extent and pattern of debt financing of firms as they grow in size. This can provide a clue to the regulators as to how to devise policies for making bank portfolios less concentrated and thereby minimizing the overall banking system risk. Thus, this chapter aims to explore how corporate financing behaviour is related to bad loan accumulation and what role borrower size plays in corporate financing behaviour.

2.2 Review of literature

Two approaches in the literature explain repayment of corporate debt obligations-The financial accelerator approach and the Collateral Approach. The financial accelerator approach focuses on how macro-economic shocks affect the real sector through corporate balance-sheets (Bernanke and Gertler, 1995). Under the collateral approach when borrowing/lending is collateralized and the market price of collateral falls, the ability of firms to rely on assets as collateral for new loans and financial institutions' ability to extend new credit become impaired, which in turn adversely affects investment (Caballero and Krishnamurthy, 2000). There is some evidence in the literature that points towards the linkage between corporate developments, corporate leverage, and the likelihood of financial crises (Rajan and Zingales, 1995).

As far as the theory behind the firm size and financing behaviour is concerned, two main theories in the literature explain the leverage choices of a firm. The first one is the trade-off theory propounded by Modigliani and Miller in 1958. This theory suggests a positive linear relationship between size and leverage. The second theory is the pecking order theory of Myers and Majluf (1984) which suggests a negative linear relationship between leverage and firm size. To test the theoretical predictions in this study, we employ the most commonly used determinants of leverage in the literature. The positive relation between size and leverage was first empirically confirmed by Schwartz and van Tassel (1950). They argued that small firms find it difficult to access capital markets due to high registering costs, and therefore, they rely on internal capital contributed by owners. The rationale behind the positive correlation between size and leverage is found in Warner (1977) and Ang, Chua, and McConnell (1982). These studies argue that as the firm value increases (growth in size), the relevance of insolvency and bankruptcy costs decreases, implying that these costs have very little impact on the borrowing decisions of large firms. Other notable studies which have reported a positive relationship between size and leverage include Antoniou, Guney, and Poudyal (2008), Bhaduri (2002), Brierly and Bunn (2005), Chauhan (2017), Dinlersoz, Kalemli-Ozcan, Hyatt, and Penciakova (2018), Ferri and Jones (1979), Frank and Goyal (2003), Frank and Goyal (2009), Gaud, Jani, Hoesli, and Bender(2005), Jaggi and Gul (1999), López-Iturriaga and Rodríguez-Sanz (2008), and Ahmad and Etudaiye- Muhtar (2017). The positive firm size–leverage relation has mostly been found in emerging market studies (Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001; Mitton, 2007). The main reasons put forth in support of the positive size–leverage relationship are (a) higher collateral values and lower risk of bankruptcy (Chauhan, 2017; King, 1977); (b) higher level of information disclosure by large firms as compared to smaller firms

(Fama & Jensen, 1983; Rajan & Zingales, 1995); (c) diversification of large-sized firms which enhances their ability to fulfill interest obligations (Cardone-Riportella & Cazorla-Papis, 2001; Pandey, 2004); (d) higher investment opportunities of larger firms (Dittmar, 2004; Gonenc, 2005); (e) better access to capital markets enjoyed by larger firms (Chauhan, 2017; Ferri & Jones, 1979); (f) favourable interest rates offered to large firms (Ferri & Jones, 1979); and (g) ability of larger firms to fully use tax shields (Smith & Stulz, 1985). These studies are based on the premise that as the firm grows its borrowing capacity and borrowing needs increase, which makes the firm go for higher debt financing. Small firms, on the other hand, operate on a smaller scale and thus their fund requirement is limited. Moreover, their low debt repayment capacity forces them to eschew the risk of bankruptcy and loss of ownership associated with debt financing. On the supply side, banks too hesitate to commit funds to smaller firms due to their limited ability to repay and secure the debt with collateral.

Notable exceptions to the positive relation between size and leverage can be found in Titman and Wessels (1988), Baskin (1989), Berger and Udell (1994), Erickson and Trevino (1994), Rajan and Zingales (1995), Cosh and Hughes (1994), Cooley and Quadrini (2001), Bevan and Danbolt (2002), Fama and French (2002), Drobetz and Fix (2003), Lemmon and Zender (2004), Faulkender and Petersen (2006), Delcours (2007) and Handoo and Sharma (2014), among other studies. The findings of these studies are in line with the pecking order hypothesis. According to Grinblatt and Titman (1998), in small firms, there is a relatively more severe conflict between shareholders and creditors because managers of small firms tend to be large shareholders and are better able to switch between alternative investment projects. Furthermore, the level of information asymmetry between insiders and outside investors is higher in small firms (Harris & Raviv, 1991).

The main reasons put forward by these studies for explaining the negative relationship between size and leverage are the lesser cost of equity for large firms in comparison to debt, less information asymmetry for large firms, reputation advantage of large firms, better access of large firms to equity financing, lower dividend payout by small firms and consequent less incentive for equity investors.

Some studies have reported no significant relationship between size and leverage. For instance, while analyzing the leverage effect on a firm's value using a sample of 422 firms from the Indian manufacturing sector, Chadha and Sharma (2016) did not find any significant relationship between a firm's value and leverage, which by implication suggests that their study does not support any significant relationship between size and leverage. However, due to the small sample size and manufacturing sector-specific nature of their study, the indirect inference

from their study needs further verification. Keeping in mind the foregoing discussion it is pertinent to ask how corporate balance sheets affect the bank risk in the Indian context and how corporate leverage is related to the borrower size. This investigation will help in understanding the relationship between the lending behaviour of banks and the borrowing behaviour of companies.

2.3 Objectives of the chapter

The objectives of this chapter are twofold. First, the relationship between the banking system loan quality and the financial condition of the corporate sector is examined, by regressing the loan quality of banks on corporate leverage and a set of control variables. Second, we examine the relationship between bank borrowings and firm size in India. To that end, we investigate the size–leverage relationship in the context of India. The idea is to analyze the borrower side of the loan contracts and make an indirect inference as to whether bank lending is biased toward large-size borrowers.

2.4 Methodology

2.4.1 Data

The data were taken from CMIE prowess and company financial reports for a sample of 3164 firms operating in the Indian economy spanning different non-financial sectors. The study period chosen was 2002–2018. We constructed a panel data set and employed panel data generalized least squares (GLS) random-effects regression for analyzing the relation between firm size and leverage. Our data set is by far the largest in the Indian context for analyzing the size–leverage relationship. The financial-sector firms were excluded from the sample because such firms’ use of leverage considerably differs from non- financial firms. Table 2.1 presents the sample of firms, and the variable definitions are provided in Table 2.2.

Table 2.1: Firm Sample

Industry	No. of Firms	Proportion
Manufacturing	1421	44.91
Infrastructure	109	3.44
Mining	180	5.68
Construction and Real estate	667	21.00
Electricity and related	277	8.80
Non-financial services	510	16.11
	3164	100

Source: Extracted from CMIE Prowess

Table 2.2: Variable Definitions

Variable	Definition
NPL	<i>NPL</i> is the ratio of non-performing loans to total loans
CRAR	<i>CRAR</i> is the ratio of capital to risk-weighted assets
ROA	Return on assets
OETA	Operating expenses to total assets
I	Inflation rate as measured by the wholesale price index
K_r	The real cost of capital is calculated as weighted average of banks' lending rate less call money rate deflated by WPI
GDP_{rg}	Real GDP growth rate
$M3_{rg}$	The real growth rate of broad money
$CREDIT_{rg}$	the real growth rate of domestic credit
REXR	Index of real effective exchange rate
DE	Corporate leverage as measured by the debt-to-equity ratio
RONW	The return on net worth is defined as the ratio of net profit to net worth
TLR	Total leverage ratio (Total debt/Total assets)
LTLR	Long-term leverage ratio (Long term debt/Total assets)
STLR	Short Term leverage (Short term debt/Total assets)
TBB	Total bank borrowings to total assets
LTB	Long-term bank borrowings to total assets
STB	Short-term bank borrowings to total assets
Size	Firm size. Measured as Log of Total Assets
LIQ	Liquidity. Measured as Cash and short-term investments/ Total assets
Evar	Earnings Variability. It is measured as $(EBIT_t - EBIT_{t-1}) / EBIT_{t-1}$
Prof	Profitability. Measured as EBIT/Total assets
Asset_Tan	Asset Tangibility. Measured as Tangible fixed assets/Total assets
Firm_Age	No. of years since its inception.

Source: Authors

2.4.2 Empirical strategy

To achieve our objectives, we lay down two empirical specifications: Model I and Model II. Model I is an aggregate-level analysis that tests the relationship between corporate leverage and banking sector non-performing loans while as Model II is more granular and helps understand the relationship between borrower size and leverage and thereby provides clues about the lending behaviour of banks.

Model I

We specify an aggregate-level model for how corporate balance sheet leverage is affecting the loan quality of the aggregate banking system. To handle the possibility of endogeneity, we use the following simultaneous equations model. The variable definitions are given in Table 2.2

$$NPL = a_0 + a_1DE + a_2K_r + a_3 CRAR + a_4GDP_{rg} + a_5I + a_6REXR + a_7 M3_{rg} \quad 2.1$$

$$CRAR = b_0 + b_1DE + b_2NPL + b_3ROA + b_4OETA + b_5CREDIT_{rg} \quad 2.2$$

$$DE = c_0 + c_1RONW + c_2K_r + c_3NPL + c_4GDP_{rg} + c_5I + c_6 CREDIT_{rg} \quad 2.3$$

$$K_r = d_0 + d_1DE + d_2GDP_{rg} + d_3M3_{rg} \quad 2.4$$

NPL is likely to have a positive relation with corporate leverage in equation 2.1 because an increase in corporate leverage (DE) tends to increase the probability of default, and thus NPLs³.

In Equation 2.2, with an increase in leverage (DE), CRAR is likely to decrease because an increase in DE will increase the likelihood of default and force the banks to increase provisions thereby decreasing the capital buffer.

DE should be negatively related to NPL in equation 2.3 since a larger volume of bad loans curtails banks' lending capacity.

Finally, K_r is likely to have a positive relation with DE, because an increase in firm leverage makes further lending riskier and thus increases the risk premium in the lending rate

Empirical Results of Model I

The results of the simultaneous equations model are presented in Table 2.3. We estimated the model using a panel dataset of 3164 firms across 6 industry groups⁴ (see Table 2.1). To control endogeneity arising out of simultaneity, we use a 2-step instrumental variables regression. In the first step, the predicted values for the dependent variable are obtained by regressing it on all exogenous variables plus the reserve rate⁵. Subsequently predicted values of relevant dependent variables are used instead of original values to complete the estimation. Following a general to specific estimation strategy appropriate best-fitting lag structure of predictor variables was found.

³ NPLs of public sector banks have been used as public sector banks dominate the banking system.

⁴ The corporate specific variables (Leverage, *DE* and return on net worth, *RONW*) are calculated at aggregate level for each of 6 industry groups each year.

⁵ **SLR** is used as a proxy for reserve rate

Table 2.3 IV regression estimation results for Model I

Variable	NPL	CRAR	DE	K _r
Constant	41.38 (3.12) ***	13.98 (0.41) ***	0.62 (0.31) **	0.11 (0.02) ***
RONW			-0.11(0.007)***	
Ist lag of DE	0.17 (0.008) ***	-0.09 (0.03)***		0.02 (0.009) *
K _r	0.56 (0.16) ***		-28.89 (37.31)	
Ist lag of K _r	0.47 (0.13) ***			
NPL		-0.15 (0.04) ***		
Ist lag of NPL			-0.11 (0.02) ***	
CRAR	-2.29 (0.22) ***			
ROA		0.51 (0.20) ***		
OETA		0.79 (0.37) **		
GDP _{rg}	-0.17 (0.08) **		-0.43 (0.25) *	
Ist lag of GDP _{rg}	-0.12 (0.09)			-0.03 (0.01) *
I	-0.23 (0.05) ***		0.15 (0.17)	
REXR	0.21 (0.08) **			
M3 _{rg}	0.37 (0.11) ***			0.05 (0.007) ***
CREDIT _{rg}		-0.05 (0.03) *	0.25 (0.13) **	
Adjusted R-square	0.913	0.921	0.781	0.711
No. of Obs	102	102	102	102

Standard errors in parentheses

*, **, *** represent significance levels of 10%, 5% and 1% respectively

The results show that a 10-percentage point rise in corporate leverage leads to a 1.7 percent rise in NPLs after a lag of one year. The probable reason for this is that increased leverage makes default more likely which is reflected in the form of deterioration in the loan quality. Thus, corporate leverage levels can provide good indications about the impending bad loan crisis. The rise of borrowing costs, due to the increase in the real cost of capital, K_r, may be the reason for the positive relationship between the real cost of capital and NPLs. The significant negative coefficient of CRAR shows that banks with better capital buffer face less credit risks. Greater CRAR implies that the bank shows prudential behaviour and hence takes a lesser risk which is ultimately reflected in the form of lower NPLs.

NPLs are negatively related to the GDP growth rate indicating that as the economy grows at a faster rate due to better real sector performance, defaults decrease. However, the lagged GDP growth rate has no significant effect on the defaults. An increase in the real effective exchange rate is positively related to NPLs. This could be due to the diminished export competitiveness of the corporate sector. An increase in inflation makes the repayment of loans cheaper by lowering the real value and hence leads to lower defaults. Finally, expansion in the money

supply may result in increased lending and increased bad loans. Profitability, ROA, is positively related to the capital position, CRAR implying that profits increase the capital cushion of banks. The significant negative relation between bad loans (NPLs) and capital position is mutually reinforcing. Faster credit growth weakens the capital position of banks. Corporate leverage has a significant effect on bank capital. Also, leverage is negatively related to the NPLs which may be due to the decline in credit when banks face increasing bad loans. Firms' financing costs, K_r go up with the increase in leverage.

Model II

We use the most frequently employed determinant variables of leverage in literature to test the following three specifications for examining the relationship between firm size and leverage:

Total leverage model:

$$TLR = \beta_0 + \beta_1 Size_{i,t} + \beta_2 LIQ_{i,t} + \beta_3 Evar_{i,t} + \beta_4 Prof_{i,t} + \beta_5 Asset_Tan_{i,t} + \beta_6 Firm_Age_{i,t} + \pi_i + \varepsilon_{i,t} \quad (2.5)$$

Long-term leverage model:

$$LTLR = \beta_0 + \beta_1 Size_{i,t} + \beta_2 LIQ_{i,t} + \beta_3 Evar_{i,t} + \beta_4 Prof_{i,t} + \beta_5 Asset_Tan_{i,t} + \beta_6 Firm_Age_{i,t} + \pi_i + \varepsilon_{i,t} \quad (2.6)$$

Short-term leverage model:

$$STLR = \beta_0 + \beta_1 Size_{i,t} + \beta_2 LIQ_{i,t} + \beta_3 Evar_{i,t} + \beta_4 Prof_{i,t} + \beta_5 Asset_Tan_{i,t} + \beta_6 Firm_Age_{i,t} + \pi_i + \varepsilon_{i,t} \quad (2.7)$$

where π_i represents the time-invariant random effect which varies across firms and $\varepsilon_{i,t}$ is the residual. Liquidity (LIQ), earnings variability (Evar), profitability (Prof), asset tangibility (Asset_Tan), and age of the firm (Firm_Age) are used as control variables.

Table 2.4: Descriptive statistics

Variable	Mean	Std. Dev	Min	Max
TLR	0.885211	1.302919	0	8.542861
LTLR	0.741187	1.144991	-0.000140	8.162231
STLR	0.782842	1.264851	2.93e-07	8.672852
Asset_Tan	0.412614	0.465169	0	8.586346
LIQ	0.984449	1.605608	-0.0004785	8.871506
Evar	0.912712	0.628350	-3.71	16.93
Prof	0.087906	0.220554	-4.804088	6.411026
Size	5.99355	3.048856	2.302585	15.63742
Firm_Age	39.5453	18.272521	14	156

Source: Author's Calculations

In the relevant literature, there is evidence that firm size may influence leverage, therefore we use two-stage least squares instruments variable regression by treating *Size* as the endogenous variable and using its lagged and the lagged values of profitability (*Prof*), asset tangibility (*Asset_Tan*) and firm age (*Firm_Age*) as the instruments. We did not find any issues of endogeneity(see Table 7 in Appendix A1). Liquidity of a firm acts as a strong signal of the repaying ability to banks. A firm having a strong liquidity position can raise more debt. Therefore, liquidity is expected to be positively related to leverage. Earnings variability measures the riskiness of the firm. The more variable the earnings, the less the ability to meet the fixed obligations, and hence lesser would be the leverage used. Thus, we expect Evar to be negatively related to leverage. A greater level of profitability is expected to increase the internal capital in the form of retained earnings and reduce the dependence on external funds. However, greater profits can also increase the debt-servicing capacity and increase the leverage, provided the firm has profitable business opportunities and needs more funds to capitalize on them. Again, older firms, by virtue of having survived for a long time, will be trusted more, and thus they will be able to raise more debt as compared to new firms. On the demand side, however, older firms may not be as aggressive and risk-taking as new firms and therefore might not opt to use more debt. They may fall back on the accumulated retained earnings for financing new operations. Fixed assets of a firm are viewed as collateral by banks. Therefore, firms with high tangible fixed assets would be able to raise more debt.

2.5 Results and discussion

Table 2.4 provides the descriptive statistics of three measures of leverage and the exogenous variables. The STLR (78.28per cent) is more than LTLR (74.11per cent). This indicates that firms in India prefer short-term financing. The smaller standard deviation of LTLR shows that long-term leverage does not vary much for Indian firms as compared to short-term leverage.

Table 2.5 shows the correlation analysis results for the variables used in the three leverage models. Total leverage is positively correlated with both short-term leverage ($r = 0.42$) and long-term leverage ($r = 0.44$). Among the predictors, no high pairwise intercorrelation is observed. Lastly, Table 2.6 reports the GLS random-effects regression results for the three leverage models. The results are in line with the pecking order hypothesis. All the leverage measures are negatively and significantly related to firm size. This shows that as the firm grows in size, the likelihood of employing debt leverage decreases. Our results align with Gupta, (1969), Titman and Wessels (1988), Cooley and Quadrini (2001), Handoo and Sharma (2014), among others. The results, however, contradict the predictions of the trade-off theory which

has been empirically supported by Ferri and Jones (1979), Rajan and Zingales (1995), and Frank and Goyal (2009), among others. The overall lesser use of debt by large firms can be attributed to the ability of larger firms to use accumulated internal capital relatively easily as compared to small firms. Among the controlling variables, asset tangibility (Asset_Tan) and firm age (Firm_Age) have a significant positive relationship with all the measures of leverage, while profitability (Prof), liquidity (LIQ), and earnings variability (Evar) have a significant negative relationship with the three measures of leverage. Asset tangibility indirectly signals the collateral value of firms. Therefore, higher collateral values will enhance the firm's borrowing ability and the willingness of lenders to lend.

Table 2.5: Correlation among variables

Variables	TLR	LTLR	STLR	Asset_Tan	LIQ	Evar	Prof	Size	Firm_Age
TLR	1								
LTLR	0.4435	1							
STLR	0.4234	0.1527	1						
Asset_Tan	0.2253	0.2544	0.1356	1					
LIQ	-0.2849	-0.0521	-0.1584	-0.0113	1				
Evar	-0.0083	-0.0280	-0.0210	-0.0729	0.0088	1			
Prof	-0.0641	-0.0806	-0.0838	-0.0273	-0.1469	-0.0163	1		
Size	-0.2677	-0.1038	-0.1619	-0.1570	-0.1347	0.0490	0.1148	1	
Firm_Age	0.0191	0.0117	0.0156	0.0216	0.0578	-0.0494	0.0434	0.2047	1

Source: Author's calculations

Table 2.6: Results of leverage models

Independent Variables	(1) Total leverage	(2) Long term Leverage	(3) Short term leverage
Asset_Tan	0.046121*** (0.005021)	0.053501*** (0.00452)	0.014541*** (0.00298)
LIQ	-0.073719*** (0.002571)	-0.051943*** (0.002294)	-0.082320*** (0.002881)
Evar	-0.036271*** (0.003121)	-0.058615*** (0.002872)	-0.113122*** (0.003837)
Prof	-0.072548*** (0.006162)	-0.091175*** (0.005713)	-0.037293*** (0.007773)
Size	-0.006336*** (0.000191)	-0.008371*** (0.000161)	-0.004512*** (0.000203)
Firm_Age	0.007031*** (0.000465)	0.004635*** (0.000352)	0.005092*** (0.000349)
Constant	0.025561*** (0.002313)	0.031131*** (0.001964)	0.032322*** (0.001351)
Observations	53788	53788	53788

Source: Author's Calculations
Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The older firms are more likely to have accumulated the profits to use them in financing their business operations. Firms with high liquidity do not feel compelled to look for external finance to meet day-to-day payment obligations. Therefore, liquidity is negatively related to raising external debt. Finally, earnings variability (Evar) makes a firm riskier and therefore decreases the capability to service fixed obligations arising from debt financing. Thus, earnings variability is negatively related to leverage.

Table 2.7: Leverage and firm size

Variables	(1)	(2)	(3)
	TLR	LTLR	STLR
Asset_Tan	0.043551*** (0.006012)	0.053113*** (0.005491)	0.011212*** (0.004684)
LIQ	-0.072353*** (0.001893)	-0.047137*** (0.001883)	-0.076258*** (0.004095)
Evar	-0.035153*** (0.003857)	-0.059167*** (0.003583)	0.107156*** (0.004373)
Prof	-0.070153*** (0.007982)	-0.093221*** (0.007414)	-0.035422*** (0.009557)
Large	0.019217*** (0.001211)	0.020516*** (0.001533)	0.021974*** (0.002435)
Medium	-0.092232*** (0.011954)	-0.093765*** (0.010863)	-0.119768*** (0.011723)
Firm_Age	0.001181** (0.000387)	0.002742*** (0.000332)	0.002033*** (0.000321)
_cons	0.028272*** (0.001831)	0.029327*** (0.001445)	0.077454*** (0.001652)
Observations	53788	53788	53788

Source: Author's Calculations

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To further analyze the size-leverage relationship, we introduced the dummy variables 'Large' and 'Medium' with a value equal to 1 for large/medium firms and 0 otherwise. The sample of 3164 firms was divided into small, medium, and large firms based on the time-averaged total assets (TAVTA). The sample firms were arranged in ascending order of TAVTA. Then the sample was divided into small, medium, and large categories so that the mean TAVTA of medium firms was 50 percent more than that of small firms and the mean TAVTA of large firms was 50 percent more than that of medium firms. Out of the 3164 firms, 613 were categorized as large firms, 1151 as medium, and 1400 as small. The results of leverage models with the dummy variable 'Large' and 'Medium' are presented in Table 2.7. The results show that there is a U-shaped relationship between leverage and firm size. Small and large firms use

more leverage than medium-sized firms. However, in absolute terms, more bank debt goes to large firms as is evident by recent RBI data. Less than 0.3 per cent of the borrowers have taken more than 40 per cent of the total loans made by banks and 0.7 per cent of borrowers have been granted more than 54 per cent of all outstanding corporate loans. Only 266 companies, with borrowings at over Rs 5,000 crore each, have aggregate borrowings of over Rs 40 lakh crore.

Table 2.8: Bank loan size and distribution

INR (Crore)	No of borrowers	Percentage	Amount	Percentage
5-250	91,995	95.53	21,66,801	22.11
250-500	1,883	1.95	6,57,9287	6.71
500-1000	1,118	1.16	7,77,586	7.94
1000-2000	641	0.67	8,81,337	8.99
2000-5000	400	0.41	12, 53, 644	12.79
More than 5000	266	0.28	40,61,710	41.46

Source: FSR(RBI), 2018

To see how bank lending is related to borrower size, we change the measure of leverage from *total debt (both bank and non-bank debt) to total assets ratio* to *bank borrowings to total assets ratio* for total, long term and short-term measures of leverage we find that the firm size has a significant positive relationship with bank borrowings. Large firms with established reputations and access to public debt markets tend to choose high concentrations of bank debt when they are difficult for outsiders to observe (Hooks, 2003). Our results are supported by (Yang, Lee, Gu, & Lee, 2010); (Kim, Heshmati, & Aoun, 2006); (Rajan & Zingales, 1995); (Khémiri & Noubbigh, 2018) and (Moradi & Paulet, 2019). The main reasons cited in the literature for the positive relation between size and bank borrowings are: large firms are more diversified and can easily access capital markets; they can borrow at cheaper rates and generally enjoy higher credit rating in raising debt capital and they also own less information asymmetry. (King, 1977; Fama & Jensen, 1983; Rajan & Zingales, 1995; Cardone-Riportella & Cazorla-Papis, 2001; Pandey, 2004; Dittmar, 2004; Gonenc, 2005; Chauhan, 2017; Ferri & Jones, 1979; Smith & Stulz, 1985).

Table 2.9: Results of leverage models with bank borrowings as a measure of leverage

Independent Variables	(1) (TBB)	(2) (LTB)	(3) (STB)
Asset_Tan	0.055332*** (0.004015)	0.048253*** (0.004413)	0.015135*** (0.002785)
LIQ	-0.081213*** (0.004134)	-0.060561*** (0.003592)	-0.113321*** (0.003073)
Evar	-0.043562*** (0.002984)	-0.063236*** (0.003096)	-0.102567*** (0.003051)
Prof	-0.052256*** (0.007123)	-0.085563*** (0.005132)	-0.048137*** (0.006113)
Firm_Size	0.085321*** (0.005034)	0.113343*** (0.004788)	0.088767*** (0.003553)
Firm_Age	0.005223*** (0.000567)	0.003723*** (0.000219)	0.004993*** (0.000405)
Constant	0.031239*** (0.003723)	0.034765*** (0.003143)	0.037654*** (0.001845)
Observations	53788	53788	53788

Source: Author's Calculations
Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

However, since in India banks have a major share in the capital market and large borrowers have a major share in bank borrowings, this suggests banks in India tend to lend more to larger firms especially when the borrowings are for longer periods. The easier lending to larger firms has been reflected in the recent non-performing loan build-up in the Indian banking system where a significant portion of non-performing loans has been from large-size borrowers. These findings are in line with the recent RBI data as shown in Table 2.8. The negative and significant coefficient of profitability in all the models suggests that with the increase in profitability, firms tend to borrow less from banks. This may be due to their ability to use internal finance.

2.6 Policy Implications

The analysis reveals that corporate leverage can serve as a strong indicator of banking system asset quality at an aggregate level and can provide policy makers a signal about the impending bad loan build-up. Furthermore, results are in line with the recent data on bank lending in India being skewed towards larger firms. This points to the fact that rather than carrying out due credit appraisal of the borrower, banks may be taking firm size as a signal of loan repaying

capacity. This biased lending may also be an indication of a moral hazard type of lending where banks refinance already existing loans of big borrowers. Moral hazard-type lending may be encouraged and exacerbated by the presence of soft budget constraints in the economy. For policy purposes, the bank lending mechanism needs to be made more borrower risk-based which needs a strict credit appraisal and monitoring of loans made by banks. A loan restructuring decision of banks should be carefully monitored by the supervisory authorities to unearth the reasons underlying such decisions. Bank regulators can also design a concentration criterion to prevent the concentration of debt in a particular size category of borrowers.

2.7 Chapter conclusion

The findings of this chapter help in understanding the financing behaviour (and hence the lending behaviour of banks) of Indian companies. At the aggregate level, the results show that corporate leverage can serve as a strong indicator of banking system asset quality. Using the largest panel data set in the Indian context, the study seems to support the pecking order hypothesis. However, looking at the sample carefully and considering the bank borrowings to total assets ratio as a leverage measure, we find that bank lending is more skewed towards larger firms. The concentration of bank debt in large firms creates moral hazard because the large firms have high bargaining power. To retain their business, banks often feel compelled to refinance their loans. Banks may also extend loans to such borrowers with the expectation that their financial situation gets better and they may be able to repay their obligations. Such a moral hazard type lending behaviour leads to the accumulation of risks in the banking system jeopardizing the financial system stability as a whole. In the face of an outside economic shock, these accumulated risks may result in the emergence of bad loans on bank balance sheets and cripple them to the extent that they may not be able to survive without government-sponsored bailouts and recapitalizations. These tentative findings, however, need further investigation which we intend to undertake in the next chapters

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CHAPTER 3. BANK LENDING BEHAVIOUR, SOFT BUDGET CONSTRAINTS, AND BAD LOAN CRISIS IN THE INDIAN BANKING SYSTEM

Abstract

In this chapter, we empirically examine the lending behaviour of Indian banks and how far is their lending behaviour driven by soft budget constraints in the economy. We also examine whether the banks operate with a lending bias towards government and group firms and whether banks ration credit according to riskiness of the borrowers. Biased lending and lack of credit rationing are manifestations of SBC which leads to build up of bad loans in the banking system. We use a panel dataset of 3164 firms covering manufacturing, infrastructure, mining, construction and real estate, electricity, and non-financial services. We infer the bank lending behaviour from the firms' debt leverage in our sample. We find the presence of soft budget syndrome in the economy and bank lending is biased in favour of government and group firms as against the individual private firms. This inherent bias seems to have exacerbated after the 2008 financial crisis. Moreover, banks do not ration credit according to borrower riskiness and are lending more to government and group firms as their risk increases.

3.1 Introduction

After the 2008 global financial crisis, the Indian economy witnessed a slowdown in the growth which triggered the onset of a bad loan crisis in the commercial banking system. From 2011 onwards stress started building on the bank balance sheets and banks started restructuring the stressed assets with the hope of tiding over the bad phase quickly. But the global demand slump and resultant economic slowdown prolonged the bad phase and Reserve Bank of India (RBI) had to intervene and force the banks to review their assets and make provisions for non-performing assets (NPAs) through a rigorous asset quality review (AQR). The loans which turned bad had been made during the pre-crisis boom period which lasted from 2002 to 2008. This economic boom was the result of economic reforms undertaken in the last decade of the 20th century. The major focus of those reforms was increasing autonomy of public sector banks by restructuring and recapitalization, fostering competition by allowing entry for private banks, improvement in regulatory frameworks, bank consolidation, prudential norms relating provisioning for bad loans, income recognition and assets classification interest rate deregulation, the introduction of Basel norms (Kumar, 2013). In the post-reform period, one major change in India's financial system was the demise of development financial institutions

(DFIs) and their role was taken up by ordinary commercial banks especially public sector banks (PSBs) which had hitherto restricted themselves to working capital finance. Large corporate investments in key industrial sectors like infrastructure, mining, power etc were now financed by PSBs under public-private partnership (PPP) model. Then came the 2008 Global Financial Crisis (GFC) which changed the growth trajectory of the economy towards a slowly creeping recession. The impact of the crisis was felt with a lag of two years and corporate and banking sector vulnerabilities started rising sharply since 2011 posing a threat to domestic financial stability.

By 2015 India had one of the most leveraged corporate sectors among emerging economies. Due to increasing corruption which negatively affects economic output (MoF Govt. of India, 2019; Suzuki, 2018), deteriorating global and domestic conditions; glut in the global steel market and the falling steel price (Chalabyan et al., 2018) and the bottlenecks in major infrastructure project approvals, the debt repayment capacity of certain sectors in India was highly strained. This increased the stressed assets of PSBs to gargantuan levels-reaching 15.8 per cent by December 2016. According to IMF, by December 2017 India with an NPA ratio of 9.98per cent ranked 7th among the worst global economies with problem loans after Greece (45.57per cent), Italy (16.35per cent), Portugal (13.30per cent), Ireland (11.46per cent) and Russia (10 per cent) while as Brazil (3.59per cent) South Africa (3.10per cent), Turkey (2.84per cent), Indonesia (2.56per cent) and China (1.74per cent) were comfortably placed ahead of India with regard to loan quality⁶.

Why has the Indian banking system got caught up in a bad loan problem again? Why public sector banks' asset quality has deteriorated more than those of private banks? To answer these questions a lot of research explaining the factors leading to the current NPA crisis has come up (see Table 3.1) but no study, to the best of our knowledge, has focused on the fundamental structural problem in Indian economy which gives rise to such recurring bad loan crises. There are enough reasons to believe that such crises rather than being merely the reflections of poor global economic conditions are related to the fundamental structure of the Indian economy. Firstly, India is still in transition towards becoming a full-fledged market-based economy. Government still retains a large share in several sectors in the economy e.g. banking, infrastructure development, shipping, defence, railways etc. Government ownership across lending and borrowing entities considerably weakens the market discipline (Wu &

⁶ <https://www.thehindubusinessline.com/opinion/indias-npas-and-the-global-scenario/article24145872.ece>

Bowe, 2010) and fosters softening of budget constraints (Lu et al., 2005a). Secondly, the excessive dependence on public sector banks for financing of the corporate sector is making it difficult for market discipline to work effectively because government ownership of banks causes them to be used for politically directed lending. The role of ownership in banking has been explained by three theories: agency, political and social. The agency view states that state-owned enterprises are set up to maximize social welfare, but they can give rise to corruption and misallocation of resources (Banerjee, 1997; Hart et al., 1997). The managerial incentives in SOEs are weakened due to agency costs within the government bureaucracy. The literature on the politics of government ownership (Shleifer & Vishny, 1994) argues that state ownership is a means of seeking individual objectives by politicians e.g. providing funds to the companies related to them or creating employment for fulfilling their election promises. The political view is that public ownership leads to inefficiency because politicians deliberately transfer resources to their supporters (Shleifer, 1998). Based on the economic theory of institutions, the social view (Atkinson & Stiglitz, 1980) argues that state-owned enterprises are established to correct market failures whenever their social benefits exceed their costs. According to social view, government-owned banks promote economic development and increase general welfare (Stiglitz, 1993)

Thirdly, the bankruptcy resolution system in India remains extremely unwieldy, complicated, and time-consuming despite the changes over the last three decades (Branch & Khizer, 2016). According to Bloomberg Business, only 25.7 per cent of loans are being recovered by the current bankruptcy resolution system in India compared to 80.4 per cent in the US in half the time. The current system lacks legal indemnifications to unsecured creditors without which it is difficult to motivate investors to invest in long-term projects. Finally, the government's ex-ante and ex-post interventions in the financial system prepare the ground for the weakening of credit culture and market discipline thus increasing the susceptibility of the banking system to bad loan crises. As an example, during the year 2008, farm loan waiver worth Rs 660 billion scheme⁷ was implemented by the government of India which was found to have significantly reallocated credit and increased defaults with no offsetting positive effect on consumption, productivity or wages (Giné & Kanz, 2018)

Previously, priority sector lending (PSL) has been blamed for banks' balance sheet stress and non-performing loans in India. However, the current data shows that PSL does not

⁷ http://articles.economictimes.indiatimes.com/2012-03-01/news/31113521_1_debt-waiver-loan-waiver-agricultural-loans

contribute much to the bad loans of banks. As of 2017, priority sector contributed only 24.1 per cent of the total NPAs of public sector banks and 18 per cent to the total NPAs of private sector banks while non-priority sector contributed 75.9 per cent and 82 per cent to the total NPAs of public and private sector banks. This shows that bad loans are more of a systemic issue than a sectoral one.

3.2 Reasons for the NPA Crisis in the Indian banking system

The literature on the current NPA crisis in India highlights several reasons for the accumulation of Non-performing assets. The main factors identified by the studies include (1) macroeconomic factors like the slowdown in GDP growth, project failures in critical sectors, lending to sensitive sectors, etc (2) bank-specific factors like lack of credit appraisal and monitoring skills, lending to unviable projects, irrational exuberance, etc and (3) Governance related issues like wilful defaults, corruption, frauds, etc. Table 3.1 below shows the results of some select studies and the opinion of some banking industry experts on the causes of NPA crisis in the Indian context.

Table 3.1: Reasons for NPAs in India

Factors/ Variables Affecting Bad Loans	Variable Level	Author(s)/ Experts
Economic slowdown, Delays in project approvals and implementation, Delays in land acquisition; Non-availability of coal and gas for power plants, Soaring real interest rates and high inflation.	Macroeconomy specific	(Raghuram G. Rajan, 2018) (Pandey, Patnaik, & Shah, 2017)
Project failures in infrastructure, steel, metals, textiles	Macroeconomy specific	Pandey, Patnaik and Shah (2016)
Evergreening	Bank and Governance	(Ghosh, 2017)
Lack of project assessment skills, Improper credit appraisal and loan monitoring; Aggressive lending and irrational exuberance during 2002-2008	Bank-specific	(Raghuram G. Rajan, 2018)
Inefficient borrower screening, credit appraisal and post-disbursement supervision		Charan Singh, RBI Chair Professor

Infrastructure Financing	Macroeconomy and Bank specific	(Gopinath, 2007) (Acharya & Kulkarni, 2012)
Project Finance by Commercial Banks and the resultant asset-liability mismatch	Macroeconomy specific	(Leeladhar, 2008) Pronab Sen
GDP, Priority sector advances, Past credit growth, Return on assets and Capital adequacy ratio	Bank Specific	Samantaraya (2016)
Politically inspired agitations	Economy Specific	Sitaramamurty (2016)
Wilful defaults, Corruption Frauds, Corruption scandals specifically in the coal, and telecommunication sectors, Malfeasance and inflation of costs by promoters, Delays in environmental clearances; Cronyism pertaining to business in sectors like minerals, energy, infrastructure, and government contracts, Diversion of funds, Political discretion in the allocation of licences	Governance	(Sengupta & Vardhan, 2017) Rajan (2018) Aiyer (2018)
Dumping practices by steel producers especially China	Global Economy specific	(Chalabyan et al., 2018)
Forbearance lending and restructuring, Regulatory forbearance.	Governance and Bank Specific	(Raghuram G. Rajan, 2018), (Samantaraya, 2015) Rajeswari and Sengupta (2017) Pandey, Patnaik and Shah, 2016) Gosh (2017)
Non-performing administration	Governance	K.C Chakraborty, ex-deputy Governor, RBI
Lending to unviable projects at non-optimal conditions	Bank specific	Viral V Acharaya
GDP growth, Bank size, profitability, ownership and rural-urban share of banks' operation	Bank and Macro-economy	(Sensarma & Chaudhuri, 2008)
Loans to sensitive sectors, net interest margin (NIM) and capital adequacy ratio	Bank specific	(Dhar & Bakshi, 2015)
Politically induced lending	Governance	Somasroy Chakraborty (2015)

Weak governance, Mishandling of banking system by Govt. Prolonged forbearance lending after the Financial Crisis	Governance	Y V Reddy
Competition in real estate and telecom sectors	Macro-economy Specific	(Chandrasekhar & Gosh, 2017)

Source: Compiled by authors from literature

3.3 Soft budget constraints as the drivers of NPAs

Soft budget constraints (SBC) as a systemic problem of transition economies was first conceptualized by Janos Kornai in 1980. Soft budget constraint is defined as “a condition when the strict relationship between expenditure and earnings of an economic entity is relaxed, that is when excess expenditure over earnings will be paid by some other institution, typically by the state. A further condition of ‘softening’ is that the decision-maker expects such external financial assistance with high probability and this probability is firmly built into his behaviour”(J. Kornai, 1979; Lou, 2016).

There is a lot of theoretical literature on soft budget constraints which emphasizes that failing enterprises often get rescued by banks (Dewatripont & Maskin, 1995; Kornai et al., 2003; Maskin & Xu, 2001) and banks themselves, especially government-owned banks, often operate under soft budgets (Du & Li, 2007; János Kornai et al., 2003). However, the empirical testing of soft budget constraints has proved elusive. There is very little empirical testing of soft budget constraint (Lu et al., 2005a). Generally, the researchers employ indirect measures or indicators for detecting the presence and degree of softness of budget constraints (see Table 5 in Appendix A1). A cursory look at the Indian economy shows that most of the indicators of soft budgets support the presence of SBC. The rising bad loans, delayed bankruptcy resolutions, rare filing of bankruptcies, lending to risky firms (Ghosh, 2017); frequent bank bailouts, scams, and governance failures amply suggest the existence of SBC in India. Moreover, politically connected firms have been shown to exhibit investment inefficiency indicating distortion of overall credit created by political influence (Chahal & Ahmad, 2020). The recent surge in loan frauds and wilful defaults have been mostly coming from unlisted and private limited companies which are financed by public sector banks. This has been attributed to weak governance structures at the country and especially bank level in government banks (Jayadev & Padma, 2020). Also, the legal context in which over-regulated public sector banks operate may also be shifting the focus of the leadership. In a recent study by Agarwal et al.,

(2022), it has been shown that in the bank board meetings issues tabled for discussion related to risks constitute only 10 per cent of the total issues while compliance and regulation comprise 41 per cent and issues related to business strategy comprise 31 per cent. This shows banks may be underinvesting in risk and over-investing in compliance and regulation. Thus, over-regulation and government ownership may be partly responsible for prevalence of conditions giving rise to softness of budget constraints in the economy.

Empirically the presence of SBC was demonstrated by Komera & Lukose P. J., (2014) after analysing a sample of 1185 firms that filed for bankruptcy from 1992-2009. The authors observed that soft budget constraint was one of the main reasons for less severe capital expenditure deterioration in state-controlled and group-affiliated firms. State ownership or control is often found responsible for the softening of budget constraints. The main reason behind the rise of SBC in formerly socialist economies was the government intervention, control and ownership (Kornai, 1979).

In India, government intervention in banking operations takes place through the mandatory requirement of lending to the priority sector. Priority sector lending (PSL) is a typical case of ex-ante government intervention in banks' affairs. Generally, priority sector loans in India are used as a tool for political rent-seeking when different political parties resort to promises of loan waivers. Such loans have often been waived at the cost of taxpayers' money which ultimately leads to the weakening of market discipline. Bank managers have often used priority sector loans as an excuse for poor lending decisions. Apart from PSL, ex-ante intervention in bank lending decisions may also come through political influence and corruption. Usually, politically well-connected businesses, irrespective of their risk profile, get credit very easily by influencing bank managers through politicians (Ruiz et al., 2016). Ex-post intervention by the government in the lending decisions of public sector banks comes in the form of debt restructuring schemes, evergreening, bailouts of public sector enterprises (PSEs), and bank recapitalizations. Such actions have been shown to give rise to moral hazard and disincentivize the banks to pursue improved lending efficiency (Xu & Lu, 2001).

Another aspect of SBC that has been emphasized in the literature is the public ownership of lenders and borrowers. Public ownership of banks and public sector enterprises has often been blamed for inefficiency. Indian banks, especially public sector banks often use relationship banking with public sector enterprises (PSEs) and large private group companies. Such a relationship-dominated style of banking is believed to create soft budget constraints on

the banks and their borrowers (PSEs and Group Companies) which distorts the credit allocation in the economy. Credit allocation becomes biased in favour of PSEs and Group companies because banks perceive PSEs and group companies to be the safe bets due to the implicit guarantees in case of loans to PSEs and support of related companies to a group affiliated company apart from relationship value in case of larger group companies. Such relationship-oriented banking helps banks save transaction costs. When soft budget constraints are viewed as a consequence of the rent-seeking behaviour of a firm in which firm actions in control sphere⁸ give rise to opportunity cost in the real sphere⁹ in the form of lower productivity, the estimated social costs associated with budget softness are higher (Scott, 1990). Moreover, in the absence of a strong bankruptcy code, banks are often reluctant to force liquidation of distressed group companies because they do not want to give a negative signal to the market by announcing defaults. Bank managers try to avoid being in the spotlight for having lent to such defaulters. Sometimes large companies threaten to switch their borrowing business to other banks if a bank does not restructure their loans. This motivates the lending bank to evergreen the loans to such powerful borrowers (group companies). However, there is very little empirical evidence to support the systematic bias in banks' lending behaviour in favour of the government and group companies.

Another issue that is often debated in India is the bailouts of stressed PSBs by the government through recapitalizations. To stop the problem of NPAs from spiraling out of hand, Govt of India has once again resorted to prompt recapitalization of banks. Starting from the 1990s the magnitude of recapitalizations has considerably gone up over the years putting pressure on the government's budgetary resources. The total recapitalization amounts up to 2009-10 was around Rs 230 billion which has gone up to Rs 1081 trillion by 2016-17. For 2017-18, the government planned a further infusion of Rs 880 billion for recapitalizing the ailing PSBs¹⁰. These recapitalizations are temporary band-aids rather than the cure. Instead of eradicating the problem, such actions aggravate the problem of poor market discipline, soft budget constraints syndrome, and moral hazard.

3.4 Credit rationing and NPAs

In their seminal article (Stiglitz & Weiss, 1981) put forward the idea of credit rationing. They showed how the interest rate charged by the bank affects the riskiness of the loan portfolio of

⁸ those actions of a firm that are undertaken to secure support and assistance

⁹ actions related to increasing productivity or reducing costs

¹⁰ <https://timesofindia.indiatimes.com/business/india-business/rs-88000cr-bank-recap-reforms-plan-unveiled/articleshow/62641920.cms>

the bank by either selecting potential borrowers or by affecting their actions. They proved that it is optimal for a bank to ration credit when there is excess demand rather than raising the interest rate. Thus, when the supply of credit is less than the demand in a market with asymmetric information, some borrowing firms always obtain credit in preference to others which may not be appreciably different from the former. For banks, the rationale behind the rationing of credit is the maximization of expected return or minimization of risk (defaults or NPAs). However, when banks operate under soft budget constraints, borrowers' budget constraints also get softened, and they obtain credit regardless of their risk profile. According to the MM hypothesis the market value of a firm is not affected by how a firm is financed in a perfect capital market (Modigliani & Miller, 1958). In a perfect capital market, all firms enjoy equal access to external finance and real investment of a firm will not be affected by financial policy and capital structure. But in an imperfect capital market, internal finance will affect investment decisions. The role of information asymmetry in corporate financing is highlighted by modern corporate finance theory. In an imperfect capital market with asymmetric information, it is better for a firm to go for internal finance before going for external sources of capital and if at all a firm has to raise external capital, low-risk debt should be preferred over equity (Myers & Majluf, 1984). Thus, in an imperfect capital market, a firm's investments will be constrained by the availability of internal finance. The asymmetric information will be more severe for more risky firms and such firms are more likely to get credit rationed. This means that in the case of a high-risk firm, internal capital will have a greater effect on investment decisions as compared to the low-risk firm. When a recession coincides with a financial crisis, bank-oriented systems tend to be more severely hit, since banks may propagate and amplify the economic consequences of the turmoil (Angori et al., 2020). Credit rationing is therefore linked to the amount of bad loans in the banking system. A strict credit rationing will minimize risk and hence the amount of bad loans will be lower. There are several scenarios in which credit rationing might weaken or fail. Generally, serious banking crises should induce banks to adopt strict credit rationing. But even after the financial crisis bank credit rationing may still not be happening (Kremp & Sevestre, 2013) leading to the increased credit risk on the balance sheets of banks. Since India has an underdeveloped corporate debt market and has a bank-based financial system with public sector banks having a majority share, it is pertinent to ask whether they ration credit according to the riskiness of the borrowers and whether credit rationing across different size borrowers is equally effective. There is evidence in the literature that due to implicit government guarantees, the probability of credit rationing gets reduced (Alexandre & Clavier, 2017). Also, state-owned banks are prone to political influence (La Porta, Lopez-De-

Silanes, & Shleifer, 2002, Shleifer & Vishny, 1994; Kornai, 1979; Boubakri, Cosset, & Saffar, 2017), which may also weaken credit rationing. Moreover, state ownership of banks tends to soften the budget constraints of the borrowers whereby they are able to refinance their loans despite having low creditworthiness (Berglof & Roland, 1998; Kornai, 1993; Megginson & Netter, 2001).

3.4 Research questions and objectives

Keeping in view the above-given background we want to answer the following research questions which form the objectives of this chapter:

- a) Whether bank lending in India is driven by SBC?
- b) How does Indian banks' lending vary across government and non-government firms with similar risk characteristics? Do banks favour government firms over non-government firms?
- c) Do banks practice preferential lending to group-affiliated over non-group-affiliated firms with similar risk characteristics?
- d) Whether banks in India ration credit according to the riskiness of firms and whether the credit is granted according to riskiness across all firm sizes?

3.5 Methodology and empirical results

Since we have used various methods, the methodology and empirical results have been clubbed together for the sake of continuity of presentation and coherence. We divide this section into four subsections: (A), (B), (C) and (D). Section (A) presents data and variables. Section (B) presents empirical strategy for determining SBC along with results. Section (C) presents empirical specification for testing lending bias along with results. Finally, section (D) deals with testing credit rationing.

(A) Data and variables

Data for a panel of 3164 firms was taken from the CMIE Prowess database. Table 3.2 shows the sample firms are spread across different sectors of manufacturing, mining, infrastructure, construction and real estate, electricity, and non-financial services.

Table 3.2: Sample of firms

Industry	No. of Firms	Proportion
Manufacturing	1421	44.91
Infrastructure	109	3.44
Mining	180	5.68
Construction and Real estate	667	21.00
Electricity and related	277	8.80
Non-financial services	510	16.11
	3164	100

Source: CMIE Prowess

Table 3.3: Variable description

Variable name	Proxy	Description	Source
BTA	Bank Leverage	Bank borrowings to Total Assets Ratio. Bank borrowings are the total borrowings from banks.	Lu <i>et al.</i> (2005)
INV_K	Investments	Investments/ capital stock. Investments include expenditure on fixed assets, long and short-term investments. Capital stock is the book value of intangible assets, fixed assets, and long-term investments.	(S. M. Fazzari, Hubbard, & Petersen, 2000; Steven M. Fazzari, Hubbard, & Petersen, 1988) (Aggarwal & Zong, 2006; Cleary, Povel, & Raith, 2007; Degryse & De Jong, 2006; Ghosh, 2006; Kadapakkam, Kumar, & Riddick, 1998; Laeven, 2003; Shen & Wang, 2005)); (Ghosh, 2006)
GRB	Lending (Borrowing)	The growth rate of borrowings	Chosen by Authors for Robustness test
INV_TA		Investments to Total assets	
CF_K	Internal Capital	Cash flow from operations/ capital stock	
Q	Market Opportunities	Tobin's q = Market value of equity/book value of equity. This ratio indicates the market valuation of investment opportunities.	(S. M. Fazzari, Hubbard, & Petersen, 2000; Steven M. Fazzari, Hubbard, & Petersen, 1988) Degryse and De Jong (2006)
Δ TBB_TA	New Total Loans	Changes in Total Bank Borrowings to Total Assets	Alexeev & Kim (2008)
Δ STBB_TA	New Short-Term Loans	Changes in Short-term Bank Borrowings to Total assets	
CFOA_TA	Liquidity	Cash flow from operations to total assets	Bhandari & Iyer (2013).
PBDITA_TA		Gross Profit/Total Assets. Profit before depreciation, interest, tax and amortization (PBDITA) is a measure of Gross Profit.	

Z	Probability of Default	Z-score	Alexeev & Kim (2008)
Firm_Age	Age of the Firm	Age of the firm in years	Alexeev & Kim (2008)
FIRM_SIZE	Size of the Firm	Log of Total Assets.	
D	Default	Default. If profit for t-2 and t-1 and t is negative, D = 1, otherwise 0	
RC1, RC2, RC3, RC4	Risk Levels	Dummy variables for risk class 1, 2 3 and 4 based on the probability of default derived from the logit model. Firms belonging to risk level 1 are the least risky and those belonging to Risk level 4 are the worst risk firms.	Lu <i>et al.</i> (2005)
S_K	Sales Expansion	Sales to Capital Stock	Lu <i>et al.</i> (2001)
E	Equity Capital	Equity capital	Lu <i>et al.</i> (2005); Altman (1968)
FA_TA	Collateral	Fixed Assets to Total Assets	Altman (1968, 2006)
RE_TA	Internal Funds	Retained earnings to Total assets	
EBIT_TA	Profitability	Earnings before interest and tax to Total assets	Altman (1968, 2006); Alexeev & Kim (2008)
EBITDA_S	Return on Sales	EBITDA to sales	
MVE_BVD	Debt Capacity	Market value of equity to Book value of Debt	Altman (1968, 2006)
S_TA	Operating Performance	Sales to Total assets	
OIS	Operational Efficiency	Operating income to sales	Introduced by Authors as controls
CAP_TA	Internal source of funds	Capital to Total assets ratio	

B&D_TA	Funds raised from Corporate debt market	Bonds and debentures to Total assets ratio	
WC_TA	Liquidity	Working capital to total assets	(Altman, 1968, 2006; Hosaka, 2019; Laitinen & Laitinen, 2000; Liang et al., 2016; Ohlson, 1980; Platt & Platt, 1991; Tian & Yu, 2017).
TIE_TEX	Interest rate on debt	Total interest expenses to total expenses	Proxy for interest rate on debt adopted in line with Alexeev & Kim (2008)
D_MC	Risk to Shareholders	Debt to Market Capitalization ratio	Created by Authors in line with Lu <i>et al.</i> (2005)
SGR	Business Expansion	Sales Growth Rate	
GOV_F	Government Firm	Dummy for govt. firms. GOVF=1 for government firms, and 0 otherwise. Government firms include those where government shareholding is greater or equal to 51 per cent and which are designated as government companies as per the Indian Companies Act, 1956.	
GROUP_F	Group Affiliated Firm	Dummy for Group affiliated firm.	
IP_F	Stand Alone Private Firm	Dummy for Individual Private Firm. IP_F includes both domestic and foreign firms	
GG		Dummy for Government & Group Firm.	

Source: Compiled by Authors from literature

(B) Empirical strategy to determine SBC

In contrast to the previous NPA build-up, the post-financial crisis NPA build-up has been majorly due to the loan defaults from the non-priority sector. This indicates that banks have been lending to the poorly performing firms with a lax credit appraisal. The lack of stringent bankruptcy laws and delayed resolution of bankruptcies in India has also contributed to the banks' unwillingness to drag the delinquent borrowers to the bankruptcy courts. Since most of the banking business is in the hands of public sector banks, they tend to operate with a sense of implicit guarantees from the government against the possible failure. This implicit expectation of government bailout may be at the root of their lax attitude towards credit appraisal of poorly performing firms and rolling bad loans to such financially distressed firms to hide their non-performing loans. Such behaviour of lenders might be responsible for not only the firms' expectation of bailout but also their survival. This might have led to the accumulation of bad loans in the banking system when such financially distressed firms defaulted, and banks were forced to stop the loan restructuring and declare their bad loans under the rigorous asset quality review of 2015.

When firms operate with the bailout expectation, they are facing soft budget constraints (SBC). There is a lot of theoretical literature on the causes and consequence of SBC. The literature on the empirical testing of SBC is comparatively scarce. Moreover, the phenomenon of SBC has mostly been studied in the context of transition economies.

We employ the empirical strategy developed by Alexeev & Kim (2008) with a slight modification to examine whether Indian banks' lending (borrowings by firms) and resultant bad loan build-up are driven by soft budget constraints in the economy. We use a balanced panel dataset of 3164 listed firms extracted from the CMIE Prowess database. Our sample contains government (534), group-affiliated (1179) and individual private (1451) firms. The data covers the period from 2002 to 2018. We assume a firm defaults if it shows losses for at least three consecutive years. The third year of the loss in a three years' run is designated as the year of default. After designating default years, we compute the mean and standard deviation of different variables for firms which defaulted in $t+1$ and firms which do not default in $t+1$.

To evaluate the degree of SBC, we calculate the Altman's Z score for each firm each year to determine the firms' probability of default perceived by banks. The Z score is a simple measure

which helps in discriminating financially healthy firms from financially distressed ones. Altman's discriminant function for calculation of Z score is given below:

$$Z = 1.2WC_TA + 1.4RE_TA + 3.3EBIT_TA + 0.6MVE_BVD + 0.999S_TA \quad (3.0)$$

The variable descriptions are given in Table 3.3. Assuming that banks use Z scores for evaluating the creditworthiness of borrowers, we examine whether firms' borrowings were according to their Z-scores. If there is no SBC, the banks would refrain from extending loans to firms having low Z-scores (higher default probability). Essentially the factors comprising the Z-score give opposite incentives to a bank and the firm with respect to providing loans to the firm. If the budget constraints are hard in an economy, the banks will be driven by their long-term profitability motive. However, in the presence of SBC, the firms' demand for increased loans will primarily determine the amount of borrowing.

Therefore, by estimating the relationship between a firm's ability to borrow and their Z scores, we can test for the presence of soft budget constraints. If the low Z-score firms show a significantly greater increase in bank borrowings than other firms, soft budget constraint is likely to exist. We use the following model for testing the presence of SBC:

$$\Delta BB_{it} = \beta_0 + \beta_1 LZ_{it} + \beta_2 HZ_{it} + \beta_3 TIE_TEX_{it} + \beta_4 X_{it} + e_{it} \quad (3.1)$$

Where ΔBB_{it} is the change in the amount of bank borrowings of firm i in year t divided by total assets in year t . LZ_{it} is a dummy variable equal to 1 if the firm has a low Z-score < 0.41 and 0 otherwise. HZ_{it} is also a dummy variable which is equal to 1 for a firm having high Z-score > 2.33 and 0 otherwise. We choose these values¹¹ so that approximately 20 per cent of all observations would have low Z-score values and 20 per cent would have high Z-scores. TIE_TEX_{it} is total interest expenses to total expenses ratio and denotes the interest cost to the firm and X_{it} is a vector of control variables. We employ CAP_TA , $B\&D_TA$ and the lag of Z-score as control variables.

(B1) Empirical results for SBC

Table 3.4 shows the descriptive statistics for defaulted and non-defaulted firms. It is evident that on average the firms defaulting the following year were in a bad financial condition than those that did not.

¹¹ These values maximise the discriminant power in our sample distribution and are not according to Altman's classification.

Table 3.4 Descriptive statistics

Variable	Acronym	Firms defaulted in t + 1 (20863 obs.)		Firms not defaulted in t + 1 (32925 obs.)	
		Mean	S.D.	Mean	S.D.
Age	Firm_age	35.3	8.3	36.33	10
Z-Score	Z	0.631	1.21	1.292	1.07
Changes in Total bank borrowings to Total Assets	Δ TBB_TA	0.067	0.31	0.059	0.29
Changes in Short-term bank borrowings to Total assets	Δ STBB_TA	0.037	0.29	0.029	0.25
Cash Flow from operations to Total assets	CFOA_TA	0.023	0.07	0.027	0.06
Total interest expenses to Total expenses ratio	TIE_TEX	0.271	0.11	0.224	0.09
Sales to total capital Stock	S_K	2.255	1.02	2.677	0.98
Working capital to Total assets ratio	WC_TA	-0.193	0.09	-0.152	0.089
EBITDA to Sales	EBITDA_S	0.051	0.09	0.061	0.06
Investments to Total assets	INV_TA	0.059	0.06	0.061	0.06
Total Assets	TA	2.514	13.7	2.413	14.3

Source: Authors' calculations from CMIE data

EBITDA to sales ratio and Cash flow for the soon-to-default firms were all considerably lower than for the firms that did not default the following year¹². Nevertheless, the borrowing amount from banks was slightly higher in the case of soon-to-default firms. The total interest expenses were also higher than the non-defaulting firms. The positive and significant coefficient of low Z-score in both the regressions in Table 3.5 shows that risky firms are able to increase their bank loans. This suggests the presence of SBC in the Indian economy and SBC-driven lending by banks.

¹² Note that Table 3.4 depicts descriptive statistics on firm-year observations. Therefore, if any default occurs beyond t+1, the data for year t is counted in non-defaulted column.

Table 3.5 Results of Model 3.1

Variable	Δ TBB_TA	Δ STBB_TA
	Coefficient	Coefficient
Low Z-score	0.056*** (0.013)	0.055*** (0.011)
High Z-score	-0.015 (0.012)	-0.011 (0.010)
TIE_TEX	.009 (0.111)	0.009 (0.098)
Z-Score (t-1)	0.035*** (0.005)	0.035*** (0.004)
CAP_TA	0.038*** (0.008)	0.018*** (0.006)
B&D_TA	-0.005 (0.004)	-0.005 (0.004)
Constant	-0.027*** (0.054)	-0.115*** (0.048)
Adj. R2 (overall)	0.667	0.611
Number of obs.	53788	
Number of firms	3164	

Source: Authors' calculations

Having established the evidence of SBC-driven lending and borrowing in the stated period in the Indian economy, we now turn to lending bias and credit rationing in following sections.

(C) Empirical Strategy for testing lending bias

To prove that government and group firms are favoured by banks we want to test whether they are able to borrow more than non-government and non-group firms with similar risk characteristics. We presume that demand and supply of loans are determined by borrower's needs and costs of obtaining funds and lending risk and returns of banks. We adopt the specification of Lu et al. (2005) with slight modifications. First, we also use the flow indicator of liquidity (CFOA_TA) in the model. Secondly, we use additional controls of capital to total assets ratio (CAP_TA) and bonds & debentures to total assets ratio (B&D_TA) to make sure that excessive (lesser) employment of bank debt by firms is not solely the result of lower (higher) use of capital market debt (bonds and debentures) and capitalisation (share capital). Thus, these controls were motivated for ensuring true causality. Finally, we also use dummy variables GOV_F, GROUP_F to see whether banks' lending behaviour is biased in favour of government firms and group-affiliated companies as against the individual private firms (IP_F) with similar risk characteristics.

At a given time a firm's borrowing demand is a function of its financing needs, availability of internal finance, liquidity position, firm size, default risk and the interest rate charged by the bank while as the supply of credit to a firm by a bank depends upon the firm's fixed assets, size, firm's business prospects, default risk, firm type and interest rate. At equilibrium, the supply of credit equals the quantity of credit demanded at a given interest rate. Thus, we can set up the following specification for testing whether banks favour government firms and group firms over individual private firms.

$$\begin{aligned}
 BTA_{it} = & \beta_0 + \beta_1 FIRM_SIZE_{it} + \beta_2 FA_TA_{it} + \beta_3 PBITDA_TA_{it} + \beta_4 CFOA_TA_{it} \\
 & + \beta_5 CAP_TA_{it} + \beta_6 B\&D_TA_{it} + \beta_7 SGR_{it} + \beta_8 PD_{it} + \beta_9 GOV_{it} \\
 & + \beta_{10} GROUP_F_{it} + \alpha_{re,i} + \pi_{it}
 \end{aligned} \tag{3.2}$$

where $\alpha_{re,i}$, represents a random effect that is invariant over time and varying over cross-section for a given cross-section unit and π_{it} is residual. BTA_{it} is the Borrowings to Total Assets ratio measuring the loans granted by the banking system to firm 'i' at time t. $FIRM_SIZE_{it}$ represents the size of the firm and is measured as the log of total assets of a firm. As size may be perceived as a signal of loan security by banks and large firms have more bargaining power, it is, therefore, likely to increase the bank lending to a firm. FA_TA_{it} is the ratio of fixed assets to total assets and is a proxy for collateral that a firm can offer to a bank. A higher collateral level increases the borrowing capacity of a firm and reduces the loan risk to the bank. $PBITDA_TA_{it}$ is gross earnings to total assets ratio. The higher this ratio the lower the need for external finance. $CFOA_TA_{it}$ represents cash flow from operations to total assets and measures the liquidity of a firm (Bhandari & Iyer, 2013). A higher value of liquidity will decrease the probability of borrowing by a firm in a good financial position. Therefore, we expect a negative relationship between liquidity and borrowing. Moreover, high liquidity may be due to lack of investible opportunities. In that case, also, a firm will not go for borrowings. CAP_TA_{it} is capital to total assets ratio. The demand for borrowings from banks from a well-capitalized firm is not as much as from an undercapitalized firm. Therefore, CAP_TA is expected to be negatively related to our dependent variable. $B\&D_TA_{it}$ is bonds & debentures to total assets ratio. Firm issuing bonds and debentures would have lower demand for bank borrowings and hence $B\&D_TA_{it}$ is expected to be negatively related to BTA . SGR_{it} is the growth rate of sales and captures the borrowing demand of a firm. GOV_{it} is a dummy variable that has a value of 1 for government firms and 0 for non-government firms. $GROUP_{it}$ is a dummy variable which equals 1 for group affiliated firms and 0 otherwise. PD_{it} is the one-year default probability. A

high-risk firm tends to borrow more than a low-risk one as the low-risk borrower can raise funds through other sources as well. The computation of PD_{it} is described in the next section below.

(C1) Computation of Probability of Default, PD

We employ GLS random effects to estimate model 3.2 for testing the banks' lending behaviour vis-à-vis government firms as the fixed effects model can't be used when time-invariant variables are present in the model (Bell & Jones, 2015). We use a logistic regression model for calculating the probability of default for each firm each year for the sample of 3164 firms since risk ratings from credit rating agencies were not available. The logistic function for default probability is shown below:

$$P(X_i, b) = [1 + e^{-bX_i}]^{-1}$$

Where X_i is the vector of predictors of default for the i th observation and b , an unknown parameter, is estimated by the logarithm of the following maximum likelihood function:

$$l(b) = \sum_{i \in D=1} \log P(X_i, b) + \sum_{i \in D=0} \log \{1 - P(X_i, b)\}$$

where $D = 1$ is default cases and $D = 0$ is non-default cases in the sample.

We assume a firm goes into default (D) if it shows losses consecutively for at least three years. A similar notion is also found in (Coats & Fant, 1993; Lu et al., 2005a). India's Sick Industrial Companies (Special Provision) Act, 1985 also uses the notion of two-year cash losses among other conditions to define a sick company. Thus, default, $D = 1$ for a firm at time t , if profit for t , $t-1$ and $t-2$ is negative, otherwise $D = 0$. Out of 53788 total sample observations of 3164 firms, 20863 default cases are observed.

Logit models have been widely employed for calculating the probability of default (PD) (Heyliger & Holdren, 1991; Jing & Fang, 2018; Martin, 1977; Ohlson, 1980; Vilén, 2010; West, 1985; Zeineb & Rania, 2016). For calculating PD, we used seven accounting ratios as default determinants: Debt to Market Capitalization (D_MC) for capturing debt level vis-a-vis market valuation of the company, interest burden (TIE_TEX), liquidity ($CFOA_TA$, WC_TA), investments (INV_K), equity capital (E) and sales expansion (S_K) in our logit model. Most of these ratios were chosen out of 12 most frequently employed ratios for default prediction in the related literature based on their predictive power in backward stepwise regression. (Altman,

1968, 2006; Hosaka, 2019; Laitinen & Laitinen, 2000; Liang et al., 2016; Ohlson, 1980; Platt & Platt, 1991; Tian & Yu, 2017).

(C2) Empirical results from the Logit model

The ratios used in the logit model along with their estimation coefficients are given in Table 3.6. Default (D) is positively related to DMC, TIE_TEX and INV_K. The first two ratios are direct indicators of the debt burden of a firm. Therefore, they strongly influence the probability of default. Investments to Capital ratio (INV_K) is an indirect indicator of obligations created due to investments. For investments, firms may raise external capital and, in the process exchange fixed charge funds for risk-bearing assets. Equity, E is negatively related to the probability of default because equity capital does not create any payment obligations on the firm and provides a buffer against losses. A higher sales level, S_K generates more revenue which helps a firm to pay its liabilities. Higher liquidity (WC_TA, CFOA_TA) also reduces the likelihood of default because often it is not only the capacity to repay but the ease and timeliness of repayment that are crucial for a firm to avoid default.

Table 3.6: Estimation results from logit model

Number of obs	= 53,788	Prob > chi2	=	0.0000
Wald chi2 (7)	= 7407.30	Log likelihood	=	-24050.585
D	Coef.	Std. Err.	z	P> z
DMC	0.262246	0.013056	20.09	0.000
E	-0.187592	0.037881	-4.95	0.000
S_K	-0.460574	0.020302	-22.69	0.000
WC_TA	-0.72588	0.026377	-27.52	0.000
INV_K	0.140203	0.019876	7.05	0.000
CFOA_TA	-0.132614	0.056672	-2.34	0.019
TIE_TEX	0.047373	0.021578	2.20	0.027
_cons	0.405416	0.072456	5.60	0.000

Source: Author calculations

The average marginal effects of independent variables in the logit model are shown in Table 3.7. S_K, DMC and E have a higher impact on D as compared to other variables in the model.

Table 3.7: Average marginal effects

D	dy/dx	Delta Method Std. Err.	z	P> z
DMC	0.084416	0.002734	30.87	0.000
E	-0.096128	0.009774	-9.83	0.000
S_K	-0.153731	0.003802	-40.43	0.000
WC_TA	-0.098384	0.005553	-17.72	0.000
INV_K	0.023062	0.003972	5.81	0.000
CFOA_TA	-0.019003	0.009417	-2.02	0.044
TIE_TEX	0.019401	0.005517	3.52	0.000

Source: Author calculations

We did not observe any serious issues of multicollinearity (see Table 1 in Appendix A1). With a cut-off value of 0.33, our model correctly classifies 16313 out of 20863 default cases (sensitivity = 78.19 per cent) and 25203 out of 32925 no-default cases (specificity=76.55per cent). The model has a good overall accuracy of 77.18 per cent (refer to Table 2 and Table 3 in Appendix A1)

Using the PD produced by the logit model, the sample firms were classified into four risk categories according to the scheme shown in Table 3.8 below:

Table 3.8: Risk-based classification of sample firms

If	Risk category	Label
$0 \leq PD < 0.11$	RC1, 0 otherwise	Low
$0.11 \leq PD < 0.22$	RC2, 0 otherwise	Medium
$0.22 \leq PD < 0.33$	RC3, 0 otherwise	High
$0.33 \leq PD \leq 1.00$	RC4, 0 otherwise	Worst (Default)

Source: Authors

The preliminary analysis of bank borrowings across four risk classes of firms is shown in Table 3.9. The data shows that mean and median borrowing ratios rise with the risk level.

Table 3.9: Bank borrowings by firms grouped by risk categories

Risk Level	RC1	RC2	RC3	RC4
Mean	0.207653	0.305217	0.353178	1.575099
Median	0.177395	0.307621	0.334431	0.758273
Std Dev	0.207402	0.192596	0.255005	1.576551
Min	6.25e-07	0	0.000029	0
Max	6.452052	4.115231	4.324301	8.542861
No of cases	5,789	15,226	9,324	23,449

Source: Author calculations

Table 3.10 presents borrowing ratios of firms by firm type. Both mean and median borrowing ratios are higher for government firms and group firms. Mean, and median borrowing ratios of group firms are higher than non-group firms. These results are in line with (Manos & Green, 2001) who also found that group affiliated firms in India had higher mean and median leverage as compared to non-group affiliated or standalone firms.

Table 3.10: Bank borrowings by firms grouped by firm type

Firm Type	GOV_F	Non-GOV_F	GROUP_F	Non-GROUP_F	GG	Non-GG
Mean	0.86208	0.61929	0.87751	0.84424	0.86284	0.80258
Median	0.37010	.25563	0.38093	0.35957	0.37402	0.33338
Max	8.54286	4.4398	6.26149	8.54286	6.26149	8.54286
Min	0.73249	6.25e-07	0	0	0	0
Std Dev	1.23199	1.06193	1.23991	1.22224	1.231927	1.22700
Frequency	9,078	44,710	20,043	33,745	29,112	24676

Source: Author calculations

(C3) Evidence for lending bias

The estimation results for model 3.2 are presented in Table 3.11 below. The table reports heteroskedasticity and autocorrelation consistent White standard errors (White H., 1980)

Table 3.11: Estimation results of model 3.2

R-square:		No of groups	=	3,164
Within	= 0.8342	No of obs	=	53,788
Between	= 0.8609	Wald Chi2	=	221011.01
Overall	=	Prob > Chi2	=	0.000
0.8413				
BTA	Coef.	Std. Err.	z	P> z
FIRM_SIZE	0.07931	0.004134	19.18	0.000
PBDITA_TA	-0.128087	0.008020	-15.97	0.000
CFOA_TA	-0.079130	0.008298	-9.54	0.000
CAP_TA	-0.073142	0.017414	-4.20	0.000
B&D_TA	-0.046180	0.007607	-6.07	0.000
FA_TA	0.553090	0.003250	170.18	0.000
SGR	-0.004685	0.001459	-3.21	0.002
PD	0.813522	0.013192	61.66	0.000
GOV_F	0.407077	0.041057	9.91	0.000
GROUP_F	0.259989	0.012705	20.46	0.000
_cons	0.709376	0.015953	44.46	0.000

Source: Author calculations

The results show that the growth rate of sales (SGR) is negatively related to borrowings, but the magnitude of the impact is quite low. This shows that the supply side of loans may have more to do with credit allocation than the demand side. The rest of the variable coefficients meet our expectations well.

To check the model for the issues of endogeneity we conducted the test of endogeneity for two suspected variables, CAP_TA, and B&D_TA by treating them as endogenous by using single equation instrumental variable regression. The instruments chosen were lagged values of the variables themselves and lagged values of other variables in the model (Coles et al., 2008; McKnight and Weir 2009; Choi et al., 2013; Muttakin et al., 2015). The results of the Durbin Score = 1.9254, $p=0.1768$ and Wu Hausman = 1.8994, $p=0.1689$) show that CAP_TA is not an endogenous variable. Likewise, the results for B&D_TA (the Durbin Score =1.9132, $p=0.1668$ and Wu Hausman-test =1.8989, $p=0.1709$) show B&D to be exogenous(see Appendix A1 Table 8 and Table 9).

The results in Table 3.11 show that lending is positively biased towards government-owned firms. This indicates that government firms are less constrained financially than non-government firms which is a reflection of soft budget constraints (Jin, Zhao, & Kumbhakar, 2019; Zhang, 2020, Mykhayliv & Zauner, 2017; Chow, Song, & Wong, 2010). This preferential treatment of SOEs creates a competitive advantage against private firms (Guriev,

2017). The significant positive coefficient of GOV_F (.407) shows that in comparison to the individual private firms (IP_F) with similar risk level, government-owned firms obtain 40.7 per cent more loans. Also, the positive and significant coefficient of GROUP_F suggests that all else being equal a group firm's borrowings increase by 26 per cent more than those of and Individual private firm (IP_F). These results show that banks provide more credit to group firms at a given risk level as compared to non-group individual private firms. Group firms are able to secure more credit and refinancing because their budget constraints are softer than individual private firms. These findings are in line with those of (Komera & Lukose P. J., 2014) who showed that, due to soft budget constraints, group and government companies face less deterioration in capital budget expenditure as compared to stand alone private firms. These results are further supported by Srinivasan & Thampy (2017) who showed that firms that maintain intimate and exclusive relationships with public sector banks have considerably lower investment cashflow sensitivity than other firms. This is especially true about large firms in poor financial condition. This evidence shows how large firms with poor financial condition may be benefitting from lending from government banks and this could be the reason of piling of bad loans from large borrowers as indicated by recent data. In the context of banking, government ownership of lending institutions and borrowing firms gives rise to soft budget constraints in the economy, which can be defined as the expected re-negotiability of loans in state-owned firms (János. Kornai, 1980; János Kornai, 1998). The government may pressurise the lending banks to refinance loss making government firms for political benefits. The financially distressed firms expect refinancing or restructuring of loans instead of bankruptcy. The threat of shift of control under such a scenario may no longer be credible. This makes managers of distressed firms indifferent to bankers' dissatisfaction. Thus, under soft budget constraints, debt does not reduce managerial agency costs but instead increases the resources at their disposal leading to managerial exploitation ((Andrei Shleifer & Vishny, 1994).

Associated with SBC is moral hazard which the Indian bankers may be facing. (La Porta, Lopez-De-Silanes, & Shleifer, 2002) argue that government-owned banks are politicized. Public sector bank managers in India may think of themselves as government's financial agents and follow the directions of the government officials to extend financial assistance to the financially troubled state-owned enterprises at the cost of their profitability, without fear of bankruptcy.

In the case of group firms when a firm belonging to a group is in trouble, it is often rescued by the other affiliated or parental firms. This expectation of rescue makes group firms

more risk-seeking and banks perceive these firms to be less risky because they think their loans will be repaid by other related firms in the group. Moreover, banks also get involved in relationship banking with large group firms to reap transaction cost benefits. Such firms usually enjoy a lot of bargaining power for ex-post loan restructuring. If a bank does not agree to restructure their troubled loans, they may threaten to switch their business to other banks (Raghuram G. Rajan, 2018). This forces the banks to go for evergreening of bad loans (Ghosh, 2017) with a hope to turn around the struggling projects of such firms.

Coordination failure among banks and low collateral has been shown to encourage forbearance lending and softening of budget constraints (Berglöf & Roland, 1997; Berglöf & Roland, 1998; Schüle, 2018). There have been multiple instances of lending with insufficient or no collateral in the current NPA crisis by PSBs. There has also been a lack of information on borrowers who borrow from multiple banks. To overcome this problem, RBI has constituted a Central Repository of Information on Large Credits (CRILC) in 2014 to collect, store and distribute information on borrowers with Rs 50 million or more exposure to banks. Berglöf & Roland(1995) argue that even if banks do not have any intrinsic interest in re-negotiating loans to loss-making firms, they may still refinance them to exploit the softness of government. Banks may thus contribute to softening of the firm budget constraints by gambling for government bailouts (recapitalizations). The absence of collateral, poor loan quality, low bank capitalization, low commitment power of government and inadequate loan monitoring and screening skills of public sector banks are key determinants of soft budget constraints and recurring bank bailouts.

By dropping one independent variable in successive specifications, the results of the model were found to be significant and stable. To check the robustness of the model, we used the growth rate of borrowings (GRB) as the dependent variable and the results are shown in Table 3.12. The results do not vary much from the earlier specification. To further check the lending bias, we grouped the government and group firms and introduced a new dummy variable GG (government and group). The mean and median ratios of GG firms are higher than non-GG firms (see Table 3.10). The estimation results with GG dummy variable in the model are shown in Table 3.13. The positive coefficient of GG (.2735) shows that while granting credit group and government firms are preferred by banks over individual private firms.

Table 3.12: Robustness check

R-square:		No of obs	=	53788
Within	= 0.5742	No of groups	=	3164
Between	= 0.4709	Wald Chi2	=	206391
Overall	= 0.5213	Prob > Chi2	=	0.000
GRB	Coef.	Std. Err.	z	P> z
FIRM_SIZE	0.073001	0.004209	17.34	0.000
PBDITA_TA	-0.139421	0.070060	-1.99	0.046
CFOA_TA	-0.069291	0.018527	-3.74	0.000
CAP_TA	-0.078946	0.018796	-4.2	0.000
B&D_TA	-0.051823	0.008481	-6.11	0.000
FA_TA	0.510127	0.078481	-6.5	0.000
SGR	-0.004112	0.000300	-13.69	0.000
PD	0.842175	0.072789	11.57	0.000
GOV_F	0.382734	0.045672	8.38	0.000
GROUP_F	0.271934	0.034034	7.99	0.000
_cons	0.692392	0.045107	15.35	0.000

Source: Author calculations

Table 3.13: Lending bias in favour of Group and Govt. firms (GG)

R-square:		Number of obs	=	53,788
within	= 0.7961	No. of groups	=	3,164
between	= 0.8407	Wald chi2	=	214971.01
overall	= 0.8212	Prob > chi2	=	0.0000
BTA	Coef.	Std. Err.	z	P > z
FIRM_SIZE	0.077130	0.004221	18.27	0.000
FA_TA	0.581243	0.003246	179.06	0.000
CFOA_TA	-0.080201	0.008298	-9.66	0.000
PBDITA_TA	-0.101429	0.008021	-12.65	0.000
CAP_TA	-0.071132	0.017017	-4.18	0.000
B&D_TA	-0.044387	0.007536	-5.89	0.000
SGR	-0.004367	0.001459	-2.99	0.002
PD	0.836679	0.013191	63.43	0.000
GG	0.273512	0.012527	21.83	0.000
_cons	0.707835	0.015926	44.44	0.000

Source: Author calculations

To further check the robustness of the model estimated in Table 3.11, we re-estimated the model using discrete risk levels. The results are presented in Table 3.14. The results indicate that the group and government firms (GG) with higher risk are able to borrow more than those with lower risks. This is especially true in the case of worst-risk firms (RC4) whose coefficient is highest (.347). We argue that high-risk group and government firms are able to borrow more

due to the presence of soft budget constraints and moral hazard type lending in the economy, especially by the public sector banks to government enterprises and large group firms.

Table 3.14: Lending bias in favour of GG firms with discrete risk levels

R-square:		Number of obs	=	53,788
within	= 0.7843	No. of groups	=	3,164
between	= 0.8276	Wald chi2	=	200050.39
overall	= 0.8091	Prob > chi2	=	0.0000
BTA	Coef.	Std. Err.	z	P > z
FIRM_SIZE	0.075127	0.004203	17.87	0.000
FA_TA	0.589931	0.003407	173.11	0.000
CFOA_TA	-0.099346	0.008527	-11.65	0.000
PBDITA_TA	-0.121063	0.009291	-13.03	0.000
CAP_TA	-0.077264	0.017401	-4.44	0.000
B&D_TA	-0.047013	0.008091	-5.81	0.000
SGR	-0.004530	0.001336	-3.39	0.000
GG*RC1	0.109345	0.016668	6.56	0.000
GG*RC2	0.138732	0.015927	8.71	0.000
Non-GG*RC2	-0.084238	0.011157	-7.55	0.000
GG*RC3	0.159834	0.019187	8.33	0.000
Non-GG*RC3	-0.130107	0.014172	-9.18	0.000
GG*RC4	0.347432	0.017267	20.12	0.000
Non-GG*RC4	0.011534	0.003708	3.11	0.000
_cons	1.290342	0.020095	64.21	0.000

Source: Author calculations

(C4) Pre- and post-crisis comparison of lending bias

To compare the lending bias, we divided the sample into two subsamples-pre and post-crisis. Many experts suggest that the subprime financial crisis hit the Indian banking sector in 2009-10 (Sinha, 2012). Therefore, we choose 2009-10 as the year of crisis and use it to divide the sample into pre-2010 and post-2010 subsamples. The estimation results for pre- and post-crisis periods is given in Table 3.15. The lending bias towards the group and government firms seems to have been exacerbated after the financial crisis. This points towards further softening of soft budget constraints after the crisis. Banks might have focused on lending more to government companies because of implicit guarantees behind such loans. Implicit government guarantees have been shown to create a lending bias towards firms with more state ownership (Lu et al., 2005a). In the case of group companies, banks might be lending more to them with the

assumption that a group-affiliated firm will find support from other firms in the group at the time of financial difficulty. Again, many group companies are in partnership with government companies in sectors like infrastructure under the public-private partnership (PPP) model. This PPP mechanism may also have fostered softening of budget constraints because private group companies in these partnerships usually rely on the govt. for support. And public sector banks being government-owned may also be lending to such joint arrangements with relatively less prudence because they feel the loans are protected by implicit government guarantees. Moreover, the practice of debt restructuring, initially allowed by RBI to tide over the bad phase brought about by the financial crisis, has been heavily used by bankers to maintain capital ratios. The rollover of loans to maintain capital ratios is a manifestation of SBC (Tsuji, 2015). Another reason for lending bias towards large group companies may be the relationship banking through which group firms drag the banks into interminable relationships due to the group firms' high bargaining power and the threat of switching to other banks (Rajan, 2018). These results are in agreement with Agrawal (2015) who showed that group-affiliated firms in India have preferential access to debt financing on cheaper terms from public sector banks and financial institutions as compared to stand-alone firms. As can be seen from Table 3.15, pre-crisis lending was more responsive to collaterals, liquidity gross earnings while post-crisis lending seems to be more responsive to firms' demand for loans (proxied by the sales growth rate, SGR). The increase in the coefficient of PD after the financial crisis suggests that lending has become riskier and this risk seems to have been induced by SBC driven lending behaviour. These findings are in line with (Ghosh, 2017). But for banks, this risk seems to be insured by perceived implicit guarantees.

Table 3.15: Pre- and post-crisis lending bias

Pre-crisis lending bias					Post-crisis lending bias				
R-square:					R-square:				
within	=	0.7773			within	=	0.7847		
between	=	0.7566			between	=	0.8392		
overall	=	0.7638			overall	=	0.8275		
Number of obs	=	25,312			Number of obs	=	25,312		
No. of groups	=	3,164			No. of groups	=	3,164		
Wald chi2	=	86680.62			Wald chi2	=	98611.10		
Prob > chi2	=	0.0000			Prob > chi2	=	0.0000		
BTA	Coef.	Std. Err.	z	P> z	Coef.	Std. Err.	z	P > z	
FIRM_SIZE	0.089127	0.004533	19.66	0.000	0.065125	0.004192	15.53	0.000	
FA_TA	0.597864	0.004619	129.41	0.000	0.382262	0.004649	82.22	0.000	
CFOA_TA	-0.083654	0.010189	-8.21	0.000	-0.056587	0.010778	-5.25	0.000	
PBDITA_TA	-0.131123	0.010836	-12.1	0.000	-0.091027	0.011238	-8.1	0.000	
CAP_TA	-0.075974	0.018046	-4.21	0.000	-0.075111	0.017508	-4.29	0.000	
B&D_TA	-0.045269	0.006261	-7.23	0.000	-0.047231	0.007885	-5.99	0.000	
SGR	-0.000897	0.000300	-2.99	0.000	0.006729	0.002938	2.29	0.024	
PD	0.687510	0.018073	38.04	0.000	0.711254	0.021546	33.01	0.000	
GOV_F	0.367149	0.046008	7.98	0.000	0.639929	0.052930	12.09	0.000	
GROUP_F	0.228352	0.013346	17.11	0.000	0.352741	0.016203	21.77	0.000	
_cons	0.513876	0.018906	27.18	0.000	1.482351	0.025413	58.33	0.000	

Source: Author calculations

(D) Empirical strategy for testing credit rationing

To see whether banks practice credit rationing, we test the sensitivity of investments to the internal cashflows. After controlling for (i) investment and growth opportunities (Tobin's q), and (ii) other external sources of finance (B&D_TA), a low investment-cash flow sensitivity of a high-risk firm indicates that the bank credit is easily available to such a firm. This implies a lack of effective credit rationing. Investment cash-flow sensitivity model has been employed by Fazzari, Hubbard, & Petersen, (2000) and Fazzari, Hubbard, & Petersen, (1988) to study the investment sensitivity of financially constrained firms to the availability of internal finance. They found that investments of financially constrained firms are more sensitive to the availability of internal funds. International studies also provide evidence of a firm's investments being highly related to its cash flows. Following their work, other studies conducted in both developed and emerging economies also support the fact that firm investments are related to cashflows (Aggarwal & Zong, 2006; Cleary, Povel, & Raith, 2007; Degryse & De Jong, 2006;

Ghosh, 2006; Kadapakkam, Kumar, & Riddick, 1998; Laeven, 2003; Shen & Wang, 2005; Ghosh, 2006).

Since investments are financed either through internally available capital or external borrowings, investment to cash flow sensitivity serves as a good measure of how easily a firm gets external finance (bank credit). In our sample of firms, we find that investments are positively correlated with bank borrowings ($r = 0.89$). So, a lower investment to cash flow sensitivity for a high-risk firm would mean that the firm is not financially constrained (suggesting easier availability of bank finance).

In line with Fazzari et al., (1988) model we develop the following testable model.

$$\begin{aligned}
 INV_K = & \beta_0 + \beta_1 Q + \beta_2 Q_{i,t-1} + \beta_{31} CFC_{it} * RC1 + \beta_{32} CFC_{it} * RC2 + \beta_{33} CFC_{it} * RC3 + \\
 & \beta_{34} CFC_{it} * RC4 + \beta_4 CFC_{i,t-1} + \beta_5 S_K_{it} + \beta_6 S_K_{i,t-1} + \beta_7 B\&D_TA_{i,t} + \beta_8 CAP_TA_{i,t} + \\
 & \alpha_{re,i} + \pi_{it}
 \end{aligned}
 \tag{3.3}$$

where INV_K , Q , CF_K , S_K , $B\&D_TA$, CAP_TA respectively represent investment to capital stock, Tobin's q (a proxy for growth opportunity), cash flow to capital stock, sales to capital stock, bonds and debentures to total assets and capital to total assets; $\alpha_{re,i}$ is the time-invariant random effect and π_{it} is the residual error. We employ $B\&D_TA$ to control for other sources of external finance like bonds and debentures. This allows us to examine how easily the firms are able to secure bank credit. CAP_TA is used as a control variable for a firm's demand for bank credit. For detailed variable descriptions refer to Table 3.3

The interaction of risk dummies and cashflows gives us a measure of the sensitivity of investments to cash flows of firms (internal capital) in different risk classes. For credit rationing to hold, $\beta_{31} < \beta_{32} < \beta_{33} < \beta_{34}$ which leads us to the hypothesis: $\beta_{31} = \beta_{32} = \beta_{33} = \beta_{34}$ implying that the difference in the coefficients of interaction terms of cash flow with different risk levels is insignificant.

(D1) Empirical results of investments-to-cashflow sensitivity model

In this section, we present the empirical results of investments-cash flow sensitivity model. First, we present the investment pattern of sample firms across different risk classes and firm sizes. Table 3.16 shows the investment pattern of our sample firms by risk categories. The mean and median investments decrease with the increase in risk level. The variability of

investments is lowest in case of default firms. This can be due to their indifference to the riskiness of investment opportunities.

Table 3.16: Investment of firms by risk category

Risk Leve	RC1	RC2	RC3	RC4	All Firms
Investments (INV_K)					
Mean	1.908617	1.290673	0.7170141	0.5304336	1.529061
Med	1.722345	0.7741171	0.3278832	0.2297793	1.114511
Max	6.292972	5.040537	5.149314	3.837317	6.292972
Min	0.0005583	0.0005794	0.0005411	0.0005583	0.0005411
Sd	1.505923	1.372892	1.102264	0.7543342	1.475231

Source: Authors calculatons

Table 3.17: Investment of firms by firm size

Size	Small	Medium	Large	All Firms
Investments (INV_K)				
Mean	0.270273	1.092633	3.163548	1.529061
Med	0.082991	0.6697881	3.219883	1.114511
Max	1.23157	4.671048	6.292972	6.292972
Min	0.008015	0.0005411	0.0073164	0.0005411
Sd	0.294278	1.121554	1.412371	1.475231

Source: Authors' calculations

Table 3.17 shows the investment pattern of small, medium, and large firms. The classification was done based on time averaged total assets (TAVTA). The sample firms were arranged in ascending order of their TAVTA. Then the sample was divided into small, medium, and large categories so that mean TAVTA of medium firms was 50 percent more than that of small firms and mean TAVTA of large firms was 50 percent more than that of medium firms. The data in Table 3.17 shows that investment growth of large firms is much larger than the sample average. The variability of investments is lesser in the case of small firms possibly due to lack of access to capital for expansion.

(D2) Credit rationing and firm riskiness

Table 3.18 presents the results of the investment-cashflow sensitivity model for different risk categories of firms for estimating the ease of availability of bank credit (external finance) to different firms in different risk categories.

Table 3.18: Estimation results of Investments-Cashflow sensitivity model

Variable	Coeff.	Std. Err.	t	P > t
Q	0.003478	0.000269	12.91	0.000
Q (-1)	0.004348	0.000370	11.74	0.000
CAP_TA	0.071131	0.015412	4.61	0.000
B&D	0.041712	0.006213	6.73	0.000
RC1*CF_K	0.079921	0.019990	3.99	0.000
RC2*CF_K	0.119145	0.047788	2.49	0.013
RC3*CF_K	0.053420	0.024172	2.21	0.027
RC4*CF_K	0.023548	0.048509	2.06	0.040
CF_K (-1)	0.062219	0.023001	2.71	0.006
S_K	0.311411	0.037275	8.35	0.000
S_K (-1)	0.057601	0.026445	2.18	0.030

R-squared = 0.40
 Source: Authors' calculations

Significance Level = 5per cent

From Table 3.18, we note the following:

- 1) The small beta value of RC1*CF_K as compared to RC2*CF_K shows that internal capital has a lesser impact on investments of best risk firms (RC1) and medium risk firms (RC2). This shows that their investments are not strongly dependent on internal capital indicating that best risk firms enjoy easier access to credit than medium risk firms. Thus, best risk firms may not be subjected to credit rationing by banks.
- 2) RC2 firms (medium risk firms) have higher value of beta (0.119) suggesting a greater effect of fluctuations in internal capital on their investments and hence they appear to be facing stricter credit rationing by banks as compared to RC1 firms.
- 3) RC3 and RC4 firms' investments are least responsive to internal capital indicating the ineffectiveness of credit rationing on them. The coefficients of RC3*CF_K and RC4*CF_K are statistically significantly different from each other at the 5 per cent significance level.
- 4) RC3 and RC4 (High and Worst risk) firms' beta weights are lower than RC1 and RC2 (Low and medium) risk firms. This indicates lower financial constraints on such firms or weak risk-based credit rationing to such firms. Thus, banks do not seem to lend according to the riskiness of these firms. This might be due to lax credit appraisal being done by banks at the time of making lending decisions. The absence of effective credit

appraisal and loan monitoring has been cited to be the major reason for the build-up of bad loans in Indian public sector banks. The lower values of beta coefficients of cash flows of different risk category firms indicate either ineffectiveness of rationing on firms or the existence of weak rationing.

Since most of the long-term corporate lending is done by government-owned banks, their cost of liquidity is lesser due to implicit government guarantees which decreases the probability of credit rationing (Alexandre & Clavier, 2017). State ownership of banks who finance long term projects seems to have fostered relaxed credit after the roll-over and restructuring policies of RBI post-2008 financial crisis. State-owned banks may be politically influenced to grant financing to firms with low creditworthiness (La Porta et al., 2002; Shleifer & Vishny, 1994; Kornai, 1979; Boubakri et al., 2017).

Furthermore, state ownership of banks softens the budget constraints of the borrowers whereby they refinance the borrowers (usually SOEs) with questionable creditworthiness just to keep them afloat. (Berglof & Roland, 1998; Kornai, 1993; Megginson & Netter, 2001).

(D3) Bank credit rationing and firm size

The results in Table 3.19 show that investments of large firms are less responsive to the changes in the internal capital than the medium and small firms respectively. The coefficient of SF*CF_K is almost twice the coefficient of MF*CF_K and more than two times than that of LF*CF_K. All coefficients are significant at 5 per cent level of significance. Even at a given risk level, the investments of large firms are less sensitive to internal cash flows than those of small firms. This indicates that larger firms have easy access to credit than small firms even when the risk level is the same (see Table 3.20). The results are in line with (Drakos & Giannakopoulos, 2018) who show that the likelihoods of bank credit rationing increase as firm size decreases. The reason for higher credit rationing for small firms is that they are relatively opaque and do not have a long relationship history with the banks (Kirschenmann, 2016).

Credit rationing depends upon the length of the relationship between borrowers and lenders and it varies for different size groups of firms. The length of the relationship with the main bank substantially decreases the probability of rationing for large firms endowed with more bargaining power (Cenni et al., 2015). Small firms in India may not be in a position to develop multiple bank relationships along with a strong relationship with the main bank as compared to larger firms which may explain their disadvantaged access to credit (Angori et al., 2020). Small firms being relatively opaque and young generally engage in transactional relationships

with banks which may increase the probability of credit rationing in their case (Ferri & Murro, 2015). Larger firms enjoy strong relations with banks and thus they may not be as strictly rationed (Ferri et al., 2020). We argue that relationship-based lending ignores the risk and the borrowers' budget constraints become soft. A financially troubled borrower can still get a loan or refinance an existing loan if it engages in a relationship with the lending bank. And public-sector banks operating with an expectation of bail-out by the government also face soft budget constraints. Moreover, at a given risk level, the banks should treat the same size borrowers similarly. But our results do not show that risk-based credit rationing is strictly being practised by banks. The coefficients of $LF*RC1*CF_K$ and $MF*RC1*CF_K$ are not very much different in magnitude and they are not statistically significantly different. This implies that banks view large and medium-sized firms in best-risk category (RC1) as being similar.

Table 3.19: Investments-to-Cashflow sensitivity model and firm size

Variable	Coeff.	Std. Err.	t	P > t
Q	0.002401	0.000264	9.10	0.000
Q (-1)	0.000488	0.000204	2.39	0.007
CAP_TA	0.069112	0.016942	4.08	0.000
B&D_TA	0.043352	0.005923	7.32	0.000
SF*CF_K	0.661213	0.149595	4.42	0.000
MF*CF_K	0.352313	0.155204	2.27	0.013
LF*CF_K	0.258021	0.121136	2.13	0.027
CF_K (-1)	0.054630	0.021764	2.51	0.012
S_K	0.276521	0.035280	7.84	0.000
S_K(-1)	0.059110	0.026445	2.23	0.025

R-squared = 0.46

Significance Level = 5per cent

Source: Authors' calculations

To test the credit rationing hypothesis for firms of different risk classes falling in different size groups, we replaced CF_K with CF_K*SIZE in the previous specification and the results are depicted in Table 3.20. The coefficients of RC_i*CF_K*SIZE , $SIZE$ being a three-level categorical variable coded as 'Small Firm (SF)', 'Medium Firm (MF)' and 'Large Firm (LF)', measure investment-to-cashflow sensitivities for small, medium and large firms in different risk categories. Within the Large Firms, the coefficient decreases from RC1 to RC4 firms indicating the weak credit rationing. The impact of internal finance on investments goes down

with the increase in the risk of large firms. This implies that banks' lending to these firms is not done based on their riskiness. The coefficient of LF*RC4*CF_K is the lowest among large firms. This shows that worst-risk firms' investments are not affected by their internal capital constraints. Similar results were obtained for medium firms of different risk categories. This may be because lending against collateral may not necessarily curtail risk rather it can create some negative incentives for the borrowers who might gamble to save their collateral (Niinimäki, 2018).

Table 3.20: Investments-to-Cashflow sensitivity model across firm size and risk category

Dependent Variable: INV_K				
GLS random-effects regression				
Number of firms: 3164				
Number of observations = 53788				
Variable	Coeff.	Std. Err.	t	P > t
Q	0.003567	0.000351	10.16	0.000
Q (-1)	0.004836	0.000401	12.06	0.000
CAP_TA	0.070212	0.015582	4.51	0.000
B&D_TA	0.044542	0.004974	8.96	0.000
LF*RC1*CF_K	0.428311	0.038539	11.11	0.000
LF*RC2*CF_K	0.405111	0.086240	4.69	0.000
LF*RC3*CF_K	0.229768	0.040496	5.67	0.000
LF*RC4*CF_K	0.165035	0.080672	2.06	0.039
MF*RC1*CF_K	0.407014	0.094445	4.31	0.000
MF*RC2*CF_K	0.360407	0.088078	4.09	0.000
MF*RC3*CF_K	0.301282	0.099180	3.03	0.002
MF*RC4*CF_K	-0.2369	0.076115	-3.11	0.001
SF*RC1*CF_K	0.610658	0.289099	2.11	0.034
SF*RC2*CF_K	0.652468	0.307735	2.12	0.034
SF*RC3*CF_K	0.690925	0.346733	1.99	0.046
SF*RC4*CF_K	0.683565	0.356020	1.91	0.056
CF_K (-1)	0.053423	0.021816	2.45	0.014
S_K	0.315457	0.036265	8.69	0.000
S_K(-1)	.057607	0.025435	2.26	0.030

R-squared = 0.63 Significance Level = 5 per cent
Source: Authors' calculations

In the case of small firms, contrary results were found. Small firms' coefficients increased from RC1 to RC3 indicating the existence of credit rationing. Only the coefficient of SF*RC4*CF_K was found to be less than SF*RC3*CF_K, but the difference is insignificant at 5 per cent level of significance. This could again be due to the fact that banks may not be differentiating SF*RC4*CF_K firms from SF*RC3*CF_K firms. The large negative

magnitude of the coefficient of $MF*RC4*CF_K$ indicates relaxed credit rationing to worst risk medium-sized firms. Lastly, the higher overall investment-to-cash flow sensitivity of small firms indicates that the banks perceive small firms as being riskier than medium and large firms.

(D4) Credit rationing post-Asset Quality Review

In 2015, RBI undertook an extensive asset quality review (AQR) covering 93 per cent of banking assets in which the loan portfolios of 36 largest banks were reviewed. As a result of this rigorous review, banks were asked to (i) clean up their banking books by recognising bad loans which were hitherto not classified as NPA, and (ii) make provisions for hidden and impaired assets before March 2017. AQR was followed by the introduction of Insolvency and bankruptcy code in early 2016 to enable banks to complete the default resolution in a time-bound manner. To make AQR a meaningful exercise, Govt. of India has reinforced its commitment towards provisions and structural changes in the banking sector by promising a fresh infusion of Rs 700,000 million to public sector banks to support an increase in credit flow into the economy by buttressing the capital base of banks (Roy, 2019).

To test whether Indian banks strengthened the credit rationing post AQR and IBC, we modified the investment-cash flow sensitivity model by including a time dummy variable ‘post_AQR’, where $post_AQR = 1$ if year > 2015 or 0 otherwise¹³. The results are tabulated in Table 3.21. The results show that post AQR there is evidence for credit rationing as the coefficient of $RC1*CF_K*post_AQR$ is less than $RC2*CF_K*post_AQR$ and $RC3*CF_K*post_AQR$. Only RC4 firms’ investments are less sensitive to the internal finance after AQR indicating no effectiveness of credit rationing on them. This can be explained in terms of unresolved NPAs on the banks’ balance sheets which await resolution. The most plausible explanation for apparently lax credit provision to worst-risk firms (negative coefficient of investment-to-cash flow sensitivity) even after AQR seems to be due to the stagnation of already made bad loans and resolution delays of bankruptcy cases because it takes years to recover the bad loans. This resolution delay is supported by data. According to the World Bank, the average loan recovery period in India is highest (4.3 years) among major Asian economies. As of March 2017, the recovery rate of NPAs in India stood at 20.8 per cent which is far below the 2009 recovery rate of 61.8 per cent (RBI, 2017). Despite the enactment of Insolvency and

¹³ We assume simultaneous arrival of AQR and IBC although, AQR was started in October 2015 and IBC came into force on May 28, 2016.

Bankruptcy Code in 2016, the loan recovery has not picked up as much as was anticipated and resolution delays are again threatening to make IBC toothless (Rebello & Ray, 2019). Effective credit rationing cuts financing to risky industries. Thus, a more efficient resolution of borrower default and bank failures can help in financing more industries for a given opportunity cost of funds. This necessitates strengthening the institutional arrangements for bankruptcy resolution and bank failure (Elosegui, 2003). Our results show that banks have started to lend in a disciplined fashion after the introduction of AQR and IBC.

Table 3.21: Investment-to-Cash flow sensitivity post-Asset Quality Review (AQR)

Variable	Coeff.	Std. Err.	t	P > t
Q	0.003528	0.000271	13.02	0.000
Q (-1)	0.000498	0.000190	2.61	0.009
CAP_TA	0.071113	0.014954	4.76	0.000
B&D_TA	0.043312	0.004861	8.91	0.000
RC1*CF_K	0.172485	0.034884	4.94	0.000
RC1*CF_K*post_AQR	0.072525	0.033112	2.19	0.028
RC2*CF_K	0.098036	0.048877	2.01	0.044
RC2*CF_K*post_AQR	0.310840	0.091812	3.39	0.001
RC3*CF_K	0.036635	0.017445	2.10	0.035
RC3*CF_K*post_AQR	0.356909	0.115501	3.09	0.002
RC4*CF_K	-0.154491	0.077621	-1.99	0.046
RC4*CF_K*post_AQR	0.159343	0.077988	2.04	0.041
CF_K (-1)	0.058037	0.022924	2.53	0.011
S_K	0.309152	0.037127	8.33	0.000
S_K(-1)	0.052567	0.026359	1.99	0.046

R-squared = 0.40
 Source: Authors' calculations

Significance Level = 5per cent

3.6 Discussion and conclusions

This study attempted to explore the lending behaviour of banks and offer a banking system structure specific explanation for the NPA build-up in India. Specifically, we tried to investigate whether bank lending was driven by SBC and whether the presence of SBC makes bank lending biased towards government and group firms. We also attempted to investigate whether banks have resorted to credit rationing because effective credit rationing would most likely prevent the emergence of bad loans. Based on a panel of 3164 firms across different

sectors of the Indian economy, we attempt to analyse the soft budget constraint-driven lending behaviour of banks over 17 years from 2002 to 2018.

We find bank lending (firm borrowing) is driven by SBC. We also find that bank lending is biased in favour of government and group firms as against the individual private firms. This inherent bias seems to have exacerbated after the 2008 financial crisis. Moreover, banks are lending more as the risk level of the government and group firms goes up. This can be explained by the fact that both banks (lenders) and firms(borrowers) are facing soft budget constraints. Due to repeated recapitalizations, the public sector banks' lending is not fully risk based as they feel that they are covered against the risk of failure by government guarantees. They lend more to government companies because these companies' default risk is insured by implicit government guarantees. The lending bias in favour of group companies can be due to the following two reasons: (1) relationship-based banking activities which banks find hard to forego because large firms enjoy considerable bargaining power for restructuring the loans taken for their faltering projects. (2) PPP projects where large group companies and government join hands to finance long gestation period projects in sectors like infrastructure and (3) the banks rather than going for in-depth risk analysis of borrowers simply assume that larger group-affiliated borrowing firms are better safer than individual private firms. It appears that the banks have shown the gambling for resurrection type behaviour by not letting the high-risk firms default (Ghosh, 2017). Such defaults would not be good news for bank managers. Such gambling for resurrection was partly encouraged by the government and RBI through regulatory forbearance post-financial crisis. This has not worked well for the banking system which finds itself under the huge mountain of crippling bad loans. The already existing moral hazard and soft budget constraint-driven lending has exacerbated after the financial crisis.

With NPAs standing at very high levels in the public sector banks, just writing off bad loans and recapitalizing PSBs is not going to be enough. The recapitalization of banks has to be followed by strong legal procedures to which would discourage the development of future bailout expectations among banks and borrowers alike. Besides governance of public sector banks in India needs to be improved because governance quality and performance has a significant bearing on financial and risk performance of banks (Lafuente et al., 2019). Strengthening of financial institutions is crucial for ensuring non-recurrence of bad loan crises because the improvement in corporate governance, banking system transparency, easy access to financial information and credit and promotion of investor-friendly practices are directly related to the strength of financial institutions (Dutta & Mukherjee, 2018). Besides,

privatization or divestment, if pursued, must be substantial to stop state influence on corporate strategies. Partial divestment to enhance efficiency and eliminate soft budget constraint syndrome may not work completely (Cardinale & Belotti, 2022). From the credit supplier end, foreign participation of foreign banks can further improve the credit allocation and minimize the distortions created by politically oriented lending by state control of banks (Tsai et al., 2014).

The introduction of Insolvency and Bankruptcy Code is a step in this direction but what remains to be seen is how effectively it is implemented. Strong commitments from Government are needed to enforce hard budget constraints on PSBs, PSEs and group firms so that the lending bias is eradicated and cyclic accumulation of NPAs is prevented. The legal system needs to be recast in such a manner which encourages equitable sharing of losses (R.G. Rajan, 2014). To address the problem of recurring bad loans, RBI has taken some decisive steps. It has asked the banks to share information on big borrowers in a shared database to overcome informational asymmetries. Strategic debt restructuring has been revised to give banks more powers using which they can change ownership of borrowing entities in cases where the inefficient borrowers are unable to turnaround their businesses.

Our results also show that banks do not ration credit strictly according to the riskiness of borrowers and they prefer large borrowers over small borrowers at the same risk level. These results are consistent with Srinivasan and Thampy (2017) but in contrast to Banerjee et al (2014). However, our findings should be considered with care due to certain limitations of the study. Our dataset was chosen based upon the availability of data for the sample firms during the selected period. We find that banks in India do not stick to strict credit rationing based upon riskiness of borrowers. For effective credit rationing, the sensitivity of cash flows to investments should be in descending order from low risk (RC1) to worst-risk (RC4) firms. For effective credit rationing, there should be relaxed credit rationing for best risk (RC1) firms followed by moderate (RC2), high (RC3) and worst-risk (RC4) firms. But our results show that worst-risk firms also enjoy relaxed credit. This can be explained in terms of banks' 'entanglement' with the borrowers wherein the banks become hostages to the borrowers' demands. The fear of bankruptcy of the borrower motivates the banker to keep supporting the former with the hope of turning around a bad project because the banker does not want to declare the loan as NPA (Ghosh, 2017). This 'entanglement' and 'speculatory evergreening' in turn is encouraged by a banks' deep belief that they are 'too important to fail'. Public sector banks in India, due to their government ownership, have a history of being rescued by the

government through recapitalizations and it is primarily PSBs that suffer from recrudescence of bad loans.

We also found that large firms enjoy easy access to credit than medium and small firms. At a given risk level, small firms' cash flow sensitivities were much higher than those of large firms. This shows that large firms enjoy the easy availability of credit than small firms. Also, within small firms, the credit rationing seems to be working perfectly with low-risk small firms enjoying better credit access than higher-risk small firms. The rationing bias in favour of large firms can be explained by as follows. Large firms generally have long and intimate relationships with banks and they have high bargaining power. The length of the relationship with the main bank substantially decreases the probability of rationing for large firms endowed with more bargaining power (Cenni et al., 2015). Small firms may not be in a position to develop multiple bank relationships along with a strong relationship with the main bank as compared to larger firms which may explain their disadvantaged access to credit (Angori et al., 2020). Small firms being relatively opaque and young generally engage in transactional relationships with banks which may increase the probability of credit rationing in their case (Ferri & Murro, 2015). Larger firms enjoy strong relations with banks and thus they may not be as strictly rationed (Ferri et al., 2020). We argue that relationship-based lending ignores the risk and makes the budget constraints soft. A financially troubled borrower can still get a loan or refinancing for an existing loan if it engages in a relationship with the lending bank. And public-sector banks operating with an expectation of bail-out by the government also face soft budget constraints. This softening of budget constraints may encourage lending to risky borrowers.

Also, the existence of public-private partnership (PPP) model for financing long term and strategic projects in sectors like infrastructure (Sengupta & Vardhan, 2017) may be another channel through which soft budget syndrome develops. These projects are mostly taken up by large firms. Due to long gestation periods, most projects in infrastructure, funded through the PPP model, have defaulted leading to non-performing loans in the banks' balance sheets. Government, in a PPP model, acts as a lender and borrower simultaneously because the government owns public sector banks as well as a part of PPP projects. This situation creates the right conditions for the softening of budget constraints. Banks feel more than safe to lend to PPP projects and may not care about due diligence as much as they should and project promoters in PPP projects expect the government to keep the project afloat during difficult circumstances. Additionally, in the absence of strong credit appraisal and due diligence, the

size of a firm may be taken as a signal of its creditworthiness by banks because larger companies have comparatively a lot to lose if they default (Davis, 1994; Hoshi et al., 1993). In an economy with soft budget constraints, the market discipline also becomes weak leading to excessive risk-taking by banks. The lack of strict credit rationing in an economy can encourage more and more borrowers to undertake risky projects leading to moral hazard type lending. Such lending would benefit managers and stockholders at the cost of government if the government keeps taking the burden of NPAs on its shoulders. With huge stress in the banking system, the recapitalization of PSBs alone is not going to solve the problem. Our study reveals that AQR and IBC have been able to induce some discipline in the credit market. After the introduction of AQR and IBC, credit rationing seems to have taken some hold.

The study has policy implications. Banks' lending should be made more risk-based by introducing strict credit appraisal and due diligence mechanisms. This is especially important for large loans. A third-party supplementary appraisal of the borrowers can be one way to ensure that banks lend according to the riskiness of the borrowers.

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CHAPTER 4. MARKET DISCIPLINE, RISK-TAKING BEHAVIOUR, AND NON-PERFORMING LOANS IN INDIAN BANKING SYSTEM

Abstract

This chapter seeks to investigate how effectively the market disciplinary forces, proxied by information disclosure and interbank deposits, incentivise the Indian banks to adopt prudential risk management by enhancing their risk-weighted capital ratio. Using a panel dataset of 36 commercial banks from 2004 to 2018, we test whether increased use of interbank deposits and more information disclosure check the risk-taking behaviour of banks in India. First, we run the aggregate model and we find that economic growth is not significantly related to bank capital ratio. Profitability (ROA) has a significant positive impact on bank capital. Size of the bank has a positive and significant effect on bank capital. We find evidence that non-performing assets lead to erosion of bank capital and information disclosure and interbank deposits do not induce prudential risk behaviour among banks in India. However, when the interaction of banking sector concentration and market discipline measures (information disclosure and interbank deposits) is used in the model, we find that with increasing concentration in the banking sector, a higher level of information disclosure effectively induces banks to maintain higher capital ratios, but interbank deposits do not have any significant effect on bank capital. We also observe that government banks maintain lower capital ratios as compared to private banks. The main reason behind the lower capital of government banks is the expectation of a bailout by the government in the event of financial problems.

4.1 Introduction

Since the 1991 reforms, the Indian banking system has undergone several structural changes. Major policy changes initiated include the introduction of prudential norms and internationally accepted accounting practices, risk-based capital in line with Basel norms, phased reduction in cash reserve ratio (CRR) and statutory liquidity ratio (SLR), strengthening of bank supervision, deregulation of entry and issuance of licenses to private banks and interest rate deregulation (Sengupta & Vardhan, 2017). The demise of development financial institutions coupled with the euphoria associated with financial liberalization and globalization made the commercial banks more exuberant and they started lending aggressively to the corporate sector. The banking and other economic reforms ushered an era of unprecedented growth in India from 2002 to 2008. However, despite market-based reforms, the government of India's inherent pro-

socialistic attitude did not change much, and this became manifest after the financial crisis hit the Indian economy. Rather than letting the poorly performing banks face the losses and possible failure, the government of India started an unending programme of recapitalization of public sector banks thereby weakening the market discipline which, among other things, the market reforms intended to strengthen. The timing and magnitude of the current NPA crisis points to the exacerbation of soft budget constraint problems and poor market discipline. As per Reserve bank of India (RBI) data on global operations, the gross NPAs of public sector banks rose from Rs. 2,790 billion as on March 2015 to Rs. 8,956 billion as on March 2018. The main reasons cited by RBI for this high growth in bad loans include aggressive lending practices, corruption, loan frauds, wilful default and economic slowdown (Press Information Bureau Government of India Ministry of Finance, 2019). The accumulation of NPAs has posed serious risks to the capital base of banks. According to a report by (BMI Research, 2018), Indian banks need an estimated USD 65 billion of additional capacity to stay Basel III compliant

From soft budget constraints and market discipline perspective, banks would not lend and restructure the loans to loss-making firms if there were hard budget constraints and market discipline was strong and effective. The effective operation of market discipline could thus keep the NPAs to a minimum acceptable level. But the high levels of NPAs with public sector banks suggests that market discipline is not working well in India and budget constraints are not hard enough. To fully develop a market-based banking system and avoid the repetition of the ongoing NPA crisis, the responsiveness of bank risk to market forces has to be improved in the Indian banking sector as overwhelming evidence across countries suggests that crises weaken the market discipline (Cubillas et al., 2012). For instance, while testing the presence of depositor-imposed discipline in EU and US before and during the financial crisis, Berger & Turk-Ariss (2015) found the existence of significant market discipline exerted by depositors before the crisis in both the EU and US which considerably decreased during the crisis.

The Indian banking system is one of the most strongly regulated banking systems in the world. This rigid regulatory regime has been touted as the key defence wall against the devastating effect of the 2008 financial crisis. The purpose of regulation and supervision is to safeguard the depositors and maintain stability in the economy. However, it is not easy to design optimal regulation in banking due to the conflicting interests of different stakeholders and political intervention. This underscores the importance of strengthening market discipline as an alternative to costly regulation in banking. The universal problems of moral hazard, poor

market discipline and asymmetric information affecting the banking and financial systems around the world were highlighted by the 2008 global financial crisis. To overcome these problems, Basel III mandates banks to disclose more risk-related information to all stakeholders in a timely fashion so that they can assess the banks' riskiness and capital adequacy. Greater disclosure of information helps strengthen market discipline and facilitates effective prudential risk management. Thus, market discipline is an important part of the Basel III regulatory regime.

Lack of market disciplinary forces blunts prudential behaviour and makes the banking system vulnerable to the accumulation of risks in the form of stressed assets. In the backdrop of the magnitude and characteristics of the current NPA crisis, this chapter seeks to examine how effectively the market discipline is operating in the Indian banking system as the growing incidence of credit risk has been found to adversely affect the bank profitability of whole banking industry in India (Rakshit & Bardhan, 2022; Haque & Shahid, 2016)

We follow the approach given in Wu & Bowe (2010) to analyse how Indian banks' risk-taking behaviour is impacted by market-based disciplinary actions operating through changes in market concentration, interbank deposits and the level of information they disclose to their stakeholders. This is the first study in India to focus on information disclosure. Our results provide evidence that non-performing assets lead to erosion of bank capital and information disclosure and interbank deposits do not induce prudential risk behaviour among banks in India. When we introduce an interaction term between market discipline and concentration in the model, we find evidence that with increasing concentration in the banking sector, the higher the information disclosed by banks, the more the capital they hold but interbank deposits do not have any significant relation with bank capital. We also observe that government banks maintain lower capital ratios as compared to private banks. Information disclosure becomes an important tool for market discipline at a given loan quality.

4.2 Related background literature

Market discipline is the sum total of actions taken by the bank's stakeholders to implicitly penalize the bank for taking excessive risks by demanding extra returns or withdrawing their deposits (Nier & Baumann, 2006; Sironi, 2003). Market discipline is essentially a process through which the security holders monitor the actions of the firm and then cause the firm to reflect this monitoring in its behaviour. (Robert R. Bliss & Flannery, 2002). For effective market discipline, the monitoring actions should produce a change in the behaviour of the firm

(influencing). Without influencing, monitoring alone would not lead to market discipline (R.R. Bliss, 2004).

For market discipline to work effectively, four conditions must be met (Lane, 1993). Failure of market discipline may be due to failure of any of these conditions

a) Open and competitive capital markets

Market discipline requires that the credit markets be free and open so that interest rates are in accordance with the nature and level of borrowings. The forces of supply and demand should dictate the flow of credit in accordance with the borrowers' risk. The borrowers must not be subjected to captive markets where lenders do not have the power to deny credit. An example of a captive market would be the case of state-owned enterprises getting credit from banks at the dictation of government regardless of their credit rating. In such a scenario market discipline ceases to operate. To end the captive markets, financial markets should be liberalized to strengthen the market's disciplinary role.

b) Information

Another condition for making the market discipline effective is that information about borrowers' existing debt should be easily available to investors, regulators, and banks. This would help regulators and banks to accurately identify and assess financial risks. For supervisors and creditors, the information about the financial intermediaries is crucial as the latter may conceal and window dress their financial statements. Finally, borrowing costs may not reflect the entire information about the borrower's risk because banks, may be locked into the existing debt contract terms which might force them to keep the lending costs fixed despite the increase in the debt levels of the borrower.

c) No bailout

In case of an impending bankruptcy of the borrower, if the market participants believe that the borrower would be bailed out, the mechanism of market discipline would not work. Therefore, to strengthen the market discipline the market participants must not have any expectation of a bailout. This is a very crucial condition for market discipline to work. However, it is not easy to satisfy this condition. The market participants must believe the commitment to 'no bailout' from the concerned parties (usually government). The credibility of no-bailout commitment depends upon the incentives to keep up this promise. When the market perceives a borrower to be 'too big to fail' there will be a general belief of a bailout taking place no matter what the government says. Thus, in such a case the unsustainable borrowing will not push up the interest rate spread, and market discipline will fail. Another reason why no-bailout commitment lacks

credibility from the market participants' perspective is time inconsistency. Ex post bailouts are often beneficial as they may stop a chain reaction of defaults and thus help avoid a system crisis. However, ex-ante, the expectation and promise of a bailout give rise to moral hazard. Lenders no more bother about monitoring the borrowers' behaviour and borrowers may not have the incentive to maintain solvency. Thus, to avoid the moral hazard, a strong no-bailout commitment is appropriate even if each bailout is defensible individually.

Moreover, the bailout expectation also gives rise to 'soft budget constraint problem' in an economy with substantial government ownership. With the expectation of a government bailout, managers and workers in government-owned firms do not have a strong incentive for restructuring and high productivity to cut costs. This may lead to excessive risk-taking overmanning and inefficiency (Schaffer, 1989).

d) Borrower's response

With rising debt, as the interest rate of additional loans goes up, a rational borrower would cut back on borrowing to stay on a sustainable path. In the presence of perfect market information, a rational borrower would not wait for the interest rates to go up to refrain from unsustainable borrowing. When the borrowing levels become unsustainable, the borrowers may start gambling by taking additional loans rather than cutting on borrowing leading to failure of market discipline. Another reason for the failure of market discipline due to borrower response is that he may not have any intention to repay the debt at all. This makes the rising interest rate insignificant in disciplining the borrowers and leads to an adverse selection-the inability of the lenders to identify the borrowers with no intention to repay. (Stiglitz & Weiss, 1981) have used the problem of adverse selection to explain the credit rationing in private credit markets. The rationale behind credit rationing is the fact that there is no limit to the amount of borrowings for a borrower who does not intend to repay. The same can be argued about borrowers who have a very high likelihood of going insolvent. Such borrowers would borrow virtually at any interest rate.

Disclosure of information is a prerequisite for market discipline to work in a market (Hamalainen et al., 2003). Disclosure of relevant information by banks to their stakeholders greatly enhances their ability to distinguish good banks from bad banks. That is why Pillar 3 of Basel III accord stresses the important role of information disclosure for strengthening market discipline. Ready access to information about the risk profile of an intermediary like a

bank helps the investors to choose a better risk portfolio for their investments. This keeps the overall risk in the banking system under check. Further, the transparent disclosure makes the banks to avoid taking any undue risks because the bank managers know that their actions are constantly monitored by external observers.

(Cordella & Yeyati, 1998), (Blum, 2002), (Boot & Schmeits, 2000) have developed theoretical models explaining how disclosure of more information about risk exposure and use of uninsured deposits by banks will lead them to choose lower overall default risk on their loan portfolios in an equilibrium. This is because the greater disclosure enables the uninsured depositors of high-risk banks to demand compensation for bearing extra risk (Baer & Brewer, 1986; Cook & Spellman, 1994; Ellis & Flannery, 1992; Nier & Baumann, 2006)(Nier & Baumann, 2006). Apart from uninsured deposits, subordinated debt has also been found to enhance market discipline and decrease bank risk-taking (Nguyen, 2013).

There is a lot of theoretical and empirical literature which has shown that deposit insurance considerably weakens the depositors' incentive to monitor banks and if the deposits are uninsured, it strengthens their incentive to monitor the actions of banks (Diamond & Dybvig, 1986; Flannery, 1994); (Allen, Carletti, Goldstein, & Leonello, 2015)(Goldberg & Hudgins, 1996; Gropp & Vesala, 2004; Hoang, Faff, & Haq, 2014)(Karas, Pyle, & Schoors, 2013)(Hadad, Agusman, Monroe, Gasbarro, & Zumwalt, 2011a). In a single country-specific study (Wu & Bowe, 2010) following (Nier & Baumann, 2006) empirically tested the effectiveness of market discipline captured through interbank deposits and amount of information disclosure by banks in checking their risk-taking behaviour. Their findings confirmed the propositions of signalling theory that greater disclosure about risk exposures forces the bank managers to lessen the bank risk by increasing the capital buffer.

A prudently managed bank will increase the economic capital if its loan portfolio includes investments in risky projects with high default rate. In the absence of market discipline, the onus of monitoring and checking the risky behaviour of banks falls on the shoulders of regulators. However, due to the opaque and complicated asset portfolio structure, the task of regulation becomes very difficult. Thus, market discipline is the alternative market-based approach available to shareholders to constrain the banks from excessive risk-taking (Greenspan, 2001).

Traditionally market discipline in the banking sector has been analysed in terms of the actions of potential and actual depositors by examining whether they compel banks to

compensate them for taking an extra risk by demanding higher interest rates or reduction in the absolute level of uninsured debt (Hamalainen et al., 2003). These approaches are respectively called price-based and quantity-based approaches. The price-based approach to market discipline can be found in (Baer & Brewer, 1986), (Ellis & Flannery, 1992), (Jagtiani & Lemieux, 2001), (Sironi, 2003) among others. While the quantity-based approach to market discipline is employed in (Jordan, 2000), (Park & Peristiani, 1998) and (Das & Ghosh, 2004) among others. However, most empirical studies on market discipline have been carried out in developed economies with well-developed legal and financial systems in place (Nier & Baumann, 2006). The evidence from developing countries transitioning towards the market-based system is relatively little on this subject.

Testing the market discipline in Central and Eastern Europe using interbank deposits (Distinguin, Kouassi, & Tarazi, 2013) found that strong regulation reduces bank risk but dampens market discipline. They found market discipline depends on bankruptcy resolution strategies and institutional and legal factors and state-owned banks are not disciplined due to implicit government guarantees. Likewise from emerging markets, (Angkinand & Wihlborg, 2010) found that market discipline depends on the ownership structure of banks and the extent of deposit insurance. Deposit insurance can create moral hazard by shifting risks from the banking system to deposit insurance fund when the banks are undercapitalized. Market discipline is weakened by government guarantees and is more pronounced in listed banks than unlisted banks and in foreign banks than domestic banks (Hadad et al., 2011b). From South American countries also, there is little or no evidence for the presence of market discipline operating through interbank deposits and depositors. (Tovar-García, 2016; (Tovar-García, 2017); Tovar Garcia, 2017b)

The Indian banking system, although operating with deposit insurance system¹⁴ which might disincentivize bank stakeholders to monitor banks (Diamond & Dybvig, 1986; Flannery, 1994) saw a dramatic withdrawal of deposits from private sector banks to public sector banks during the financial crisis of 2008 even though both public and private banks are equally protected. This indicates that the bank depositors, rather than evaluating the riskiness of banks sought refuge in the implicit government guarantees behind public sector banks (Eichengreen & Gupta, 2013). As documented by previous studies, deposit insurance dampens the market

¹⁴ Deposit Insurance and Credit Guarantee Corporation (DICGC), a subsidiary of India's central bank (Reserve Bank of India) provides the deposit insurance in India. A maximum of Rs 1,00,000 is insured for each depositor irrespective of number of accounts held by him/her.

discipline forces. But deposit insurance offers limited protection. Therefore, even in the presence of deposit protection guarantees, it is a pertinent question to ask whether market discipline operating through interbank deposits affects banks' risk-taking behaviour in India. Moreover, the predominance of state-owned banks tends to make market discipline ineffective (Caprio & Honohan, 2004) and government ownership has been found to soften the budget constraints of lenders and borrowers (Du & Li, 2007; Kornai, 1980; Lu et al., 2005a) leading to bailout expectations and further weakening of market discipline. The linkage of government ownership and distorted credit allocation is explained by the political rent-seeking argument. The government control distorts credit allocation by favouring state-owned firms and by seeking votes which ultimately hampers productive efficiency and economic growth (Shleifer & Vishny, 1994; Faccio, 2006; Xu, Zhu, & Lin, 2005).

4.3 Research gaps

- The evidence on market discipline from emerging markets is still scarce
- In the Indian context, the role of interbank deposits and information disclosure in market discipline is still unexplored
- Being a bank-based economy with predominant public ownership, the assessment of market discipline is needed to better understand bank lending behaviour
- Furthermore, since the 1980s the Indian financial system has witnessed mushrooming growth in non-banking finance companies (NBFCs) and after the reforms of 1990s, these NBFCs have been regulated like banks by Reserve Bank of India (RBI) and securities exchange board of India (SEBI). The growth of private banks together with NBFCs since liberalization period has greatly increased competition in the financial system. The advent of private banks and NBFCs may have led to considerable improvement in the efficacy of market discipline. Moreover, as the increase in competition (decrease in concentration) in banking mitigates the banks' risk (Boyd & De Nicoló, 2005), we examine the relationship between bank risk-taking, concentration and market discipline

4.4 Objectives

In light of the above literature, we intend to examine the effectiveness of market discipline in the Indian context in constraining the bank risk-taking behaviour and how it varies across government and private banks.

4.5 Methodology

We have constructed a strongly balanced panel dataset of 36 banks, 23 government and 13 private, covering a period of 15 years from 2004 to 2018. The data has been sourced from Bloomberg, Bankscope (now Orbis Bank Focus) and World Bank. We have used a sample of 36 banks based on data availability and their total share of deposits in the overall banking sector. As of September 2018, these 36 banks represent 86.56 per cent of banking sector deposits of the banking system.

We employ random effect panel (GLS) models for estimation to accommodate non-normal errors as GLS gives less weightage to large residuals than OLS while minimizing the weighted sum of squared residuals. Moreover, to accommodate time-invariant variables (bank ownership dummies), random effect model is appropriate to use. Using Wooldridge (2002) autocorrelation test, we find that our panel dataset has first-order autocorrelation. As noted in previous related studies, a bank with a sound capital position may enhance a bank's access to capital markets and increase its propensity to disclose more information for getting a favourable rating. This means that the market discipline variables, information disclosure index score (*IDI*) and interbank deposits (*IBD*), may be influenced by capital buffer leading to the problem of endogeneity. To resolve this problem of endogeneity, we employ a 2SLS estimation technique by instrumenting both of our market discipline variables, *IDI* and *IBD*. For both *IDI* and *IBD* we use the same set of instrumental variables¹⁵.

4.5 Model and hypothesis

Our fundamental aim is to test the effectiveness of market discipline in influencing the risk-taking behaviour of banks in India. Prudent risk management is reflected in the increase in the bank capital buffer in response to an increase in the bank risk profile. Following Nier & Baumann, (2006); Wu & Bowe (2010), we develop the following empirical specification which represents a general relation between the level of the capital buffer, bank-specific variables, measures of market discipline, market structure, and macro-economy-related variables:

¹⁵ The variables in italics, *IDI* and *IBD* have been instrumented throughout the estimations. We use, the cost to income ratio, Size, ROA, total loans to total assets ratio, yearly time dummies and ownership dummies as instruments.

$$Capital\ Ratio_{it} = \alpha_0 + \beta_1 Bank\ Size + \beta_2 NPA_{it} + \beta_3 ROA_{it} + \beta_4 Market\ Discipline_{it} + \beta_5 GDP_t + \beta_6 Market\ Structure_{it} + \varepsilon_{it} \quad (4.1)$$

where i is the cross-section of banks and t is the time in years and ε is the error term. The detailed variable definitions are given below:

4.5.1 Capital ratio

Bank capital is the funds contributed by shareholders of banks which acts as a cushion against the various risks undertaken by a bank. Capital Ratio, measured according to Basel criteria as capital to risk-weighted assets, is the amount of capital that a bank needs to set aside (not lend) for covering the bankruptcy risks. Capital buffer is an important defense against bankruptcy (Diamond & Rajan, 2000; Kim & Santomero, 1988). The notion of capital adequacy has been adopted by the Basel committee in Basel norms to help banks insure themselves against the risk of insolvency. Apart from insuring their credit risk, banks hold capital buffer to avoid the costs associated with the market discipline (Nier & Baumann, 2006; Wu & Bove, 2010). In a well-disciplined market, bank capital varies in commensurate with the risk level of the bank.

4.5.2 Market discipline variables

i) Information disclosure (ID)

Disclosure of information by a bank helps potential investors to gauge its riskiness and accordingly take risk-compensation-seeking decisions to cover themselves against potential losses. This compels a bank to maintain a higher capital buffer in relation to risky assets to avoid any punitive stakeholder responses. Hence, higher disclosure of critical information pertaining to risk will be associated with a higher capital buffer in a prudently managed bank. In the literature on market discipline, disclosure index has been commonly used for assessing the information related market discipline on the bank risk-taking behaviour. Disclosure index is the amount of crucial accounting information on a list of items that are disclosed through reports and financial statements (Marston & Shrikes, 1991). For this study, we use Fitch IBA Bankscope database¹⁶ to construct a bank-level disclosure index. The index provides information on 15 items which cover various aspects of risk like credit, liquidity, interest rate and market risk. Every item is given a score of 1 if the information on that item is provided by the bank and 0 otherwise except capital buffer¹⁷ which receives a score of 3 if the information on at least two items on the capital buffer is provided. Thus, information disclosure index (*IDI*)

¹⁶ Bankscope, published by Bureau Van Dijk (BvD) was replaced by Orbis Bank Focus due to termination of contract between BvD and Fitch in 2016. Therefore, data for 2017 and 2018 was taken from Orbis Bank Focus.

¹⁷ Capital buffer is the most important variable from the viewpoint of prospective investors for assessing the risk profile of a bank.

can have a maximum value of 17 and a minimum value of 0. Similar disclosure framework has been used by the Basel committee and IMF also. Other prominent studies which have employed the same disclosure index include (Hamid & Yunus, 2017; Nier & Baumann, 2006; Wu & Bowe, 2010). We hypothesize that information disclosure is positively associated with bank capital under effective market discipline.

ii) Interbank deposits (*IBD*)

There is a lot of evidence in the literature which suggests that uninsured funding is one of the most important instruments for strengthening market discipline. Following (Hamid & Yunus, 2017; Nier & Baumann, 2006; Wu & Bowe, 2010) and Hamid & Yunus (2017), we use interbank deposits, measured as the ratio of interbank deposits to total deposits as a proxy measure for uninsured funding. We expect the market discipline to be stronger when the banks use higher interbank deposits because banks as depositors are more informed investors and can discipline other banks (borrowing banks) more strictly as compared to ordinary depositors.

4.5.3 Bank-specific controls

i) Bank size

To examine the working of market discipline, we use several bank-level variables which influence a bank's capital ratio. We include *Bank Size*, measured as the log of total assets to rule out the effect of differences in bank size on the relationship between market discipline and bank capital. Bank size has been found to be negatively related to its equity capital in the related literature (Ayuso et al., 2004; Lindquist, 2004). The reason for this negative relation is that larger banks are usually well-diversified across various business segments and geographies which helps them to minimize the overall risk. Again, larger banks usually suffer from 'too big to fail' expectation which encourages them to maintain a relatively lower capital level for covering their risks because they expect the government to rescue them in the event of any economic shocks. Moreover, it is difficult for smaller banks to access the capital markets, therefore, they generally maintain a higher overall capital ratio as compared to larger banks (Demirgüç-Kunt & Huizinga, 2004). However, systemically larger banks have also been observed to be subject to stronger market discipline (Bertay et al., 2013).

ii) Return on assets

ROA, as a measure of profitability, gauges how easy it is for a bank to employ internal capital. A bank with consistently higher ROA will be able to accumulate the profits and build a reserve of retained earnings and consequently will find it easier to use internal capital. Hence, we

expect ROA to have a positive relationship with bank capital ratio as evidenced in Gropp & Heider (2009).

iii) Non-performing assets.

Non-performing loans are a reflection of the quality of a banks' past investment decisions. In the process of lending, a stringent loan appraisal and monitoring help a bank to avoid future costs associated with recovering loans from defaulters. Therefore, prudential risk management of a bank with respect to its loan risk is reflected by NPA and is defined as the ratio of gross non-performing loans to total loans.

4.5.4 Macroeconomic controls

i) GDP growth rate

Bank capital fluctuates with the overall business cycle in the economy. During the periods of slow economic activity, loan defaults increase leading to depletion of bank capital buffer while as banks may accumulate the profits during expansionary phases to increase their capital. Thus, there is a positive relation between bank capital and GDP growth (Borio et al., 2001). There is also evidence that the capital ratios of banks move countercyclically. The reasoning behind the countercyclical movement of capital is that bank balance sheets inflate during economic expansion and contract during a recession due to loan defaults (Berger & Udell, 2004). Wu and Bowe (2010) find a negative relationship between bank capital and business cycle in China. Since we adopt the approach given in Wu and Bowe (2010) and use the same determinants of bank capital, we also expect the GDP growth to have a negative relation with bank capital.

ii) Concentration

A highly concentrated banking system has few larger banks with high market power. Such a system is more likely to give rise 'to a too big to fail' scenario in the banking system and thus enjoy government support. This decreases the managerial incentives to prudently keep a high capital ratio as a protective cushion against unexpected losses. This view was theorized by Boyd & De Nicoló (2005) who demonstrated that increased concentration in the banking system increases the bank fragility. To assess the effect of concentration of bank risk-taking we introduce two widely used concentration measures defined below:

Four bank concentration ratio (CR4)

$$CR4 = \frac{\text{Ratio of total deposits of 4 largest banks}}{\text{Total Deposits of all banks}}$$

CR4 is an indicator of the market power of the four largest banks, and its value approaches 1 for a pure monopoly and 0 in a perfectly competitive market

Herfindahl-Hirschman Index (HHI)

$$HHI = \sum MSD^2$$

where MSD is the market share of deposits in a given year. For a perfectly competitive market, HHI value is slightly greater than 0 and for a monopoly, it equals to 1. The HHI accounts for both the inequality of market shares among banks and the number of banks. HHI will increase if market share inequality increases among banks.

iii) Recapitalization

Recapitalization is the process of infusing new capital into the capital-constrained banks for saving them from collapsing under the weight of bad loans. Bank recapitalizations are ex-post government interventions in the operation of the banking system. They are usually undertaken to safeguard state banks from going bankrupt and thus they may build an incentive for excessive risk-taking in the government-owned banks. Since government-owned banks have received recapitalizations from time to time in India, we create a dummy variable Recapitalization, which equals to 1 if government-owned banks received one or more recapitalization injections, to capture the impact of government interventions on bank capital. A positive sign of the variable Recapitalization will indicate that government intervention through a recapitalization of banks has successfully enhanced their capital buffer.

4.5.5 Bank ownership

Banks in which government has considerable or majority shareholding are rarely allowed to fail during financial crises. In India, recapitalizing public sector banks has become a tradition since the 1990s. This government intervention softens the budget constraints and weakens market discipline because public sector banks always operate with the bail-out expectation. To capture the effect of this government intervention, we divide the banks into private and government banks¹⁸. We define two dummy variables GOV and PVT. GOV equals to 1 if

¹⁸ We exclude Foreign banks due to lack of data and relatively lesser market share in the overall banking sector.

government shareholding is greater or equal to 51 per cent and PVT equals to 1 if the bank is privately owned and both equal to 0 otherwise.

4.6 Empirical results

We proceed to obtain the empirical results as follows. First, we run the basic model given in equation (4.1). Next, we input the interaction terms between concentration and market discipline in the specification (4.1). Subsequently, we also use interaction terms between ownership and market discipline variables and loan quality and market discipline (information disclosure). Table 4.1 presents the aggregate and group-wise descriptive statistics of all the variables used in this study. Between variation of variables, though less than within variation, is nevertheless quite significant which signifies the importance of cross-sectional analysis. The mean and within variation in Capital Ratio of private banks is higher than government banks indicating private banks have more actively managed their risk than government banks. Lower between variation in Capital Ratio of government banks suggests that government banks tend to maintain a similar view towards the credit risk. Looking at asset risk (NPA ratio), mean and within variation is higher in government banks compared to private banks indicating higher risk-taking of government banks which varies substantially across time. The mean and standard deviation of profitability of government banks is less than private banks indicating the better performance of private banks. For information disclosure index score (*IDI*), the mean is higher for government banks and for interbank deposits (*IBD*), the mean is higher for private banks. Estimation results of the basic market discipline model for the entire sample is given in Table 4.2. The first two columns represent the basic model. We introduce the two market discipline variables (*IDI* and *IBD*) alternately with two concentration measures (CR4 and HHI). We find that economic growth is not significantly related to bank capital ratio. Profitability (ROA) has a significant positive impact on bank capital across all specifications. This shows that profitability helps banks to accumulate capital and increase the capital ratio. Similar results have been obtained by (Gropp & Heider, 2009; Hamid & Yunus, 2017; Wu & Bowe, 2010). The relation between size and bank capital ratio is positive and significant. This result is in contrast with (Hamid & Yunus, 2017; Nier & Baumann, 2006; Wu & Bowe, 2010). These results appear to show that larger banks in India are either more prudent or they do not want to be under the constant surveillance of the supervisory authorities.

Table 4.1: Descriptive statistics

Variable	Mean	Std Dev	Between Std Dev	Within Std Dev	Min	Max	No of obs
Bank specific							
Cap Ratio	12.937	2.344	1.384	1.904	7.51	26.67	540
GOV	12.475	1.986	0.6793	1.872	9.01	26.67	345
PVT	13.754	2.687	1.901	1.966	7.51	22.47	195
NPA	4.059	4.489	1.522	4.230	.017	22.621	540
GOV	4.594	4.892	1.341	4.712	.017	22.621	345
PVT	3.113	3.485	1.394	3.216	.224	14.963	195
ROA	0.772	0.774	0.501	0.595	-3.591	6.259	540
GOV	0.635	0.581	0.256	0.524	-1.359	2.301	345
PVT	1.013	0.987	0.717	0.70	-3.591	6.259	195
Bank Size	13.658	1.341	1.171	0.679	10.090	17.355	540
GOV	14.076	1.027	0.825	0.634	11.638	17.355	345
PVT	12.919	1.505	1.352	0.754	10.090	16.104	195
Market Discipline Variables							
<i>IDI</i>	14.355	2.013	0.816	1.845	9	17	540
GOV	15.066	1.934	0.719	1.801	12	17	345
PVT	13.097	1.985	0.911	1.923	9	17	195
<i>IDB</i>	0.066	0.263	0.086	0.249	0.004	0.157	540
GOV	0.046	0.054	0.039	0.038	0.004	0.093	395
PVT	0.103	0.431	0.129	0.412	0.001	0.157	195
Macro-economic							
GDP	7.054	1.413	-	-	3.086	8.497	540
HHI	0.095	0.008	-	-	0.0856	0.111	540
CR4	0.062	0.097	-	-	0.0002	0.616	540

Source: Author Calculations from Bloomberg Data

We suspect that by maintaining, higher capital ratio, larger banks want to keep away the supervisory intervention of RBI since India has one of the most rigid and stringent regulatory regimes in place for ensuring banking system stability. This regulatory control seems to have worked well to keep the “too big to fail” mindset at bay. The significant negative coefficient of NPA shows that non-performing assets erode the capital. The significant negative coefficients of the two market discipline variables, *IDI* and *IDB*, suggest that banks which disclose more information and have higher uninsured interbank deposits maintain lower capital levels matching the results in (Tovar-García, 2016). This shows that the uninsured interbank deposits and higher information disclosure do not induce Indian banks to take lower risks. The reason could be the predominance of government ownership of banks wherein implicit insurance of government banks comes into play and the lending banks do not feel compelled

to monitor the borrowing banks(Borisova & Megginson, 2011; Distinguin et al., 2013). The relationship between bank capital and two market concentration variables CR4 and HHI is not statistically significant in the basic specification.

Table 4.2: Effect of market discipline on bank capital

	(1)	(2)	(3)	(4)	(5)	(6)
	Cap Ratio	Cap Ratio	Cap Ratio	Cap Ratio	Cap Ratio	Cap Ratio
GDP	0.0306 (0.061211)	0.0238 (0.058040)	0.0542 (0.071311)	0.0590 (0.069411)	0.0224 (0.062222)	0.0238 (0.056666)
ROA	0.805*** (0.147166)	0.802*** (0.14635)	1.279** (0.439519)	1.423*** (0.413663)	0.677*** (0.151794)	0.671*** (0.152500)
Size	0.317** (0.120992)	0.445*** (0.107229)	0.131** (0.047636)	0.114* (0.045418)	0.352* (0.177778)	0.655** (0.248106)
NPA	-0.0967*** (0.022646)	-0.101*** (0.022295)	-0.081** (.0302238)	-0.090*** (-3.39)	-0.105*** (-4.22)	-0.0989*** (-4.14)
CR4		-1.024 (0.602823)		-1.256 (0.692771)		-1.473 (0.872630)
HHI	-1.078 (0.772759)		-0.614 (0.479687)		-1.057 (0.817478)	
IBD			-1.040* (0.522611)	-1.034* (0.467873)		
IDI					-0.0181* (0.008743)	-0.0106* (0.005273)
_cons	8.732*** (0.278152)	6.685*** (0.151587)	10.12** (0.350173)	10.77** (0.358297)	8.139* (0.322976)	5.067* (0.255909)
N	540	540	540	540	540	540
R ²	0.2280	0.2358	0.1065	0.0901	0.2185	0.2019
Wald	102.38	104.88	69.80	68.20	90.14	91.33
Chi2						

Source: Author Calculations from Bloomberg Data

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.6.1 Market discipline and concentration

The Indian banking sector has seen consolidation over the years and the process of consolidation is still going on. This consolidation drive has enhanced market concentration. In line with (Boyd & De Nicoló, 2005; Hamid & Yunus, 2017; Wu & Bowe, 2010), we posit that banks' capital level will be determined by the degree of competition (concentration) in the

banking system and more concentrated banking (less competition) will make the banking system riskier (less capital). To see how concentration mediates the relation between bank capital and market discipline, we introduce an interaction term of two market discipline variables (*IDI* and *IDB*) with two concentration variables (CR4 and HHI). We also introduce two dummy variables GOV and Recap for ownership and recapitalization status to examine the difference in capital levels of government vs private and recapitalized vs non-recapitalized banks. When GOV = 1, the bank is government-owned and when GOV = 0, the bank is private. Likewise, when Recap = 1, the bank received a capital injection and Recap = 0 for the bank which is not recapitalized. The results are displayed in Table 4.3. The positive and significant coefficients of interaction terms CR4**IDI* and HHI**IDI* indicates that with increasing banking sector concentration, information disclosure induces market discipline. These findings are in line with Hamid & Yunus (2017). The main reason behind this could be the removal of weaker banks after consolidation. However, interbank deposits do not have any significant effect on bank capital with an increase in concentration in the banking sector. We do not find any significant evidence for the positive impact of recapitalization on bank capital. This could be due to the fact that recapitalization has started in the later years¹⁹ of the study period for our study. Again, due to continuously rising NPAs, the recapitalization injections may not have improved the risk capital positions of banks in a significant manner. Moreover, market participants adjust their bailout expectations in response to government bailouts. Thus, recapitalizations may deteriorate the market discipline (Hett & Schmidt, 2017).

Table 4.3: Market discipline and concentration

	1	2	3	4
	Cap Ratio	Cap Ratio	Cap Ratio	Cap Ratio
<i>IDI</i>	-0.262*** (0.089115)	-4.173*** (0.993571)		
CR4	-1.88* (0.749003)		-1.406* (0.706532)	
CR4* <i>IDI</i>	0.733 0.37020202			
HHI		-3.8*** (0.935960)		-0.271* (0.129047)
HHI* <i>IDI</i>		4.47*** (0.871345)		
<i>IDB</i>			-1.045 (0.699933)	-1.031 (0.799224)

¹⁹ Indradhanush recapitalization scheme was decided in August 2015 by Govt of India and is still under implementation.

GDP	0.0326 (0.058214)	0.127 (0.069021)	0.0588 (0.066067)	0.0102 (0.078461)
CR4* <i>IBD</i>			1.89 (0.984375)	
HHI* <i>IBD</i>				0.81 (0.826530)
Recap	0.123 (0.424137)	0.022 (0.439215)	0.073 (0.478431)	0.117 (0.431734)
ROA	0.745 (0.142994)	0.831 (0.148392)	1.655 (0.483918)	0.829 (0.166801)
SIZE	0.91*** (0.163669)	0.546*** (0.125517)	0.218*** (0.198181)	0.631*** (0.207565)
NPA	-0.0862*** (0.023746)	-0.0951*** (0.025292)	-0.0808* (0.037934)	-0.101*** (0.029022)
GOV	-1.945*** (0.362873)	-1.565*** (0.342450)	-1.232*** (0.354022)	-1.533*** (0.333260)
_cons	4.072*** (0.163534)	4.35*** (0.910752)	6.351*** (0.248037)	5.363*** (0.240493)
N	540	540	540	540
R ²	0.3121	0.2751	0.165	0.2447
Wald Chi2	150.95	151.79	107.36	136.73

Source: Author Computations from Bloomberg Data

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.6.2 Market discipline and ownership

In India, public sector banks have accumulated more NPAs than private banks. One of the reasons for this NPA build-up is the ineffectiveness of market discipline on public sector banks as compared to their private counterparts because the management of public sector banks implicitly assume that they are protected by government guarantees against bankruptcy. To test this conjecture, we introduce the interaction terms *GOV*IDI* and *GOV*IBD* in the model alternately along with two concentration variables, CR4 and HHI. The estimation results are reported in Table 4.4. The negative and significant coefficient of GOV in all specifications shows that government banks maintain lower capital ratios than private banks. The main reason behind lower capital of government banks is the implicit government guarantees and expectation of a bailout by the government in the event of financial problems (Borisova & Megginson, 2011; Arnold et al., 2016; Hett & Schmidt, 2017; Distinguin et al., 2013;

Boubakri, El Ghouli, Guedhami, & Hossain, 2020). The significant positive coefficient of $GOV*IDI$ shows that information disclosure makes market discipline effective in government banks and helps them raise more capital. This result is interesting from a policy perspective. Information disclosure via internet and internet banking can be an effective way to enhance market discipline (Ghosh & Das, 2005; Kozłowski, 2016; Hou, Gao, & Wang, 2016). Our results are in contrast to Wu & Bowe (2010) but in line with Hamid & Yunus (2017). However, the market discipline variable of interbank deposits, IBD does not have any significant impact on bank capital of government banks as observed in Hamid & Yunus (2017), Wu & Bowe (2010), and Tovar-García (2016). Interbank deposits, in general, do not seem to compel banks in India to maintain higher capital ratios. This could be due to the dominance of public sector/government banks in the Indian banking sector. This predominance of government banks gives the players in the interbank market a sense of insurance against defaults by counterparty banks in interbank deposits market.

4.6.3 Market discipline and risk management

The level of non-performing assets on a bank's balance sheet shows the quality of the existing loan portfolio. As can be seen in the previous estimations, the accumulation of NPA negatively affects the bank capital ratio. In this section we test the effectiveness of market discipline at a given loan quality by incorporating $IDI*NPA$ and $GOV*NPA$.

Table 4.4: Market discipline and ownership

	(1) Cap Ratio	(2) Cap Ratio	(3) Cap Ratio	(4) Cap Ratio
GDP	0.0198 (0.058235)	0.0227 (0.063055)	0.0278 (0.057916)	0.0122 (0.058095)
CR4	-1.512 (0.0779381)		-1.519 (0.898816)	
HHI		-0.050 (0.076363)		-0.833 (0.954594)
ROA	0.073*** (0.014285)	0.073*** (0.012372)	0.087*** (0.015183)	0.083*** (0.015313)
SIZE	0.715*** (0.148340)	0.526*** (0.127980)	0.529*** (.106012)	0.494*** (0.122580)
NPA	-0.0770** (0.024367)	-0.0746** (0.025813)	-0.0904*** (0.024235)	-0.0919*** (0.024506)

Recap	0.233 (0.416071)	0.270 (0.421875)	0.0622 (0.414666)	0.0852 (0.405714)
GOV	-0.541* (0.261352)	-0.868* (0.398165)	-1.473*** (0.315417)	-1.555*** (0.338779)
<i>IDI</i>	-0.218** (0.074914)	-0.201** (0.067224)		
GOV* <i>IDI</i>	0.232* (0.094693)	0.265** (0.095323)		
<i>IBD</i>			1.065 (0.825581)	1.093 (0.888617)
GOV* <i>IBD</i>			-1.031 (0.691946)	-1.051 (0.661006)
_cons	2.01*** (0.378101)	2.03*** (0.355833)	2.05*** (0.474537)	1.99*** (0.313220)
N	540	540	540	540
R ²	0.3203	0.3077	0.3045	0.2959
Wald Chi2	147.96	144.10	144.00	136.47

Source: Author Calculations from Bloomberg Data

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.5 reports the results. NPA has a significant negative relation with capital ratio across all specifications which shows that bad loans lead to erosion of bank capital.

Table 4.5: Market discipline and risk management

	(1) Cap Ratio	(2) Cap Ratio	(3) Cap Ratio	(4) Cap Ratio
IDI	-0.370** (0.114551)	-0.303* (0.142924)		
GDP	0.0433 (0.057733)	0.0608 (0.066086)	0.0288 (0.057601)	0.0101 (0.063125)
CR4	-2.111 (0.748581)		-1.432 (0.719597)	
ROA	0.800*** (0.143884)	0.817*** (0.148007)	0.773*** (0.143413)	0.741*** (0.145579)
SIZE	0.952*** (0.166433)	0.627*** (0.132558)	0.533*** (0.110123)	0.520*** (0.123809)

Recap	-0.166 (0.436842)	-0.0967 (0.439545)	0.0541 (0.416153)	0.0483 (0.439090)
NPA	-0.371** (0.122039)	-0.354** (0.132584)	-0.125** (0.042808)	-0.138** (0.043260)
GOV	-2.130*** (0.381037)	-1.922*** (0.393047)	-1.447*** (0.349516)	-1.604*** (0.365375)
IDI*NPA	0.0301* (0.012808)	0.0284* (0.014271)		
HHI		1.096 (0.823441)		1.08 (0.83720)
GOV*NPA			-0.0297* (0.014009)	-0.0442* (0.02177)
_cons	2.07*** (0.647292)	2.051*** (0.574671)	2.03*** (0.491525)	2.09*** (0.545701)

Source: Author Calculations from Bloomberg Data

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The positive and significant coefficient of IDI*NPA in the specifications (1) and (2) in Table 4.5 shows that those banks which disclose more information, for a given loan quality, maintain a higher capital ratio. These results support the findings from Hamid & Yunus (2017) and Wu & Bove (2010). The significant negative coefficient of GOV*NPA in specifications (3) and (4) shows that for a given level of loan quality government banks hold lesser capital than private banks.

4.7 Chapter conclusions

This chapter seeks to investigate the efficacy of market discipline, measured by the level of information disclosed by banks and interbank deposits, in incentivising the Indian banks to adopt prudential risk management by enhancing their risk-weighted capital ratio. We construct a panel dataset of 36 commercial banks from 2004 to 2018. During this period, the Indian banking sector witnessed several changes apart from facing the financial crisis and the ensuing bad loan build-up. The accumulation of huge bad loans in Indian banks, especially public sector banks, raises a concern about the effective working of market discipline in the Indian banking sector. We examine how effectively market disciplinary forces induce prudential risk-taking

behaviour in the Indian banking sector. First, we run the aggregate model and we find that economic growth is not significantly related to bank capital ratio. Profitability (ROA) has a significant positive impact on bank capital implying that profitability helps banks to accumulate capital and increase the capital ratio. Our results are in agreement with those obtained by Gropp & Heider (2009); Hamid & Yunus (2017); Wu & Bowe (2010). Size of the bank positively affects the capital indicating that larger banks in India keep more capital and take lesser risks. This result is in contrast with Hamid & Yunus (2017); Nier & Baumann, (2006) and Wu & Bowe (2010). This shows that larger banks in India are either more prudent or they do not want to attract unnecessary attention of supervisory authorities. We also find evidence that non-performing assets lead to erosion of bank capital and information disclosure and interbank deposits do not induce prudential risk behaviour among banks in India. However, when we introduce an interaction term between market discipline and concentration in the model, we find evidence that with increasing concentration in the banking system, the greater disclosure of information tends to induce banks to maintain higher capital ratios but interbank deposits do not have any significant effect on bank-risk taking behaviour. We also observe that government banks maintain lower capital ratios as compared to private banks. The main reason behind the lower capital of government banks is the expectation of a bailout by the government in the event of financial problems. This has implications for the reformation of public sector banks. There has been a long-pending demand for reducing government ownership in public sector banks to make them more prudent. Our results seem to lend credence to the case for some divestment in public sector banks. Privatization has been found to considerably improve the operational efficiency and financial results (D'Souza et al., 2017) by reducing information asymmetry and agency problems of state ownership (Chen et al., 2017). However, in the Indian context total privatization may not be feasible. Therefore, the government can reduce its ownership of the banking system to 50 per cent which might have desired effects on improving market discipline. When we interact market discipline variables with ownership, we find evidence that information disclosure makes the government banks to maintain higher capital ratios, but interbank deposits do not have any statistically significant effect on the capital level of government banks. We also do not find any significant evidence for the positive impact of recapitalization on bank capital. This may be due to the implementation of recapitalization towards the end of our study period. Lastly, we find evidence that non-performing assets have a negative relation with bank capital. At a given loan quality, the more disclosure of information forces the banks to maintain higher capital ratio supporting the findings from

Hamid & Yunus (2017) and Wu & Bowe (2010) but government banks maintain lower capital as compared to private banks at a given loan quality level.

Our study has potential implications for preventing the build-up of episodic bad loan crises in the Indian banking system. The prevalence of poor market discipline is the basic underlying cause for reckless lending practices of banks, especially public sector banks. RBI has so far stuck to a strong regulatory discipline rather than strengthening incentives for market discipline. There is evidence in the literature that regulatory discipline, including capital requirements, may even aggravate the problem of moral hazard (Anginer, Demirgüç-Kunt, & Mare, 2018; Distinguin et al., 2013)

To strengthen the disciplinary forces the government may consider removing the deposit insurance of public sector banks who already enjoy the implicit government support. The downside of deposit insurance is that it leads to the problem of moral hazard due to limited shareholder liability and disincentivises insured depositors to check the risk-taking of banks. In the presence of deposit insurance, banks tend to take extra risks which can be shifted to the deposit insurance fund (Angkinand & Wihlborg, 2010).

The government should focus on the divestment of public sector banks for inducing the desired market discipline in the banking system. As the government of India is on a consolidation drive to reduce the number of public sector banks, It would be advisable to encourage banks to increase the amount of information disclosure in a transparent fashion by bringing in the necessary changes in the laws governing the banking system. One such change could be extending the provisions of Companies Act 2013 to public sector banks.

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CHAPTER 5. GENERAL CONCLUSIONS, RECOMMENDATIONS, LIMITATIONS AND FUTURE SCOPE

The following general conclusions follow from the study:

- 1) There exists a linkage between corporate leverage and bank NPAs. Increase in corporate leverage leads to increase in banking system risk (NPAs)
- 2) Corporate firms leverage data in our sample shows that bank lending is more skewed towards larger firms.
- 3) Bank lending is biased in favour of government and group firms as against the individual private firms. This inherent bias seems to have exacerbated after the 2008 financial crisis. This bias seems to be the result of the dominance of public sector banks and their repeated bailouts by the government.
- 4) Banks in India do not stick to strict credit rationing based upon riskiness of borrowers. The banks get caught in an 'entanglement' with large borrowers in relationship banking which

gives rise to ‘speculatory loan evergreening’ driven by the banks’ deep belief that they are ‘too important to fail’ for the government.

- 5) There is no evidence of strong market discipline operating in the banking system of India
- 6) With an increasing concentration in the banking system, the greater disclosure of information tends to induce banks to maintain higher capital ratios (low risk-taking), but interbank deposits do not have any significant effect on bank-risk taking behaviour. Government banks maintain lower capital ratios as compared to private banks. We argue that the main reason behind the lower capital of government banks is the expectation of a bailout by the government in the event of financial problems.
- 7) At a given loan quality, the more disclosure of information forces the banks to maintain a higher capital ratio, but government banks maintain lower capital as compared to private banks at a given loan quality level which again points to their reliance on implicit guarantee by the government against failure.

5.1 Discussion and recommendations

Our study indicates that bank lending is soft budget constraint-driven due to government ownership across borrowers and lenders. To curb this lending behaviour the Indian economy needs a fresh dose of privatization especially of loss-making PSEs and PSBs. With privatization, the prospects of better productivity growth will increase.

Whether PSBs should be privatized or not has been the subject of a long debate in India. The main argument in favour of government ownership is depositor confidence. Depositors have confidence in the PSBs because they believe that they enjoy government guarantee for repayment of their deposits. This makes bank runs less likely and encourages savings. However, the disadvantages associated with state ownership outweigh the advantages. Public ownership of banks softens budget constraints of borrowers and lenders themselves. There is evidence that the performance of Indian PSBs is far below the standards of international private banks of similar size. After the Global financial crisis, the situation has got worse pushing the stressed advances of PSBs at around 16 per cent of total advances, compared with about 4.5 per cent in private banks. Other financial indicators also suggest the same dismal performance. The main reason for such a poor performance, as pointed out by Vinayak committee also, is the way PSBs are governed. This poor performance is the direct result of disempowered bank boards.

The injection of capital under Indradhanush scheme was expected to restore the capital levels of banks so that they are able to lend again in the face of balance sheet clean up undertaken through asset quality review in 2015. All this is going to prove fruitful only if the basic issue of governance is addressed otherwise the vicious cycle of bad loans-clean ups-recapitalization is going to continue endlessly. So far, the efforts to minimize the state interventions in PSBs have not worked well in India. Every time the banks were in trouble, they were bailed out through capital injections using taxpayers' money. The current crisis has raised public consciousness about the mismanagement of PSBs. This presents an opportunity to introduce meaningful reforms in the PSB ownership structure and governance. Moreover, from the experience of former socialist states, the case for privatizing Indian PSBs seems quite strong. However, the pace and approach to privatization can differ for different banks depending upon their overall health and performance.

The double whammy of COVID19 and pre-COVID-19 NPA build-up has further complicated the situation for the Indian banks. According to RBI estimates under the baseline scenario, the gross NPA ratio of all scheduled commercial banks is likely to go up to 12.5 per cent by March 2021 from 8.5 per cent in March 2020 in the aftermath of Covid-19 pandemic. The COVID19 crisis has led to a record contraction of 23.9 per cent in the Indian economy between April 2020 and June 2020. Amid this crisis the government and the regulator has again resorted to loan moratorium, forbearance, and loan restructuring to support viable businesses. While such policy responses can not be avoided altogether, the challenge remains in implementing them in a way that does not impact the credit behaviour of borrowers. A longer moratorium is most likely going to have an adverse impact on the credit behaviour after the moratorium ends. Therefore, the more sensible approach is to go for small scale lending at fairly competitive interest rates which help businesses in covering their operating costs. Also, the banks should focus on improving their resilience by enhancing their capital and increasing provisions. Banks can take a leap of faith with those borrowers among small businesses whose pre-covid19 creditworthiness was quite satisfactory.

Least efficient and loss-making public-sector banks must be restructured and turned into narrow banks while as reform in the governance of those banks whose performance is quite satisfactory should be undertaken without reducing the state's majority shareholding. Apart from the above, some viable banks should be privatized straight away to modernize the banking system. The privatization of PSBs would enhance competition within the sector which will help in addressing the current inefficiency problem plaguing the PSBs. In this direction

bringing all banks under Companies Act and repealing the Bank Nationalization Act could be the first step. This would help the government to reduce its stake in PSBs to any extent it deems appropriate. The downside of privatization is excessive risk-taking in search of greater profits. To ensure the overall stability in the financial system, both PSBs and private banks need to be regulated through international benchmark practices.

Another problem with PSBs is creditor passivity. When corporate debtors fail to repay their debt and interest obligations on time, instead of enforcing the loan contract by foreclosing on the collateral and initiating a bankruptcy case, banks usually resort to rescheduling of debtors' loans. There are several reasons for creditor passivity. Firstly, banks hesitate to press for bankruptcy proceedings against the debtors because costs of enforcing bankruptcy are greater than the expected value of debtor's assets, or because there may be option value in deferring the recovery process. In the first case, the bank has no incentive to extend new loans to the debtor whereas in the second option banks may justify rescheduling the debt with the expectation that the economic condition of the debtor may turn favourable and thus the existing non-performing and new debt may get repaid. Second, initiating bankruptcy against debtors may give a bad signal about the loan quality of the bank to the market. Although, a bank run is unlikely for public sector banks in India, nevertheless, they may not want to attract the attention of the public and regulatory authorities by giving a signal about the level of non-performing loans in their portfolios.

Third, when there are multiple government lenders, it may give rise to free-rider problems when each bank expects that government intervention in the form of bailouts and recapitalizations will become necessary for survival. This makes the bailout expectations of banks self-fulfilling. In India, apart from these causes, a host of other factors are responsible for banks' passivity in enforcing loan contracts. They can be categorized as disincentives within and disincentives outside the banking system. Outside disincentive factors include unwillingness of the government to let public sector banks, large corporate companies, and public sector enterprises to file for bankruptcy, no history of robust bankruptcy law, regionalism, political interference with banks, weaknesses in the bankruptcy tribunal system etc.

While loan restructuring, soft credits and rollover of bad loans are the primary source of soft budget constraints on PSEs and large private borrowers, the general budget constraints on India's public sector banks are soft as well. Public sector banks in India do not operate with

autonomy and independence. A significant part of their loans has to go to the priority sector even though the risk in such lending might be high. This mandatory requirement makes it difficult to hold banks accountable for their profits and losses. Moreover, the state ownership of PSBs increases their government bailout expectation. A significant proportion of their lending remains policy loans or loans conducted under informal government intervention; therefore, they have to extend loans to the priority sector regardless of the creditworthiness. This, together with the various administrative controls on commercial banks, makes it difficult to hold them responsible for their profits and losses. Also, because of their state ownership "too big to fail" logic, state commercial banks can always expect government bailout.

The PSBs in India are entities operating under the Bank Nationalization Act of 1969 while as their private sector counterparts are created and run under the Companies Act 1956. This exempts PSBs from requirements on disclosures, board governance, etc. mandated by Companies Act 1965. Thus, PSBs face less scrutiny than private banks. Moreover, due to the majority government stake, they become an easy target of political influence and any crisis in them can potentially lead to a fiscal problem for the government (Sengupta & Vardhan, 2017). To simplify the corporate governance mechanism and make regulation transparent and uniform, P.J.Nayak committee has recommended repealing of Banking Nationalization Act and SBI Act and registration of PSBs under Companies Act 1956.

Policy changes post the banking crisis of 1997 led to the demise of developmental financial institutions and large-scale private sector participation in infrastructure financing. With the opening up of aviation, telecom, etc for private investment, there was a high demand of credit from these sectors, but commercial banks had little or no experience in assessing the risks in these businesses. There was a mismatch between the capabilities of PSBs and expertise required to finance these sectors. This lack of the skills required to do project lending lead to faulty credit appraisal and hence risky lending by PSBs (Sengupta & Vardhan, 2017). This also led to asset-liability mismatch problems for commercial banks as they did not possess long term funding sources unlike DFI's. Furthermore, lending to the newly opened privatized industries and projects exposed the banks to a new set of risks originating from delayed project approvals due to environmental concerns, problems in land acquisition and the inability of project promoters to raise equity finance. Since most of the infrastructure projects were undertaken through public-private-partnership model (PPP), it complicated the role of government which on the one hand, as a partner in infrastructure development had to ensure the viability and feasibility of these projects and on the other hand, being the owner of PSBs,

had to keep an eye on risk-taking of PSBs. The rise of NPAs in the infrastructure sector has been due to the misuse of the PPP model by some private players wherein they diverted the funds to other businesses. This pilferage of public funds exposed the loopholes in the legal and regulatory apparatus. This calls for immediate revamp of the model concession agreements.

Due to lack of expertise in running such businesses and operational and legal challenges in removing errant promoters, public sector banks show hesitation in restructuring such borrowers. These issues need prompt addressing before new infrastructure projects are financed through PPP arrangements.

The main problems in PPP arrangements in the domain of infrastructure which have led to the development of banking stress are: fake equity of the concessionaire through funds diversion and round-tripping; manipulation and inflation of project construction costs to finance the project only with funds raised from banks; Conversion of loan funds taken from PSBs into unsecured assets; Lack of right to audit and inspection over other promoter group entities; Lack of personal and corporate guarantees from the promoter group; Diversion of funds to other businesses (Singh & Brar, 2016). No bailout expectation and borrowers' responsiveness to market signals are prerequisites to market discipline. These two conditions are hampered in India by the predominance of government ownership in the banking sector and underdeveloped corporate debt market and banks' passivity in enforcing loan contracts.

Moreover, there is a sharp difference in the way the lending process operates from loan application to loan disbursement in private and public sector banks (Singh & Brar, 2016). Private banks' lending process is flexible, more streamlined, seamless, focused on recovery and involves post disbursement supervision. The PSBs suffer from the red tape and do not make the lending terms flexible to match the borrowers' repayment timing although their loans are cheaper and allow more time for repayment than private banks'. There are cases when the loan is collected by the borrower for buying a particular product but diverts the funds for some other purpose. The processes of loan verification, loan follow-up and recovery plan are not so robust in PSBs. It rarely happens that PSBs repossess the financed product in case the borrower fails to repay in time (Singh & Brar, 2016). PSBs also face governance issues. The selection of CEOs in PSBs is not a rigorous exercise and is usually done based on political preference. The need for making CEO selection in PSBs a professional exercise was emphasized by P J Nayak Committee. As per the committee report, the CEO selection is done based on demographics and there was no proper manpower planning being followed in PSBs. To overcome this

problem, there was a proposal to rope in CEOs from private sector banks but due to opposition from certain quarters, it could not be implemented (Singh & Brar, 2016).

Lastly, the use of block chain technology in the banking system can greatly enhance transparency and prevent loan frauds. Loan frauds have recently played havoc with the Indian banking system. Blockchain can bring the desired transparency and accountability to prevent frauds and embezzlement

5.2 Limitations and future scope

The study relies on secondary data and makes use of an indirect approach to infer bank lending behaviour. A granular level investigation into public sector banks' lending behaviour can be conducted to understand the differences in lending behaviour across PSBs. It would be worthwhile to supplement the study with a primary survey of large borrowers and key managerial personnel of the banks to understand the motivations behind loan restructuring, bad loan rollover and preferential lending to government and group firms. In the market discipline assessment, future studies can explore the borrower side of market discipline by analysing whether banks with better fundamentals attract more borrowers with better loan terms. Furthermore, the reaction of stakeholders to the information that is not contained in financial statements of banks needs to be investigated. Future studies can also take into account expected government support through measured through a primary survey of bankers to examine its impact on bank risk-taking.

Appendices

A1. Supplementary data

Table 1: Correlation matrix of logit model

	DMC	E	S_TC	INV_K	CFOA_TA	WC_TA	TIE_TEX	_cons
D_MC	1.000							
E	-0.1105	1.000						
S_TC	-0.0905	0.0440	1.000					
INV_K	0.1301	0.0104	-0.1322	1.000				
CFOA_TA	-0.0271	-0.0153	-0.0925	-0.0426	1.000			
WC_TA	0.0752	-0.0230	-0.1516	-0.0503	-0.0545	1.000		
TIE_TEX	0.0136	0.1257	0.1481	-0.0886	0.0326	0.1333	1.000	
_cons	-0.0475	-0.1099	-0.1191	-0.0159	0.0189	0.0654	-0.0741	1.000

Source: Author Calculations

Table 2: Classification table

	True		

	D	~D	
Positive	16313	7722	24035
Negative	4550	25203	29753
Total	20863	32925	53788

Classified positive if predicted $\Pr(D) \geq .33$

True D defined as $D \neq 0$

Source: Author Calculations

Table 3: Classification accuracy of logit model for default(D)

Sensitivity	Pr(+ve D)	78.19%
Specificity	Pr(-ve ~D)	76.55%
Positive predictive value	Pr(D +ve)	67.87%
Negative predictive value	Pr(~D -ve)	84.71%
False + rate for true ~D	Pr(+ve ~D)	23.45%
False - rate for true D	Pr(-ve D)	21.81%
False + rate for classified +	Pr(~D +ve)	32.13%
False - rate for classified -	Pr(D -ve)	15.29%
Correctly classified		77.18%

Source: Author Calculations

Variable	Mean	Std. Dev.	Min	Max
D	0.387874	0.487270	0	1
D_MC	1.056066	1.129965	0	8.31537
E	2.007122	0.578976	-1	5.08993
S_TC	2.255713	1.776662	-4.86914	9.25472
WC_TA	-0.193447	0.782717	-8.54247	4.47747
INV_K	0.656954	1.028261	-2.04152	7.57858
CFOA_TA	0.033697	0.216585	-5.93314	8.11432
TIE_TEX	0.271849	0.535376	-3.75708	5.81712

Source: Author calculations

Table 5: Indicators of the softness/hardness of the budget constraints

Phenomena represented by the measurement	Studies applying the measurement
a) <u>Instruments of softening</u>	
1. Subsidies or other contributions of the state	
i) percentage of GDP or total budget	EBRD (1997) Gao and Schaffer (1998) Raiser (1994, 1996)
ii) percentage of firms reporting subsidies	Earle and Estrin (1998) EBRD (1999)
2. Soft taxation	
i) tax arrears as a percentage of GDP or total budget	Djankov and Kreacic (1998) EBRD (1997) Frydman, Gray, Hessel and Rapaczynski (2000) Pinto, Drebensov and Morozov (2000) Schaffer (1998) Sjöberg and Gang (1996)
ii) percentage of firms reporting tax arrears	EBRD (1999)
iii) survey: perception of the phenomenon	Tóth (1998)
3. Soft bank credit	
i) Preference for distressed firms in credit allocation	Brana, Maurel and Sgard (1999) Budina, Garretsen and de Jong (2000) Gao and Schaffer (1998) Schaffer (1998) Bonin and Schaffer (1995) EBRD (1997, 1998)

ii) “Bad” loans (e.g. as a percentage of total outstanding loans)	Gao and Schaffer (1998)
iii) Arrears of repayment of loans (e.g. as a percentage of total outstanding loans or bank credit and bank arrear correlation)	Cull and Xu (2000) Dobrinisky (1994) Frydman, Gray, Hessel and Rapaczynski (2000) Gao and Schaffer (1998) Perotti and Carare (1997)
iv) Unusual debt/equity ratio or debt/asset ratio	Budina, Garretsen and de Jong (2000) Majumdar (1998) Gao and Schaffer (1998)
v) Unusual cash-flow/debt ratio	Pohl, Anderson, Claessens, Djankov and (1997)
vi) Survey: subjective assessment	Tóth (1998)
4. Excess trade-credit	
i) overdue trade credit as a percentage of GDP or total capital	Bonin and Schaffer (1995) EBRD (1997) Frydman, Gray, Hessel and Rapaczynski (2000) Pinto, Drebenstov and Morozov (2000) Schaffer (1998) Tóth (1998)
ii) Survey: subjective assessment	
b) <u>Expectation of rescue</u>	
5. Survey data about subjective probabilities concerning the expectation of rescue	Anderson, Korsun and Murrell (2000)
c) <u>Characteristics of the exit process</u>	
6. Survival of organizations in financial trouble (chronic deficit, insolvency, accelerating growth of indebtedness) (e.g. loss-makers as a percentage of all firms)	Claessens and Peters (1997) EBRD (1997) Gao and Schaffer (1998) Li and Liang (1998)
7. Frequency of bankruptcies and liquidations, filed and executed (e.g. as a percentage of total number of firms)	Bonin and Schaffer (1995) EBRD (1997) Mitchell (1998)
8. Frequency of bailouts	Li and Liang (1998)

Source: Kornai *et al.*, (2003)

Table 6: Regression-based test of endogeneity for PBDITA_TA using Sales/Total Assets = PBDITA_TA) as instrument for predicting residuals, v

Source	SS	df	MS	No. of obs = 53,788
Model	120352.779	8	15044.0974	F (8, 53780) > 99999.00
Residual	354.056199	53,788	0.006583418	Prob > F = 0.0000
Total	120706.835	53788	2.24412202	R-squared = 0.9122 Adj R-squared = 0.8871 Root MSE = 0.08114
BTA	Coef.	Std. Err.	t	P > t
FIRM_SIZE	0.095432	0.020090	4.75	0.000
PBDITA_TA	-0.138713	0.070060	-1.98	0.046
CFOA_TA	-0.069902	0.018527	-3.77	0.000
CAP_TA	-0.078894	0.018796	-4.20	0.000
B&D_TA	-0.050129	0.008481	-5.91	0.000
FA_TA	0.520341	0.078481	-6.63	0.000
SGR	-0.004031	0.000300	-13.42	0.000
PD	0.839217	0.072789	11.53	0.000
v	0.023135	0.045107	0.51	0.695

Source: Authors

H_0 : coefficient of v is zero. The t value of 0.51 fails to reject H_0 . This implies PBDIT_TA is exogenous.

Table 7: Test of endogeneity for *Size* in leverage model

ivregress 2sls TLR (*Size* = I.*Size* I.*Prof* I.*Asset_Tan* I.*Firm_Age*) *Prof* *Asset_Tan*
Firm_Age *Evar* *LIQ*

Instrumental variables (2SLS) regression

Statistics robust to heteroskedasticity

Number of clusters (firms) = 3164

Number of observations = 53788

Wald chi2(1) = 1124.50

Prob > chi2 = 0.0000

Variable	Coefficient	Std. Err.	z	P> z	[95% Conf. Interval]	
<i>Size</i>	-0.006336	0.000191	-33.17	0.000	-0.006724	-0.005947
<i>Prof</i>	-0.072548	0.006162	-11.77	0.000	-0.085545	-0.059551
<i>Firm_Age</i>	0.007031	0.000465	15.12	0.000	0.006119	0.007943
<i>Asset_Tan</i>	0.046121	0.005021	9.18	0.000	0.036259	0.055983
<i>Evar</i>	-0.036271	0.003121	-11.62	0.000	-0.042369	-0.030173
<i>LIQ</i>	-0.073719	0.002571	-28.67	0.000	-0.078697	-0.068741

Instrumented: *Size*

Instruments: I.*Size* I.*Prof* I.*Asset_Tan* I.*Firm_Age*

Test of Endogeneity

H₀ : Variables are exogenous

Durbin (score) chi2 (1) = 1.91132 (p=0.1671)

Wu-Hausman F (1, 53782) = 1.89806 (p= 0.1690)

Table 8: Test of Endogeneity for *CAP_TA* assets in model 3.2

Ivregress 2sls BTA (*CAP_TA* = I.*CAP_TA* I.*FIRM_SIZE* I. *B&D_TA* I. *PBDITA_TA*)
FIRM_SIZE *PBDITA_TA* *CFOA_TA* *B&D_TA* *FA_TA* *SGR* *PD* *GOV_F* *GROUP_F*

Instrumental variables (2SLS) regression

Statistics robust to heteroskedasticity

Number of clusters (firms) = 3164

Number of observations = 53788

Wald chi2(1) = 201011.03

Prob > chi2 = 0.0000

Variable	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
<i>FIRM_SIZE</i>	0.07900	0.00400	19.75	0.000	0.071204	0.086796
<i>PBDITA_TA</i>	-0.13000	0.00780	-16.66	0.000	-0.145170	-0.114830
<i>CFOA_TA</i>	-0.07950	0.00820	-9.69	0.000	-0.095198	-0.063802
<i>CAP_TA</i>	-0.07300	.017500	-4.17	0.000	-0.107947	-0.038053
<i>B&D_TA</i>	-0.04580	.007600	-6.02	0.000	-0.060844	-0.030756
<i>FA_TA</i>	0.55350	.003300	167.72	0.000	0.546037	0.560963
<i>SGR</i>	-0.00480	.001500	-3.20	0.002	-0.007705	-0.001895
<i>PD</i>	0.81300	.013000	62.53	0.000	0.787447	0.838553
<i>GOV_F</i>	0.40800	.041000	9.95	0.000	0.326100	0.489900
<i>GROUP_F</i>	0.26050	0.01290	20.19	0.000	0.235317	0.285683
_cons	0.70800	0.016000	44.25	0.000	0.676601	0.739399

Instrumented: *CAP_TA*

Instruments: I.*CAP_TA* I.*FIRM_SIZE* I. *B&D_TA* I. *PBDITA_TA*

Test of Endogeneity

H0: Variables are exogenous

Durbin (score) chi2 (1) = 1.9254 (p = 0.1768)

Wu-Hausman F (1, 53777) = 1.8994 (p = 0.1689)

Table 9: Test of Endogeneity for *B&D_TA* in model 3.2

ivregress 2sls BTA (*B&D_TA* = I.CAP_TA I.FIRM_SIZE I.B&D_TA I.PBDITA_TA)
 FIRM_SIZE PBDITA_TA CFOA_TA CAP_TA FA_TA SGR PD GOV_F GROUP_F

Instrumental variables (2SLS) regression

Statistics robust to heteroskedasticity

Number of clusters (firms) = 3164

Number of observations = 53788

Wald chi2(1) = 201015.1

Prob > chi2 = 0.0000

Variable	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
FIRM_SIZE	0.07870	0.00410	19.24	0.000	0.07070	0.08671
PBDITA_TA	-0.12991	0.00780	-16.68	0.000	-0.14491	-0.11492
CFOA_TA	-0.08023	0.00831	-9.63	0.000	-0.09652	-0.06382
CAP_TA	-0.07352	0.01741	-4.21	0.000	-0.10772	-0.03934
<i>B&D_TA</i>	-0.04522	0.00770	-5.87	0.000	-0.06021	-0.03027
FA_TA	0.55282	0.00331	167.18	0.000	0.54623	0.55949
SGR	-0.00471	0.00141	-3.36	0.002	-0.00743	-0.00191
PD	0.81411	0.01320	61.60	0.000	0.78732	0.84085
GOV_F	0.40852	0.04090	9.90	0.000	0.32825	0.48886
GROUP_F	0.26023	0.01260	20.67	0.000	0.23546	0.28505
_cons	0.70751	0.01581	44.86	0.000	0.67653	0.73848

Instrumented: *B&D_TA*

Instruments: I.CAP_TA I.FIRM_SIZE I.B&D_TA I.PBDITA_TA

Test of Endogeneity

H₀: Variables are exogenous

Durbin (score) chi2 (1) = 1.9132 (p = 0.1668)

Wu-Hausman F (1, 53777) = 1.8989 (p = 0.1709)

A2. List of publications

- 1) Bhat, D. A., Chanda, U., & Bhat, A. K. (2020). Does Firm Size Influence Leverage? Evidence from India. *Global Business Review*. <https://doi.org/10.1177/0972150919891616>
- 2) Bhat, D. A., Chanda, U., & Bhat, A. K. (2020). How market disciplined is Indian banking system. *International Journal of Finance and Economics* (**Under 3rd Review**)
- 3) Bhat, D. A., Chanda, U., & Bhat, A. K. (2020). Bank lending behaviour, soft budget constraints and bad loan crisis in Indian banking system. *China Finance Review International* (**Resubmitted after revision**)
- 4) Bhat, D. A., Chanda, U., & Bhat, A. K. (2020). On the soft budget constraints and default risks in Indian banking system. *International Journal of Emerging Markets* (**Communicated**)
- 5) Bhat, D. A., Chanda, U., & Bhat, A. K. (2020). Understanding India's NPA problem- Analysis of an expert survey. *World Economics Journal* (**Communicated**)

A3. List of conferences/workshops

- 1) Attended one-week workshop on “Survey Design and Data Management (SDDM)” organized by Department of Economics, the University of Kashmir from 29-10-2018 to 04-11-2018
- 2) Attended ten days workshop on “Basic and Applied Econometrics” of The Indian Econometric Society (TIES), organized by Department of Economics, University of Kashmir, Srinagar from 24-05-2016 to 02-06-2016
- 3) Attended ICSSR workshop on Research Methodology organized by Department of Management, BITS Pilani from 17-02-2020 to 27-02-2020
- 4) Presented a paper titled, “Bad loans in Indian banking system: A reflection of soft budget constraints, at 7th PANIIM management conference conducted by IIM Rohtak from 12-12-2019 to 14-12-2019
- 5) Presented a paper titled, “Capturing risk through ratios: A proxy-based risk analysis of Indian commercial banking system in COSMAR organized by IISc Bangalore from 11-11-2016 to 12-11-2016
- 6) Presented a paper titled, “Asset-Liability Management Modelling: A Multi-Objective Programming Approach” in National Conference on Computational Mathematics & Operations Research (CMOR)” held at B K Birla Institute of Engineering & Technology (BKBIET), Pilani from 15- 10-2016, 2 to 16-10-2016
- 7) Presented a paper titled, “Asset-Liability Management and Risk Integration: An income Statement Approach” in 2nd International Conference on “Applied Economics and Business” held at Shri Mata Vaishno Devi University from 28- 07- 2016, 2 to 29-07- 2016

A4. A brief biography of Supervisor

Prof Udayan Chanda

Udayan Chanda is currently working as Professor in Department of Management, Birla Institute of Technology & Science (BITS) Pilani. Earlier he was associated with Industrial Statistics Lab., Department of Information & Industrial Engineering Yonsei University as Post-Doctoral Fellow and Department of Operational Research, University of Delhi as Assistant Professor (Ad-hoc). He received his PhD degree in Marketing Models and Optimization (Operational Research) from University of Delhi, Delhi. He has published numerous papers in the area of Marketing Models, Optimization, Software Reliability and Inventory Management in international journals and conference proceedings. His current research interests include Marketing Models, Inventory Modelling, Software Reliability Growth Modelling, and Dynamic Optimization Techniques.

A5. A Brief Biography of co-supervisor

Prof. Anil K Bhat

Prof. Anil Bhat graduated in Mechanical Engineering in 1982 from REC, (now NIT) Srinagar and obtained his doctorate (fellowship) from IIM-Bangalore. His specialization is Marketing Research, and his methodological contribution has been in the area of “Cluster analysis of rank order data”. He is a member of Academy of Management (AOM), American Marketing Association (AMA), Academy of International Business (AIB), British Academy of Management (BAM) and a Fellow of Institution of Engineers (India). He has been trained at international workshops conducted by Haas School of Business, University of California, Berkeley and STVP, Stanford & has completed "10,000 Women Program: Tools for Growing your Business" organised by Goldman Sachs in partnership with London Business School. Prof. Bhat has worked in a managerial capacity for organizations before turning to academics and has headed the Department of Management at BITS Pilani for almost a decade. He has more than a hundred publications to his credit and has conceptualized, designed and conducted many MDP's both for private as well as for public sector companies. He has served as a management expert on Union Public Service Commission expert panel. He has been certified as an Entrepreneur Educator by STVP Stanford, NEN and IIMB. Besides guiding many Ph.D's, he has co-authored a book on management published by Oxford University Press. He is presently Professor, Department of Management BITS Pilani, Member Department Research Committee and Faculty Advisor, Centre for Entrepreneurial Leadership (CEL) at BITS-Pilani. He believes that Business is a force for Good and his Management Philosophy is anchored around the Goal of Maximizing the Impact of Individual Actions for the Good of Society.

A5. A Brief Biography of the candidate

Mr Dilawar Ahmad Bhat

Mr Dilawar Ahmad Bhat has done MBA from BGSB University Rajouri, J&K. He has also done MCOM from IGNOU and qualified SET, NET-JRF in Management, NET (Commerce). Before joining the PhD programme in BITS Pilani he has taught at the university level in Central University of Kashmir and Islamic University of Science and Technology, Awantipora, J&K. His area of interest is corporate finance, banking, and financial engineering.