Development Research Group

Governance, Efficiency and Soundness of Indian Banks

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DRG Study

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[1] The views expressed in this study are of the authors alone, and not of the institutions to which they belong. The usual disclaimer applies.

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Governance, Efficiency and Soundness of Indian Banks

Abstract

The report delivers the response to the key research question: do governance and efficiency explain bank soundness in India? The subject of this report is of utmost significance for an emerging economy like India, but until now, it falls in little-investigated research territory. An empirical investigation is done using the unique panel dataset for the period spanning from 2009 to 2018. The study built the bank-wise non-parametric indices of corporate governance and bank soundness utilising the "Benefit-of-the-Doubt" approach and estimated the risk-adjusted profit efficiency scores for banks using the data envelopment analysis approach. Based on the publicly available information on banks, the empirical connection between governance, efficiency and soundness of banks is explored using the dynamic panel data econometric models. The empirical results uncover that although Indian banks have made impressive progress in adhering to the mostly mandatory corporate governance norms/standards in the last few years, the existing compliance level is not adequate to label the current governance structure as a "socially efficient" structure. The analysis of sampled banks reveals noticeable asymmetries in the policy priorities across ownership groups on underlined dimensions of governance and soundness. The results of the econometric estimation are robust, and reveal that the governance structure crucially determines bank soundness, and profit efficient banks are sound enough to hold the capability of absorbing shocks. The key policy implication stemming from the empirical outcomes is that inadequate regulatory adherence by banks with governance norms would be costlier and may have destabilising impact on the banking sector.

Acknowledgments

Executive Summary

This report answers the key research question: do governance and efficiency explain bank soundness in India? This subject is of significant interest to all the stakeholders. However, so far, there exists no sufficient evidence in this regard for the Indian banking industry. In particular, this study aims to examine the nexus between governance, efficiency, and soundness using a unique and new bank-level panel dataset obtained from publicly available information in the individual bank's annual report for the period from 2008-09 to 2017-18. The research objectives are accomplished by constructing the non-parametric "Benefit-of-the-Doubt (BoD)" based composite indices for bank governance and soundness. An index of governance is built using 48 governance norms/standards, covering six key dimensions of bank governance: "board effectiveness", "audit function", "risk management", "remuneration", "shareholders' rights and information", and "disclosure and transparency". For building a composite index of bank soundness, the study employs 14 ratio indicators encompassing five distinct dimensions: "capital adequacy", "asset quality", "profitability", "liquidity", and "management efficiency". The risk-adjusted profit efficiency scores are calculated using a data envelopment analysis (DEA) model, which accommodates internal risk control variables in line with the 'optimal' approach suggested by Simper *et al.* (2017). The relationship between bank soundness, efficiency and governance is ascertained by using the state-of-the-art dynamic econometric methods for panel data.

From the empirical analysis regarding levels and developments of governance and soundness across ownership groups, we reach to the following conclusions. First, albeit banks in India have made significant progress in complying with governance norms in the last few years, the current compliance level is insufficient to label the existing governance structure as "socially efficient". Second, private banks showed relatively better performance in adhering to governance norms during the study period. Notably, public sector banks (PSBs) stumbled in achieving greater compliance with the dimensions of board effectiveness, risk management, and audit functions. Third, the analysis of trends in soundness levels of banks in India shows that from 2008-09 to 2012-13, the banking industry remained relatively sound before early signs of a decline began to appear in 2013-14. However, this up-turn in the bank soundness was reversed due to endogenous shocks coupled with an economic downturn, and banking groups experienced widened soundness gaps. Fourth, a significant drop in profitability and asset quality caused an increase in the fragility and vulnerability of the Indian banking system in the turbulent period.

An assessment of policy priorities divulges that, on average, PSBs accord higher priority to disclosure and transparency, which is followed by the remuneration, and shareholders' rights and information. In contrast, private banks ascribe a greater focus on audit function, followed by risk management and board quality. On

dimensions of bank soundness, PSBs amply focused on management efficiency, while private banks zeroed in on management efficiency, followed by asset quality and profitability. These differences highlight asymmetries in the policy priorities of banks on governance and soundness across ownership groups.

The report draws the following inferences while investigating the nexus between governance, efficiency and soundness using the cutting-edge dynamic econometric tools for panel data. First, governance significantly explains bank soundness, and any regulatory non-adherence to selected governance principles would be costly and may undermine soundness of the Indian banking system. Second, profit-efficient banks are sound enough to hold the capability of absorbing shocks, which may reduce destabilising effects. Therefore, to avoid the risk of bank failure in the long-run, business practices that assure sustainable profits with proportionate risk be encouraged. Third, there is a lack of instantaneous recovery in bank soundness may be due to the detrimental effects of many potential exogenous and endogenous shocks to the system. Fourth, government engagement can serve as an implicit assurance and safeguard, only to a point; beyond that, it may not necessarily foster bank soundness. Fifth, positive spillover effects of re-regulation and new regulatory reforms resulting from adverse events (like under-reporting of financial data by banks, inadequate compliance with governance standards/norms, management malpractices, *etc.*) are not felt immediately. The retrieval process is still in operation in pushing the banking industry back to an erstwhile soundness level.

Based on this study's assessment of governance dimensions and norms on bank soundness, we draw attention to the following. First, a prominent emphasis only on stringent compliance with board attributes and a meagre focus on other important dimensions of governance may be costly and impede bank soundness. Second, pro-active regulatory developments in the aftermath of the year 2014 have resulted in increased audit compliance, contributing to greater bank soundness. Third, mere regulatory compliance with risk management principles is not adequate to make a bank sound. Instead, other policy interventions, especially in the form of greater supervisory power to resolution authorities and better compliance on risk governance, may improve soundness. Fourth, better remuneration practices help the board to decide performance-linked compensation packages for executives, lower agency conflicts and enhance bank soundness. Fifth, higher compliance with shareholders' rights enhances the soundness of banks, and superfluous disclosure might precipitate the risk of being unsound and thus need rationalisation on this front. Finally, quality board meetings, a large proportion of outside directors on the audit committee, and a remuneration committee assist in exercising better controls and averting shocks in the industry. As to the effect of board independence on bank soundness, the impact is observed to be uneven across ownership groups. Finally, the empirical results mentioned in this paper are robust to different estimation models for panel data.

Abbreviations

AFC	Asian Financial Crisis
AQR	Asset Quality Review
BCBS	Basel Committee on Banking Supervision
BBB	Banks Board Bureau
BoD	Benefit-of-the-doubt
BSE	Bombay Stock Exchange
CBI	Central Bureau of Investigation
CBS	Core Banking System
CEO	Chief Executive Officer
CA	Companies Act
CI_S	Composite Index of Bank Soundness
CI_G	Composite Index of Bank Governance
DEA	Data Envelopment Analysis
FSB	Financial Stability Board
GFC	Global Financial Crisis
GMM	Generalised Methods of Moments
GoI	Government of India
GDP	Gross Domestic Product
LLP	Loan-Loss Provisions
LODR	Listing Obligation and Disclosure Requirements
LoU	Letter of Understanding
MD	Managing Director
NPA	Non-Performing Assets
NSE	National Stock Exchange
OECD	Organisation for Economic Co-operation and Development
PSB	Public Sector Bank
PB	Private Bank
PCA	Principal Component Analysis
RoA	Return on Assets
RBI	Reserve Bank of India
RBS	Royal Bank of Scotland
SEBI	Securities and Exchange Board of India
SBI	State Bank of India
SRC	Stakeholders' Relationship Committee
SZL	Simar-Zelenyuk-adapted-Li
VAR	Vector Auto-Regression

Table of Contents	**Page No.**

Governance, Efficiency and Soundness of Indian Banks

1. Introduction

In the past few years, particularly since the global financial crisis (GFC) of 2007-09, the regulators, supervisors, and policymakers around the globe have begun to pay greater attention to issues such as bank soundness, bank efficiency, and good corporate governance issues of banks. The raison d'être for this renewed interest involved the colossal effects of the crisis that were brought about in large part by the inadequate bank corporate governance, which created a climate of inertia, caused a massive collapse, and resulted in increased vulnerability and fragility in the banking system (Jokippi & Monnin, 2013). The fall of the Royal Bank of Scotland (RBS) is one of the noteworthy examples illustrating how failure in bank corporate governance can have a lasting impact on a nation's economic growth. This bank failed mainly because of the lack of sound decision-making abilities of its management executives and other fellow directors on the board. As a result, the government has to bail out RBS with taxpayer money to prevent its collapse. Financial Services Authority Board (2011) describes the economic cost of this bank failure as: "*RBS's failure has imposed large costs on UK citizens… The larger costs arise from the recession, which resulted from that crisis, within which RBS's failure played a significant role. That recession has caused unemployment for many, losses of income and wealth for many more* (p. 6)". An example such as this illustrates clearly how inadequate bank corporate governance can not only wreak havoc on the bank's finances, but also have detrimental effects on the economy of a country.

Following such instances of bank failures, regulatory and supervisory authorities have been re-evaluating and redesigning banking sector policies with a clear focus on adopting appropriate governance norms to achieve a high level of soundness in the banking system. Such evidence of bank failures and the resulting insolvency in the banking systems of the Western world compelled the Reserve Bank of India (RBI) to establish a Financial Stability Unit in 2009 and pressed to include bank stability/soundness as its most coveted goal in the policy formulation. In conjunction with this, a series of recent developments in the Indian banking industry, such as large scale bank frauds, cases of money laundering, as well as the unusual exposure of Indian banks to credit risk, have raised concern over the inadequacies of the governance structure for banks and its ramifications for the soundness and efficiency of the banking industry. RBI has made various steps for furthering sound corporate governance and supervision in the Indian banking system in recent years (RBI, 2014, 2020). Specifically, the transparency and disclosure standards are aligned with international best practices, and the systems of off-line surveillance and prompt corrective action are adopted for promoting bank soundness. Overall, RBI recognised the importance of good governance of banks for achieving higher efficiency and soundness levels and has taken an array of proactive steps in this direction. This is

clear from the remark of Mr. Shaktikanta Das, the Governor of RBI, in the foreword of the Financial Stability Report - 2019. In the report, he echoed the significance of good governance of banks by stating that "*the importance of good corporate governance across the board is the most significant factor that can promote stability and lift the efficiency of our economy to its full potential*".

According to the official statistics by the RBI, the ratios of gross and net non-performing assets as a percentage of total advances have raised significantly from 2.3 per cent and 1.1 per cent, respectively, in 2007-08 to 9.1 per cent and 3.7 per cent in 2018-19 (RBI, 2019a). Additionally, the banking industry registered a total of 6,801 frauds in 2018-19, worth INR 715.43 billion (RBI, 2019a). Regarding banking operations, 53 per cent of these frauds (*i.e.*, 3,606 frauds) are predominantly related to credit lending. In publicly available sources, insider involvement and management "dishonesty" or failure to conduct effective internal and statutory audits or the breach of regulatory guidelines (particularly concerning issuing of letters of credit), or the senior management's failure to implement an effective strategy for governance or all are hinted at as possibilities for why these frauds occurred. Therefore, it has served as an alarming bell to policy analysts and academic researchers to re-examine the level of existing governance standards and identify the impact of governance and efficiency on Indian banking soundness.

Recognising the significance of effective governance for banks and its ramifications, numerous efforts have been made by the regulators and legislators to institutionalise governance mechanisms for banking companies in India (see, for details, RBI 2001, 2002, 2014; Ministry of Corporate Affairs, 2013; SEBI, 2015). It is noteworthy here that the Indian Government has set up an institutional system for bank governance, under their own legal and regulatory statutes; Companies Act (CA), 1956 (as amended in 2009 & 2013), which is based on guidelines established by the M/o. Corporate Affairs; the SEBI under Clause 49 (LODR) Regulations, 2000 (amended in 2005, 2009, 2015 & 2017); and Report of the Corporate Governance Committee, 2017. In the past two decades, the governance structure for banking companies in India has evolved from the "single-aspect," comprising the board of directors and executive/board committees only, to the "multiple-aspects" including the role of audit, remuneration, nomination, risk management committees, and ownership structure. Nonetheless, Indian banks, especially PSBs, face trouble in the smooth implementation of all layers due to "dual regulation" by the Government of India (GoI) and RBI that has limited their capacity to compete with their private counterparts in terms of profitability and efficiency (RBI, 2001).

Against this background, it has become crucial to develop a profound understanding of the degree of effectiveness of governance mechanisms, bank efficiency level, and how they impact the overall soundness of the banking industry in India. As an attempt in this direction, this report responds to the following pertinent

research questions: What are the extent of governance compliance, bank efficiency and bank soundness in India? What are the optimal policy priorities of sampled banks regarding underlined dimensions of governance and soundness? In which dimension should a less sound (or less governed) bank focus? Do governance and efficiency explain bank soundness in India? In particular, the report helps to achieve the following research objectives: i) to explore the dynamics of bank governance, efficiency and soundness; ii) to estimate "benefit-of-the-doubt" (hereafter, BoD) based data-driven and endogenously defined optimal policy weights corresponding to the underlined dimensions of soundness and governance for Indian banks; and iii) to examine the relationship between bank governance, efficiency and soundness. It is fundamentally essential to answer these research questions at this critical moment when financial distress and fragility have reached a tangible limit and become a major policy concern for bank regulators.

An innovative non-parametric constrained "benefit-of-the-doubt" (BoD) model, as proposed by Cherchye et al. (2004, 2007), is used to quantify and create composite governance and soundness indexes. Our composite index of bank soundness is based on 14 ratio indicators, as suggested in RBI (2010). The selected ratio indicators encompass five distinct aspects: "capital adequacy", "asset quality", "profitability", "liquidity", and "management efficiency". It is imperative to indicate that the non-parametric index of bank soundness computed here is a more meaningful and holistic measure since it overcomes the significant inadequacies of the Z-score, the most popularly used bank soundness measure in the extant literature. Note that the Z-score is an accounting measure and captures bank insolvency risk[2]. It compares only bank buffers (returns & capitalisation) with risk (estimated by returns volatility). The main limitation of this measure is that it does not consider other aspects of bank soundness, such as asset quality, management performance, liquidity, or volatility to market risk (Huljak, 2015; Shaddady & Moore, 2019). The index of bank governance is based on the computational framework suggested by Gulati et al. (2020), which aggregates six dimensional indices of bank governance. These dimensions pertain to "board effectiveness", "audit function", "risk management", "remuneration", "shareholders' rights and information", and "disclosure and transparency". This study considers 48 governance standards/norms defined by legislative and regulatory authorities for computing dimensional indices and the composite index of bank governance (see Sections 4.1 & 4.2 for more details).

The BoD-based computational process used here for constructing the composite indices yields endogenous data-driven optimum policy weights for different

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[2] Prominent studies that use Z-score for measuring bank soundness include Demirgüç-Kunt & Detragiache (2011), Schaeck & Cihák (2014), Fernández et al. (2016), Fiordelisi & Mare (2014), Ahamed & Mallick (2017), among others.

dimensions of bank governance and soundness for each sampled bank. These weights explain the policy priorities and preferences of a bank and shed light on the area(s) of bank governance and soundness that needs policy interventions. In particular, the BoD approach is chosen due to its key advantages such as i) due to its non-parametric nature, it is not reliant on pre-assumptions and is appropriate for combining the unit invariant data; ii) it is also suitable for small samples; iii) the variants of the BoD approach allows the actual data (both positive & negative financial ratios) to choose endogenous weights (OECD, 2008); iv) it enables the extraction of "implicit" policy weights needed to linearly aggregate a set of dimensions from the observed data. Thus, the underlined extraction process eliminates the arbitrariness in choosing the weights required for aggregation; v) it takes a range of dimensions/indicators and assigns a single numerical score (so-called composite index) (Puyenbroeck, 2018); vi) it allows a differential weighting scheme that provides endogenous (*i.e.*, decided by the model rather than predetermined) weights for dimensions that vary across sample units (Greco *et al.*, 2019); and vii) the computational process is fairly intuitive and straightforward.

At a final step, the study examines a connection between governance, profit efficiency and bank soundness using a two-step system generalised method of moments (GMM) approach[3]. An analysis of governance-soundness nexus is carried out by testing whether better compliance with any or all governance aspects predicts a bank's soundness. The controlling effect of efficiency in impacting the connection between governance and soundness is also investigated. For this, the risk-adjusted profit efficiency scores of banks are estimated by choosing the "optimal" approach, suggested by Simper *et al.* (2017), for selecting an appropriate set of risk measures in a bank efficiency study. The DEA approach is used to obtain the profit efficiency scores for sampled banks. An empirical analysis is conducted using the data set for the period 2009-2018, which covers the adoption of the governance guidelines by Indian banks, as well as their revision and amendment. This study is expected to provide regulators and policymakers with a deeper understanding of interconnection between bank governance, profit efficiency and bank soundness. Further, the study results will help banks to focus on key governance and soundness issues that must be addressed urgently to avoid financial crises in the future.

The study departs from existing work on corporate governance, efficiency, and soundness in several ways. First of all, the BoD model is used for the first time in this study to build non-parametric indices of corporate governance and bank soundness. Prior studies have either used unweighted averages or principal

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[3] It is important to note that in our case no. of time units are less than cross-sectional units (*i.e.*, $N>T$), thus, it is preferable to adopt short-panel models (like dynamic panel models) instead of long-panel models (where $T>N$).

component analysis (PCA) when computing these indices (Gulati *et al.*, 2020). However, PCA is inappropriate when sample sizes are small and variability is low (OECD, 2008). In addition, the linear average method eases the assumption that indicators are non-compensated. Thus, it is beneficial and appropriate to use the BoD approach to construct bank-level indices since it enables utilisation of unit-invariant data, applying idiosyncratic weights and aggregating multiple dimensions simultaneously to construct a composite index (Rogge & Puyenbroeck, 2007; Puyenbroeck, 2018). In light of the highlighted advantages of the BoD approach and shortfalls of its counterparts, this study constructs the bank governance and soundness indices based on a computationally less cumbersome algorithm that generates bank-specific data-driven endogenously determined weights for distinct dimensions rather than weights based on an abstract, subjective judgment. Furthermore, these weights indicate the policy priorities and preferences of sampled banks concerning underlined dimensions. Another contribution of this study lies in using data information on 14 ratio indicators and 48 equity and debt governance norms to construct bank soundness and governance indices, respectively. The corporate finance literature argues stakeholders for banking firms include not only shareholders (*majority* and *minority*), but also, comprises depositors and other creditors whose trust needs to remain intact in the bank by the managers. Therefore, the scope of corporate governance, particularly for banks, extends beyond the equity governance (shareholders) to encompass debt governance (debtholders)[4]. As far as we could possibly know, no previous empirical study used such a wide array of indicators to build these indices of bank soundness and governance. At long last, this is perhaps the first study that investigates a link between "governance-efficiency-soundness" in the banking industry in India. To the authors' knowledge, there exists no study to date that attempted in this direction.

In India, bank governance and soundness can be studied for two main reasons. First, dispersed ownership structures have led to several bank collapses and governance failures in developed nations, such as in the U.S. and the UK (Ard & Berg, 2010). In contrast, emerging and developing economies such as India, which have banking systems characterised by deeply concentrated financial holdings (particularly their state-owned banking segment), have experienced relatively fewer collapses and largely remained untouched by the GFC of 2007-09 (see, for example, Eichengreen and Gupta, 2013; Kumar *et al.*, 2016; Gulati and Kumar, 2016). With this in mind, it would be worth investigating whether adhering to governance codes within a banking industry characterised by concentrated ownership guarantees soundness. The study's

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[4] Note here that "*debt governance that relies on debt (including deposits) pertains to the sort of principles governing depositors' and other creditors' interests*" (Whitehead, 2011). Hopt (2013) also points out that "*the banks cannot be restrained to equity governance but must focus on some sort of debt governance in order to avoid excessive risk-taking*".

observations can also be applicable to countries such as Pakistan and China where the banking sector has a highly concentrated ownership structure[5]. Second, the tepid performance of banks, especially PSBs, in the domestic market and the significant decline in bank activities abroad due to frauds and money laundering, necessitate increased transparency and improved corporate governance. Since this study pinpoints specific areas where governance needs to be strengthened, its conclusions can be used for formulating a strategy for achieving sustainable growth in India's banking sector.

The remaining of the study proceeds as follows. In the following section, we discuss governance structures and reforms, as well as governance models across nations. A description of key governance indicators for the banking industry and across bank groups is also presented. The following section reviews the literature on bank soundness, corporate governance, and performance. We then look at indicators, ratios and dimensions of bank governance and soundness. Additionally, a discussion of governance dimensions and bank soundness is provided. We present the database, methodology, and analytical tools in the subsequent section. The penultimate section provides empirical results, and the final section discusses policy implications, limitations, and directions for future research.

2. Governance for Banks in India: Structure, Reforms and Policy Amendments

2.1 Governance Structure for Banks in India

As of 1st April 2020, there are 12 public sector banks (PSBs) in which the GoI holds more than 50 per cent of the stake, 22 private banks (PBs), and 44 foreign banks (FBs). All public and private banks are listed except for three old private banks (the Catholic Syrian Bank, the Tamilnad Mercantile Bank, and the Bank of Nainital). Reserve Bank of India regulates banks under the Banking Regulation Act, 1949 (amended in 2017), which gives the industry a unified regulatory environment. Interestingly, governance regulations, especially concerning board composition, are separate for banks under distinct ownership types. Note here that even though efforts were made to harmonise the regulatory structure across ownership types, yet some differences still exist.

The governance and regulatory structure of Indian banks are outlined in Table 1. From the table, it is observed that the "Banking Companies (Acquisition & Transfer of Undertakings) Acts of 1970 and 1980" govern the board composition and structure

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[5] In China, around 60-90 per cent bank equity stakes in the 5 largest commercial banks are held with the government. This accounts for more than half of banking system assets in China (https://www.rba.gov.au/publications/bulletin/2012/sep/pdf/bu-0912-7.pdf).

of the nationalised banks, while the State Bank of India (SBI) Act of 1955 defines the set of regulations for SBI. Private banks are governed under the Companies Act of 1956 (amended in 2009 & 2013), which is broadly based on entity laws. On contrasting governance structure across public and private bank groups, it is observed that in private banks, the board of directors play a supervisory role and appoints managers to run the bank. While in PSBs, the GoI, in consultation with RBI through the Appointments Committee of the Cabinet, decides the appointment of the board of directors except for shareholders appointees. The key agency concern that emerges because of this arrangement is that there exists a dual regulation system for PSBs, in which the Ministry of Finance of the GoI and RBI define the legal and regulatory frameworks for these banks. The presence of the dual regulation system debilitates the regulatory discipline leading to feeble corporate governance in PSBs. Further, ownership concentration and control with the government, especially of PSBs, raise the agency conflict of type II, which may have troubled the banks in the smooth implementation of all layers, and limited their ability to compete with their private counterparts (RBI, 2001). In addition, the ownership concentration varies significantly across PSBs. Interestingly, the proportion of government-owned equity shares in Indian state-owned banks is quite high that varies from a minimum of 63 per cent in the Bank of Baroda to a maximum of 93 per cent in the UCO Bank as of 1st April 2020.

Table 1: Governance Structure of Banks in India

(As of end March-2018)

Ownership type	Public Sector Banks (PSBs)	Private Banks (PBs)
Banks	11 Nationalised banks and State Bank of India.	12 Old private and 10 New private banks.
Regulatory framework	Banking Regulation Act, 1949 (amended in 2017).	Banking Regulation Act, 1949 (amended in 2017)
Legal framework	*Nationalised banks:* The "Banking Companies (Acquisition & Transfer of Undertakings) Acts of 1970 & 1980" *SBI:* State Bank of India Act of 1955.	Companies Act of 1956 (amended in 2009, 2013).
Composition of board#	*Nationalised Banks:* 8 categories of directors on the board: Whole-time directors (Chairman & Executive Directors); Central Govt. official directors; RBI director; workmen employee directors; officer employee directors; Chartered Accountant directors; Central Govt. nominee directors; and Elected Shareholder directors. *SBI:* 7 categories, excluding Chartered Accountant directors.	Three categories, with executive directors, part-time independent directors and part-time non-independent directors (earlier 5 categories).
Board Strength	Minimum of 10 and maximum of 15 directors (incl. nominee directors) for companies with a net worth of INR 15 crore.	Minimum of two and maximum of 12 directors (excluding nominee directors).

Appointments of directors	By the GoI, through appointments Committee of Cabinet, in consultation with RBI. RBI, *vide* their communication "DBOD. No.BC. No.47/ 29.39.001/ 2007-08 dated Nov.1, 2007", notified banks to constitute the nomination committee of Board of Directors. However, the role of the nomination/ appointments committee is limited to elected/ appointed shareholder directors.	By nomination/appointments committee of the board of directors where the existing board of directors works with the CEO to appoint suitable new directors, and the final director appointment needs approval from the RBI.
Board Meetings	At least 6 times in a year	At least 4 times in a year
Listing of banks	All banks are listed on the BSE and the NSE and governed as per listing rule by listing regulator - SEBI - under Clause 49 [LODR] Regulations, 2000 (amended in 2005, 2009, 2015 & 2017)	All new private banks and nine old private banks are listed on the BSE and the NSE. Also, governed as per listing rules by listing regulator – SEBI - under the Clause 49 [LODR] Regulations, 2000 (amended in 2005, 2009, 2015 & 2017).
Directorship in other companies or committees (Inter-locked directors)	A non-executive director on the board will be eligible to be a director on the boards of at most 6 other listed companies, and a whole-time director on at most 3 companies	A non-executive director on the board will be eligible to be a director on the boards of at most 7 other listed companies, and a whole-time director on at most 3 companies
Remuneration and Compensation	Until 2007, the remuneration to the whole-time directors in the PSBs was as per the GoI guidelines. In accordance with M/o. Finance, Dept. of Economic Affairs (Banking Div.) notification F.No.20.I.2005-Bo-I, dated 09.03.2007, and the "Corporate Governance Voluntary Guidelines, 2009" by the Dept. of Corporate Affairs, many banks constituted the Remuneration Committee of the Board of Directors. They recommended the performance-linked incentives for the whole-time directors of PSBs; while the non-executive directors will only be paid the sitting fees for attending the meetings as per the GoI rules.	Compensation or Remuneration committee of the board of directors incentivises top management (*i.e.*, CEO) in accordance with their performance reflected through bank profits or returns through stock options while an independent director will not be entitled to any stock options and may receive a sitting fee as per the GoI rules.
Director's age	Minimum age of 35 and maximum age of 60 as per the GoI rules	Minimum age of 21 and maximum age of 70 for directors of companies and the maximum age should be 65 for whole-time directors
Director's Tenure	The chairman shall be appointed on 5-year tenure; whole-time and other directors for 3-year tenure with a maximum period not exceeding 9 years, Chartered Accountant Director for not exceeding 15 years.	No non-executive independent director shall hold office for more than 10 years (2 consecutive terms)

Notes: # The executive directors are inside or whole-time directors on the board, while the non-executive directors are outside or part-time directors who either may be independent or non-independent. The non-independent or affiliated or "grey" directors are generally former company officials, relatives of the officials, or those who have any existing business relationships with the company, while non-executive or non-affiliated or independent directors, other than the nominee director to the company, are those who perform advisory or fiduciary roles for the interest of shareholders.

Source: Authors' elaboration from various regulatory and legal acts and committee reports

2.2 Governance Models across Countries: An International Comparison

The groundwork for governance principles for banks is done by the Basel Committee on Banking Supervision (BCBS), who published the newest set of guidelines on the "Corporate Governance Principles for Banks" in 2015. From the perspective of the banking industry, the committee defines corporate governance as "*a manner in which business and affairs of a bank are governed by the board of directors and senior management*" (BCBS, 2015). Since then, the national regulatory authorities have been either amending or proposing a new set of governance codes, presumably, consistent with the latest principles of governance by the Basel Committee with the purpose of remaining globally competitive and financially stable. However, differences remain in the governance models adopted by banking systems across nations, mainly due to differences in legal, economic, regulatory, or political-cultural environments.

The banking systems in the US, UK, and India follow the so-called "one-tier" board structure. In contrast, the Chinese banking system follows a "two-tier" board structure representing a separation of management and supervisory boards. Jurisdictions such as in India and Japan set limits on the number of bank directorships held by a director to reduce potential agency conflict of interests among stakeholders. Dissimilarities also exist in adopting a shareholder versus stakeholder models[6], while India and the UK follow the Anglo-Saxon or shareholder (or rule-based model) of the US; Japan and China support a hybrid approach representing a mix of shareholder and stakeholder models. Japan (under the Abenomics agenda) introduced principles-based stewardship codes of "comply or explain" for listed banking companies. Aside from Japan, the bank boards in the US, UK, India, and China constitute a risk management committee. Only India forms a stakeholder's relationship committee as an additional mandatory requirement to protect investors' and shareholders' rights[7].

2.3 Governance Reforms in India

In 1996, the Confederation of Indian Industry (CII) established a "National Task Force on Desirable Corporate Governance: A Code" (led by Rahul Bajaj) to strengthen and promote corporate governance standards. The committee was given the task of

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[6] Literature suggests two models of corporate governance: the shareholder model, also known as typical Anglo-American (or common law system) followed by Anglo-Saxon countries, and the stakeholder model, which is usually adopted by the continental European countries. The former is based on agency theory and focus on maximisation of shareholder's wealth and mitigating agency concerns, while the latter is based on stakeholder theory and emphasise on wider group of stakeholders (Maxfield *et al.*, 2018). However, the financial crisis of 2007-09 has shown convergence across both the governance models by the means of enhanced governance practices adopted in many Continental European banks (Fernández Sánchez *et al.*, 2020).

[7] For more details, see thematic review on corporate governance by Financial Stability Board (2017) and Table I.1 of Annexure-I for detailed comparison of governance models across the world.

designing governance codes for Indian corporations, including banks and financial institutions, as well as recommending guiding principles for publicly listed firms. The task force's proposed corporate governance criteria were endorsed by SEBI's "Committee on Corporate Governance" (chaired by Kumar Mangalam Birla). In order to implement the recommendations of this committee, SEBI added a new clause to the listing requirements, widely recognised as Clause 49 of LODR. In 2003, SEBI established a "Committee on Corporate Governance", chaired by N. Murthy, to improve the transparency of listed firms and line up their listing agreements with the Companies Act. SEBI took its recommendations into account in amending Clause 49 of the LODR to include independent directors, whistleblower mechanisms, remuneration committees, and board performance evaluations. Clause 49 has been revised three times since 2009: in 2009, 2015, and most recently in 2017. The most recent amendments were made in response to the suggestions of the "Committee on Corporate Governance 2017" (led by U. Kotak) that focuses on improving corporate governance, protecting investors, and boosting transparency in Indian industry.

To develop cogent standards for governance in Indian commercial banks, the RBI formed the "Standing Committee on International Financial Standards and Codes" (chaired by Y.V. Reddy) in 2000, which later entrusted the task to the "Advisory Group on Corporate Governance" in 2001 (chaired by R.H. Patil). This group compared frameworks for corporate governance practices in India with international best practices and put recommendations that encompass all aspects of corporate governance, as proposed by the OECD. The recommendations include such as directors' responsibilities, shareholders'/stakeholders' accountability, criteria for selecting independent directors, the board structure and composition, the constitution of committees (audit, nominating and remuneration, stakeholder relationship), and relevant disclosures. Further, RBI established the "Consultative Group of Directors of Banks and Financial Institutions" (chaired by A.S. Ganguly) for reviewing the role of boards as supervisors, which, in 2002, submitted a report making specific suggestions for scheduled commercial banks and non-banking finance companies. Recently, a review of boards of Indian banks was undertaken by the "Committee to Review Governance of Boards of Banks in India" (chaired by P. J. Nayak). It was recommended by the Nayak committee that listed banks should follow the SEBI regulations on corporate governance.

The prevailing governance codes for banks are based on an "Anglo-American" one-tier board structure. It combines both executive (insiders) and non-executive (outsiders) directors into one unified body. As board members, the executive directors engage in both managerial and oversight roles; ownership and management are completely separated. Several recommendations have been made by the above committees over the years, including the following: i) ensuring an optimum mix of insider and outside directors, including at least one woman on the board; ii) having an

appropriate frequency of board meetings; iii) maximum board size of fifteen including nominees; iv) having at least three functional committees of the board- audit, remuneration, and risk management; v) effective internal assurance functions; vi) disclosure and transparency in compliance with listing agreements; and vii) a separate report on the bank's corporate governance. As part of its plan to strengthen governance standards in banks, the RBI published a "Discussion Paper on Governance in Commercial Banks in India" in 2020. In accordance with existing guidelines/instructions issued by the FSB, the BCBS, and the BBB, this discussion paper solicits inputs and suggestions from the public. This paper outlines indicates sweeping changes to the current governance structure, which will optimise bank resource allocation, protect depositor interests, and maintain financial stability.

2.4 Selected Governance Characteristics

In this sub-section, we examine the temporal variations in key variables related to the governance of public and private banking groups in India. The underlined governance parameters are i) board composition and structure, ii) audit committee and audit function, iii) risk management function, and iv) remuneration policy. Also, temporal changes in mean remuneration paid to executives and bank's ownership equity shareholding with the government have been discussed. In 2013, the regulatory and legislative authorities introduced a series of new governance reforms, added new clauses, and amended existing governance standards. Therefore, to capture the impact of recent reforms on governance parameters, the study breaks the full period from 2009 to 2018 into two sub-periods: 2009-2013 and 2014-2018. Table 2 summarises the descriptive statistics of selected governance variables in the Indian banking industry. In addition, the yearly variations at three points in time 2009, 2014, and 2018 are presented in Figures 1-4.

Board composition and structure: It is well established that an ideal board with a perfect mix of inside and outside directors is able to resolve agency conflicts effectively and enhance bank efficiency and soundness. In terms of the board's composition and structure, SEBI's listing agreement and CA 2013's clause 149 (4) recommend that the board be composed of an appropriate mix of executive and non-executive members, with at least one woman director to ensure that they are able to discharge their fiduciary duties efficiently. The nominee director shall not be defined as an independent director, following the SEBI's Clause 49 (II.B). The board should conduct a reasonable number of meetings and constitute qualified and independent board-level committees with their discrete functions. Following the US Sarbanes-Oxley Act of 2002, Indian regulators made it mandatory that the board have the majority of non-affiliated independent directors, who are free of decision-making in the business activities and functioning of the overall board as well as in board-level committees. In

accordance with revised Clause 49 (I.A.i and ii, 2009), at least two-third of board members should be outsiders, in the case of a non-executive chairman, and for an executive chairman, it should at least half. A new Clause 49 (II.B) introduced in the SEBI 2015 and CA 2013 requires independent (outside) directors on the board to certify their independence & schedule at least one separate meeting in the financial year (see Table II.1 in Annexure-II, for more details).

Table 2 and Figure 1 show that, on average, the bank board in India has 11 directors, including executive directors (inside or whole-time directors), non-executive (affiliated and non-affiliated) directors, and nominee directors. Among ownership groups, although the mean board size is more or less 10 over the years, PSBs have only 41 per cent board members as independent directors compared to 69 per cent in PBs in 2014. However, the percentage of independent directors on the board has declined to 32 per cent for PSBs and 58 per cent for PBs, respectively, in the terminal year of the study. In total, the sampled banks have 54 per cent independent directors during the first sub-period (2009-2013) compared to 47 per cent during the second sub-period (2014-2018). The observed decline in the independent directors on the bank boards in India seems consistent with developments in banking systems across Asia. According to the Global Financial Stability Report (2014), the share of independent directors on the bank boards in Asia is lower (about 30 per cent in 2012-13) than in Europe (about 50 per cent in 2012-13) and the United States (about 70 per cent in 2012-13).

With respect to the frequency of board meetings and per cent of female directors, the study observes no discernible difference. On average, the bank board conducts 12 meetings per year, with a frequency of at least one meeting a month. To adhere to regulatory norms pertaining to gender diversity on the board, at least one woman director is preferably appointed, which is reflected from the mean percentage of women directors on the board as 10 per cent (see Table 2). In the case of CEO duality and appointment of non-executive chairman on the board, a remarkable difference is visible. As in 83 per cent of PSBs, the same person holds two positions of the chairman and the CEO, compared to only 18 per cent of PBs in 2009. Further, the percentage of PSBs representing CEO duality declined to 14 per cent in 2018. In 2018, 88 percent of PBs appointed a non-executive director as chairman. PSBs have seen a rise in the percentage of banks with a non-executive chairman from 9 per cent in 2009 to 48 per cent in 2018.

Figure 1: Selected Governance Characteristics across Bank Groups: Board Composition and Structure
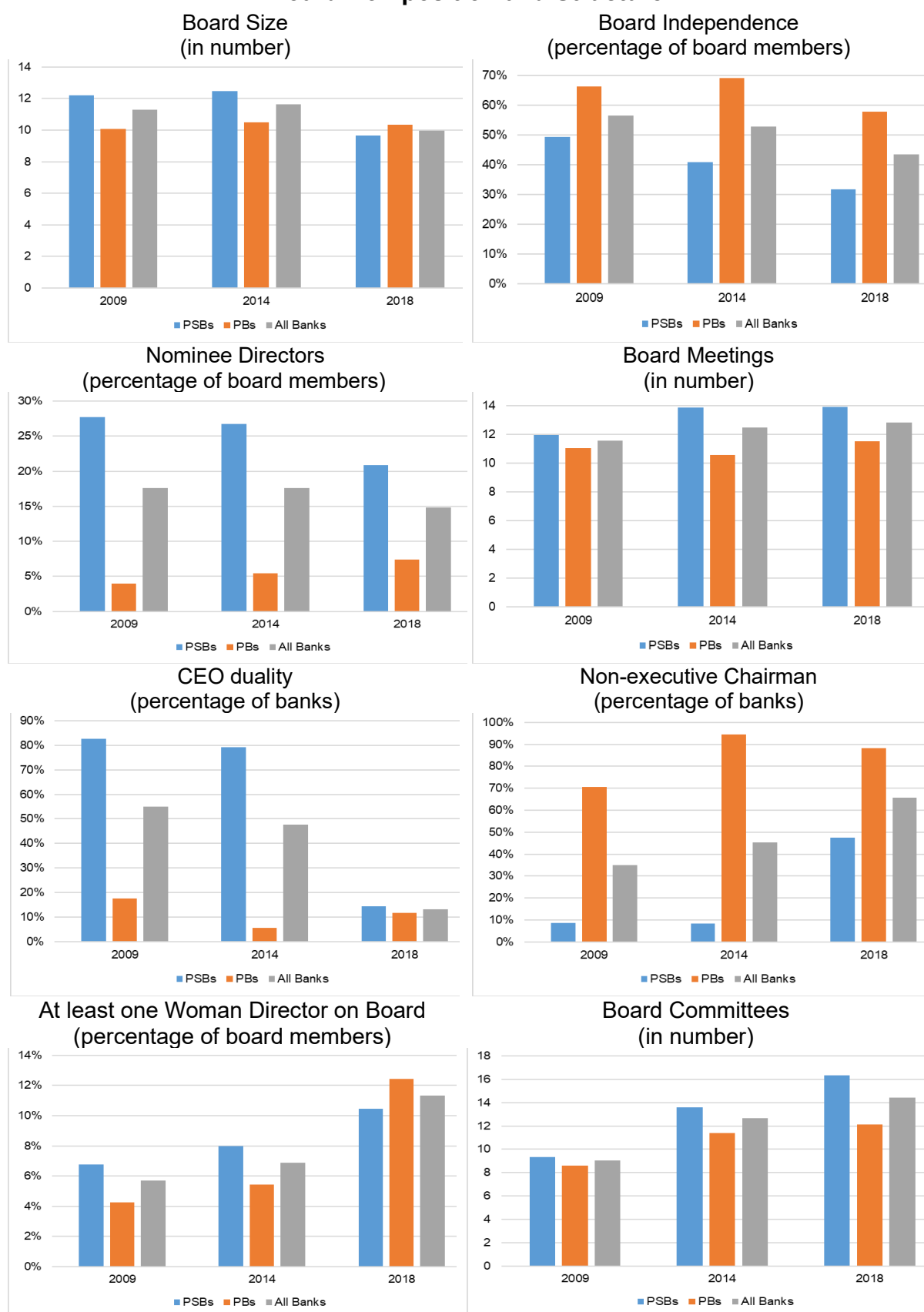
Source: Authors' elaboration.

Audit committee and audit function: The legislative and regulatory authorities recommend that banks form an audit committee of their boards comprised of at least three non-executive directors, preferably two-thirds of them should be independent. The audit committee can invite an executive director as a special invitee. If, in any case, non-independent and insider directors form the part of the committee, the reason should be disclosed in the annual report. The internal audit function should be transparent and sound enough and explained as a part of the annual report, and the required details should be given to the statutory auditor(s). Both the internal and external auditors report directly to the committee. Table 2 and Figure 2 reveal that the average number of meetings held by the audit committee members is 9 in a year, the mean percentage of independent (outside) directors in the audit committee is 55 per cent, and the average number of directors on the audit committee is five during the period 2009-2018. Of the sampled banks, 95 per cent of banks append a certificate of compliance by the statutory auditor(s) in their annual report.

Figure 2: Audit Committee and Audit Function
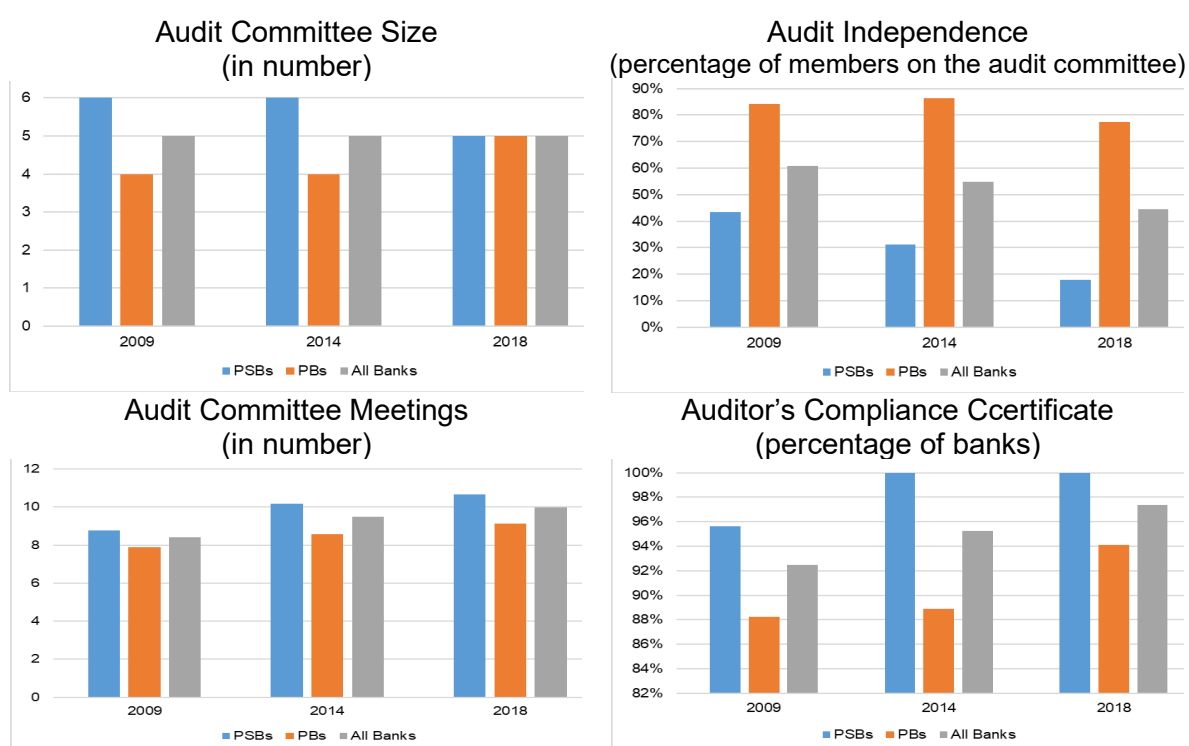
Source: Authors' elaboration.

Interestingly, bank groups behave differently. On average, the audit committee of a PSB has six members and met more frequently, 9 times in 2009 to 11 in 2018. In PBs, the average committee size was 4 in 2014 and 5 in 2018. The average number of independent directors on the audit committee of PSBs and PBs are 35 per cent and

81 per cent, respectively. Almost 100 per cent of the PSBs in our sample obtained an auditor's compliance certificate, while only 89 per cent of the PBs complied with this norm in 2014, and this percentage increased to 94 in 2018.

Table 2: Summary Statistics of Selected Governance Characteristics

Governance Variables↓	2009-2018			2009-2013			2014-2018		
Bank Groups→	All banks	PSBs	PBs	All banks	PSBs	PBs	All banks	PSBs	PBs
Board effectiveness									
BOARDSIZE	11	11	10	11	11	10	11	10	11
BINDEP (%)	50	40	64	54	44	67	47	37	61
BMEET	12	13	11	12	13	11	12	13	11
CEOD (% of banks)	38	61	8	51	82	8.2	25	38	7
BCOMM	12	13	11	10	11	10	14	15	12
WOMENP (%)	8	8	7	6	7	3.9	10	10	10
Audit committee and audit function									
AUDITSIZE	5	6	4	5	6	4	5	5	5
AUDITINDEP (%)	55	35	81	58	41	81	51	28	81
AUDITMEET	9	10	9	9	10	8	10	10	9
AUDITCOMP (% of banks)	95	99	90	94	98	88	96	99	92
Risk management function									
RISKSIZE	5	6	5	5	5	5	5	6	5
RISKNEX (% of banks)	32	12	59	24	4	51	41	22	68
RISKMEET	4	5	4	4	5	4	5	5	4
Remuneration									
REMCOMM (% of banks)	93	94	91	88	92	82	97	95	100
REMMEET	2	1	4	2	1	3	3	1	4
MEXREM (INR in lakhs)	190.0	58.2	372.8	133.2	46.5	258.0	249.3	71.0	485.1
MEDEXREM (INR in lakhs)	63.9	53.2	78.8	55.0	51.4	83.0	72	61.0	200.0

Notes: BOARDSIZE, Board size (no. of directors on the board); BINDEP, percentage of independent directors on the board; BMEET, Board meetings; CEOD, CEO duality (percentage of banks); BCOMM, Board committees; WOMENP, percentage of woman directors on the board; AUDITSIZE, size of the audit committee; AUDITINDEP, percentage of non-executive independent directors on the audit committee; AUDITMEET, no. of meetings held by audit committee; AUDITCOMP, self-reporting statutory auditor's compliance certificate (percentage of banks); RISKSIZE, size of the risk committee; RISKNEX, non-executive chairman of the risk committee; RISKMEET, no. of meetings held by the risk management committee; REMCOMM, percentage of banks having remuneration committee; REMMEET, no. of meetings held by remuneration committee; MEXREM, mean executive remuneration; MEDEXREM, median executive remuneration.
Source: Authors' calculations.

Risk management[8]: Regarding risk governance, the "Consultative Group of Directors of Banks/Financial Institutions, 2002" has recommended that each bank should constitute a stand-alone board-level risk management committee (RMC). The

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[8] Globally, the risk functions has gained importance, especially since the global financial crisis of 2007-09. The regulations require companies with certain size (market capitalisation) to constitute a risk committee and appoint a Chief Risk Officer (for *e.g.,* the Dodd-Frank Act in the United States, the Capital Requirements Directive—EU Directive 2013/36/EU, CRD IV—in Europe) [Global Financial Stability Report, 2014].

constitution of the RMC not only avoids the dual hatting of the chairman of the audit committee (OECD, 2014) but also allows independent monitoring of the risk policy for a bank. In India, the Central Vigilance Commission separately monitors the risk practices of the state-owned banks due to their corporate social responsibility. Besides, the "Report of the Corporate Governance Committee, 2017" (Chairman: Uday Kotak) recommended that all the top 500 of the largest listed companies should form this risk committee. Based on sampled data, we note that the percentage of banks having a non-executive member as a chairman of the risk management committee increased from 22.5 per cent in 2009 to 57 per cent in 2018 (see Table 2 & Figure 3). In PSBs, this percentage had escalated from 0 per cent in 2009 to 47 per cent in 2018. This figure is much larger in PBs (70 per cent *vis-à-vis* 47 per cent in 2018) than PSBs. On average, the risk management committee conducts four meetings in a year and has a mean size of 5 members (including the chairman).

Figure 3: Risk Management Function
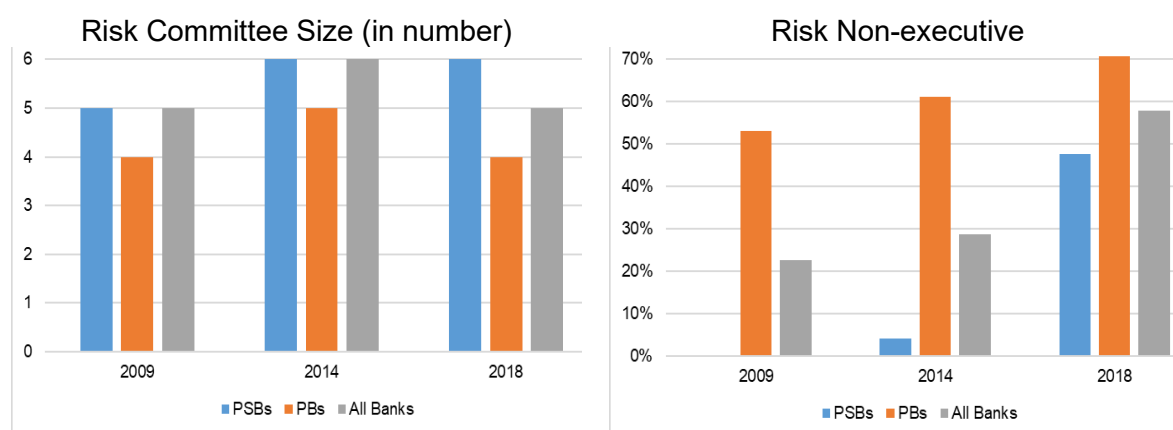
Source: Authors' elaboration.

Remuneration committee and bank executive remuneration: Initially, the constitution of the remuneration committee was voluntary in 2009 (refer to SEBI revised Clause 49 (item 2) 2009 and Corporate Governance Voluntary Guidelines 2009). However, the new clause 49 (IV.E) 2015 and CA 2013 mandate the constitution of a remuneration committee with all non-executive directors and an independent director as the chairman. The statistics reveal that only 64 per cent of PBs had a dedicated remuneration committee in 2009 and 100 per cent in 2014. In PSBs, 95 per cent of banks constituted the remuneration committee in 2014. On average, this committee meets four times a year and only once a year in PSBs. Table 2 and Figure 4 presents the trends in remuneration paid to bank executives in India during the whole study period[9]. The average (median) executive remuneration has increased in the

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[9] The executive remuneration includes fixed pay, perquisites, gratuity fund, pension fund, and other long-term benefits subject to their financial performance. For PSBs, the GoI decides the remuneration of whole-time directors in consultation with RBI. However, RBI approves the remuneration packages of whole-time directors

industry as a whole and across bank groups. The mean (median) executive remuneration turns out to be INR 110.97 lakhs (INR 34.96 lakhs) in 2009 and INR 296.22 lakhs (INR 93.02 lakhs) in 2018, with INR 190 lakhs (INR 93.02 lakhs) during the entire study period 2009-2018. This figure is smaller for the executives of PSBs because it is GoI, who decides it in consultation with RBI. Further, bank executives are not entitled to stock options and equity grants in PSBs during the study period. Only 8 PBs have paid stock options to their executives during the entire study period. Thus, there exist significant differences in the remuneration policy and executive remuneration packages across bank ownership groups.

Figure 4: Remuneration Committee and Trends in Remuneration Practices
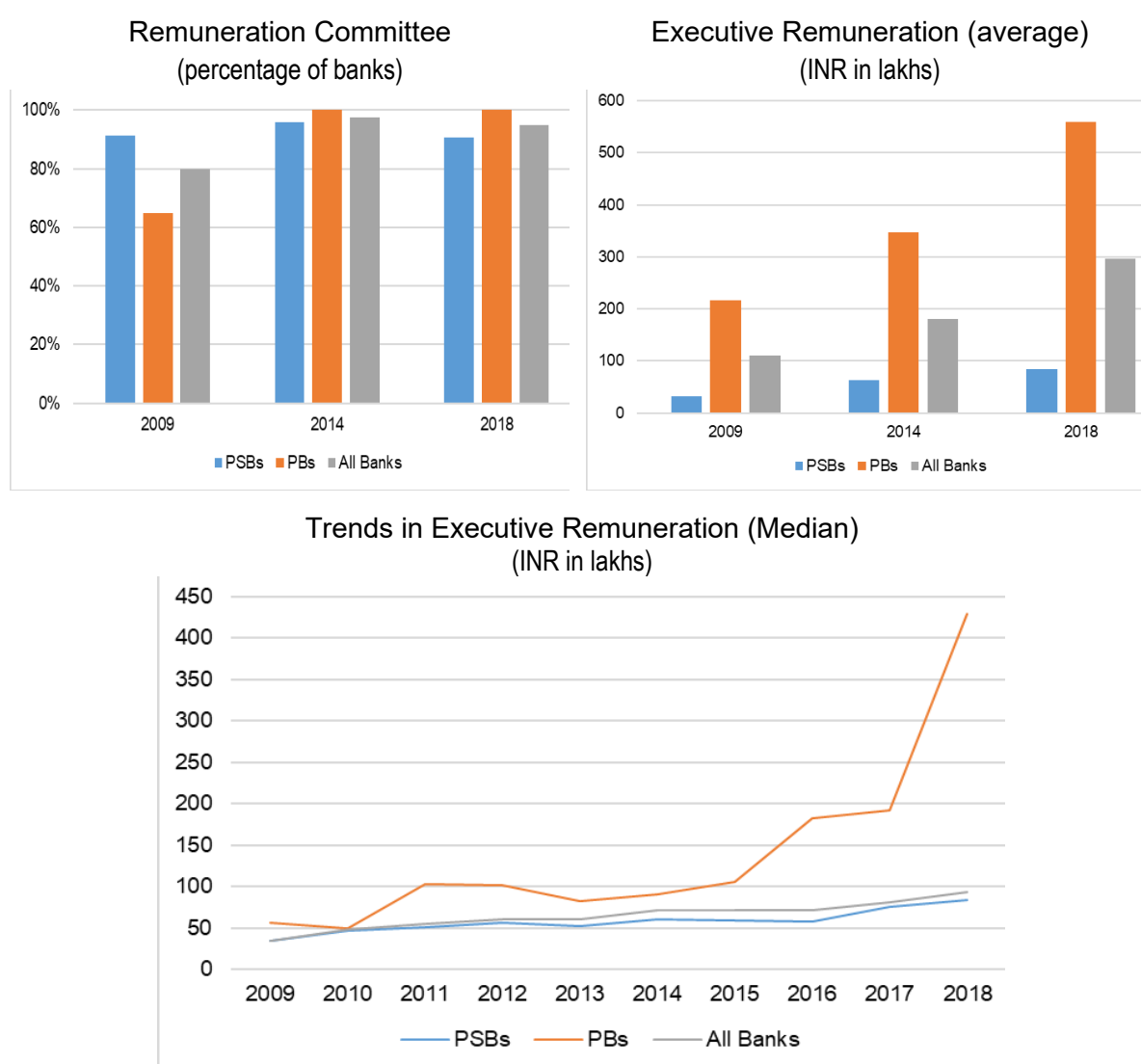
Source: Authors' elaboration.

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for the PBs (RBI, 2019b). Based on the "Guidelines on Compensation to Whole-time Directors", the executives of PBs embraced all the aspects of remuneration, including stock options and equity grants, which is not practicable in PSBs. Although the scheme of stock options and equity grants is recommended for PSBs by the BBB in 2017.

On average, in terms of ownership shareholding, government ownership in the bank's equity shareholding has increased to 77.1 per cent for PSBs in 2018. In the case of PBs, only 17.5 per cent and 3.5 per cent of the shareholding rest with the government in 2014 and 2018, respectively (see Figure 5).

Figure 5: Trends in Ownership Shareholding with the Government
(percentage)
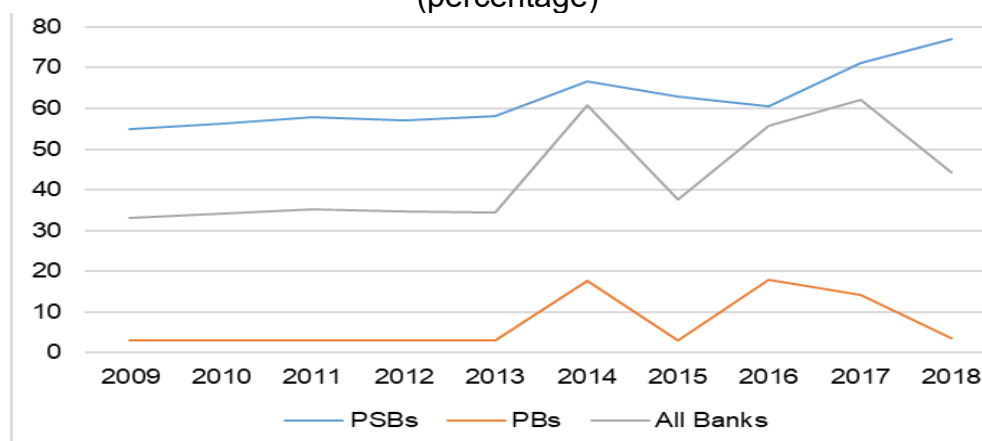
Source: Authors' elaboration.

3. Governance, Efficiency and Soundness of Banks: A Relevant Literature Review

3.1 Bank Governance: A Relevant Literature Review

Recently, corporate governance research in banking has gained momentum from both theoretical and empirical perspectives. In their influential theoretical research, Caprio and Levine (2002), Adams and Mehran (2003), Levine (2004), and De Haan and Vlahu (2016) considered two aspects of bank governance: i) how bank governance differs from that of non-bank organisations, and ii) how sound governance can improve management discipline, protect shareholders' and other stakeholder' rights, reduce multi-agency conflicts, and promote financial stability. In a similar strand of research, Arun and Turner (2004), Mullineux (2006), Mülbert (2010), and Becht *et al.* (2011) conceptualised an argument that banks suffer from multiple agency conflicts because of the twin fiduciary duty of bank managers to creditors/depositors who are risk-averse, as well as shareholders who dare risk to maximise their return. Further, the special nature and the developmental roles that banks play across nations has necessitated a special consideration of governance in banking (Adams & Mehran, 2003; Hopt, 2013). In addition, Mülbert (2010) hinted that governance failures were stated to have been the primary cause of the GFC of 2007-09 by some recent research. Heremans (2007) explained how bank governance and stability are linked and argues that "a*s corporate governance is a necessary complement to regulatory*

and supervisory intervention, it should be approached not only from the point of view of profit maximisation but also from the perspective of financial stability". Overall, the theoretical research on various aspects of bank governance broadly emphasises that effective governance of banking firms is indispensable for sustainable growth of these firms and can be achieved only through an empowered board, sound audit controls, robust risk management practices and a high level of disclosures and greater transparency along with well-defined shareholders' rights.

The empirical research on governance in banking, especially in the developing economies, is at an embryonic stage. A vital thread of this research focuses on quantifying bank governance by building a composite corporate governance index for banks (see Gulati *et al.*, 2020, for more details). However, research efforts in this direction are diminutive. Song and Li (2012) developed an index of bank governance from 48 countries based on 15 indicators about board and ownership structures, executive pay, and transparency. Relying on 51 governance indicators, Peni and Vähämaa (2012) constructed a corporate governance index akin to the Gov-Score elaborated by Brown and Caylor (2006). Ellul and Yerramilli (2013) adopted a corporate governance index by Gompers *et al.* (2003). Combining 26 bank governance standards, Love and Rachinsky (2015) constructed a composite index of corporate governance and five standardised sub-indices for a sample of banks operating in Russia and Ukraine. They also probed the connection between corporate governance and financial performance in sampled banks. It has been inferred that there is a modest connection relationship between corporate governance and performance due to a feeble institutional environment. Based on risk and supervisory board variables, Andrieș *et al.* (2018) calculated the bank governance index for emerging economies. In a recent study, Misra and Das (2020) attempted to prepare the benchmark index of board composition based on six key norms pertaining to board structure and composition using the data of seven public sector and five private banks in India. Using 58 governance norms, Gulati *et al.* (2020) proposed an index of corporate governance for Indian banks using the constrained BoD approach.

3.2 Bank Efficiency: A Relevant Literature Review

Over the past three decades, there has been a proliferation of studies on bank efficiency using frontier efficiency approaches. Stochastic Frontier Approach (SFA) is the widely used parametric technique, and data envelopment analysis (DEA) is the popular non-parametric approach in bank efficiency analysis. In the banking literature, the key research themes that have attracted the attention of researchers include i) the effect of financial sector reforms, deregulatory and restructuring measures, banking crises, and regulation and supervision on bank efficiency levels, ii) efficiency variations across ownership types and size classes, iii) cross-country contrasts in bank efficiency

and productivity growth, iv) potential efficiency gains from bank mergers, and v) the impact of environmental factors on bank efficiency. One can easily observe wide variations in efficiency estimates even for an identical sample of banking firms because the results are highly sensitive to the choice of the methodological framework used and the approach chosen to specify input and output variables. The recent excellent survey article by Aiello and Bonanno (2018) clearly highlights the sources of heterogeneity in efficiency scores across 120 empirical studies conducted from 2000 to 2014. Based on meta-regression results, they infer that the parametric approach yields relatively lower efficiency scores irrespective of frontier type. The study further found that model specifications under a value-added approach produce a higher efficiency than production, intermediation or hybrid approaches.

Different episodes of the financial crisis, notably the AFC of 1997 and the recent GFC of 2007-09, force the banking regulators as well as governments to pay serious attention to the risk-taking behaviour of the banking firms. Consequently, a growing number of studies explicitly account for internal risks in the bank's production technology specification. While measuring the cost efficiency of US banks, Mester (1996) argues that "*unless quality and risk are controlled for, one might miscalculate a bank's level of inefficiency*". The author incorporates NPLs and equity into the cost function to reflect the banks' output quality and their risk level. There are two strands in the extant literature on incorporating risk in efficiency. The first strand treats risk as an exogenous factor and uses a two-stage efficiency framework in which the efficiency scores are calculated in the first stage, and then these scores are regressed on risk management ratios and other environmental factors in the second stage. Some notable studies that belong to this strand are Casu and Molyneux (2003), Ariff and Can (2008), Jiménez-Hernández *et al.* (2019), among others. The second strand of this literature uses the one-step approach in which a risk measure is directly adjusted/introduced as either input or output in deriving an efficient frontier. To obtain risk-adjusted estimates of bank efficiency, researchers focus primarily on incorporating credit risk measure(s) in the efficiency measurement model. The three widely used credit risk control variables in the extant literature are: i) equity capital, ii) loan loss provisions as good (desirable) inputs, and iii) non-performing loans (NPLs) as bad (undesirable) output (Simper *et al.*, 2017).

In the Indian context, the literature on bank efficiency is extensive (see, Kumar and Gulati, 2014). The key focal point of most of the studies is to explore the impact of financial deregulation programme on bank efficiency and computing efficiency gaps across distinct ownership types. Some recent studies likewise attempted to investigate the effect of the GFC of 2007-09. The works of Gulati and Kumar (2016), and Kumar *et al.* (2016) are among those who explored such impacts on bank efficiency in India. Additionally, only the efforts by Das and Ghosh (2009), Gulati and Kumar (2016),

Jayaraman and Srinivasan (2014), and Jayaraman and Bhuyan (2020) focused on profit efficiency estimation of Indian banks. Interestingly, just the investigations by Fujii *et al.* (2014), Jayaraman and Srinivasan (2014), and Jayaraman and Bhuyan (2020) explicitly accommodate the presence of bank risk in the form of NPLs as an undesirable output in the bank's production process. By and large, the extant literature on bank efficiency in India calls attention to that there is a dearth of studies that characterise the bank technology by jointly modeling the production of desirable (good) and undesirable (bad) outputs and the role of the bank's input and output prices.

3.3 Bank Soundness: A Relevant Literature Review

The contemporary growth literature suggests that the soundness of the banking sector plays a vital role in accelerating economic growth (Jokippi and Monnin, 2013), and the economy bears huge economic costs, especially in terms of loss of real output and employment if a crisis hits its banking system (Boyd *et al.*, 2006; Dell'Ariccia *et al.*, 2008). The global financial crisis of 2007-09 once again jolted the regulators and policy formulators to identify the leading indicators of banking sector problems. One of the key strands of the bank soundness literature focuses on identifying the leading indicators of banking fragility and developing an index of banking soundness. For the identification of indicators of fragility, the signaling approach and qualitative response models are frequently employed in the literature. However, the indicators used in explaining a banking crisis vary widely across studies.

Kaminsky and Reinhart (1999) used the signaling approach to analyse the links between banking and currency crises. Indicators of bank stability are constructed, and their changes are used to provide a reliable signal for the emergence of crises between normal times and times of stress. Their analysis showed that banking and currency crises are found to be closely linked, and generally the problems in the banking sector precede a currency crisis, which activates a vicious spiral of economic recession. A multivariate logit model was utilised by Demirgüç-Kunt and Detragiache (1998) to forecast the banking crisis probabilities in both developed and developing countries from 1980-1994. Based on forecast probabilities, they developed an early warning system and a rating system of bank fragility. They found that the extreme behaviour of one or more macroeconomic variables can trigger a banking crisis. Based on the banks' joint probability of default, Segoviano and Goodhart (2009) proposed a four-step non-parametric approach to construct a set of bank stability measures. They derived the stability measures from the banking system's (portfolio) multivariate density (BSMD), which embeds the distress dependence among the banks and is based on copula functions characterising both linear and non-linear dependence.

In the Indian context, only limited studies have been undertaken to measure bank soundness using a comprehensive multi-dimensional index-based approach. Bhattacharya and Roy (2012) used the index-based approach to identify the episodes of distress in the Indian banking sector during 1994-2007. Based on the probit regression model results, they found that the probability of bank fragility in India is explained by the economic slowdown, key policy rates, and trade-related factors. Using data on Indian banks for the period 1997-2007, Ghosh (2011) developed a simple index of bank fragility using three indicators of banking operations: (i) loan-loss provisions to total asset ratio, (ii) capital adequacy ratio, and (iii) returns-on-asset. He found that majority of the Indian banks have remained moderately stable during the study period. The results of the panel regression analysis showed that bank fragility is explained significantly by prudential norms, concentration, and foreign bank presence.

In the extant literature, a few studies used the CAMELS assessment framework of RBI for constructing the bank stability index (BSI). Mishra *et al.* (2013) constructed a banking stability indicator based on the weighted average ratios used in RBI's CAMELS assessment. They also showed that the stability of the banking system affects the performance of financial markets and real output. However, financial market instability and the fall of the real output impact the bank stability with a lag. Using the PCA weighted CAMEL framework, Gulati and Singh (2019) constructed the BSI for the period 2007-2017. Notable findings of their study are i) the bank stability dwindled in the post-crisis period that marked a beginning in 2008-09, and ii) foreign banks dominate the high stable category, and no PSB belongs to this category. Using quarterly data of 39 banks in India, Dhal *et al.* (2011) endeavoured to employ the vector auto-regression model for studying policy transmission mechanisms comprising output, inflation, interest rates, and financial stability index (which was computed using the CAMEL indicators). One of the key findings of their study is that financial stability, growth, and inflation share a medium to long-term relationship.

3.4 Relationship between Governance, Efficiency and Soundness

An important strand of current literature discusses the role of internal governance mechanisms, particularly boards, in determining the performance and risk-taking behaviour of banks. Using the sample of large banks in the EU, Agoraki *et al.* (2010) revealed a non-linear relation between board composition and bank efficiency, while a negative relationship with the board size. Grove *et al.* (2011) found a concave relationship between board size and performance of the US banks. Further, their study supported a negative association between CEO duality and bank performance. Also, Adam and Mehran (2012) examined 35 US bank holding companies and found that larger boards positively correlated with bank performance. However, they established no significant relationship between board composition and

performance, which was measured by Tobin's Q statistic. Nyamongo and Temesgen (2013) reported that the larger board size deteriorates the performance, while the independent directors enhance the performance of Kenyan banks.

Further, Liang *et al.* (2013) divulged a significant positive impact of board meetings and independent directors and the negative influence of board size on the performance of Chinese banks. García-Meca *et al.* (2015), who highlighted the decisive role of female directors on the profitability of 159 listed banks in nine countries. Mamatzakis and Bermpei (2015) witnessed a positive effect of CEO power on bank performance but a negative relation of board ownership with the performance for a certain threshold. Dong *et al.* (2017) showed a positive influence of board independence, while CEO duality exerted a negative impact on the profit efficiency of Chinese banks.

With the newly revised BCBS governance principles, scholars are now exploring how risk mitigation, disclosure practices, and compensation policies relate to the various aspects of bank soundness. For the sample of 800 banks in 72 countries, Marques and Oppers (2014) examined the impact of compensation policies on bank-risk taking. Andrieș *et al.* (2018) found that banks with rigid managing boards and tight risk management structure lower the cost and technical efficiency of sampled banks in 17 CEE nations. Also, there have been few attempts to establish the relationship between i) governance and capitalisation (Anginer *et al.*, 2016), and ii) governance and bank failures (Berger *et al.*, 2016). Also, in the context of emerging economies, researchers have made attempts to analyse the role of boards and tried to explore the inter-relationship between bank performance and bank board characteristics (see, for example, Bukhari *et al.* (2013) for Pakistan; Dong *et al.* (2017) for China; among others).

While significant effort has been put into analysing corporate governance in listed companies in India, there has been little attention paid to corporate governance concerns in banking organisations. Mohan (2004), Chakrabarti (2005), Subbarao (2011) and Jain (2021) discussed governance reforms and the glitches and challenges confronted by Indian banks regarding these reforms. The study by Agarwal *et al.* (2015) studied 29 banks in India to analyse the relationship between board conduct and risk-taking behaviour. The effect of boards on performance of Indian banks was also investigated by Sarkar and Sarkar (2018). In brief, the prior literature offers two main issues that are innate in the measurement of governance and soundness for banks. These concerns pertain to i) the selection of indicators/ratios and dimensions for developing an overall index for the subject in question, and ii) the choice of the appropriate methodological framework for aggregating the indicators or dimensions. For the development of the bank governance index, a few studies utilised the self-

structured framework, which depends on one or few indicators/ dimensions. To measure the strength and independence of the risk management functions, for the bank soundness index, despite some of the critical limitations, the *Z*-score is the leading indicator to capture the bank soundness. In addition, most of the existing studies have built a composite index of bank soundness, considering a few ratio indicators. For massing indicators/norms/dimensions, past studies generally relied either on weights by the expert judgment (Geršl and Heřmánek, 2006), or employed the traditional unweighted method (Central Bank of the Republic of Turkey, 2008; RBI 2010; Song and Li, 2012; Kočišová and Stavárek, 2018) or weights generated by PCA (Andrieş *et al.*, 2018; Gulati and Singh, 2019).

The following observations can be made based on a thorough study of the literature on governance and soundness for banking firms. First, in most studies, only one or a few indicators are used to create composite measures of governance and soundness. They have ignored a full set of indicators/norms in building the soundness/governance index. Second, methodologically, the studies have mainly employed the traditional unweighted method, which implicitly implies equal weights, ignoring the fact that all the dimensions of soundness/governance may not share the same policy priorities and preferences by banks. Third, in most empirical studies exploring the connection between governance and bank performance, the bank performance is proxied by traditional accounting-based financial ratios like returns of assets, returns of equity, *etc*., along with the measures like stock returns and Tobin's Q. Only a few studies captured the bank performance as a multi-input and multi-output non-parametric frontier-based efficiency measure (see, for example, Mamatzakis & Bermpei, 2015; Dong *et al.*, 2017; Andrieş *et al.*, 2018; among others). However, the issues of bank efficiency measurement adopting an "optimal" approach to obtain robust estimates of risk-adjusted profit efficiency and establishing a link with governance and soundness for Indian banks are not attempted yet. Our study is an attempt to rationally consider these above mentioned issues.

4. Measurement of Bank Governance, Soundness and Efficiency

4.1 Governance Index: Norms and Dimensions

The study calculates the governance index based on a "Benefit-of-the-Doubt" (BoD), as proposed by Gulati *et al.* (2020), that aggregates six different dimensional indices of corporate governance for obtaining yearly values of composite governance index for individual sampled banks over the period 2009-2018. The underlined dimensional indices are computed from 48 governance norms that pertain to "board effectiveness", "audit function", "risk management", "remuneration", "shareholders'

rights and information", and "disclosure and transparency" (see Figure 6). A description of the coding process and grouping of the norms within each dimension of the bank-level governance index is given in Table IV.2 in Annexure IV.

We make several data adjustments before we obtain the composite index of bank governance. First, after obtaining either quantitative or qualitative details about 48 governance norms, we code each norm as a dummy variable with a score of 1 if a bank complies with this regulatory norm and 0 otherwise. This data adjustment helps us in achieving homogeneity and uniformity in defining these norms. Second, to get individual dimensional indices, the study applies well known linear unweighted average method for aggregating the governance norms. One explanation for utilising this method for getting dimensional indices is that the underlined norms are addressed as a binary outcome. An index value, ranging from 0 to 1, is assigned to each dimension. Dimensional indices of governance (DI_G) are obtained as:

$$DI\_G_{k,j} = \frac{1}{\eta_k} \sum_{l=1}^{\eta_k} p_{l,j} \qquad k = 1,...,K; j = 1,...,n$$

where $DI\_G_{k,j}$ is the dimensional index for the k-th dimension of governance for j-th bank, K is the total number of dimensions, $p_{l,j}$ is the value of l-th norm for j-th bank, η_k is the number of governance norms that define the k-th dimension, and n is the number of banks.

Third, we follow Vidoli and Fusco (2018) and normalise dimensional indices obtained in step (2) at the mean of 100 and standard deviation of 10 to deal with 0 and 1 scores of dimensional indices. Finally, we employ the non-parametric constrained BoD model for aggregating six normalised dimensional indices to determine the preferences (as defined through the weights obtained) of the bank on each dimension and to construct a bank-level composite index of governance (see Section 4.3 for the details on the constrained BoD model). This step, thus, provides a set of endogenously generated weights, which sheds important light on the priorities of a particular bank on different dimensions of corporate governance. The present study differs substantially from earlier ones. We instead use an idiosyncratic and bank-specific endogenous weights (specific to banks and dimensions), rather than the traditional linear weighted average or PCA. The index value thus computed by this methodology lies between 0 (worst) and 1 (best).

Figure 6: A Governance Framework for a Bank
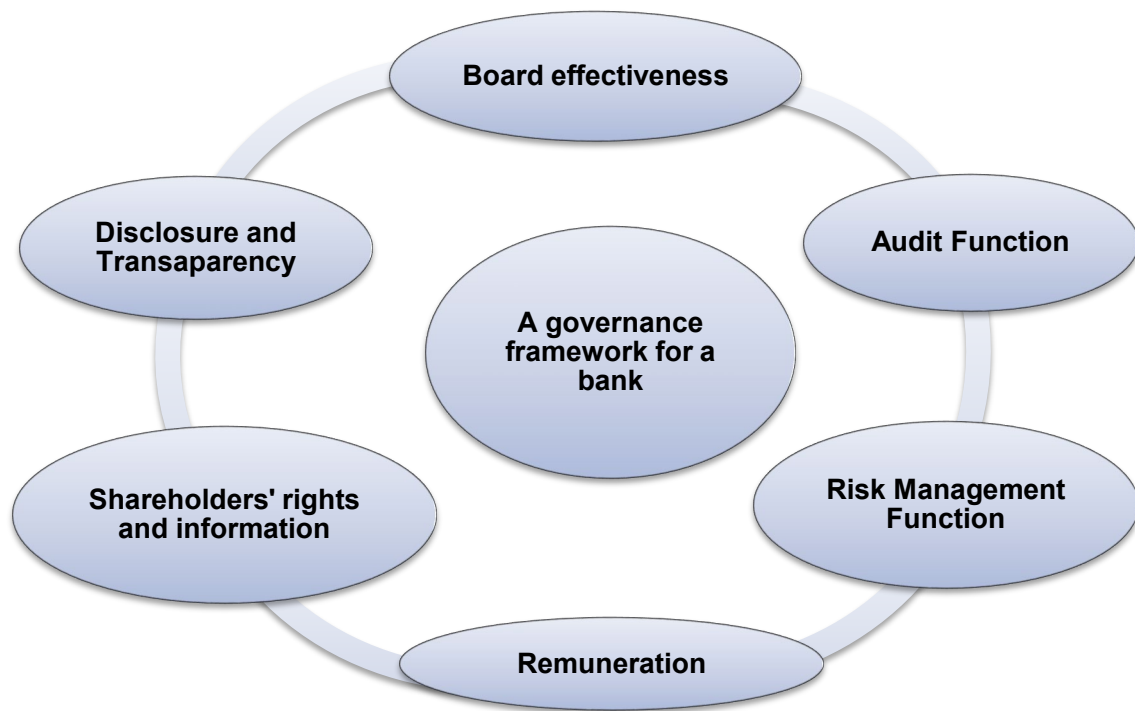
4.2 Bank Soundness Index: Indicators and Dimensions

Adapting the five-dimensional framework of RBI (2010), we construct a composite bank soundness index (see Figure 7). This study chooses 14 ratio indicators and combines them to obtain five distinct dimensional indices, namely "capital adequacy", "asset quality", "profitability", "liquidity", and "management efficiency". In terms of the new bank soundness index, one should note that both the financial resilience of banks and their major operations risks (such as credit or liquidity) were taken into consideration. For instance, capital adequacy acts as a shock absorber, which safeguards the bank against expected risks; liquidity measures the capacity of a bank to meet cash and collateral obligations; asset quality assesses the degree of default risk; profitability reflects the earning ability (Geršl & Heřmánek, 2006). Table IV.1 in Annexure-IV lists out ratio indicators used and an assessment of their effects on overall bank soundness and the adjustments implemented.

Figure 7: A Soundness Framework for a Bank
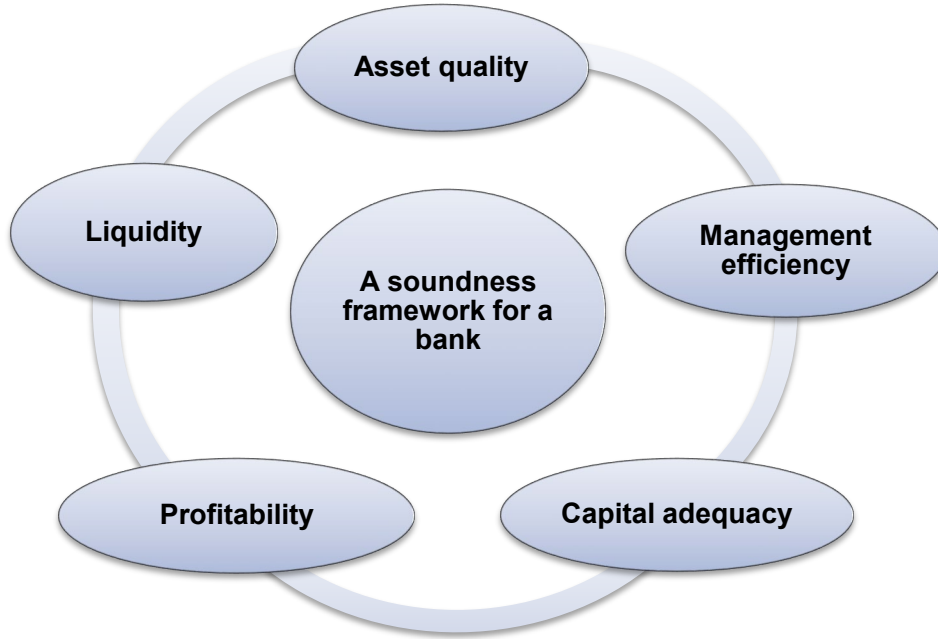
We apply several data adjustments to arrive at the composite index of bank soundness. First, to mitigate the impact of outliers, all 14 ratio indicators (y_r) (expressed in the actual unit of measurement) are winsorised at the 10 per cent level. Second, then we use min-max method to normalise all ratio indicators based on their polarity with bank soundness as follows.

$$y^*_{r,j} = \left(y_{r,j} - \min_{j=1}^{n}\{y_r\} \right) \Big/ \left(\max_{j=1}^{n}\{y_r\} - \min_{j=1}^{n}\{y_r\} \right), \text{ if the ratio satisfies the benefit criterion;}$$

$$y^*_{r,j} = \left(\max_{j=1}^{n}\{y_r\} - y_{r,j} \right) \Big/ \left(\max_{j=1}^{n}\{y_r\} - \min_{j=1}^{n}\{y_r\} \right), \text{ if the ratio satisfies the cost criterion.}$$

where $y^*_{r,j}$ = normalised score of the r-th indicator for j-th bank. Note that this normalisation adjustment transforms all the ratios on an identical scale of zero-one. Third, all the normalised ratios are combined using a linear unweighted average method to compute five different dimensional indices, one analogous to each dimension of soundness. The following formula is used for constructing i-th dimensional index of soundness for *j-th* bank.

$$DI\_S_{i,j} = \frac{1}{\tau_i} \sum_{r=1}^{\tau_i} y^*_{r,j} \qquad i = 1,...,m; j = 1,...,n$$

where $y^*_{r,j}$ is normalised score of r-th ratio for j-th bank in i-th dimension, τ_i is the maximum ratios that define the i-th dimension, and m is the number of dimensions. Dimension indices range from 0 to 1. In the fourth step, the dimensional indices are again normalised using Vidoli and Fusco (2018)'s standardisation procedure. Finally, a bank-wise composite index of bank soundness is constructed based on the five

normalised dimensional indices using the BoD approach (see Section 4.3 for more detail). A bank's soundness is measured by a composite index ranging from 0 (unstable) to 1 (fully stable).

4.3 The Constrained "benefit-of-the-doubt" Model

To quantify bank governance and soundness, we used two-step procedure in the present study. Step 1 involves the computation of the dimensional indices by aggregating governance and soundness norms using the linear unweighted average method (see Sections 4.1 & 4.2 for further details). The second step is a bit different from the previous research efforts. It includes the use of a cutting-edge and innovative constrained BoD model for aggregating the dimensional indices gotten in the initial step.

The BoD approach is based on a "multiplier" version of the CCR model (the first Data envelopment analysis (DEA) model), named after its developers Charnes, Cooper, and Rhodes (1978). The approach was initially proposed by Melyn and Moesen (1991) and later developed in-depth by Cherchye *et al.* (2004, 2007). In the BoD approach, we implement DEA with the outputs and a dummy input equal to 1 being all grouped into a single index (Lovell *et al.*, 1995). Therefore, a typical BoD model tantamounts to a DEA model in a "pure output setting". As a result, a BoD model only considers "outcomes" (e.g., outputs) without taking into account inputs (Lavigne *et al.*, 2019). It compares the actual index (weighted average of the dimensions) to a benchmark index. This is in contrast to the traditional DEA models, where the actual output level is compared to the industry's benchmark output level, given the amount of inputs.

The constrained BoD model utilised here is a data-oriented weighting method since it helps in getting the non-negative "optimal" policy weights. These weights can be used to design a potent policy structure for improving bank governance and augmenting bank soundness levels. The entire calculation process involves the generation of endogenous weights that are dimension-specific and vary across banks. Simply, in the absence of any a priori weights, the BoD model provides a weighting and aggregation scheme based on available raw data on distinct dimensions of governance and soundness. The main idea behind the constrained BoD modeling framework is to select the weights that maximise the overall index value for each bank under investigation and allows the weights generated to be strictly positive. Witte and Rogge (2011) also recommend the use of the BoD modeling framework in a situation like ours where true weights are unknown a priori for the underlined dimensions and indicators. Based on the basic features of our BoD model, idiosyncratic and

endogenous weights provide the best value for the composite governance and soundness indexes for banks.

A mathematical formulation of the classical BoD model for the construction of the index of governance (*CI_G*) for bank *o* can be expressed in the form of a linear programming problem defined in the model (A). Assume *k* represents the set of dimensions, $DI\_G_{k,j} = \{k_1, k_2, ..., k_K\}$ is the value of *k*-th dimension of governance for *j*-th bank ($j = 1, 2, ..., n$), $\upsilon_{k,o}$ represents the endogenously derived weight assigned to *k*-th dimension that helps in maximising the governance index value for bank *o* under consideration. The classical BoD model for bank *o* is defined as below.

$$CI\_G_o = \max_{\upsilon_{k,o}} \sum_{i=1}^{m} \upsilon_{k,o} DI\_G_{k,o} \qquad (1)$$

s.t. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (A)

$$\sum_{k=1}^{s} \upsilon_{k,o} DI\_G_{k,j} \leq 1 \qquad j = 1, ..., n; \quad k = 1, ..., K \qquad (2)$$

$$\upsilon_{k,o} \geq 0 \qquad\qquad\qquad\qquad\qquad\qquad (3)$$

Similarly, the composite index of bank soundness (*CI_S*) for bank *o* can be computed using a linear programming problem defined in model (B).

$$CI\_S_o = \max_{w_{i,o}} \sum_{i=1}^{m} w_{i,o} DI\_S_{i,o} \qquad (4)$$

s.t. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (B)

$$\sum_{i=1}^{m} w_{i,o} DI\_S_{i,j} \leq 1 \qquad j = 1, ..., n; \quad i = 1, ..., m \qquad (5)$$

$$w_{i,o} \geq 0 \qquad\qquad\qquad\qquad\qquad\qquad (6)$$

Here *m* is the set of dimensions, $DI\_S_{i,j} = \{i_1, i_2, ..., i_m\}$ as the value of *i*-th dimension of bank soundness for *j*-th bank ($j = 1, 2, ..., n$). Dimensions are weighted with a non-negative column vector of weights, where $w_{i,o}$ represents the endogenously derived weight assigned to *i*-th dimension of bank soundness that helps in maximising the index value for bank *o* under consideration. The optimal solutions of models (A) and (B) provide the index values for the bank *o* in terms of all aspects of governance and soundness, respectively.

A couple of things are noteworthy here. To start with, the optimum values of both composite indicators (*i.e.*, $CI\_G_o^*$ or $CI\_S_o^*$) acquired utilising Models (A) and (B) lie in the range 0-1. The value equals 1 indicates the best performance relative to other banks included in the sample, and the value of 0 indicates the worst performance in relative terms. Second, solving the Models (A) and (B) *n* times yields a set of a bank-specific composite index. Third, $w_{i,o}^*$ *and* $\upsilon_{k,o}^*$ can be interpreted as the endogenous policy weights. These weights are chosen to maximise (optimise) the index value of

the bank under evaluation. Further, these weights represent the "best" set of weights in the sense that any other weighting scheme will adversely impact the bank's ranking. Additionally, when some other bank utilises these weights, this would not bring about an overall index value greater than one. Fourth, the bank under evaluation always has the maximum possible index value relative to other peers included in the sample. Fifth, both models deliver objective governance and soundness performance indices for banks included in the sample since the computation process negates any possibility for accommodating any sort of subjectivity in determining weights (Giambona & Vassallo, 2013).

Cherchye *et al.* (2004) observed that because the BoD modeling framework retrieves that optimal weights from the observed data, it is possible that one or a couple of dimensions may get exceptionally higher weights (i.e., over-emphasised) or zero weights (*i.e.*, completely ignored). As per Charles and Díaz (2017), in the generic BoD model, this situation emerges because all entities are assessed in the best possible scenario, and a particular entity may get exceptionally higher weight for a particular dimension where the entity plays out the best in relative term or get even a zero weight where the entity performs worst relative to its peers. This downside of the generic BoD model seems a severe concern in light of the fact that all the underlined dimensions are theoretically important. To overcome this downside, the use of weight restriction is recommended in the extant literature. The use of restrictions on weights can be found in Allen *et al.* (1997) and Athanassoglou (2016). Adding constraint (7) in Model A and (8) in Model B, in the classic BoD models (A) and (B), respectively, transform them into the constrained BoD models:

$$L_{k,j} \leq \upsilon_{k,j} DI\_G_{k,j} \Big/ \sum_k \upsilon_{k,j} DI\_G_{k,j} \leq U_{k,j} \qquad k = 1,...,K; \ j = 1,...,n \qquad (7)$$

$$L_{i,j} \leq w_{i,j} DI\_S_{i,j} \Big/ \sum_i w_{i,j} DI\_S_{i,j} \leq U_{i,j} \qquad i = 1,...,m; \ j = 1,...,n \qquad (8)$$

where U and L denote the upper and lower bounds on the allocated endogenous weight. Badasyan *et al.* (2011) and Giambona and Vassallo (2013) adapted similar weight restriction methods in their empirical studies. In the current investigation, the lower limit for a specific dimension is set to be 10 per cent, while the upper bound is determined as needs be. For example, in the case of construction of a bank governance index, if the lower bound of a dimension is set as 10 per cent, the upper bound will be at 40 per cent (i.e., 100-(6×10)=40). The strategy of combining weight restrictions with the generic BoD model not only overcomes a major shortcoming of this model but also effectively handles the issue of the impact of outliers on overall index values since no dimension is overlooked in the process of aggregation. All calculations for obtaining the values of the underlined composite indices are done using the "Compind" package in *R*.

4.4 Estimation of Profit Efficiency

Instead of relying on commonly used financial ratios (like returns-on-asset (ROA), returns-on-equity (ROE), and Tobin's Q), this study uses the DEA-based risk-adjusted profit efficiency measure, which is no doubt a holistic measure of bank performance. Contingent upon whether market power is considered, the extant literature distinguishes standard and alternative profit efficiency measures. While computing the standard profit efficiency measure for a bank, it is assumed that i) the bank operates in a perfectly competitive market, ii) prices of inputs (p) and outputs (q) are exogenously determined, and iii) the bank maximises its profit (π) by adjusting quantities of inputs and outputs. A standard profit efficiency measure is based on the profit function $\pi = f(p,q)$ and gauges how close a bank is to produce the level of maximum potential profits given a specific level of input and output prices. However, in practice, the notion of standard profit efficiency is of little relevance in the real-world cases because the key assumptions of perfect competition and exogenous output prices are not generally meet with the prevailing reality of the banking markets. Alternatively, these assumptions indicate the non-existence of market power in the hand of banking firms in setting the price of their outputs. Since banking firms enjoy market power in determining their output prices, the standard profit efficiency measure seems improper.

In contrast, Humphrey and Pulley (1997) developed the alternative profit efficiency measure based on the realistic assumption that banks operate in imperfect market conditions and can exercise market power in setting output prices. Notwithstanding, this market power is confined to output markets, and banks stay competitive buyers of inputs. An alternative profit efficiency measure is based on the profit function $\pi = f(p,y)$, and thus measures how close a bank is operating to earn maximum potential profits given its output levels (Berger & Mester, 1997). While maximising their profits, banks adjust output prices and input quantities. Both standard and alternative profit efficiency measures are considered superior by Berger and Mester (1997) since "*they are derived from economic optimisation based on relative prices rather than optimisation only based on the technology*". Further, they lauded the alternative profit efficiency as a more adequate and informative measure of profit efficiency, especially when some of the assumptions of the standard measure are not met in the banking industry. Assuming that banking firms operating in India face imperfect competition, the present study follows Maudos and Pastor (2003) and Gulati and Kumar (2016) and computes the alternative profit efficiency scores for sampled banks. Our inclination for alternative profit efficiency measure is also spurred by potential inaccuracies in the data for output prices.

DEA Model for Risk-adjusted Profit Efficiency Score

Assume that a bank uses l quasi-fixed inputs $z = (z_1,...,z_l) \in \mathfrak{R}_+^l$ and m variable inputs $x = (x_1,...,x_m) \in \mathfrak{R}_+^m$ to produce s outputs $y = (y_1,...,y_s) \in \mathfrak{R}_+^s$. Further, it is assumed that a bank attempts to maximise the revenue and contract the quantity of inputs to maximise profits, given exogenous prices for variable inputs $p = (p_1,...,p_m) \in \mathfrak{R}_+^m$. The bank "$o$" earns actual profits as $\pi_o = R_o - \sum_{i=1}^m p_{i,o} x_{i,o}$ where R_o represents the total revenue of this bank. The bank's profit efficiency can be measured from the ratio of actual profits to maximum potential profits. Model (C) specifies the optimisation problem that provides the maximum potential profits for the bank "o".

$$\pi_o(R,p) = \max_{\lambda,\tilde{x},\tilde{R}} \quad \tilde{R}_o - \sum_{i=1}^m p_{i,o}\, \tilde{x}_{i,o}$$

$$\text{s.t.} \quad \sum_{j=1}^N \lambda_j x_{i,j} \le \tilde{x}_{i,o}, \qquad\qquad i = 1,...,m$$

$$\sum_{j=1}^N \lambda_j z_{q,j} \le z_{q,o}, \qquad\qquad q = 1,...,l$$

$$\sum_{j=1}^N \lambda_j y_{r,j} \ge y_{r,o}, \qquad\qquad r = 1,...,s \qquad\qquad (C)$$

$$\sum_{j=1}^N \lambda_j R_j \ge \tilde{R}_o,$$

$$x_{i,o} \ge \tilde{x}_{i,o},$$

$$R_o \le \tilde{R}_o,$$

$$\lambda_j \ge 0$$

where

$p_{i,o} =$ the unit price of input for the bank "o";

$\tilde{x}_{i,o} =$ the (unknown) quantity of input for the bank "o" that maximize profits;

$x_{i,j} =$ the observed quantity of the input for the jth bank;

$z_{q,j} =$ the observed quantity of the qth quasi-fixed input for the jth bank;

$y_{r,j} =$ the observed quantity of the rth output for the jth bank;

$x_{i,o} =$ the observed values of ith variable input for bank "o";

$z_{q,o} =$ the observed values of qth quasi-fixed input for bank "o";

$y_{r,o} =$ the observed values of rth output for bank "o";
$R_o =$ total revenue for bank "o";
$R_j =$ the actual revenue of the jth bank; and

$\tilde{R}_o =$ the (unknown) revenue for bank "o" that maximizes profits.

After solving the above optimisation problem n times, a set of optimal values of $\tilde{R}_o$ and $\tilde{x}_{io}$ (i.e., $\tilde{R}_o^*$ and $\tilde{x}_{io}^*$) is generated, which yields the values of maximum potential

profits for bank "o" as $\tilde{R}_o^* - \sum_{i=1}^{m} p_{i,o} \; \tilde{x}_{i,o}^*$. The estimate of alternative profit effiicency for the bank "o" ($PROFEFF_o$) is then obtained using the expression:

$$PROFEFF_o = \frac{\text{Actual Profits}}{\text{Maximum Profits}} = \frac{R_o - \sum_{i=1}^{m} p_{i,o} \; x_{i,o}}{\tilde{R}_o^* - \sum_{i=1}^{m} p_{i,o} \; \tilde{x}_{i,o}^*}$$

Interestingly, the $PROFEFF_o$ lies in the range between $-\infty$ and 1. The value equals 1 indicates that the bank "o" operates at the profit frontier and is fully profit efficient. $PROFEFF_o$ can be negative if the bank "o" experiences losses. A risk-adjusted alternative profit efficiency score is derived for each bank using the Microsoft Excel Solver for the first bank and automated the calculation process by recording a macro in VBA coding language.

Selection of Input-output Variables for Risk-adjusted Profit Efficiency

For the choice of input and output variables, we modified the bank production specification utilised by Gulati and Kumar (2016) to calculate the alternative profit efficiency score. More specifically, we implemented the suggestions of Simper *et al.* (2017) and incorporated two key internal risk control variables. The first risk control measure is bank equity, which is taken as a quasi-fixed input, and an explicit constraint is added in the optimisation model for this variable. The second risk control variable is non-performing advances. The non-performing loans are deducted from total advances to obtain the figures of performing loans. The performing advances generate the interest revenues, and their inclusion adequately represents the true production technology of a typical commercial bank.

For the purpose of adequately specifying the production technology, three variable inputs, one quasi-fixed input, and three outputs are chosen. The variable input vector includes physical capital (x_1) (estimated as the value of fixed assets), ii) labour (x_2) (estimated by total manpower strength), iii) loanable funds (x_3) (measured as the sum of deposits & borrowings). The prices of these inputs are not directly available and, therefore, are approximated from the available information in the dataset used. The price of physical capital (p_1) is approximated by the ratio of total operating expenses (net of personnel expenses) to fixed assets. The price of labour (p_2) is computed from the ratio of personnel expenses to the number of employees. The price of loanable funds (p_3) is estimated by the ratio of total interest paid on deposits and borrowings to total loanable funds. The bank equity capital is considered as a quasi-fixed input without any associated price. The recent bank efficiency literature favours

the explicit inclusion of bank equity in the bank's production technology specification since it adequately controls for bank's insolvency risk and risk-return trade-off (see, for example, Färe *et al.*, 2004; Simper *et al.*, 2017).

As mentioned above, the output vector includes three variables. The first output is performing loans (y_1)(measured as total advances minus gross non-performing loans advances). The price of this output variable is approximated by the ratio of Interest/discount on advances/bills to the total value of performing advances. The second output variable is investments(y_2). The price of this output variable is computed from the ratio of income of investments to total investments. The final output variable is non-interest income(y_3). The price of non-interest income is taken as 1 since Indian banks have an almost uniform pricing structure with negligible variations for their fee-based activities. The extant literature on bank efficiency emphasises the inclusion of non-interest income in bank production technology specification since it accounts for income from fee-generating and off-balance sheet activities. In this context, Gulati and Kumar (2011) point out that while measuring bank efficiency, one should focus on incomes originating from both traditional financial intermediation and non-traditional off-balance sheet and fee income business activities. Thus, it is highly incongruous if the output vector includes only earning assets from traditional business activities and excludes off-balance sheet activities. Under such a scenario, the bank's output is misspecified, and the efficiency estimates are not adequate and present a distorted picture. Note that except labour input, all variables are in rupees lakhs.

5. Data, Econometric Methodology, and Hypotheses

5.1 Database

In this study, the analysis appears to be restricted to domestic commercial banks, which account for more than 90 per cent of total bank assets in the Indian banking industry. During the period from 2009 to 2018, we compiled information on 48 governance codes for individual banks. The publicly available "Corporate Governance Reports" of the sample banks provide required data and information. These reports were collected by researching the websites of each bank we sampled[10]. In cases where the reports weren't available on the banks' websites, we accessed them from the SANSCO database. Thereafter, to acquire the required data information, we systematically analysed all annual reports conscientiously to get insights on the issues pertaining to regulatory governance by banks in India. Any missing information on governance norms was sought and completed from the "Corporate Governance"

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[10] The list of banks included in the analysis can be found in Annexure-III.

section of the National Stock Exchange (NSE) website. In addition, the data on the total cash remuneration paid to executives, including salary, performance-linked pay, perquisites, and other long term benefits like pension funds, superannuation funds, *etc*., were jointly collected from the "Indian Boards".

The data on 14 financial ratios used to construct bank-level soundness index were culled from the "*Statistical Table Relating to Banks in India*," an annual publication of RBI. To estimate profit efficiency for sampled banks, one needs the data on inputs, outputs, and prices. In this regard, we collected the required data from the bank's financial statements and the "*Statistical Table Relating to Banks in India*." To mitigate the impact of inflation on profit efficiency estimates, we used the figures of input and output variables (except labour) at constant prices. These figures were derived using the implicit GDP deflator (with base 2011-12=100). With the purpose to minimise the impact of random noise emanating from measurement errors in data and to throw out the effect of heterogeneity across banks to size variations, all input and output variables for a bank are normalised by the number of branches. This normalisation is consistent with the lines suggested by Gulati and Kumar (2016). Further, all banks with a single branch are removed to reduce the possibility of outliers in the sample.

The entire study period (2009-2018) can be divided into two sub-periods: i) 2009-2013, and ii) 2014-2018. Because of the erosion of asset quality of Indian banks, as well as the emergence of many large-scale frauds since 2013 and the severe economic downturn, we treat this period as a "turbulent period". In the post-2013 years, with an aim to deal with the rising NPAs problems and accelerate insolvency proceedings, the regulatory authorities have introduced a number of new provisions and/or amended the existing governance norms (the most important being the CA of 2013 and new Clause 49 of the LODR 2015) together with RBI (2014) recommendations. The empirical analysis covering the underlined sub-periods, we believe, will help us measure banks' reaction to new regulatory changes and governance requirements.

5.2 Econometric Methods

5.2.1 Empirical Design of the Model and Panel Econometric Methods

Dynamic Panel Econometric Model

The study examines the relationship between governance, profit efficiency, and soundness of the Indian banking sector using the following dynamic panel regression models.

$$CI\_S_{j,t} = \gamma_0 + \delta_0 CI\_S_{j,t-1} + \delta_1 PROFEFF_{j,t-s} + \delta_2 CI\_G_{j,t-s} + \sum_{z=1}^{Z} \varphi_z X_{j,t-s}^z + \sum_{d=1}^{D} \theta_d X_{j,t-s}^d + \varepsilon_{j,t-s} \qquad (9)$$

$$CI\_S_{j,t} = \gamma_0 + \delta_0' CI\_S_{j,t-1} + \delta_1' PROFEFF_{j,t-s} + \sum_{k=1}^{K} \beta_k DI\_G_{k,j,t-s} + \sum_{z=1}^{Z} \gamma_z X_{j,t-s}^z + \sum_{d=1}^{D} \zeta_d X_{j,t-s}^d + \varepsilon_{j,t-s} \qquad (10)$$

$$CI\_S_{j,t} = \gamma_0 + \delta_0'' CI\_S_{j,t-1} + \delta_1'' PROFEFF_{j,t-s} + \sum_{l=1}^{L} \alpha_l GOV_{j,t-s}^l + \sum_{z=1}^{Z} \phi_z X_{j,t-s}^z + \varepsilon_{j,t-s} \qquad (11)$$

where $\left|\delta_0 < 1\right|, \left|\delta_0' < 1\right|$, and $\left|\delta_0'' < 1\right|$; $j = 1,...,N$; $t = 1,...,T$; $s = 0,1,...,L$ and $\varepsilon_{j,t} = v_j + \xi_t + \mu_{i,t}$, and j indicates the cross-sectional and t indicates the time dimensions of the panel, respectively. $CI\_S_{j,t-1}$ = the BoD-based bank soundness index; $CI\_G_{j,t-s}$ = the BoD-based governance index; $PROFEFF_{j,t-s}$ = the profit efficiency score; $DI\_G_{k,j,t-s}$ = k-th dimensional index of governance; $GOV_{j,t-s}^l$ = the l-th governance norm corresponding to k-th dimensional index; $X_{j,t-s}^z$ = the vector of bank-specific control variables (z); and $X_{j,t-s}^d$ = the vector of dummy variables (d).

The values of δ_0, δ_0' and δ_0'' lie between 0 and 1, and these values indicate whether the bank soundness persists. The $\varepsilon_{j,t} = v_j + \xi_t + \mu_{j,t}$ is the composite error term, v_j represents the unobserved bank-specific effects, ξ_t represents unobserved time-effects, and $\mu_{j,t}$ is the idiosyncratic error term, and δ_0, δ_0', δ_0'', δ_1, δ_2, βs, γs, ζs, φs, ϕs, αs, ηs and θs are the model parameters to be estimated. A detailed description of these variables is provided below.

In order to estimate a link between governance, efficiency and soundness, we consider $CI\_S_{j,t-1}$ and $CI\_G_{j,t-s}$ as the bank-level composite indices of bank soundness and governance, respectively computed using models (A) and (B) (see the previous section for details on the construction of these indices). $PROFEFF_{j,t-s}$ is the bank-level risk-adjusted alternative profit efficiency scores obtained using the data envelopment analysis (refer to model (C) in Section 4.4). The controlling effect of profit efficiency in influencing the relationship between governance and soundness is captured across all the econometric model specifications. $DI\_G_{k,j,t-s}$ captures the effect of k-th governance dimension, *viz.*, "board effectiveness" (*BOARD*), "audit function" (*AUDIT*), "risk management" (*RISK*), "remuneration" (*REMUNERATION*), "shareholders' rights and information" (*SHAREHOLDER*), and "disclosure and transparency" (*DISCLOSURE*), on bank soundness level. Moving deeper into the analysis, we also investigate the impact of l-th governance norm ($GOV_{j,t-s}^l$) relating to the k-th dimension on bank soundness using the model specification (11). For this, four additional dynamic panel regressions are estimated (see below). The first

econometric specification (11a) substitutes the individual norms pertaining to the $GOV_{j,t-s}^{l}$ as board attributes, *i.e.*, $BOARD_{j,t-s}^{l}$ and determines the influence of *board size, board independence, board meetings, CEO duality, board committees, and gender diversity* on bank soundness. The second and third specifications (11b) and (11c) deal in the internal audit and risk control functions, *i.e.*, $AUDIT_{j,t-s}^{l}$ (*audit committee size, audit committee meetings, auditor's compliance*), and $RISK_{j,t-s}^{l}$ (*risk committee size, non-executive directors on risk committee, risk committee meetings*). The fourth model (11d) develops a link between the remuneration committee and policies, *i.e.*, $REMUNERATION_{j,t-s}^{l}$ (*remuneration committee, remuneration committee meetings, executive pay*) and bank soundness.

$$CI\_S_{j,t} = \gamma_0 + \delta_0'' CI\_S_{j,t-1} + \delta_1'' PROFEFF_{j,t-s} + \sum_{l=1}^{L} \alpha_l' BOARD_{j,t-s}^{l} + \sum_{z=1}^{Z} \phi_z X_{j,t-s}^{z} + \varepsilon_{j,t-s} \qquad (11a)$$

$$CI\_S_{j,t} = \gamma_0 + \delta_0'' CI\_S_{j,t-1} + \delta_1'' PROFEFF_{j,t-s} + \sum_{l=1}^{L} \alpha_l'' AUDIT_{j,t-s}^{l} + \sum_{z=1}^{Z} \phi_z X_{j,t-s}^{z} + \varepsilon_{j,t-s} \qquad (11b)$$

$$CI\_S_{j,t} = \gamma_0 + \delta_0'' CI\_S_{j,t-1} + \delta_1'' PROFEFF_{j,t-s} + \sum_{l=1}^{L} \alpha_l''' RISK_{j,t-s}^{l} + \sum_{z=1}^{Z} \phi_z X_{j,t-s}^{z} + \varepsilon_{j,t-s} \qquad (11c)$$

$$CI\_S_{j,t} = \gamma_0 + \delta_0'' CI\_S_{j,t-1} + \delta_1'' PROFEFF_{j,t-s} + \sum_{l=1}^{L} \alpha_l'''' REMUNERATION_{j,t-s}^{l} + \sum_{z=1}^{Z} \phi_z X_{j,t-s}^{z} + \varepsilon_{j,t-s} \qquad (11d)$$

In addition, two broad groups of variables: $X_{j,t-s}^{z}$ and $X_{j,t-s}^{d}$ are incorporated in the models. The first group $X_{j,t-s}^{z}$ constitutes three variables that represent the characteristics of banks and have been used to control differences between banks. Bank size and ownership structure are immensely important factors for bank soundness in India (Mohan, 2004). Therefore, while investigating the relationship between governance and bank soundness, each econometric model specification controls for the effect of size (*SIZE*), ownership shareholding of a bank with the government defined as ownership concentration (*OWNSHARE*), and the presence of foreign branches (*FORBRANCH*). The variable *SIZE* is measured as the natural logarithm of total assets; *OWNSHARE* is the percentage of government ownership shareholding; *FORBRANCH* represents branches of a bank abroad. By including the *FORBRANCH* as a control variable, we can see whether bank internationalisation influences its soundness. The $X_{j,t-s}^{d}$ represents the vector of dummy variables, which include two dummies: *DREFORM* and *PUBLIC*. *DREFORM* is a dummy variable that has the value 1 for the period 2014-2018, and 0 otherwise, and is used to capture the effects of new provisions and amendments in the existing governance standards, and therefore describes the "comply-or-explain" approach considered necessary to

achieve effective compliance. We expect that regulatory changes and new banking reforms, and eventual changes in the banking landscape might have altered the banking system's soundness. We include *PUBLIC* as a dummy variable taking value 1 for the PSB and 0 otherwise. This variable is used to capture the ownership effects and understand whether the relationship between bank soundness and governance differs significantly across distinct ownership groups or not. The effect of the financial crisis on soundness levels is captured by introducing a dummy variable *CRISIS*, taking value 1 for the local NPA banking crisis period during 2013-2017 and 0 otherwise. Note here that the banking industry in India suffered from a serious local (endogenous) NPAs crisis during the period 2013-2017. In addition, we use the interaction variables to grab the interaction effect of the post-2014 developments, ownership shareholding, *CRISIS*, and *PUBLIC* dummies with governance dimensions/norms, on the bank soundness level (see Table V.1 in Annexure-V for details on the complete set of governance, performance and other bank-specific & dummy variables used in the econometric analysis)[11].

Generalised Method of Moments (GMM) and Endogeneity Concerns

In studies exploring the relationship between bank performance, risk-taking, and financial soundness, serious endogeneity concerns have been raised. There are two possible sources of endogeneity: unobserved heterogeneity caused by bank-specific effects or reverse causality, where risk-taking behaviour or performance determine governance (Wintoki *et al.*, 2012). Therefore, in the present study, we rely on the two-step system GMM method for the estimation of models (13)-(15) because we believe that the traditional panel estimators would not be robust to the potential endogenous relation between three aspects. Nickell (1981) showed that for finite *T*, the OLS as well as within estimators are severely biased; however, as *T* increases, the within estimator shows consistent results. But, as in our case where *T<N*, traditional panel estimators would definitely produce biased and inconsistent estimates.

The system GMM, an advancement of difference GMM, combines the equation in level as well as in the first-difference form and performs better in case of highly endogenous and persistence data (see Blundell & Bond, 1998). Blundell and Bond (1998) allowed for using additional instruments for equations in levels through the condition $E(\Delta CI\_S_{j,t-1}, \varepsilon_{j,t}) = 0$ for *j*=1,...,*N* and *t*=3,4...,*T* to improve the precision of estimates. Also, Blundell *et al.* (2001) showed that the system GMM reduces the finite sample bias and enhances the precision of estimates. We viewed the governance

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[11] Due to the panel's imbalance (N > T), the Fisher-type Phillips-Perron test is used to determine whether the panel is stationary. We find that all governance, soundness, and efficiency variables are stationary at level. Table V.2 in Annexure-V reports the results of the panel stationarity test.

index, its distinct dimensions, and profit efficiency estimates as endogenous variables in our estimates, whereas other control variables are seen as instruments for themselves. The econometric models are estimated using Roodman's (2009) command of "xtabond2" in Stata 15.0, with Windmeijer corrected standard errors[12]. The reliability of estimates is then checked using the difference-in-Hansen and Hansen tests for instrument validity and Arellano and Bond's (1991) test for serially uncorrelated errors of first- and second-order autocorrelation. For instrument validity, the study relies on Hansen-*J* statistics instead of Sargan statistics since the latter over rejects the null hypothesis of valid instruments in the presence of non-spherical errors (Roodman, 2009). In addition, the study utilises alternative panel regression estimates like pooled OLS, fixed-effects, and panel quantile estimates to check the robustness across estimation methods and to validate our two-step system GMM estimates.

5.3 Development of Key Testable Hypotheses

To develop key testable hypotheses, a discussion on the possible impacts of overall governance structure, individual dimensions of governance, and most significant governance standards/norms on bank soundness seems warranted here and is given below.

Bank soundness and governance structure: It is believed that when a banking firm has a sound governance structure and managers who are committed to protecting shareholders' and debt holders' interests, resources can be allocated more efficiently, and borrowers can be more effectively monitored. Therefore, it decreases the likelihood of failure and improves soundness (Levine, 2004; Heremans, 2007). In cross-country environments, Das *et al.* (2004) showed that the effectiveness of regulatory governance for achieving financial stability. We, therefore, postulate that adequate governance practices positively drive bank soundness. Consequently, we propose our first primary testable hypothesis, which is as follows:

H1: A sound governance structure leads to a stable banking system

Board effectiveness and bank soundness: A well-functioning board oversees management and functions as a link between shareholders and managers (BCBS, 2015). The Financial Stability Board (2017) recommends that banks should have an optimum board size with a good mix of within and outside directors. As a result, we can evaluate the board's effectiveness using metrics, such as the composition of directors (executive and non-executive), the structure (board-level committees), diversity (presence of women directors), and independence (presence of women

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[12] Windmeijer (2005) showed that corrected estimates of variance provide more accurate and robust results and approximates the finite sample variance.

directors) (certified independent directors). Based on the above, we calculate a dimensional index for board effectiveness centered on 14 governance norms. The study argues that board effectiveness and bank soundness are positively linked since a successful board resolves the agency issues and leads to a more stable and efficient bank. Based on the argument above, we build our second hypothesis as below.

H2: Board effectiveness is positively linked with bank soundness

On the one hand, the theoretical literature claims that large boards are ineffective because of communication and coordination problems and that decision-making is slow (Jensen, 1993). Agency theory also supports this viewpoint. On the other hand, resource dependence theory posits that having a large number of directors increases the likelihood of having active, intellectually opulent, and highly skilled directors, as well as improving external connections (Dalton *et al.*, 1999). The mixed findings on board size and performance indicator(s) have piqued interest, although the direction of the relationship is still unknown[13]. Empirically, it is not known how board size affects bank soundness empirically. This leads us to develop a secondary hypothesis.

H2a: Larger boards undermines bank soundness beyond a certain level

Furthermore, it is argued that executive directors (insiders) are trustworthy stewards, and thus, contribute more to the maximisation of bank's profits and minimisation of risk (Donaldson & Davis, 1991). While non-executive independent (outsiders) directors are more effective at monitoring management's actions and mitigating risks as they do not have any association with the management (Hermalin & Weisbach, 2003), and they have reputational concerns in the market (Fama, 1980; Fama & Jensen, 1983). The empirical evidence is mixed regarding the effect of board independence on bank soundness. However, in this study, we hypothesise a positive impact of independent directors on bank soundness. Gulamhussen and Santa (2015) conclude that female director(s) on the board tends to be more committed to their duties and have better decision-making capability and communication skills, which enhance profitability. We expect a positive impact of gender diversity on bank soundness. Against this background, we frame the following two secondary testable hypotheses.

H2b: Board independence exerts a positive influence on bank soundness

H2c: Gender diversity on boards has a positive impact on bank soundness

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[13] More recently, Sarkar & Sarkar (2018) conclude that board size has insignificant relationship, while Bhatia & Gulati (2020) find a non-linear inverted-U shaped relationship of board size with profitability of banks in India.

Regarding CEO duality, the corporate governance literature argues that duality increases the possibility of the CEO scheming the information flow and making biased decisions, which decreases board monitoring (Jensen,1993). This may increase the likelihood of bank failure. An alternative view suggests that duality leads to quick response to events and efficient decision-making. Sarkar and Sarkar (2018) supported the *agency theoretic* perspective and concluded a negative association between CEO duality and profitability, especially for state-owned banks in India. Mamatzakis and Bermpei (2015) validated the *stewardship theory* by reflecting a positive association between the CEO duality and performance of US banks. However, we anticipate a negative impact of CEO duality on bank soundness in the Indian context. Finally, the formation of sub-committees and frequent board meetings would assist in the effective discharge of board responsibilities and enhance board monitoring and overall soundness. We predict a positive impact of enhanced board activity on bank soundness. The related secondary testable hypotheses associated with the above arguments are given below.

H2d: The CEO duality adversely affects bank soundness

H2e: Formation of sub-committees and frequent board meetings exert a positive influence on bank soundness

Audit function and bank soundness: It is essential to have an independent audit committee in order to maintain a sound accounting process, oversee statutory and internal audits, and to ensure the independence of the auditor. It is, in fact, the audit committee allows the board of directors to have better oversight over financial and accounting operations. The key responsibility of the audit committee is to serve as a line of communication between bank management and auditors. This study looks at governance compliance on this dimension through six norms related to audit and auditor functions (refer to Table IV.2 in Annexure-IV). As greater audit compliance implies tighter bank audits and auditors' controls, we hypothesise that tight audit controls will reduce failure risks and enhance soundness. So, we propose the following third primary hypothesis.

H3: Tight audit controls improve the bank soundness

Risk function and bank soundness: Only banks that have built an effective risk-controlling system to detect, portion, and control potential risks are deemed well-governed. Through an efficient risk management structure, the bank's board can effectively manage risks and reduce the negative impact of different risks on the bank's profitability. Based on the recommendations of the "Consultative Group of Directors of Banks/Financial Institutions 2002", Indian banks established an independent risk management committee. This study utilises four risk governance principles to

construct a risk management index (Table IV.2 in Annexure-IV). Those banks with higher dimensional scores have better risk management practices. Consequently, one may expect a positive correlation between bank soundness and better risk management. We develop a fourth hypothesis as follows.

H4: Sound internal risk management and bank soundness are positively correlated

Remuneration and bank soundness: The impact of a bank's remuneration strategy on risk-taking and profitability is apparent. According to agency theory, efficient governance on this aspect is achieved when the remuneration committee plans and administers a compensation scheme in close collaboration with bank management. As a result, the approach ensures that executive compensation (which is supposed to counteract managers' inherent aversion to risk) does not induce managers to take unnecessary risks (Main & Johnston, 1993; Conyon *et al.*, 1995; Marques & Oppers, 2014). Furthermore, when a bank is in jeopardy, or the government bails it out, the board is widely criticised for greater executive compensation packages for top management. To discourage bank managers from taking excessive risks, new provisions have been added to SEBI 2015 and the amended CA 2013. These clauses mandate listing companies to constitute a pay committee that includes all non-executive directors. To create a remuneration index (see Table IV.2 in Annexure-IV for additional details), we took into account three governance principles addressing remuneration and developed the fifth primary hypothesis.

H5: Effective remuneration system translates to improved bank soundness

Since, as noted above, the higher executive compensation leads to excessive risk-taking, we also formulate a secondary testable hypothesis, which is given below.

H5a: Excessively higher executive remuneration lowers bank soundness

Shareholders' rights and bank soundness: Studies of corporate governance have shown that there are often severe agency disputes between controlling and minority shareholders, with stockholders having a significant influence on executive decisions and structuring and dissolving the corporation (Alchian & Demsetz, 1972)[14]. To protect interests of minority shareholders and investors, the listing regulator has directed all companies to set up a stakeholder relationship committee (SRC) with a non-executive director as chairperson. The SRC should handle investor grievances, share transfer transparency, shareholding patterns, and dividend distributions. This study creates a dimension index based on 11 governance principles to quantify shareholders' rights and information (for more details, see Table IV.2 in Annexure-IV). The typical choice

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[14] Bebchuk & Neeman (2010) observed that the Enron Scandal was one such example of lobbying by interest groups, which has raised doubts about investor protection in the US in the past.

of norms in this dimension is based on Uday's Kotak committee recommendations. Based on La Porta *et al.* (1998), we expect that protecting shareholders' rights and giving adequate data will benefit investors, reduce market volatility, and eventually enhance financial soundness. This aspect of governance, we believe, has a positive association with bank soundness. Our sixth primary hypothesis is as follows.

H6: The connection between shareholders' rights' and bank soundness is positive.

Disclosure and bank soundness: Banks will be able to decrease their agency costs, assure management responsibility, and improve market discipline by releasing sufficient corporate disclosures to the public. Tadesse (2006) indicated that countries with more transparent banking systems are less likely to have systemic crises. He claims that increased disclosure enhances market discipline, financial soundness, and has positive externalities (Kohn, 2011)[15]. The transparency-fragility approach, on the other hand, claims that disclosure could lead to a sense of complacency and panicked inefficient bank runs, as well as reputational contagion and prohibitions on interbank risk-sharing arrangements (Farvaque *et al.*, 2009; Bushman, 2016). All of this raises the possibility of bank being unstable. Given the foregoing viewpoints, we do not anticipate any specific association between transparency and soundness. We use a set of ten governance norms to determine the governance on this dimension (see Table IV.2 in Annexure-IV for more details). As a result, we formulate our seventh basic testable hypothesis as follows.

H7: Bank soundness and disclosure policies are intertwined ambiguously.

6. Empirical Results and Discussion

6.1 Bank Governance in India

This sub-section presents the empirical findings on corporate governance in the Indian banking system. In particular, the study focuses on i) the evolution of governance at the aggregate level of the banking industry and the disaggregate level of individual ownership groups, and ii) analysis of optimal policy weights on governance dimensions and underlined policy priorities of sampled banks. The empirical analysis presented below provides important insights to those seeking to examine the neglected and grey areas of the existing governance structure where Indian banks need to pay more attention because of the presence of some degree of under-compliance.

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[15] One such example is of the fraud of $1.5 billion by the Satyam in 2009, which happened due to inadequacies in the legal provisions designed to prevent abusive related-party transactions in India.

6.1.1 Evolution of Governance in the Indian Banking Industry

We begin with a discussion on the inter-temporal behaviour of bank governance in India. Table 3 shows the relevant descriptive statistics of the composite index of governance (*CI_G*) that can be used for drawing inferences about its trajectories at industry and distinct ownership levels across the sample period and two distinct sub-periods. As discussed above, recent developments in India like underperforming banks, large-ticket frauds and money laundering, as well as a sharp recession, have dubbed the period after these repercussions as a "turbulent" period. The legislative and regulatory authorities responded to these developments by introducing new financial reforms and amending existing governance standards. As a result, we divide the entire sample period from 2009-2018 into two distinct sub-periods to determine banks' response to the new regulatory reforms, i.e., 2008-09 to 2012-13 and 2013-14 to 2017-18.

The key research question addressed in this sub-section is: To what extent do Indian banks comply with the governance standards? Note that compliance with most governance norms/standards set by the relevant jurisdictions is mandatory. Banks are required to provide a sound explanation to the regulators in case of any under-compliance or non-compliance[16]. Table 3 presents the estimates of year-wise mean values of governance index (*CI_G*) for the Indian banking industry as a whole and distinct ownership groups. As discussed, the constrained BoD model is used to derive endogenous weights, which aggregates normalised dimensional indices to obtain the *CI_G*. Thus, the procedure is unique and generates bank-wise optimal policy weights corresponding to each governance dimension based on actual data. The governance index for a bank is expected to lie between 0 (the worst governed) and 1 (the best governed). A bank can take a maximum score of 1 (a full governance), though a minimum value of 0 (with no governance) is unlikely.

We can see that the grand mean of *CI_G* over banks and years is 0.946. This number means that a sample bank needs to put in 5.4 percent more effort on average to achieve the coveted position of a fully governed bank. Technically speaking, this figure shows that banks in the sample operate slightly away from the governance frontier, but they still have a long way to go when it comes to achieving regulatory compliance with governance standards/norms. Although there is a lack of full compliance with governance by all sample banks, this figure demonstrates an

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[16] The governance regulatory reforms could be classified as either *mandatory*, if a regulator has chosen to impose and make it mandatory (like quota for gender diversity or board independence), or *voluntary* (based on affirmative actions), if a regulator has chosen to actively encourage the bank to comply but not to impose it. For instance, appointment of at least one women director on board is *mandatory* while imparting training to directors on board is at the bank's discretion and is *voluntary*. We expect full governance if a bank provision is to adhere to all the *mandatory* and *voluntary* norms of corporate governance.

exceptionally high level of compliance regardless of the measure. High governance compliance in the Indian banking sector may be due to the fact that most governance standards are mandated rather than discretionary. Therefore banks have little room to show slack in adhering to the rules[17]. In terms of how governance compliance has evolved, we observe that mean *CI_G* significantly improved between 2010-11 and 2012-13 before plunging to its lowest level with a fall of 2.4 percentage points in 2014-15 and then it revealed a turnaround. When we compare the governance levels of banks over sub-periods, we find that the first sub-period was relatively better governed than the second sub-period. In the underlined sub-periods, the difference in governance levels is (-)1.3 percentage points. This difference, as observed by the Simar-Zelenyuk-adapted-Li (*SZL*) test results, is statistically significant[18].

Among bank groups, we note PBs showed relatively better performance in adhering to governance norms during the sample period as a whole and distinct sub-periods. These banks are benchmarked very close to the *governance frontier* relative to their public counterparts. Prominent reasons that can be cited for lower compliance by PSBs could be dual regulation, board complexities, slackness on internal controls, and externally imposed constraints through central vigilance agencies on PSBs. The observed differences are statistically validated with the rejection of the null hypothesis of no difference in the probability distributions of *CI_G* between bank groups in the most of years (see the last column of Table 3). Further, a unimodal and left-skewed density curve of *CI_G* for the PSB group compared to the rightward density of the PB group also corroborates the above findings (see Figure 9). The observed trends in mean *CI_G* divulge that, on average, PSBs showed non-compliance of 4.1 percentage points between 2012-13 to 2014-15 before it improved and gained momentum on regulatory compliance in 2015-16. This regulatory laxity on account of dual regulation of PSBs has led them to put 3 per cent additional effort to attain the status of a fully governed bank in the second sub-period. However, the findings suggest no significant difference in the governance behaviour of PBs during the distinct sub-periods, as confirmed from the *SZL* test results reported in Panel C of Table 3. Overall, the findings

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[17] Extreme caution should be exercised when interpreting the results. By itself, a high score in the governance index (CI_G) does not necessarily mean that banks in India have achieved better governance outcomes (equity and debt), but it does indicate that this bank has demonstrated better governance relative to its peers in the Indian banking sector. Importantly, the construction of governance frontier and index score depends heavily on the sample size, frontier type (national or global, intertemporal or sequential or contemporaneous), and weight restrictions in the BoD model. The constructed contemporaneous governance frontier is with a 10% weight restriction for (national) banks operating in India. The index score will definitely differ if we adopt the chosen framework to model more no. of (national) banks or change the frontier type in order to compare the governance performance of Indian banks *vis-à-vis* banks in other nations.

[18] We test the null hypothesis of equality of probability distributions of the BoD-based composite index utilising the *SZL* test, which is a bootstrapped-based statistical tool. Simar & Zelenyuk (2006) adapted the test developed by Li (1996) to the DEA context, where score lies in 0 and 1.

confirm that ownership matters in the Indian banking industry as far as regulatory compliance on governance norms is concerned[19].

Table 3: Evolution of Bank Governance Index in the Indian Banking Industry and across distinct Ownership Groups

Bank Groups→ Year↓	All banks	PSBs	PBs	*SZL* test statistic (*p*-value) $H_0 : pdf\,(CI\_G^{PSB})_t = pdf\left(CI\_G^{PB}\right)_t$
Panel A: Yearly mean estimates				
2008-09	0.946	0.938	0.957	-0.261(0.293)
2009-10	0.949	0.937	0.964	1.495(0.021)**
2010-11	0.954	0.950	0.959	-0.363(0.102)
2011-12	0.957	0.953	0.963	0.194(0.046)**
2012-13	0.957	0.955	0.959	0.375(0.482)
2013-14	0.954	0.948	0.963	2.141(0.124)
2014-15	0.930	0.914	0.952	9.273(0.000)***
2015-16	0.936	0.920	0.958	4.890(0.000)***
2016-17	0.937	0.926	0.952	2.144(0.008)***
2017-18	0.943	0.928	0.961	5.160(0.000)***
Panel B: Grand mean				
2008-09 to 2017-18	0.946	0.937	0.959	17.303(0.000)***
2008-09 to 2012-13	0.953	0.947	0.961	4.794(0.002)***
2013-14 to 2017-18	0.940	0.927	0.957	19.298(0.000)***
Panel C: *SZL* test across sub-periods $H_0 : pdf\,(CI\_G_{2008/09-2012/13}) = pdf\left(CI\_G_{2013/14-2017/18}\right)$				
Test statistic (*p*-value)	6.248*** (0.000)	13.169*** (0.000)	-1.745 (0.386)	

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Figure 8: Trends in Governance Index in the Industry and across Bank Groups
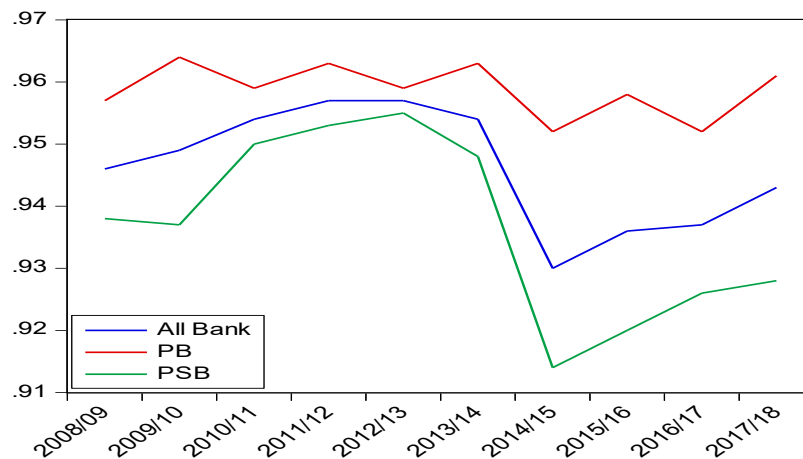
Source: Authors' elaboration.

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[19] Here we tested for differences in the distributions of governance compliance levels between i) new and old generation private banks, and ii) small and large banks (defined on the basis of total assets) in the distinct sub-periods. The *SZL* test results and inferences drawn are reported in Table VI.1 in Annexure-VI. We deeply thank the anonymous reviewers for recommending us to investigate these differences.

Figure 9: Kernel Distribution of Governance Index across Bank Groups
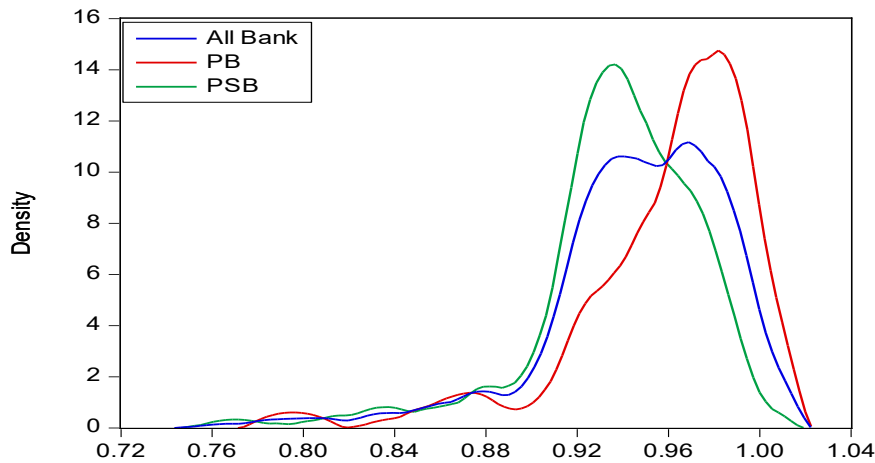
Source: Authors' elaboration.

The main raison d'être for the observed trends might be the following. First, in the initial years, banks showed herd behaviour and put a relentless focus on complying with the traditional shareholders' protection norms and maintained better disclosure and transparency levels. In 2014-15, when new policies for board independence, internal control, and compensation practices were adopted, the banks, especially PSBs, showed marginalised compliance due to weak regulatory stringency. This situation has also exacerbated a trade-off in maintaining both the equity and debt governance compliance by banks in India, and resulted in increased debt agency problems in the Indian banking system. Second, PSBs might have overlooked the governance guidelines because of dual ownership, implicit risk guarantees, and financial safety net by the government in case of trouble. Finally, having said that, after the year 2014-15, most banks, irrespective of their ownership type, have demonstrated significant progress in complying with governance provisions (see Figure 8 & the last two columns of Table IV.2 in Annexure-IV). The progress has mostly been caused by persistent regulatory coercion, which has compelled banks to circumvent penalties and restrictions on bank activities by the regulatory authority.

6.1.2 Sources of Governance Non-compliance

For identifying the sources of governance non-compliance, we deeply investigate the level of compliance on each dimension of governance by banks in the industry and across distinct ownership groups. Dimensional indices are summarised in Tables 4 and 5, and the yearly trends are depicted in Figure 10 (refer to Section 4.1 for the computational process of dimensional indices). The results show that banks in India appear to be more compliant on shareholders' rights and information, and disclosure and transparency. Further, PSBs have shown marginally better compliance on these dimensions than PBs. This suggests that while developing an influential corporate governance culture, Indian banks remained conservative since they put

greater emphasis on traditional equity governance and focused primarily on protecting investors' rights and maintaining better disclosures.

Regarding other dimensions of governance, there still exist ample weaknesses. First, although PSBs have improved governance across all dimensions, they reported a far lower mean value of audit index during the study period. Also, no statistical difference in adhering to audit norms is observed across distinct sub-periods on the basis of the *SZL* test. Such lapses in audit functions and auditor's compliance might be one of the root causes of recent bank frauds and overall weak governance. Second, even though PSBs demonstrate an upturn of 11.9 percentage points on the board index in 2017-18, the board quality in this banking group remains egregious and below par. Further, PBs observed a fall in the board index by (-)10.1 percentage points in the last year of the study period. Third, the governance on risk management has declined in PBs during the last two years of the study period, while the same has improved in PSBs. Interestingly, PSBs were found to be lagging in compliance with risk management standards by about 20 per cent relative to PBs during the entire study period.

Table 4: Dimensional Indices of Bank Governance: Board Effectiveness, Audit Function and Risk Management Function

Governance Dimension→	Board Effectiveness Index			Audit Function Index			Risk Management Function Index		
Bank Groups→ Year↓	All banks	PSBs	PBs	All banks	PSBs	PBs	All banks	PSBs	PBs
Panel A: Yearly mean estimates									
2008-09	0.614	0.587	0.651	0.804	0.717	0.922	0.750	0.685	0.838
2009-10	0.615	0.565	0.685	0.789	0.694	0.922	0.768	0.708	0.853
2010-11	0.624	0.577	0.689	0.789	0.708	0.902	0.774	0.729	0.838
2011-12	0.632	0.577	0.710	0.805	0.715	0.931	0.768	0.729	0.824
2012-13	0.631	0.580	0.698	0.825	0.722	0.963	0.780	0.740	0.833
2013-14	0.650	0.592	0.726	0.813	0.701	0.963	0.821	0.760	0.903
2014-15	0.707	0.607	0.849	0.797	0.694	0.941	0.829	0.760	0.926
2015-16	0.709	0.619	0.836	0.797	0.681	0.961	0.854	0.802	0.926
2016-17	0.707	0.616	0.819	0.803	0.683	0.951	0.855	0.833	0.882
2017-18	0.727	0.735	0.718	0.798	0.675	0.951	0.882	0.869	0.897
Panel B: Grand mean									
2008-09 to 2017-18	0.661	0.604	0.738	0.802	0.700	0.941	0.807	0.760	0.872
2008-09 to 2012-13	0.623	0.577	0.687	0.802	0.711	0.928	0.768	0.718	0.837
2013-14 to 2017-18	0.699	0.632	0.789	0.802	0.687	0.953	0.848	0.803	0.907
Panel C: Hypothesis testing									
***SZL* test across sub-periods**									
$H_0 : pdf\ (DI\_G_{2008/09-2012/13}) = pdf(DI\_G_{2013/14-2017/18})$	-0.437*** (0.000)	-17.316*** (0.002)	8.915*** (0.000)	-52.915 (0.935)	1.064*** (0.006)	5.976* (0.054)	28.965** (0.032)	65.42 (0.887)	43.806* (0.090)
***SZL* test across bank groups**									
$H_0 : pdf\ (DI\_G^{PSB}_{2008/09-2017/18}) = pdf(DI\_G^{PB}_{2008/09-2017/18})$	51.137 (0.234)			91.263*** (0.000)			37.945*** (0.000)		

$H_0: pdf\left(DI\_G^{PSB}_{2008/09-2012/13}\right) =$ $pdf\left(DI\_G^{PB}_{2008/09-2012/13}\right)$	24.514*** (0.000)	43.081 (0.000)***	37.945*** (0.000)
$H_0: pdf\left(DI\_G^{PSB}_{2013/14-2017/18}\right) =$ $pdf\left(DI\_G^{PB}_{2013/14-2017/18}\right)$	26.210*** (0.004)	48.083*** (0.000)	19.681*** (0.000)

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Despite the observed increase in adherence to all the dimensions in the most recent years, there is still enough scope for reinforcing the governance standards on board, audit, and risk management functions for banks. We feel that consistent efforts are required to be made by banks to remove governance gaps and to achieve the status of a fully governed bank. Importantly, a few recent initiatives by regulators for improving bank governance are based on the recommendations of the Committee to Review Governance of Boards of Banks in India (Chairman: P. J. Nayak) in 2014. For example, to improve the board quality, the GoI constituted the Banks Board Bureau (BBB) as an autonomous body for the independent appointments of the chiefs of PSBs. In addition, the approbation of listed banks is subject to the condition that these banks will comply with the SEBI Clause 49 regulations. In practice, since 2015, Indian banks (especially PBs) have responded promptly to both new and amended governance standards. This promptness might be due to the pro-active role of relevant jurisdictions that relentlessly pushed the PBs to strictly adhere to new and existing governance codes. However, PSBs are stumbling in achieving greater compliance with the dimensions of board effectiveness, risk management, and audit functions.

Table 5: Dimensional Indices of Bank Governance: Remuneration, Shareholders' Rights and Information and Disclosure and Transparency

Governance Dimension→	Remuneration Index			Shareholders' Rights and Information Index			Disclosure and Transparency Index		
Bank Groups→ Year↓	All banks	PSBs	PBs	All banks	PSBs	PBs	All banks	PSBs	PBs
Panel A: Yearly mean estimates									
2008-09	0.783	0.870	0.667	0.850	0.838	0.866	0.818	0.835	0.794
2009-10	0.870	0.903	0.824	0.851	0.841	0.866	0.841	0.850	0.829
2010-11	0.862	0.889	0.824	0.885	0.894	0.872	0.861	0.900	0.806
2011-12	0.862	0.875	0.843	0.889	0.905	0.866	0.871	0.904	0.824
2012-13	0.889	0.917	0.852	0.883	0.909	0.848	0.874	0.929	0.800
2013-14	0.913	0.917	0.907	0.883	0.905	0.854	0.883	0.933	0.817
2014-15	0.919	0.917	0.922	0.902	0.917	0.882	0.915	0.942	0.876
2015-16	0.976	0.958	1.000	0.916	0.939	0.882	0.912	0.942	0.871
2016-17	0.982	0.968	1.000	0.938	0.957	0.914	0.924	0.952	0.888
2017-18	0.833	0.714	0.980	0.909	0.892	0.930	0.971	0.976	0.965
Panel B: Grand mean									
2008-09 to 2017-18	0.889	0.894	0.882	0.890	0.899	0.878	0.886	0.915	0.847
2008-09 to 2012-13	0.854	0.891	0.802	0.872	0.878	0.864	0.853	0.884	0.810
2013-14 to 2017-18	0.925	0.898	0.961	0.909	0.922	0.892	0.920	0.948	0.883

Panel C: Hypothesis testing									
SZL test across sub-periods									
$H_0: pdf\left(DI\_G_{2008/09-2012/13}\right) =$ $pdf\left(DI\_G_{2013/14-2017/18}\right)$	27.088*** (0.005)	3.526 (0.811)	53.805*** (0.000)	87.275* (0.077)	49.213** (0.017)	8.699* (0.055)	27.556*** (0.000)	-0.088*** (0.000)	3.483*** (0.004)
SZL test across bank groups									
$H_0: pdf\left(DI\_G^{PSB}_{2008/09-2017/18}\right) =$ $pdf\left(DI\_G^{PB}_{2008/09-2017/18}\right)$	-64.041 (0.356)			28.097*** (0.000)			69.159** (0.047)		
$H_0: pdf\left(DI\_G^{PSB}_{2008/09-2012/13}\right) =$ $pdf\left(DI\_G^{PB}_{2008/09-2012/13}\right)$	-23.028*** (0.007)			28.973*** (0.001)			35.552** (0.040)		
$H_0: pdf\left(DI\_G^{PSB}_{2013/14-2017/18}\right) =$ $pdf\left(DI\_G^{PB}_{2013/14-2017/18}\right)$	16.848*** (0.005)			-26.630 (0.559)			35.128 (0.749)		

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Figure 10: Trends in Dimensional Indices of Governance Index

(a) Board Effectiveness Index

(b) Audit Function Index

(c) Risk Management Function Index

(d) Remuneration Index
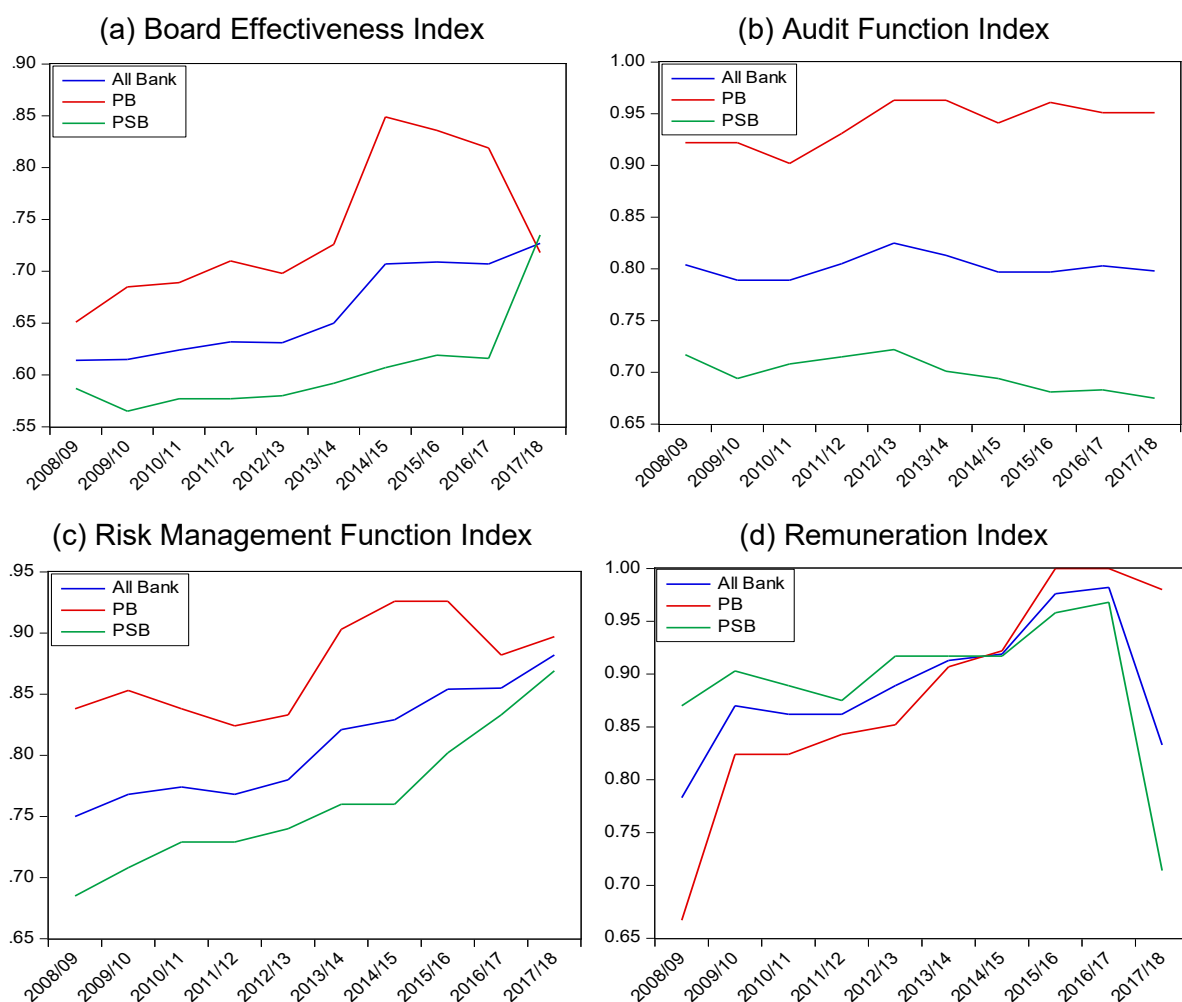
(e) Shareholders' Rights & Information Index   (f) Disclosure and Transparency Index
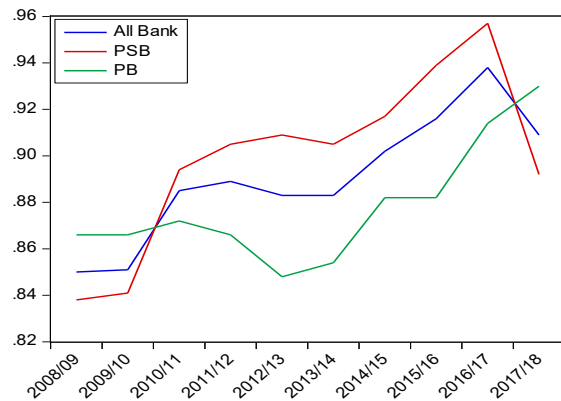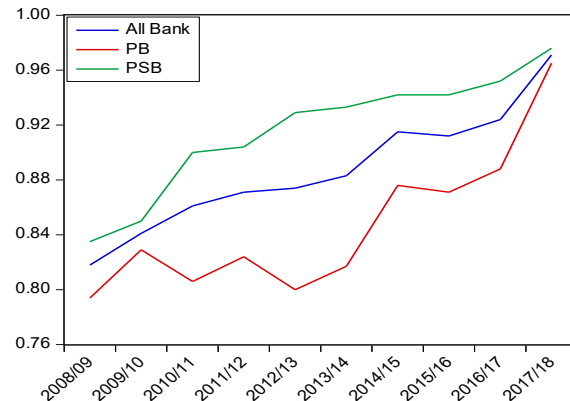
Source: Authors' elaboration.

6.1.3 Optimal Policy Weights on Governance Dimensions

From a policy perspective, a pertinent research question is: On what aspect should an inadequate governance-compliant bank focus? The non-zero optimal policy weights obtained by the model (A) (*i.e.*, $\upsilon_{k,o}^*$) can be effectively employed to answer this question[20]. It is noteworthy here that these weights reflect the sampled banks' policy priorities concerning specified dimensions of corporate governance. These values illuminate policy areas that are currently regarded as the most important by the bank and provide adequate information about aspects that are not sufficiently focused. A change in policy priorities is inevitable for banks with inadequate governance. Based on these weights, it is possible for a bank to decide how to restructure the policy priorities on governance dimensions. Thus, the weighting scheme of poorly governed banks directs their policy interventions in ways conducive to their transition to fully governed status. In Table 6, we provide a yearly mean weighting scheme that corresponds to the different dimensions of bank governance. We note that the weighting structure varies significantly between bank groups and years. An average PSB gives higher priority to disclosure (25.5 per cent), then remuneration (22.1 per cent), and shareholders' rights and information (17.3 per cent). However, the dimensions of risk management, board, and audit function are less prioritised among PSBs. In contrast, PBs placed a greater emphasis on audit function (28.2 per cent), followed by risk management (17.8 per cent) and board quality (16.2 per cent) during the study period. These differences clearly indicate significant asymmetries in bank policy priorities across ownership groups. Strikingly, even though both PSBs and PBs need to focus on risk mitigation, PBs have performed slightly better when it comes to stressing internal risk and audit controls. Following the introduction of new regulations,

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[20] Note here that the details pertaining to weights would provide a clear idea about the most important areas of governance compliance that require immediate focus of the regulators, management and board of banks. For the sake of brevity here, we have reported yearly mean weights/priorities of governance dimensions here.

this weighting scheme has clearly changed. We conclude that the weighting scheme of less governed banks requires rebalancing by focusing on less prioritised areas so as to strengthen the overall governance structure in the banking system.

Table 6: Policy Priorities assigned to Dimensions of Bank Governance

Governance Dimensions→ Year↓	Board Effective-ness Index	Audit Function Index	Risk Management Function Index	Remune-ration Index	Shareholders' Rights and Information Index	Disclosure and Transparency Index
Panel A: Public Sector Banks						
2008-09	0.100	0.100	0.117	0.291	0.204	0.187
2009-10	0.117	0.117	0.100	0.281	0.174	0.212
2010-11	0.100	0.113	0.117	0.268	0.160	0.242
2011-12	0.100	0.100	0.100	0.164	0.196	0.340
2012-13	0.100	0.100	0.100	0.167	0.183	0.350
2013-14	0.100	0.117	0.100	0.166	0.167	0.351
2014-15	0.100	0.100	0.100	0.333	0.150	0.217
2015-16	0.100	0.100	0.167	0.133	0.300	0.200
2016-17	0.100	0.100	0.214	0.252	0.100	0.233
2017-18	0.214	0.100	0.214	0.157	0.100	0.214
Mean weight	**0.113**	**0.105**	**0.133**	**0.221**	**0.173**	**0.255**
Panel B: Private Banks						
2008-09	0.218	0.100	0.194	0.171	0.218	0.100
2009-10	0.100	0.347	0.171	0.147	0.131	0.105
2010-11	0.288	0.124	0.227	0.147	0.114	0.100
2011-12	0.175	0.339	0.108	0.110	0.122	0.146
2012-13	0.117	0.316	0.162	0.142	0.135	0.127
2013-14	0.155	0.324	0.118	0.165	0.103	0.135
2014-15	0.171	0.124	0.382	0.124	0.100	0.100
2015-16	0.100	0.406	0.147	0.147	0.100	0.100
2016-17	0.100	0.406	0.124	0.171	0.100	0.100
2017-18	0.194	0.335	0.147	0.124	0.100	0.100
Mean weight	**0.162**	**0.282**	**0.178**	**0.145**	**0.122**	**0.111**

Source: Authors' calculations.

6.2 Bank Soundness in India

6.2.1 Evolution of Soundness Level in the Indian Banking Industry

To begin with, we focus on the discussion on evolutionary trends in bank soundness in India. Table 7 presents empirical estimates of the soundness index over banks and years. We note that this figure is high by any standard, at 0.930. It is clear that on average, Indian banks operate below the frontier and that they can reach the status of a "fully sound bank" by enhancing their soundness level by just 7 per cent across all dimensions[21]. We also notice considerable yearly changes in bank

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[21] Here the results must be interpreted with extreme caution. The soundness index score for a bank is sample-specific and relative in the sense and indicates how well the bank is positioned in terms of its soundness level

soundness levels in India. The banking industry remained relatively stable from 2008-09 to 2012-13, but signs of a decline in bank soundness emerged in 2013-14. When compared to the first sub-period, the results suggest that bank soundness declined by about 2.2 percentage points in the second sub-period. Furthermore, the adapted-Li test results show that the observed fall in soundness levels is statistically significant.

The following factors could explain why the initial sample years had a higher level of soundness. First, positive spillovers from the second phase of the reforms process resulted in two-digit growth in bank balance sheets, as well as improved lending operations, lower credit risk, and higher margins comparable to the global benchmark level, enabled the Indian banking system to avoid the initial ill-effects of the GFC of 2007-09 due to its sound position on the soundness/stability front which lasted till 2013-14 when a severe endogenous NPAs crisis knocked the banking system. Second, between the period October 2008 and April 2009, RBI took a series of prompt aggressive countercyclical measures like maintaining enough liquidity in the system, so liquidity stress did not trigger solvency cascades, and sharply relaxing monetary policy through the reduction in repo rate, reverse repo rate, CRR, and SLR kept the credit delivery on track. These measures gave less space for information asymmetries to surface and prevented the banks from taking higher risks. Consequently, banks successfully withheld their desired soundness levels during the crisis years and maintained these levels in the post-crisis years until 2013-14. Third, effective monetary transmission, mainly through the lending channel, could be the other reason. However, the disruption and its subsequent consequences were devastating. During the local NPAs crisis of 2013-14, Indian banks experienced a drop in profitability and increased liquidity stress, owing to a decline in credit worthiness, low margins due to massive bad advances, a reduction in the exposure to off-balance-sheet activities and the income from non-traditional sources, and increased loan loss provisioning (RBI 2014, 2017). Overall, during the most recent years, the above-mentioned adverse developments put the banking system in its most severe period of stress and significantly endangered its overall soundness. The results of hypotheses testing for equality of *CI_S* distributions across sub-periods, as reported in Panel B of Table 7, confirm the validity of our findings.

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relative to the other banks in the Indian banking industry. The index score will definitely alter if we adopt the chosen framework to model the soundness for more no. of banks or change the frontier type.

Table 7: Evolution of Bank Soundness and across Distinct Ownership Groups

Bank Groups→ Year↓	All banks	PSBs	PBs	SZL test statistic (p-value) $H_0 : pdf\,(CI\_S^{PSB})_t = pdf\left(CI\_S^{PB}\right)_t$ Test Statistic (p-value)
Panel A: Yearly mean				
2008-09	0.936	0.940	0.932	0.364 (0.051)*
2009-10	0.937	0.938	0.936	1.369 (0.009)***
2010-11	0.941	0.939	0.944	1.373 (0.070)*
2011-12	0.944	0.940	0.948	1.967 (0.036)**
2012-13	0.945	0.940	0.950	2.955 (0.002)***
2013-14	0.928	0.921	0.939	3.332 (0.000)***
2014-15	0.917	0.910	0.927	3.301 (0.002)***
2015-16	0.915	0.903	0.933	6.170 (0.000)***
2016-17	0.920	0.906	0.938	8.200 (0.000)***
2017-18	0.915	0.896	0.938	6.483 (0.000)***
Panel B: Grand mean				
2008-09 to 2017-18	0.930	0.924	0.939	10.535 (0.000)***
2008-09 to 2012-13	0.941	0.939	0.942	8.949 (0.000)***
2013-14 to 2017-18	0.919	0.907	0.935	25.079 (0.000)***
Panel C: SZL test across sub-periods $H_0 : pdf\,(CI\_S_{2008/09-2012/13}) = pdf\,(CI\_S_{2013/14-2017/18})$				
Test Statistic (p-value)	27.731*** (0.000)	42.889*** (0.000)	-0.308 (0.332)	

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Figure 11: Trends in Soundness Index in the Industry and across Bank Groups
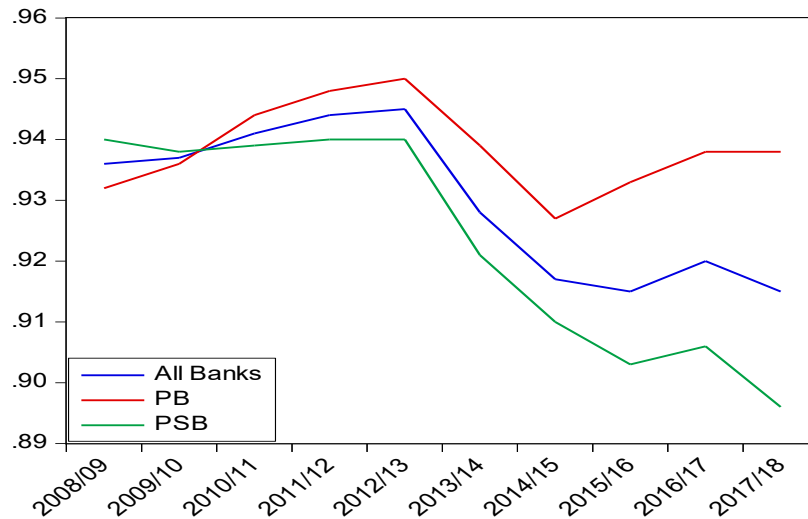
Figure 12: Kernel Distribution of Soundness Index across Bank Groups
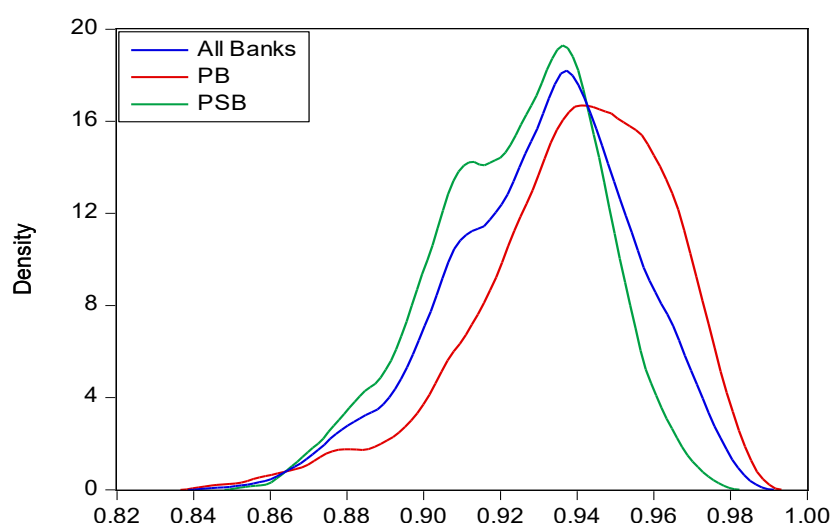
A comparative analysis of public and private banks is done to investigate if banks with different ownership types maintained similar soundness. The relevant results are reported in Table 8, and yearly variations in the soundness index are shown in Figure 11. Looking at the estimated index values, we note some important findings. First, PBs relatively outperformed PSBs in terms of sustaining soundness position during the study period. However, the story was a bit different in distinct sub-periods. Second, the PSB group maintained reasonable soundness until the year 2012-13 due to less provisioning on account of low NPA risk, better profitability, and more customer confidence in the light of implicit government guarantee and reasonable support from RBI that these banks enjoyed. At the same time, the PB group observed relatively low soundness because the asset quality of some well-known private banks deteriorated significantly during the global financial crisis period. Third, the banking industry experienced a jerk in 2012-13 due to endogenous shocks coupled with an economic downturn, which reversed the up-turn trend in soundness and widened the gap between bank groups. This enlargement in the soundness/stability gap is evident from the fact that in the second sub-period, state-owned banks observed a significant drop of (-)3.4 per cent against (-)0.7 per cent fall in the soundness levels of their private counterparts (see Panel B of Table 7). The rejection of the null hypothesis of no difference in the probability distribution of CI_S levels statistically validates this finding.

The analysis of kernel density distributions for ownership groups, as exhibited in Figure 12, reflects that the density curve for the PSB group is slightly bimodal and more peaked in terms of soundness. However, for the PB group, it appears to the right of the density curve for the PSB group, with slightly lower modal value and higher dispersion. The comparative analysis of the shape of kernel density distributions corroborates our finding mentioned above that the PB group performed relatively better in terms of bank soundness. Overall, the empirical findings send a clear

message that banks have scope to enhance their soundness performance and operate on the soundness frontier irrespective of the ownership type. Further, recently, private banks have shown signs of recovery in soundness position, but relatively low soundness remained a challenge for PSBs. However, the ongoing regulatory initiatives towards cleaning up the balance sheets of banks (especially those of PSBs), restructuring, and recapitalisation would assist with enhancing the overall soundness of the banking system in the years to come.

6.2.2 Dimensions of Bank Soundness

To see what undermines the soundness, we rely on an analysis of the mean values of dimensional indices. The estimated mean values of dimensional indices of bank soundness are reported in Panel A of Table 8 (refer to Section 4.2 for the construction of dimensional indices). The disaggregated analysis suggests that PSBs have witnessed a notable deterioration in two important dimensions of bank soundness. These dimensions are asset quality and profitability. In particular, a statistically significant decline, which is more than 5 per cent, has been noted in the values of dimensional indices of asset quality and profitability in the second sub-period relative to the first sub-period. This finding offers a clear explanation of why the Indian banking industry in general and its most significant segment of public sector banking, in particular, became somewhat less sound during the "turbulent" period. Based on our findings, we can safely infer that a decline in profitability and asset quality caused an increase in the fragility and vulnerability of the banking system in the turbulent period. The main reason for profitability and asset quality fall lies in the fact that in the years immediately following the global financial crisis of 2007-09, an internal crisis of non-performing loans has started brewing due to pro-cyclicality in the lending behaviour of Indian banks. Indian banks, especially PSBs, overstretched their lending and lent heavily to infrastructure and industrial projects in the period before the global financial crisis. The bad loans of banks rose steadily over the initial three years of the post-global financial crisis. The initial impact of the rise of NPAs was quickly absorbed by the improved past profitability (Mishra *et al.*, 2013). However, after the year 2013, the NPAs front situation worsened, which resulted in a significant decline in the asset quality and profitability levels of the Indian banks. Furthermore, this behaviour was more pervasive in the public sector banking group. Strikingly, PSBs did well in terms of management efficiency, but their performance on the capital adequacy dimension was relatively dismal. The analysis also highlights a decline in the average values of the dimensional indices pertaining to management efficiency for both ownership groups in the second sub-period. Nevertheless, banks in both groups performed almost alike as far as the liquidity front is concerned (see Figure 13).

6.2.3 Optimal Policy Weights on Bank Soundness Dimensions

The constrained BoD provides optimal weights (*i.e.,* $w_{i,o}^{*}$) obtained by solving the model (B)[22]. In the BoD modeling framework, these weights serve as policy weights for underlined dimensions and can be used to identify the dimension(s) that an unstable bank should focus on while making efforts to achieve a higher level of soundness. Table 9 lists out those weights. It is noteworthy here that higher values of weights provide sufficient information on bank soundness dimensions that were accorded higher priorities and vice-versa. The structure of weights reported in Table 9 clearly reflects the differences in policy priorities across public and private banks. We note that an average PSB entrusted higher priority to management efficiency (55.7 per cent) while paid more or less the same importance to the remaining dimensions of soundness. In contrast, an average PB put more focus on management efficiency (39.3 per cent), followed by asset quality (22 per cent) and profitability (18.5 per cent). The liquidity and capital adequacy dimensions were less prioritised by PBs. It is important to note that with the changing market dynamics, the policy priorities of PBs on soundness dimensions have also changed. In 2015-16 and 2016-17, PBs have shifted their focus towards asset quality and profitability dimensions due to the NPAs crisis.

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[22] The information pertaining to weighting scheme is intuitive and imperative. This would provide a clear idea about the most precarious areas of soundness, which need immediate attention of the bank's management and the industry regulators for desired policy intervention. For the sake of brevity, we have presented and discussed yearly mean weights/priorities corresponding to soundness dimensions here.

Table 8: Dimensional Indices of Bank Soundness

Soundness Dimensions→ Bank Groups Year↓	Asset Quality			Management Efficiency			Capital Adequacy			Profitability			Liquidity		
	All banks	PSBs	PBs	All banks	PSBs	PBs	All banks	PSBs	PBs	All banks	PSBs	PBs	All banks	PSBs	PBs
Panel A: Yearly mean															
2008-09	0.808	0.840	0.764	0.849	0.862	0.831	0.038	0.019	0.064	0.446	0.442	0.451	0.206	0.200	0.214
2009-10	0.877	0.886	0.865	0.914	0.921	0.906	0.038	0.018	0.065	0.426	0.430	0.422	0.213	0.205	0.226
2010-11	0.756	0.720	0.807	0.899	0.904	0.892	0.018	0.010	0.031	0.403	0.403	0.403	0.190	0.183	0.199
2011-12	0.623	0.521	0.766	0.901	0.912	0.885	0.015	0.008	0.025	0.299	0.284	0.321	0.123	0.126	0.119
2012-13	0.746	0.673	0.844	0.905	0.920	0.885	0.028	0.019	0.039	0.242	0.210	0.285	0.161	0.159	0.164
2013-14	0.804	0.742	0.888	0.883	0.900	0.861	0.022	0.010	0.038	0.343	0.304	0.396	0.160	0.154	0.169
2014-15	0.783	0.718	0.874	0.866	0.890	0.832	0.026	0.010	0.049	0.329	0.284	0.393	0.161	0.156	0.168
2015-16	0.796	0.711	0.916	0.876	0.892	0.853	0.026	0.013	0.044	0.348	0.279	0.445	0.158	0.156	0.162
2016-17	0.827	0.743	0.932	0.870	0.886	0.850	0.024	0.011	0.040	0.417	0.354	0.495	0.217	0.210	0.226
2017-18	0.630	0.451	0.851	0.844	0.867	0.815	0.019	0.009	0.030	0.366	0.266	0.490	0.180	0.175	0.186
Panel B: Grand mean															
2008-09 to 2017-18	0.765	0.702	0.851	0.881	0.896	0.861	0.025	0.013	0.042	0.361	0.325	0.409	0.177	0.172	0.183
2008-09 to 2012-13	0.762	0.727	0.810	0.894	0.904	0.880	0.027	0.015	0.045	0.362	0.353	0.375	0.178	0.174	0.184
2013-14 to 2017-18	0.769	0.677	0.892	0.868	0.887	0.842	0.023	0.011	0.040	0.360	0.297	0.443	0.175	0.169	0.182
Panel C: Hypothesis testing															
***SZL* test across sub-periods**															
$H_0 : pdf\,(DI\_S_{2008/09-2012/13}) =$ $pdf\,(DI\_S_{2013/14-2017/18})$	5.377*** (0.000)	6.612*** (0.000)	8.404*** (0.000)	7.500*** (0.000)	0.011 (0.178)	10.408*** (0.000)	18.996 (0.000)***	6.676 (0.000)***	1.800 (0.905)	2.557** (0.012)	7.753*** (0.000)	2.943*** (0.004)	4.645*** (0.003)	7.753*** (0.000)	2.943*** (0.004)
***SZL* test across bank groups**															
$H_0 : pdf\,(DI\_S^{PSB}_{2008/09-2017/18}) =$ $pdf\,(DI\_S^{PB}_{2008/09-2017/18})$	29.095*** (0.000)			3.752*** (0.000)			38.448*** (0.000)			13.837*** (0.000)			7.387*** (0.000)		
$H_0 : pdf\,(DI\_S^{PSB}_{2008/09-2012/13}) =$ $pdf\,(DI\_S^{PB}_{2008/09-2012/13})$	4.649*** (0.000)			0.773** (0.026)			14.960*** (0.000)			0.072 (0.161)			3.007*** (0.001)		
$H_0 : pdf\,(DI\_S^{PSB}_{2013/14-2017/18}) =$ $pdf\,(DI\_S^{PB}_{2013/14-2017/18})$	28.011*** (0.000)			5.073*** (0.000)			30.771*** (0.000)			20.028*** (0.000)			3.991*** (0.001)		

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Figure 13: Trends in Dimensional Indices of Bank Soundness

(a) Asset Quality

(b) Management Efficiency

(c) Capital Adequacy

(d) Profitability

(e) Liquidity

Source: Authors' elaboration.

Overall, PSBs assigned higher priority to managerial efficiency. At the same time, PB placed substantial importance (about 80 per cent) on the management efficiency, asset quality, and profitability dimensions and paid little emphasis on the remaining dimensions of soundness. Thus, the distribution of the weighting scheme of each dimension of bank soundness across bank groups is lop-sided.
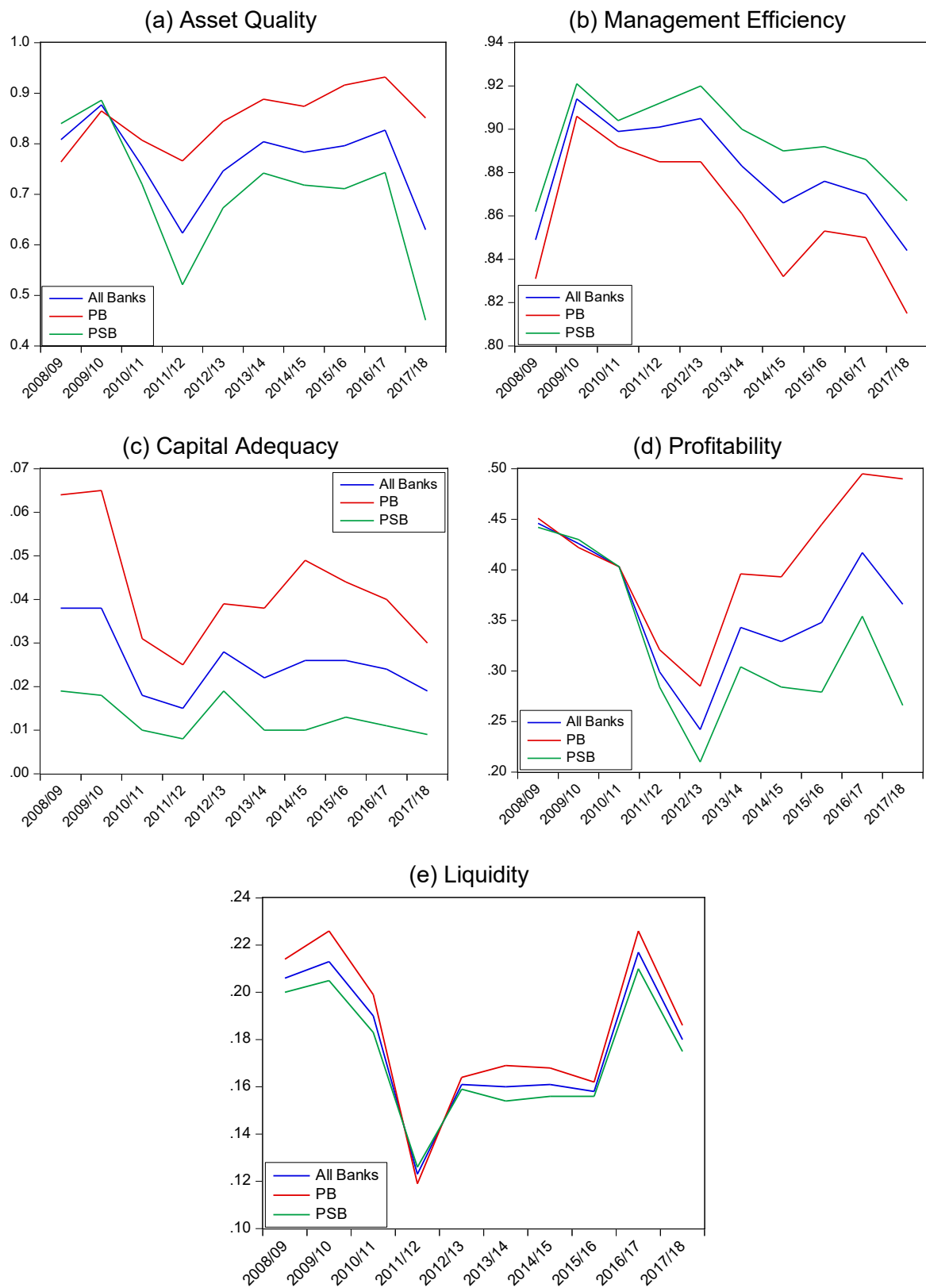
Table 9: Policy Priorities assigned to Dimensions of Bank Soundness

Soundness Dimensions→ Year↓	Asset Quality	Management Efficiency	Capital Adequacy	Profitability	Liquidity
Panel A: Public Sector Banks					
2008-09	0.147	0.508	0.100	0.145	0.100
2009-10	0.122	0.565	0.100	0.114	0.100
2010-11	0.100	0.562	0.100	0.138	0.100
2011-12	0.100	0.600	0.100	0.100	0.100
2012-13	0.100	0.589	0.100	0.111	0.100
2013-14	0.100	0.588	0.100	0.112	0.100
2014-15	0.100	0.600	0.100	0.100	0.100
2015-16	0.100	0.574	0.100	0.126	0.100
2016-17	0.152	0.507	0.118	0.123	0.100
2017-18	0.100	0.481	0.186	0.133	0.100
Mean weight	*0.112*	*0.557*	*0.110*	*0.120*	*0.100*
Panel B: Private Banks					
2008-09	0.150	0.500	0.100	0.150	0.100
2009-10	0.160	0.500	0.100	0.140	0.100
2010-11	0.162	0.501	0.100	0.138	0.100
2011-12	0.148	0.545	0.100	0.106	0.100
2012-13	0.141	0.529	0.100	0.131	0.100
2013-14	0.176	0.381	0.100	0.243	0.100
2014-15	0.260	0.294	0.106	0.240	0.100
2015-16	0.331	0.258	0.100	0.211	0.100
2016-17	0.423	0.171	0.100	0.206	0.100
2017-18	0.252	0.242	0.122	0.283	0.100
Mean weight	*0.220*	*0.392*	*0.103*	*0.185*	*0.100*

Source: Authors' calculations.

6.3 Profit Efficiency in the Indian Banking Industry

6.3.1 Evolution of Profit Efficiency in the Indian Banking Industry

Table 10 presents the estimated yearly profit efficiency scores for Indian banks. From the grand mean figures, we note that the average profit efficiency level of sampled banks is 64.3 per cent. Thus, the average profit inefficiency level is 35.7 per cent, which is very high by any standard. This finding suggests that there is considerable scope for improvements in the potential profits of Indian banks. The straightforward implication of this finding is that Indian banks should devote enormous efforts to learn the use of factor inputs in both a technically and allocatively efficient manner and choose an optimal mix of their loan and investment portfolio. Further,

PSBs significantly outperformed PBs in most of the sampled years, distinct sub-periods, and the entire sampled period. One potent reason behind this finding may be a significant flight of low-cost deposits from PBs to PSBs during the post-crisis years due to implicit government guarantees. Regarding the evolution of profit efficiency, we find i) significant variations in the yearly performance of bank groups on the profit efficiency front, ii) a sudden dip in the profit efficiency of both public and private banks in the year 2013 and an immediate bounce back (see Figure 14). The results based on the *SZL* test are clearly indicating that an increase in profit efficiency across sub-periods is only significant in the public sector banking segment. Hence, we find notable heterogeneity in profit efficiency between ownership groups in the Indian banking industry. Figure 15 clearly indicates that the profit efficiency distributions of PSBs is distinctively different than that of PBs in terms of average, dispersion, skewness, and peakedness.

Table 10: Evolution of Profit Efficiency in the Indian Banking Industry and across distinct Ownership Groups

Bank Groups→ Year↓	All Banks	PSBs	PBs	*SZL* test statistic (*p*-value) $H_0: pdf\left(PROFEFF^{PSB}\right)_t = pdf\left(PROFEFF^{PB}\right)_t$ Test Statistic (*p*-value)
Panel A: Yearly mean estimates				
2009	0.567	0.617	0.501	-0.847(0.675)
2010	0.694	0.762	0.599	-0.075(0.102)
2011	0.722	0.782	0.638	0.647(0.027)**
2012	0.704	0.759	0.627	-0.031(0.265)
2013	0.424	0.456	0.382	0.565(0.041)**
2014	0.681	0.752	0.586	2.700(0.004)***
2015	0.658	0.748	0.530	2.155(0.007)***
2016	0.704	0.737	0.657	-1.114(0.381)
2017	0.638	0.627	0.653	-2.048(0.530)
2018	0.636	0.688	0.572	1.446(0.042)**
Panel B: Grand mean				
2009-2018	0.643	0.693	0.574	10.171(0.003)***
2009-2013	0.622	0.675	0.549	3.107(0.052)*
2014-2018	0.663	0.710	0.600	4.692(0.000)***
Panel C: *SZL* test across sub-periods $H_0: pdf\left(PROFEFF_{2008/09-2012/13}\right) = pdf\left(PROFEFF_{2013/14-2017/18}\right)$				
Test Statistic (*p*-value)	-2.282 (0.123)	10.692** (0.012)	-0.142 (0.498)	

Notes: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Figure 14: Trends in Profit Efficiency in the Industry and across Bank Groups
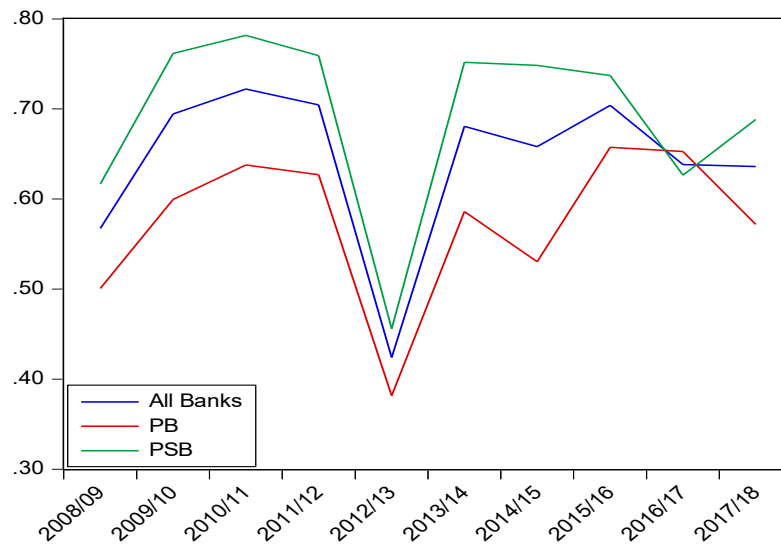
Source: Authors' elaboration.

Figure 15: Kernel Distribution of Profit Efficiency Index across Bank Groups
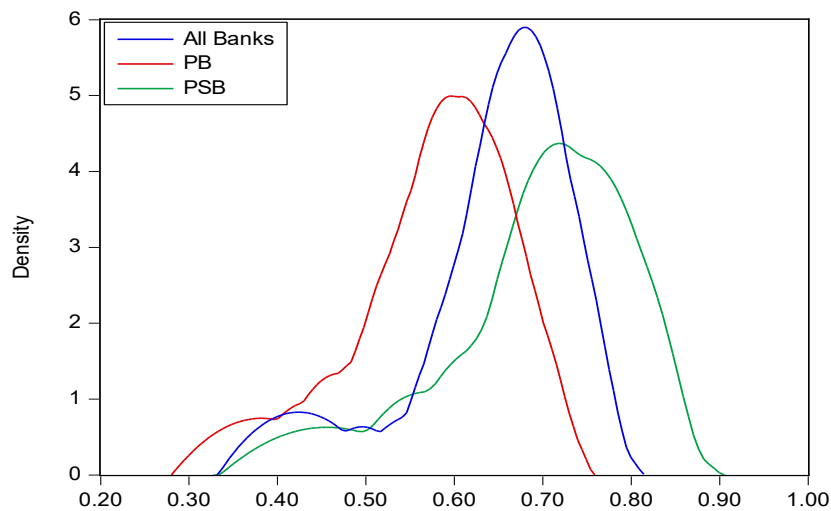
Source: Authors' elaboration.

6.4 Exploring a Relationship between Governance, Efficiency and Soundness

This sub-section aims to answer our key research question: Do governance and efficiency explain bank soundness in India? We adopt a two-step system GMM technique to infer more reliable conclusions about the association between corporate governance, efficiency, and bank soundness in India. The estimated results are outlined as below.

6.4.1 Results of Overall Governance and Bank Soundness

We begin the discussion by developing the linkage between overall governance structure and bank soundness. For this, we obtain the coefficient estimates for the econometric model (9), as deliberated in Section 5.2.1. The results for different

variants of model specification (9) are reported in Tables 11 and 12. In all the model specifications (i)-(viii), governance and efficiency are considered as endogenous, while other control variables are viewed as instruments to themselves. Reiterating here, we make this arrangement to deal with the potential endogeneity in the relationship between governance and performance indicators. The model diagnostic tests reveal that all the specifications are well fitted with the significant coefficient of first-order autocorrelation and a statistically insignificant coefficient of second-order autocorrelation. Further, the insignificant coefficients of the Hansen J test and Difference-in-Hansen test of over-identification infers that our model specifications are free from the problem of instrumentation[23]. And, finally, the overall reliability of the dynamic models is checked by a statistically significant Wald χ^2 test, which indicates the joint significance of the model estimates.

We see the persistence effect of bank soundness using the estimated coefficient of lagged dependent variable $(\hat{\delta}_0)$ in the estimated model specifications. A coefficient value between 0 and 1 signifies the persistence in soundness levels. The persistence coefficient $(\hat{\delta}_0)$ is positive and statistically significant for all of the model specifications, as shown in Tables 11 and 12. This demonstrates the persistence in bank behaviour to remain sound and stable over time. The magnitude of the $\hat{\delta}_0$ in different model specifications suggests that if the banking system experiences a jerk to stability in the current year, then about 39 to 58 per cent of its impetus will persist in the following year. Overall, the results indicate that retrieving erstwhile soundness in the Indian banking industry is not instantaneous but rather partial. The lack of observed instantaneous recovery in bank soundness may be due to the presence of damaging effects of many potential exogenous and endogenous shocks to the banking system. Some of the prominent factors that can emanate a shock in the banking system include increased risk provisioning and write-offs due to an enormous volume of NPAs, low profitability, liquidity stress, and decline in capital buffers to the level mandated by the regulators. Any shock originating from the aforementioned factors may impact the degree of persistence in bank soundness.

The estimates reported in Tables 11 and 12 reveal that the relationship between overall governance structure and soundness of banks is positive and statistically significant. Thus, we get a response to the first primary hypothesis (H1) of this study. Based on the results, we can infer that governance structure predicts bank soundness in India. From the tables, we also establish the impact of risk-adjusted profit efficiency and bank-specific variables and draw the following interesting observations. First,

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[23] Assuming the presence of non-spherical errors, Hansen J and Difference-in-Hansen tests are favoured over Sargan test for testing the validity of instruments (Roodman, 2009).

based on the specifications (iv), (vii), and (viii) in these tables, as expected, the findings report a positive and significant relationship between *PROFEFF* and bank soundness. This suggests that Indian banks that are more profit efficient are sound enough to hold the capability of absorbing shocks through dynamic loss provisioning and generating substantial capital buffers, which may reduce the destabilisation effects.

Second, the model estimates in the specifications (i), (ii), and (iii) reveal that bank soundness is adversely linked with ownership concentration. This finding seems to have the direct implication that the government's inordinate ownership shareholdings in a bank (in the majority of PSBs) may entice these banks to take a disproportionate risk and possibly embrace less prudent conduct, which may not be in the depositors' best interests (Shleifer & Vishny, 1986). This conclusion is consistent with previous studies by La Porta *et al.* (2002) and Beck *et al.* (2009). This study thus contributes to the theoretical discussion concerning the role of state ownership in bank soundness. The study results favour those who contend that involvement by the government will ensure the implicit guarantee, but only to a point, because it will not necessarily improve banking system soundness beyond that. Third, as far as bank size is concerned, we confirm that asset concentration has a destabilising effect on Indian banks (see specifications (iii) & (v)). These findings are completely contrary to those of Ben *et al.* (2015).

Fourth, our analysis shows that the coefficient of the dummy variable *DREFORM* in model specifications (ii) and (vi) has a negative sign. This finding indicates that an array of re-regulation and new reform measures introduced as a response to hostile events have slowly begun to push and restore the erstwhile soundness level in the industry. Moreover, banks with larger government ownership concentration are far more affected by this burden of greater regulatory compliance, as can be seen from the negative and significant coefficient of *DREFORM×OWNSHARE* in the specifications (ii) and (iv) in Table 11[24].

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[24] It is noteworthy here that the aforementioned inference about the impact of reforms captured using the dummy variable may not map neatly onto our conventional wisdom, which guides that regulatory reforms promote bank soundness. To further validate our results, we applied the mean unconditional comparison approach suggested by Dafny & Dranove (2006) and applied by Besstremyannaya (2012). This approach involves computing the sequence of differences in bank soundness level for k post-reform years and the average value for the 5 pre-reform years (2009–2013) and fitting unconditional mean regressions. The details of this approach are given below. Let

$$\overline{CI\_S}_{t,k} = \frac{1}{k}\sum_{j=1}^{k} CI\_S_{t-1+j} \text{ and } D_k = \overline{CI\_S}_{2014,k} - \overline{CI\_S}_{2009,5}$$

where CI_S_s is the value of bank soundness score in year s, $\overline{CI\_S}_{t,k}$ is the average value of the bank soundness score in the time interval $[t, t + k - 1]$, D_k is the difference between the average values of the bank soundness score in the time interval $[2014, 2014+k-1]$ and in the time interval $[2009, 2013]$. Given data availability, 5 dependent variables, D_k, corresponding to k equal 1, 2, 3 or 5 are constructed. For each k=1,2,…,5, we estimate the following mean unconditional regressions:

Fifth, to determine the ownership effects, we use the model specifications (v)-(viii) in Table 12. We include PUBLIC as a dummy taking value 1 for the PSB and 0 otherwise in these specifications. The results clarify that PSBs with higher government ownership control are less stable relative to private banks. The low asset quality and lower profitability of PSBs in conjunction with dual regulation by the GoI and RBI weaken supervisory controls and induce relaxed stringency on compliance with governance standards by these banks. All of this reduces their likelihood of being more stable.

Sixth, from model specification (iii) in Table 11, a negative and statistically significant coefficient of *CRISIS* econometrically validates the lower soundness performance of the Indian banks during the turbulent period. We reiterate our earlier finding presented in the sub-section 6.2.1 that the endogenous shock to the system in the form of the NPAs crisis has moved the soundness below the level observed in the years before the crisis. Interestingly, the study reports a significant and positive coefficient of the interaction dummy *CRISIS×PUBLIC*, suggesting that the re-regulation process and other reforms that were kicked off in response to the NPAs crisis have slightly moderated the ill-effects of the crisis as far as the soundness of PSBs is concerned. This finding helps us to substantiate that the regulators took a series of potent and effective policy stances during the crisis period, which to some extent, steps in the right direction to manage the impact of the crisis on PSBs within tolerable limits (see specification (viii) in Table 12). Finally, by including the *FORBRANCH* as a control variable, we can see from model specifications (vi), (vii), and (viii) that bank expansion through branch internationalisation has a strong positive impact on bank soundness.

$$D_k = \tau C + \zeta, \quad \mathrm{E}(\zeta)=0$$

Here, $\hat{\tau}$ gives the estimate of the reform effect. The computed coefficients of reform effect from the mean unconditional regressions are reported in Table VII.1 of Annexure-VII. The negative and statistically significant coefficients of difference variables in all five regression for the Indian banking industry clearly validating our earlier inference that regulatory reforms have not been successful to improve the Indian banking industry, a thing which is completely contrary to our a priori expectations. Further, we can safely generalise the above results for the public sector banking segment.

Table 11: Overall Governance Structure and Bank Soundness: Two-step System GMM results at an Aggregate Level

[Dependent variable: Bank soundness index (CI_S)]

Model specifications	(i)	(ii)	(iii)	(iv)
Constant	0.073	0.353***	0.223**	0.306***
	(0.103)	(0.079)	(0.090)	(0.072)
$CI\_S_{j,t-1}$	0.565***	0.482***	0.585***	0.493***
	(0.206)	(0.107)	(0.132)	(0.121)
$CI\_G_{j,t}$	0.340*	0.135*	0.184**	0.169
	(0.204)	(0.076)	(0.094)	(0.107)
$SIZE_{j,t}$	-0.001	0.0001	-0.001**	-0.0004
	(0.0006)	(0.0004)	(0.0007)	(0.0004)
$FORBRANCH_{j,t}$	0.0001	0.00003	0.00007	0.00006
	(0.0001)	(0.00004)	(0.00005)	(0.00004)
$OWNSHARE_{j,t}$	-0.0001**	-0.00003*	-0.00008***	-0.00001
	(0.00003)	(0.00002)	(0.00002)	(0.00002)
$PROFEFF_{j,t}$	0.027*	0.0084	0.010	0.019**
	(0.015)	(0.0081)	(0.013)	(0.007)
$DREFORM_t$	-	-0.007***	-	-
		(0.001)		
$DREFORM_t \times OWNSHARE_{j,t}$	-	-0.0001***	-	-0.0002***
		(0.00004)		(0.00003)
$CRISIS_t$	-	-	-0.006**	-
			(0.002)	
$CRISIS_t \times OWNSHARE_{j,t}$	-	-	-0.000016	-
			(0.00001)	
Model diagnostics				
Wald χ^2	37685***	914.65***	604.62***	932.80***
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)
AR(1)	-3.53***	-3.56***	-3.67***	-3.67***
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)
AR(2)	-0.61	-1.39	-0.70	-1.11
(*p*-value)	(0.540)	(0.163)	(0.484)	(0.268)
Sargan test	14.23*	3.84	7.08	8.27
(*p*-value)	(0.076)	(0.427)	(0.529)	(0.407)
Hansen test	12.79	3.22	8.53	5.56
(*p*-value)	(0.119)	(0.522)	(0.383)	(0.696)
Difference-in-Hansen test	1.33	1.87	3.10	0.92
(*p*-value)	(0.721)	(0.601)	(0.376)	(0.820)
N (No. of observations)	363	363	363	363
k (No. of bank groups)	42	42	42	42
IV (No. of instruments)	15	13	17	16

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Table 12: Overall Governance Structure and Bank Soundness:
Two-step System GMM results at an Aggregate Level (by ownership)

Model specifications				
		[Dependent variable: Bank soundness index(CI_S)]		
	(v)	**(vi)**	**(vii)**	**(viii)**
Constant	0.095	0.381***	0.282***	0.346***
	(0.103)	(0.092)	(0.083)	(0.093)
$CI\_S_{j,t-1}$	0.391	0.505***	0.468***	0.416***
	(0.239)	(0.104)	(0.112)	(0.127)
$CI\_G_{j,t}$	0.509*	0.087	0.217***	0.200**
	(0.269)	(0.102)	(0.077)	(0.082)
$SIZE_{j,t}$	-0.001**	-0.00008	-0.0006	-0.0002
	(0.0007)	(0.0005)	(0.0006)	(0.0006)
$FORBRANCH_{j,t}$	0.0001	0.00009*	0.0001***	0.0001***
	(0.0001)	(0.00004)	(0.00004)	(0.00003)
$PUBLIC_j$	-0.001	-0.006**	-0.001	-0.005*
	(0.006)	(0.002)	(0.002)	(0.003)
$PROFEFF_{j,t}$	-	0.009	0.023**	0.024**
		(0.006)	(0.010)	(0.011)
$DREFORM_t$	-	-0.008***	-	-
		(0.002)		
$DREFORM_t \times PUBLIC_j$	-	-0.009***	-0.016***	-0.021***
		(0.002)	(0.003)	(0.004)
$CRISIS_t$	-	-	0.0008	-0.001
			(0.002)	(0.002)
$CRISIS_t \times PUBLIC_j$	-	-	-	0.008***
				(0.002)
Model diagnostics				
Wald χ^2	122.86***	1016.42***	935.20***	1040.10***
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)
AR(1)	-2.97***	-3.56***	-3.53***	-3.33***
(*p*-value)	(0.003)	(0.000)	(0.000)	(0.001)
AR(2)	-1.43	-1.14	-1.21	-1.89*
(*p*-value)	(0.153)	(0.254)	(0.225)	(0.059)
Sargan test	2.76	6.49	4.24	7.61
(*p*-value)	(0.251)	(0.371)	(0.645)	(0.473)
Hansen test	2.90	5.36	2.48	7.53
(*p*-value)	(0.234)	(0.499)	(0.871)	(0.481)
Difference-in-Hansen test (*p*-value)	2.90	3.69	1.43	5.44
	(0.234)	(0.297)	(0.698)	(0.142)
N (No. of observations)	363	363	363	363
k (No. of bank groups)	42	42	42	42
IV (No. of instruments)	8	15	15	18

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

6.4.2 Dimensions of Governance and Bank Soundness

Individual dimensions of governance may have a unique impact on bank soundness due to differences in adherence. We again use dynamic panel regression

analysis to explore differential effects of various governance dimensions and statistically validate our primary testable hypotheses H2-H7. The outcome of this regression analysis helps us to explore the effects of six individual dimensions of governance on bank soundness. The regression coefficient estimates corresponding to different variants of the econometric model (10) are provided in Tables 13 and 14. In particular, we capture the impact of *BOARD*, *AUDIT*, *RISK*, *REMUNERATION*, *SHAREHOLDER*, and *DISCLOSURE* on bank soundness level. The key findings are elaborated below.

Once again, we find the positive and statistically significant coefficient of lagged dependent variable ($\hat{\delta}_0'$), inferring the persistence in soundness level in the Indian banking industry. This outcome is consistent across all the model specifications. Concerning the board effectiveness, the associated sign of the estimated coefficient is negative and significant, as evident from the specification (i) in Table 13, and (v) and (viii) in Table 14. This sign is completely contrary to our a priori expectations but in line with Andrieș *et al.* (2018). This finding provides evidence that a prominent emphasis only on stringent compliance with board attributes and putting a meagre focus on other important dimensions of governance may be costly and has an impeding effect on bank soundness.

In terms of the audit function, we find no indication that compliance with this aspect substantially impacts bank soundness. However, a positive coefficient of interaction dummy *AUDIT×DREFORM* is found in the model (iv) of Table 13. The analysis convincingly confirms that better compliance with the audit function as a result of proactive regulatory reform in the post-2014 period has had a good influence on bank soundness. This finding has a lot of practical implications because any significant efforts by the management to enhance audit function compliance will have a positive externality in the form of enhanced bank soundness.

Regarding the impact of the risk function, the econometric estimates do not empirically affirm the validity of the fourth primary hypothesis that better governance on internal risk assurance function enhances the bank's soundness level. The results reveal a negative but insignificant relationship between the risk function and bank soundness in the Indian banking industry. The direct implication of this outcome is that compliance with regulatory norms about risk management principles is not adequate to make a bank sound. Rather, other policy interventions, especially in the form of greater supervisory power to resolution authorities, along with better compliance on risk governance, may improve soundness.

All the model specifications show that better remuneration practices help the board decide compensation packages for executives linked to their performance,

which lowers agency conflicts and enhance bank soundness. However, the recent escalation in the compensation packages and other benefits to executives and key managerial personnel of PSBs have exposed these banks to excessive risk and bigger precariousness. This fact is conveyed by the negative coefficient of *REMUNERATION×PUBLIC* in the model (viii) of Table 13. It is imperative to take note that, by and large, an executive of a PSB received a nominal remuneration of INR 32.75 lakhs in 2009 and 83.92 lakhs in 2018. The study, therefore, suggests that the design of a remuneration policy must ensure that bank executives avoid excessive risk-taking and shielding the bank soundness.

Tables 13 and 14 show significant results in a statistical sense about the relationship between shareholders' rights compliance and bank soundness. The findings are entirely consistent with those made by Caprio *et al.* (2007) and Laeven & Levine (2009). By showing this connection, we might be able to explain why the Indian banks have remained relatively safe from the adverse effects of the GFC of 2007-09. According to Erkens *et al.* (2012), the financial crisis triggered in 2007 in developed nations stemmed from boards taking excess risks without protecting shareholders' rights. However, in India, a combination of aggressive countercyclical measures by the central bank during crisis periods and the boards' attention on preserving shareholder and investor rights has enabled the banking sector to avert shareholder losses and maintain the bank's resilience to turmoil during both global financial and local NPAs crises.

In view of the estimated coefficients of model specifications, we can infer that more disclosure increase the probability of being unsound, and the "*transparency-fragility*" hypothesis validates for the Indian banking industry. This hypothesis states that disclosures (voluntary & mandatory) must be sound and decisive enough to protect the stakeholders' interest, and dissuade the "illusion of knowledge" and panic of inefficient bank runs. The study thus alludes that superfluous disclosure may increase the risk of a bank being unsound and thus need rationalisation on this front. Once again, our findings affirm that i) greater government ownership warrants the implicit guarantee, only to a certain level, and ii) a stringent regulatory environment obligates the banks to focus more on compliance to governance standards and other regulatory norms. With respect to the effect of size, we don't find any steady relationship. At the disaggregated level, we see that a larger bank size enhances the probability of a bank being designated a stable bank. This may be because of the fact that they are entrenched and well-established.

Table 13: Governance Dimensions and Bank Soundness: Two-step System GMM results at Disaggregate Level

[Dependent variable: Bank soundness index (*CI_S*)]

Model specifications	(i)	(ii)	(iii)	(iv)
Constant	0.501***	0.456***	0.423***	0.441***
	(0.120)	(0.070)	(0.090)	(0.085)
$CI\_S_{j,t-1}$	0.597***	0.545***	0.602***	0.551***
	(0.105)	(0.083)	(0.097)	(0.082)
$BOARD_{j,t}$	-0.073**	-0.023	-0.038	-0.007
	(0.031)	(0.022)	(0.040)	(0.051)
$AUDIT_{j,t}$	0.005	0.012	0.027	-0.031
	(0.034)	(0.028)	(0.035)	(0.028)
$RISK_{j,t}$	-0.024	-0.019	-0.023	-0.00009
	(0.036)	(0.022)	(0.028)	(0.016)
$REMUNERATION_{j,t}$	0.045**	0.024*	0.034**	0.024*
	(0.019)	(0.013)	(0.014)	(0.012)
$SHAREHOLDER_{j,t}$	0.046	0.057***	0.051*	0.063**
	(0.028)	(0.016)	(0.027)	(0.031)
$DISCLOSURE_{j,t}$	-0.190***	-0.108***	-0.126***	-0.075
	(0.048)	(0.038)	(0.046)	(0.053)
$SIZE_{j,t}$	0.003***	0.002***	0.001	0.0005
	(0.001)	(0.0007)	(0.001)	(0.0006)
$FORBRANCH_{j,t}$	-0.0001	-0.00004	-0.00005	-0.00005
	(0.0002)	(0.0001)	(0.0001)	(0.00006)
$OWNSHARE_{j,t}$	-0.00008	-0.00002	-0.00003	-0.00008**
	(0.00006)	(0.00004)	(0.00004)	(0.00004)
$PROFEFF_{j,t}$	-	-0.0002	-	0.0005
		(0.009)		(0.010)
$DREFORM_t$	-	-0.003	-	-0.075**
		(0.004)		(0.038)
$DREFORM_t \times OWNSHARE_{j,t}$	-	-0.0001***	-	-
		(0.00005)		
$CRISIS_t$	-	-	-0.004	-
			(0.004)	
$CRISIS_t \times OWNSHARE_{j,t}$	-	-	-0.00002	-
			(0.00004)	
$BOARD_{j,t} \times DREFORM_t$	-	-	-	0.011
				(0.054)
$AUDIT_{j,t} \times DREFORM_t$	-	-	-	0.053*
				(0.031)
$RISK_{j,t} \times DREFORM_t$	-	-	-	0.003
				(0.021)
$REMUNERATION_{j,t} \times DREFORM_t$	-	-	-	-0.017
				(0.012)
$SHAREHOLDER_{j,t} \times DREFORM_t$	-	-	-	-0.021
				(0.028)
$DISCLOSURE_{j,t} \times DREFORM_t$	-	-	-	0.052
				(0.051)
Model diagnostics				
Wald χ^2	365.93***	1701.29***	668.08***	653.80***
(*p*-value)	(0.000)	(0.000)	(0.000)	(0.000)
AR(1)	-3.86***	-3.76***	-3.46***	-3.52***

(*p*-value)	(0.000)	(0.000)	(0.001)	(0.000)
AR(2)	-0.75	-1.05	-0.64	-0.95
(*p*-value)	(0.455)	(0.295)	(0.520)	(0.341)
Sargan test	17.78	10.67	16.67	19.49
(*p*-value)	(0.602)	(0.986)	(0.674)	(0.672)
Hansen test	12.49	12.77	16.99	27.71
(*p*-value)	(0.898)	(0.957)	(0.654)	(0.227)
Difference-in-Hansen test	1.12	3.26	5.01	7.96
(*p*-value)	(0.993)	(0.917)	(0.658)	(0.437)
N (No. of observations)	363	363	363	363
k (No. of bank groups)	42	42	42	42
IV (No. of instruments)	31	37	33	42

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Table 14: Governance Dimensions and Bank Soundness:
Two-step System GMM results at Disaggregate Level (by ownership)

[Dependent variable: Bank soundness index (CI_S)]

Model specifications	(v)	(vi)	(vii)	(viii)
Constant	0.464***	0.457***	0.387***	0.361***
	(0.109)	(0.114)	(0.111)	(0.083)
$CI\_S_{j,t-1}$	0.648***	0.583***	0.637***	0.800***
	(0.093)	(0.097)	(0.128)	(0.080)
$BOARD_{j,t}$	-0.075**	-0.041	-0.032	-0.088*
	(0.031)	(0.040)	(0.048)	(0.046)
$AUDIT_{j,t}$	-0.006	-0.017	0.016	-0.118
	(0.048)	(0.046)	(0.046)	(0.132)
$RISK_{j,t}$	-0.022	-0.013	-0.022	-0.030
	(0.036)	(0.029)	(0.029)	(0.061)
$REMUNERATION_{j,t}$	0.039**	0.032*	0.031**	0.057*
	(0.019)	(0.018)	(0.012)	(0.031)
$SHAREHOLDER_{j,t}$	0.048	0.065**	0.055*	0.028
	(0.031)	(0.025)	(0.031)	(0.062)
$DISCLOSURE_{j,t}$	-0.175***	-0.124**	-0.113***	-0.051
	(0.042)	(0.051)	(0.043)	(0.039)
$SIZE_{j,t}$	0.003***	0.002**	0.0008	-0.0004
	(0.0009)	(0.001)	(0.001)	(0.001)
$FORBRANCH_{j,t}$	-0.00004	-0.00005	0.00001	-
	(0.0002)	(0.0001)	(0.0001)	
$PUBLIC_{j,t}$	-0.017	-0.013	-0.006	-0.159
	(0.012)	(0.010)	(0.007)	(0.104)
$PROFEFF_{i,t}$	-	-	-	0.005
				(0.011)
$DREFORM_{t}$	-	-0.002	-	-
		(0.004)		
$DREFORM_{t} \times PUBLIC_{j}$	-	-0.010**	-	-
		(0.004)		
$CRISIS_{t}$	-	-	-0.004	-
			(0.004)	

$CRISIS_t \times PUBLIC_j$	-	-	-0.003 (0.005)	-
$BOARD_{j,t} \times PUBLIC_j$	-	-	-	0.072 (0.050)
$AUDIT_{j,t} \times PUBLIC_j$	-	-	-	0.122 (0.139)
$RISK_{j,t} \times PUBLIC_j$	-	-	-	0.028 (0.059)
$REMUNERATION_{j,t} \times PUBLIC_j$	-	-	-	-0.053* (0.031)
$SHAREHOLDER_{j,t} \times PUBLIC_j$	-	-	-	-0.018 (0.064)
$DISCLOSURE_{j,t} \times PUBLIC_j$	-	-	-	0.022 (0.040)
Model diagnostics				
Wald χ^2 (*p*-value)	293.27*** (0.000)	1337.65*** (0.000)	538.09*** (0.000)	560.23*** (0.000)
AR(1) (*p*-value)	-3.75*** (0.000)	-3.36*** (0.001)	-3.39*** (0.001)	-3.09*** (0.002)
AR(2) (*p*-value)	-0.69 (0.490)	-1.00 (0.317)	-0.50 (0.618)	-0.14 (0.891)
Sargan test (*p*-value)	19.12 (0.514)	8.81 (0.985)	16.21 (0.704)	29.89 (0.153)
Hansen test (*p*-value)	15.28 (0.760)	13.11 (0.873)	17.88 (0.595)	22.67 (0.480)
Difference-in-Hansen test (*p*-value)	3.47 (0.839)	4.26 (0.750)	6.00 (0.540)	4.45 (0.815)
N (No. of observations)	363	363	363	363
k (No. of bank groups)	42	42	42	42
IV (No. of instruments)	31	33	33	40

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively. **Source:** Authors' calculations.

6.4.3. Selected Governance Indicators and Bank Soundness

Subsequent to examining the effect of overall governance structure and individual dimensions of governance on bank soundness, we move our attention on an inside and out evaluation of the impact of selected governance norms on bank soundness and attempt to test our secondary testable hypotheses. More precisely, we explore the relationship between bank soundness and selected governance norms relating to board, audit, risk, and remuneration dimensions. Once again, we utilise the two-step system GMM approach to obtain the coefficient estimates corresponding to the model specification (11a)–(11d), as discussed in Section 5.2.1. The econometric results corresponding to the banking industry as a whole and across distinct ownership groups are presented in Tables 15-18.

Board characteristics and bank soundness: The model specification (11a) is estimated to build up the connection between individual board characteristics and bank soundness, and results are reported in Table 15. We note that the results do not unveil any evidence in favour of secondary hypothesis H2a, suggesting there exists no statistically significant relationship between board size (*BOARDSIZE*) and bank soundness in India. This inference intently follows the finding of Sarkar and Sarkar (2018), who revealed an immaterial effect of board size on profitability levels of Indian banks. In light of our econometric estimates, we do not find any significant impact of CEO duality (*CEOD*) and the presence of women directors (*WOMENP*) on bank soundness in India. Consequently, the secondary hypotheses H2c and H2d do not uphold in the Indian banking industry. As to the effect of board independence (*BINDEP*) on bank soundness, the impact is observed to be uneven across ownership groups. In the public sector banking segment, we find that board independence and soundness are decidedly related and share a positive relationship. This finding of ours backs the *agency theory* and claims that non-executive independent directors in PSBs reduce the agency conflicts, bring down the cost of debt financing, optimise the executive compensation and upgrade the soundness status of these banks. In light of this finding, we feel that recommendations of the recently constituted Banks Board Bureau (BBB) on top-level appointments like full-time directors, non-executive chairman in PSBs, will definitely improve the overall board quality of PSBs and make their board more independent. This will help PSBs with lessening the destabilisation effect of shocks. In contrast, we find that greater board independence has risked the soundness of private banks. We also see the significant impact of board activities on bank soundness. In particular, we observe that the board meetings (*BMEET*) exert a positive influence on soundness, while the formation of too many committees (*BCOMM*) brings down the soundness level. The empirical findings thus reveal that frequent board meetings offers an opportunity for quality and thorough discussion, and assist in effective discharging of board responsibilities, which is key for improving governance standards. However, the delegation of board responsibilities to a supra-optimal number of committees misgoverns the board functioning, and escalates the communication and establishment costs after a specific point, and subsequently increases the probability of bank shakiness.

Table 15: Board Characteristics and Bank Soundness

[Dependent variable: Bank soundness index (CI_S)]

Bank Groups→ Model Coefficients↓	All Banks	PSBs	PBs
Constant	0.295***	0.449*	-0.064
	(0.079)	(0.254)	(0.210)
$CI\_S_{j,t-1}$	0.707***	0.538*	1.156***
	(0.089)	(0.308)	(0.209)
$BOARDSIZE_{j,t}$	-0.001	-0.004	0.002
	(0.001)	(0.002)	(0.002)
$BINDEP_{j,t}$	-0.013	0.051*	-0.103***
	(0.018)	(0.030)	(0.033)
$BMEET_{j,t}$	0.002***	0.002	0.002
	(0.0006)	(0.001)	(0.002)
$CEOD_{j,t}$	0.004	0.009	0.108
	(0.006)	(0.006)	(0.087)
$BCOMM_{j,t}$	-0.001**	-0.001	-0.004***
	(0.0007)	(0.001)	(0.001)
$WOMENP_{j,t}$	0.016	0.062	-0.025
	(0.031)	(0.097)	(0.073)
$SIZE_{j,t}$	-0.0003	0.0006	-0.002
	(0.0006)	(0.001)	(0.001)
$PROFEFF_{j,t}$	-	-0.003	0.003
		(0.009)	(0.007)
$OWNSHARE_{j,t}$	-0.0001**	-0.0002***	-0.001
	(0.00005)	(0.00006)	(0.002)
Diagnostic tests			
Wald χ^2	411.87***	264.39***	433.79***
(*p*-value)	(0.000)	(0.000)	(0.000)
AR(1)	-3.47***	-1.58	-1.46
(*p*-value)	(0.001)	(0.115)	(0.144)
AR(2)	-1.11	-1.11	-0.07
(*p*-value)	(0.267)	(0.266)	(0.944)
Sargan test	9.52	13.89	3.52
(*p*-value)	(0.849)	(0.790)	(0.995)
Hansen test	9.10	14.03	5.24
(*p*-value)	(0.872)	(0.782)	(0.970)
N (No. of observations)	350	209	154
k (No. of bank groups)	42	24	18

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively. *Source:* Authors' calculations.

Audit and internal risk controls, and bank soundness: An investigation of the effect of the governance norms relating to audit and risk management structure on bank soundness is done econometrically by estimating the model specifications (11b) and (11c), respectively. Tables 16 and 17 report the estimated results. The negative coefficient of the size of audit and risk committees with bank soundness, implies the importance of having an optimum size of these committees. The connotation of this

finding is that an appointment of additional directors on audit and risk committees should be so that it will not increase the complexity, and rather ensure reasonable diversity and expertise in various areas, assuring the effective flow of information and proper risk mitigation. This eventually averts instability. The results thus hint towards the benefits of having the optimum number of directors on these committees. Among ownership groups, the relation between the size of the audit committee (*AUDITSIZE*) and soundness gives off an impression of being significant just for PSBs.

Table 16: Audit Function and Bank Soundness

[Dependent variable: Bank soundness index (*CI_S*)]

Bank Groups→ Model Coefficients↓	All Banks	PSBs	PBs
Constant	0.190** (0.088)	-0.009 (0.219)	0.459*** (0.151)
$CI\_S_{j,t-1}$	0.795*** (0.103)	0.967*** (0.125)	0.520*** (0.166)
$AUDITSIZE_{j,t}$	0.0001 (0.002)	-0.005** (0.002)	-0.002 (0.004)
$AUDITINDP_{j,t}$	0.026* (0.015)	0.017 (0.016)	-0.0008 (0.015)
$AUDITMEET_{j,t}$	-0.002 (0.001)	-0.002 (0.002)	-0.00002 (0.001)
$AUDITCOMP_{j,t}$	0.004 (0.011)	0.083 (0.166)	0.001 (0.009)
$PROFEFF_{j,t}$	0.001 (0.005)	0.003 (0.006)	0.008* (0.005)
Diagnostic tests			
Wald χ^2 (*p*-value)	165.01*** (0.000)	214.45*** (0.000)	51.40*** (0.000)
AR(1) (*p*-value)	-3.48*** (0.000)	-2.09** (0.036)	-1.98** (0.048)
AR(2) (*p*-value)	-1.23 (0.219)	-0.47 (0.635)	-1.25 (0.210)
Sargan test (*p*-value)	99.53*** (0.000)	26.39* (0.068)	21.92* (0.080)
Hansen test (*p*-value)	38.52 (0.137)	21.33 (0.212)	9.94 (0.766)
N (No. of observations)	350	209	154
k (No. of bank groups)	42	24	18

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Other than the size, the audit committee's independence (*AUDITINDP*) from management is the other important aspect. The independence of the audit committee necessitates that the committee appoints two-third of members as independent directors. What's more, a bank needs to get a certificate from the statutory auditors or

practicing company secretaries regarding compliance with this governance standard and unveil this information in its annual report. Table 16 also finds that while higher compliance in terms of procuring an auditor's compliance certificate does not significantly impact the soundness level. In any case, having a majority of independent directors on the audit committee assists in exercising better controls over bank accounts and finance, and accordingly, more tight audit functions bring down the danger of bank failure. At last, the negative and significant coefficient of *RISKNEX* in Table 17 indicates that mere compliance on the appointment of the non-executive chairman of the risk committee without concentrating on independent monitoring of the risk policy and strategy for a bank has destabilising effects. Therefore, the study suggests that there is a need to have better coordination between the risk committee of the board and management to fortify the monitoring role in moderating risks and maintaining soundness in the banking system.

Table 17: Risk Management Function and Bank Soundness

[Dependent variable: Bank soundness index(CI_S)]

Bank Groups→ Model Coefficients↓	All Banks	PSBs	PBs
Constant	0.332***	-0.085	0.276**
	(0.092)	(0.115)	(0.106)
$CI\_S_{j,t-1}$	0.677***	1.078***	0.726***
	(0.094)	(0.121)	(0.111)
$RISKSIZE_{j,t}$	-0.004***	0.001	-
	(0.001)	(0.002)	
$RISKNEX_{j,t}$	-0.013*	0.008	-0.004
	(0.007)	(0.007)	(0.009)
$RISKMEET_{j,t}$	0.001	-0.0004	-0.006**
	(0.001)	(0.003)	(0.003)
$PROFEFF_{j,t}$	-0.017*	0.003	0.020**
	(0.010)	(0.016)	(0.009)
Diagnostic tests			
Wald χ^2	122.62***	500.59***	94.94***
(*p*-value)	(0.000)	(0.000)	(0.000)
AR(1)	-3.69***	-2.98***	-2.34**
(*p*-value)	(0.000)	(0.003)	(0.019)
AR(2)	-1.64	-0.23	-1.90*
(*p*-value)	(0.101)	(0.815)	(0.057)
Sargan test	70.15***	32.38***	1.64
(*p*-value)	(0.000)	(0.004)	(0.977)
Hansen test	37.83	16.71	1.09
(*p*-value)	(0.186)	(0.272)	(0.993)
N (No. of observations)	350	209	154
k (No. of bank groups)	42	24	18

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Remuneration and bank soundness: So as to comprehend the role of remuneration practices on bank soundness in India, we estimate the model specification (11d). The model coefficients are given in Table 18. In the case of PB group, we find a negative and significant coefficient of the presence of the remuneration committee (*REMCOMM*). This finding validates the agency theory view of compensation holds in the private banking segment. This view links the executive compensation with the performance and explains how the underlined link resolves the moral hazard issues between the agent and the principal. Under the validity of this view, one can infer that in a typical private bank, the remuneration committee designs a better pay structure and contracts for executives that motivate them to make decisions aimed at averting shocks and improving the soundness level of the bank. Furthermore, while validating our secondary hypothesis (H5a), we note a negative and statistically significant relationship between executive remuneration (Ln(*EXREM*)) and bank soundness in the banking industry as a whole and its public sector banking segment. The recent jump in bank frauds and problem loans, which exposed the system to unsound practices, poses a big question mark on the justification for increased remuneration packages of executives in Indian banks, especially of those belonging to PSBs. Thus, the observed bank unsoundness in recent years also allows critics to raise their eyebrows to express their doubt on the overall quality of the existing corporate governance practices in the Indian banking industry.

Table 18: Remuneration and Bank Soundness

[Dependent variable: Bank soundness index(*CI_S*)]

Bank Groups→ Model Coefficients↓	All Banks	PSBs	PBs
Constant	0.084	0.263**	0.291***
	(0.091)	(0.130)	(0.110)
$CI\_S_{j,t-1}$	0.911***	0.760***	0.695***
	(0.095)	(0.111)	(0.116)
$REMCOMM_{j,t}$	0.001	0.001	-0.021***
	(0.004)	(0.007)	(0.007)
$REMMEET_{j,t}$	-0.001	-0.002	0.002
	(0.001)	(0.001)	(0.001)
$Ln(EXREM)_{j,t}$	-0.006**	-0.014**	-0.001
	(0.002)	(0.006)	(0.003)
$PROFEFF_{j,t}$	0.037***	0.022**	0.018
	(0.010)	(0.010)	(0.015)
Diagnostic tests			
Wald χ^2	145.41***	206.37***	65.57***
(*p*-value)	(0.000)	(0.000)	(0.000)
AR(1)	-3.99***	-3.25***	-2.32**
(*p*-value)	(0.000)	(0.001)	(0.021)
AR(2)	-0.08	-0.07	-1.49
(*p*-value)	(0.936)	(0.941)	(0.137)
Sargan test	25.00	24.37	2.70
(*p*-value)	(0.161)	(0.182)	(0.846)

Hansen test (*p*-value)	22.44 (0.263)	19.68 (0.414)	3.27 (0.774)
N (No. of observations)	346	209	150
k (No. of bank groups)	42	24	18

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Robust standard errors are reported in parentheses and are based on Windmeijer's (2005) correction method; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

6.5 Robustness Check using Alternate Econometric Methods

In order to ascertain the robustness of aforementioned results using the two-step system GMM approach, the econometric models have been re-estimated by applying pooled OLS (POLS) and fixed-effects (FE) methods. Tables 19-21 report the results. In addition, Tables 22-23 provide a comparison of the results across distinct panel estimation methods and validation of underlined hypotheses of the study. The econometric estimates derived from POLS and FE are found to be consistent with those obtained from the two-step system GMM approach and facilitate us to draw the robust inferences. Nonetheless, the estimated POLS and FE coefficients limit the explanation to the average effect between governance and bank soundness. It doesn't give a complete picture of the effect of overall governance structure and its dimensions on bank soundness at different points in the conditional distribution of the soundness. Therefore, along with capturing the mean effects using POLS and FE methods, we also used the panel quantile regression with non-additive fixed-effects, as developed by Powell (2016)[25], to explore varying effects along with the distribution (quantiles) of the bank soundness.

The coefficient estimates for model specifications (9) and (10) are obtained corresponding to five quantiles, *viz.*, 10th, 25th, 50th, 75th, and 95th quantiles, which are reported in Tables 25 and 27. The quantile estimates of the coefficient of governance are significant up to the 50th quantile. We find that bank governance has a highly significant and positive effect on soundness from the 10th to 50th quantiles. However, the relationship weakens at the upper quantiles, representing the banks with high soundness. To doubly check the robustness of our results, we re-estimated our econometric specification (13) to substantiate the underlined nexus between governance and soundness corresponding to 19 quantiles ranging from 0.05-0.95 with an increment of 0.05. Table 26 reports the relevant results. We find that consistent evidence of governance effects vanishes from the 75th quantile, implying that sound governance enhances bank soundness only up to the 70th quantile. Thus, the relationship between governance and soundness is significant and more pronounced

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[25]The quantile regression approach, as introduced by Koenkar & Bassett (1978), is more robust econometric tool to determine the heterogeneous relation between variables since it captures the usual departures from the normality and the presence of outliers and/or eases the restrictive assumption for error term to be identically distributed.

in the bottom quantiles relative to top quantiles. Thus, we can safely infer that in the Indian banking industry, governance predicts bank soundness, *albeit* the stronger impact is felt at lower quantiles, as evident from the higher value of the $\hat{\beta}_{CI\_G}$ coefficient of 0.271 at Q0.10 relative to 0.025 at Q0.70 (see Figure 16).

Table 19: Overall Governance Structure and Bank Soundness:
Robustness Check using Alternative Methods

[Dependent variable: Bank soundness index(CI_S)]

Variables→		$CI\_S_{j,t-1}$	$CI\_G_{j,t}$	$PROFEFF_{j,t}$	$SIZE_{j,t}$	$OWNSHARE_{j,t}$	$FORBRANCH_{i,t}$
Estimation Methods↓	Quantiles						
Pooled OLS	Mean	0.801***	0.061***	-0.001	-0.0007*	-0.00006***	0.00002
		(0.031)	(0.018)	(0.002)	(0.0004)	(0.00001)	(0.00002)
Fixed-effects	Within estimation	0.581***	0.107***	0.0005	-0.0008*	-0.0001***	-0.0006
		(0.038)	(0.028)	(0.003)	(0.0004)	(0.00002)	(0.0008)
Panel Quantile	Q0.10	0.710***	0.278***	0.002*	-0.010***	-0.0002***	-0.0006***
		(0.014)	(0.028)	(0.001)	(0.0009)	(0.00003)	(0.0001)
	Q0.25	0.355***	0.215***	0.007***	-0.014***	-0.0003***	-0.00004***
		(0.002)	(0.0008)	(0.0001)	(0.00001)	(0.000)	(0.000)
	Q0.50	0.643***	0.072***	0.0009	0.003**	-0.0001***	-0.0006***
		(0.044)	(0.015)	(0.001)	(0.001)	(0.00002)	(0.00002)
	Q0.75	0.578***	0.017	0.003	0.001	-0.00008***	-0.0004
		(0.039)	(0.014)	(0.002)	(0.003)	(0.00001)	(0.0002)
	Q0.95	0.564***	0.005	0.0008	-0.0007**	-0.0001***	-0.00009***
		(0.012)	(0.006)	(0.001)	(0.0002)	(0.00)	(0.00002)

Notes: i) For definition of variables refer to Table V.1 of Annexure-V, ii) Figure in parentheses are robust standard errors in case of Pooled OLS & Fixed-effects, and bootstrap errors in the case Panel Quantile regression; and iii) *, **, & *** indicates significance at 10%, 5% & 1% levels, respectively.
Source: Authors' calculations.

Table 20: The Relationship between Overall Governance
and Soundness at different Quantiles

[Dependent variable: Bank soundness index(CI_S)]

Quantiles	$\hat{\beta}_{CI\_G}$	Quantiles	$\hat{\beta}_{CI\_G}$
OLS(Mean)	0.061***	Q0.50	0.072***
Q0.05	0.271***	Q0.55	0.085***
Q0.10	0.278***	Q0.60	0.066***
Q0.15	0.199***	Q0.65	0.091***
Q0.20	0.206***	Q0.70	0.025***
Q0.25	0.215***	Q0.75	0.017
Q0.30	0.126***	Q0.80	0.022*
Q0.35	0.127***	Q0.85	0.023**
Q0.40	0.099***	Q0.90	-0.015*
Q0.45	0.079***	Q0.95	0.006

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Figure 16: The Relationship between Overall Governance and Soundness across Quantiles
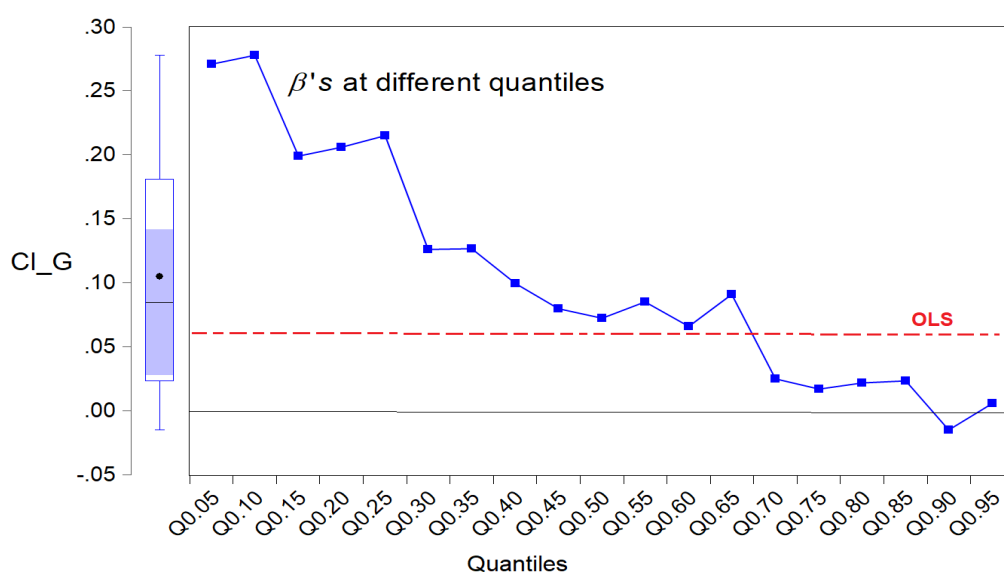
Source: Authors' elaboration.

At the disaggregated level, once again, we find that more tight audit controls tend to boost soundness across all the quantiles. Further, strict regulatory controls on risk management function increase the regulatory burden for the banks with low soundness, as reflected from the negative and significant coefficient of *RISK* for 10th and 25th quantiles. However, among moderately stable banks, greater compliance with the *RISK* dimension exerts a positive and significant impact on bank soundness since the coefficients are found to be significant for 50th and 70th quantiles. The consistently positive relation holds for all the quantiles for the remuneration and shareholders' rights and information dimensions. Except for Q0.95, profit efficiency shows a positive impact on soundness for all other quantiles. Interestingly, this effect appears to be stronger for low to moderate stable banks. Regarding compliance on disclosure practices, the quantile estimates reveal that greater transparency lowers banks' risk of instability. This relationship holds only for Q0.50 to Q0.75. For control variables, across all five quantiles, the estimates re-emphasise that i) more prominent government ownership increases the likelihood of being unsound, and ii) a stringent regulatory environment obligates the banks to concentrate more on compliance to governance standards and other regulatory norms.

Table 21: Dimensions of Governance and Bank Soundness: Robustness Check using Alternative Methods

[Dependent variable: Bank soundness index(CI_S)]

Estimation Methods	Pooled OLS		Fixed-effects		Panel Quantile				
					Q0.10	Q0.25	Q0.5	Q0.75	Q0.95
Model specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$CI\_S_{j,t-1}$	0.803***	0.718***	0.603***	0.471***	0.852***	0.829***	0.814***	0.758***	0.751***
	(0.028)	(0.037)	(0.043)	(0.051)	(0.010)	(0.005)	(0.012)	(0.025)	(0.022)
$BOARD_{j,t}$	-0.006	0.007	-0.016**	-0.002	-0.009***	-0.021***	-0.012***	-0.004	-0.001
	(0.005)	(0.005)	(0.007)	(0.007)	(0.001)	(0.002)	(0.0009)	(0.002)	(0.005)
$AUDIT_{j,t}$	0.016***	0.013**	0.019	0.012	0.028***	0.029***	0.024***	0.015***	0.019***
	(0.005)	(0.005)	(0.014)	(0.012)	(0.0009)	(0.001)	(0.001)	(0.004)	(0.004)
$RISK_{j,t}$	-0.006	-0.002	-0.005	0.003	-0.003***	-0.006***	0.004***	0.003**	-0.007
	(0.005)	(0.004)	(0.004)	(0.004)	(0.001)	(0.001)	(0.0006)	(0.001)	(0.004)
$REMUNERATION_{j,t}$	0.003	0.005	0.004	0.007*	0.018***	0.015***	0.014***	0.010***	0.010***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.0009)	(0.001)	(0.0004)	(0.002)	(0.002)
$SHAREHOLDER_{j,t}$	0.012	0.015*	0.011	0.017**	0.021***	0.023***	0.017***	0.018***	0.015***
	(0.007)	(0.009)	(0.010)	(0.008)	(0.0008)	(0.001)	(0.001)	(0.001)	(0.005)
$DISCLOSURE_{j,t}$	-0.011	-0.005	-0.020*	-0.011	0.0002	0.0001	0.005***	0.004***	-0.002
	(0.006)	(0.007)	(0.012)	(0.008)	(0.0007)	(0.001)	(0.001)	(0.001)	(0.008)
$PROFEFF_{j,t}$	-0.001	0.001	-0.0002	0.004	0.002***	0.004***	0.006***	0.004***	0.00007
	(0.002)	(0.002)	(0.004)	(0.002)	(0.0002)	(0.0004)	(0.0003)	(0.0008)	(0.003)
$SIZE_{j,t}$	-0.0005	0.0003	-0.0002	0.00007	0.001***	0.001***	0.0005***	-0.0004	-0.0004
	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.00006)	(0.0002)	(0.00006)	(0.0003)	(0.0004)
$FORBRANCH_{j,t}$	0.00001	0.00004	-0.0007	0.0009	0.00009	-0.00007	-0.00002***	0.0001**	0.0001**
	(0.00003)	(0.00003)	(0.0008)	(0.0005)	(0.00004)	(0.0003)	(0.000)	(0.00006)	(0.00008)
$OWNSHARE_{j,t}$	-0.00005***	-0.00001	-0.0001***	-0.00002	-0.00006***	-0.00004***	-0.00006***	-0.00004***	0.00001
	(0.00001)	(0.00001)	(0.00003)	(0.00004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.0002)
$DREFORM_{t}$	-	-0.009***	-	-0.009***	-0.016***	-0.010***	-0.011***	-0.010***	-0.005*
		(0.001)		(0.002)	(0.0009)	(0.0009)	(0.0003)	(0.001)	(0.003)
$DREFORM_{t} \times OWNSHARE_{j,t}$	-	-0.00009***	-	-0.0001***	0.00003***	-0.00007***	-0.00003***	-0.00008***	-0.0001***
		(0.00002)		(0.00003)	(0.000)	(0.00001)	(0.00001)	(0.00002)	(0.00003)
Constant	0.180***	0.235***	0.385***	0.468***					
	(0.029)	(0.036)	(0.042)	(0.047)					
Model diagnostics									
F-statistics (*p*-value)	200.09***	161.66***	66.01***	76.04***					
	(0.000)	(0.000)	(0.000)	(0.000)					
R^2	0.746	0.799	0.572	0.704					

Notes: i) For definition of variables, refer to Table V.1 of Annexure-V, ii) Figure in parentheses are robust standard errors in the case of Pooled OLS and Fixed-effects, and bootstrap errors in the case Panel Quantile regression; and iii) *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.

Table 22: Validation of Primary Hypotheses across Different Estimation Methods

Variables	Hypothesis validated	Expected Sign	Actual Sign	System GMM	POLS	Fixed-effects	Panel Quantile
$CI\_S_{j,t-1}$	Persistence effect	+	+	✓	✓	✓	✓ (Positive for all quantiles)
$CI\_G_{j,t}$	H1	+	+	✓ "Governance matters"	✓	✓	✓ (Positive only for Q0.10-Q0.50)
$BOARD_{j,t}$	H2	+	-	× (Negative significant effect)	×	×	✓ (Positive only for Q0.10-Q0.50)
$AUDIT_{j,t}$	H3	+	No significant effect	× (Positive effect for *AUDIT×DREFORM*)	✓	×	✓ (Positive for all quantiles)
$RISK_{j,t}$	H4	+	No significant effect	×	×	×	✓ (Positive for Q0.50-Q0.75 & Negative for Q0.10-Q0.25)
$REMUNERATION_{j,t}$	H5	+	+	✓ (Negative effect for *REMUNERATION ×PUBLIC*)	×	✓	✓ (Positive for all quantiles)
$SHAREHOLDER_{j,t}$	H6	+	+	✓ "Agency hypothesis"	✓	✓	✓ (Positive for all quantiles)
$DISCLOSURE_{j,t}$	H7	+/-	-	✓ "*Transparency-fragility* hypothesis"	×	✓	✓ (Positive only for Q0.50-Q0.75)
$PROFEFF_{j,t}$	Performance effect	+	+	✓	×	×	✓ (Positive only for Q0.10-Q0.25)

Note: The Hypothesis validated column groups H1–H7 under "Effects of overall governance and its individual dimensions."

Notes: A tick mark (✓) indicates that the primary hypothesis is supported, while a cross mark (×) indicates that the primary hypothesis is not supported.

Source: Authors' compilation based on econometric results.

Table 23: Validation of the impact of Governance Indicators and Secondary Hypotheses across Bank Groups

Governance Dimension	Indicators	Actual Sign and Hypothesis validated		
		All Banks	PSBs	PBs
BOARD	$BOARDSIZE_{j,t}$	×	×	×
	$BINDEP_{j,t}$	×	✓ (Positive "H2b")	✓ (Negative)
	$WOMENP_{j,t}$	×	×	×
	$CEOD_{j,t}$	×	×	×
	$BCOMM_{j,t}$	✓ (Negative)	×	✓ (Negative)
	$BMEET_{j,t}$	✓ (Positive, "H2e")	×	×
AUDIT	$AUDITSIZE_{j,t}$	×	✓ (Negative)	×
	$AUDITINDP_{j,t}$	✓ (Positive)	×	×
	$AUDITMEET_{j,t}$	×	×	×
	$AUDITCOMP_{j,t}$	×	×	×
RISK	$RISKSIZE_{j,t}$	✓ (Negative)	×	×
	$RISKNEX_{j,t}$	✓ (Negative)	×	×
	$RISKMEET_{j,t}$	×	×	✓ (Negative)
REMUNERATION	$REMCOMM_{j,t}$	×	×	✓ (Negative)
	$REMMEET_{j,t}$	×	×	×
	$Ln(EXREM)_{j,t}$	✓ (Negative "H5a")	✓ (Negative "H5a")	×

Notes: '✓' indicates that a significant effect of the governance variable is observed on bank soundness level, while '×' indicates that no relationship with bank soundness is perceived.
Source: Authors' compilation based on econometric results.

7. Conclusions and Policy Implications

There is no refuting that bank governance failures may endanger the soundness of the whole banking sector and have a negative impact on the economy's growth trajectory. The subject of whether governance affects bank soundness in a developing economy like India is a significant and yet little-investigated research territory. The present research study digs deep into this research territory. In particular, by employing the two-step system GMM method, this study adopts a granular research approach and empirically explores the link between governance, efficiency and bank soundness in India at various disaggregation levels. The entire empirical analysis has been completed utilising the data set for the period 2009-2018. The governance and bank soundness indexes have been computed utilising the state-of-the-art constrained Benefit-of-the-doubt (BoD) model, which has several intrinsic advantages over the traditional approaches of constructing a composite index. The estimates of the risk-adjusted profit efficiency for banks are obtained using a data envelopment analysis model.

Analysis of inter-temporal behaviour of governance compliance uncovers that, albeit Indian banks have made significant progress in complying with the governance standards over the most recent couple of years, yet the current level of compliance is not adequate to mark the existing governance structure as a "socially efficient" structure. Private banks generally demonstrated better performance in adhering to governance norms, while PSBs faltered in accomplishing greater compliance with the dimensions of board effectiveness, risk management and audit functions. Unmistakable reasons that can be referred for lower governance by PSBs could be dual regulation, board complexities, slackness on internal controls, and externally imposed constraints through central vigilance agencies on PSBs. In terms of soundness, the Indian banking industry was relatively stable from 2008-09 to 2012-13, but early symptoms of a fall in bank soundness began to surface in 2013-14. A significant drop in profitability and asset quality caused an increase in the fragility and vulnerability of the banking system in the turbulent period that marked its beginning in 2013-14.

The examination of endogenously generated weights by the BoD model reveals that, by and large, a typical PSB assigned higher priority to disclosure, which is followed by the remuneration and shareholders' rights and information. Conversely, a typical private bank attributed a more prominent spotlight on audit function, followed by risk management and board quality. On dimensions of bank soundness, PSBs entrusted higher priority to management efficiency. At the same time, private banks prioritised management efficiency, asset quality, and profitability. The finding shows asymmetries in the policy priorities of banks on governance and soundness dimensions across ownership groups.

We arrive at the following inferences while econometrically modeling the relationship between governance and bank soundness. To begin with, the degree of governance significantly explains bank soundness level, and inadequacies in regulatory compliance on selected governance principles would be exorbitant and may have a destabilising sway on the banking system. Further, there exists a time-persistence in bank soundness and the absence of an instantaneous recovery mechanism. The lack of instant recovery might be a direct result of the presence of damaging effects of many potential exogenous and endogenous shocks to the banking system. Besides, profit efficient banks are sufficiently sound to keep up capital buffers and absorb shocks, which may diminish destabilising effects. Therefore, to avoid the risk of bank failure in the long-run, business practices that assure sustainable profits with proportionate risk need to be encouraged. This study also suggests that government involvement offers the implied guarantee only up to a level, and beyond that, it does not necessarily translate into higher bank soundness. Additionally, a pervasive shift in the policy stance of regulators from deregulation to re-regulation

since 2014 has compelled the banks to concentrate more on adherence to governance standards and other regulatory norms. Concerning bank size, no stable relationship with soundness is observed.

At the disaggregated level, an assessment of the effects of individual governance dimensions/standards on bank soundness causes us to notice the following. First, the focus on stringent compliance with board attributes, and putting a less focus on other important governance dimensions might be costly and impedingly affect bank soundness. Second, in the post-2014 period, improved audit function compliance as an outcome of proactive regulatory amendments had a significantly positive impact on bank soundness. Third, compliance with regulatory norms about risk management principles is not sufficient to make a bank sound. Other policy interventions, particularly in the form of greater supervisory power to resolution authorities, along with better compliance on risk governance, improve soundness. Fourth, better remuneration practices help the board in choosing compensation packages for executives that are connected to their performance, which lowers agency conflicts and enhance bank soundness. Fifth, higher compliance on shareholders' rights enhances the soundness of banks. At the same time, only reasonable and rational disclosures can protect the interest of the minority investors along with depositors, and circumvent precipitating the risk of being unsound. At last, board meetings, independent directors on the audit committee, and the remuneration committee assists in exercising better controls, deflecting shocks, and improving the soundness level of the bank. Regarding the effect of board independence on bank soundness, the effect is observed to be uneven across ownership groups. The empirical results are found to be robust for different panel data estimation models.

On an end note, the findings of this research work are unique and feature some significant aspects of governance and bank soundness in India, which might be useful for regulators. Our findings uncover that better governance compliance has strong predicting power for explaining bank soundness. Further, bank soundness in India is not just determined by traditional equity governance principles, compliance with debt governance standards also assumes an important role in this regard, particularly as shown by the evidence for the post-2014 NPAs crisis period. In light of this, we suggest that less governed and less sound banks should re-adjust their focus on less prioritised areas. For this, the BoD-based weights can be used as a potent diagnostic tool. Although private banks have given indications of recuperation in soundness position in the most recent years, it remained a challenge for PSBs. In this context, the experts believe that the system of dual regulation debilitates the regulatory discipline prompting feeble corporate governance in PSBs. Along these lines, we feel that PSBs need greater autonomy and more controlling powers to respond quickly against frauds or irregularities and to manage the effects of any internal and external shocks. Even

the success of the recent consolidation wave in the public sector banking segment hinges upon how well newly emerged mega PSBs improve their governance structures, which is a great challenge. Altogether, we foresee that the persistent regulatory efforts by the policymakers toward cleaning banks' balance sheets (especially those of PSBs), restructuring, recapitalisation, and recent consolidation through mega merger would help to boost the overall soundness of the banking system in the years ahead.

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Annexure-I

Governance Models across Countries: An International comparison
Table I.1: Comparison of Governance Models across the World

Country	US[1]	UK[2]	Japan[3]	China[4]	India[5]
Corporate governance model	Anglo-Saxon Shareholder model	Shareholder	Hybrid model of stakeholder and shareholder	Mix of stakeholder & shareholder	Shareholder
Separation of Chairman & CEO	Recommended	Same person can hold 2 positions	No separation required	Yes	Not mandatory (for listed companies) Yes (for banks)
Board structure	One-tier (executive and non-executive board)	One-tier (executive and non-executive board)	Board of directors, office of representative directors, office of auditors, de-facto one-tier board	Two-tier board	One-tier (executive and non-executive board)
Ownership structure	Widely dispersed ownership	Widely dispersed small shareholding structure	Concentrated ownership	Concentrated ownership shareholding among state-owned banks; Dispersed for other bank groups	Concentrated ownership
Internal controls/ committees	Audit, risk, remuneration and nomination committees with all independent, outside directors for the audit committee	Audit, risk, remuneration and nomination committees with audit committee consisting entirely of non-executive directors including the chairman as independent; in nomination & remuneration committees, directors must not perform any executive function	Audit, remuneration and nomination committees with no mandatory requirement of independent directors for committees	Audit (mandatory), risk, remuneration and nomination committees (non-mandatory) with audit committee consist of all non-executive and proper portion of independent directors; No such requirement for other committees	Audit, risk, nomination committees, and stakeholder's relationship committees, remuneration committee (non-mandatory), with two-thirds of the members of the audit committee shall be independent directors; and nomination and remuneration committees require all non-executive with majority independent; stakeholder's relationship committee to be chaired by non-executive director
Board composition	Minimum 5 and maximum 25 members, optimal board size with majority groups may have	Optimal combination of executive and outside non-executive directors	Appropriate board size with diversity with outside directors does not always mean independent	Minimum 3 and maximum 19, one-third of the board be independent	Minimum 3 and maximum 15, optimal combination of executive and non-executive directors with a limit on board size; different for public and private companies

Notes: [1]Guiding Principles for Enhancing U.S. Banking Organisation Corporate Governance 2015; [2]Sir David Walker UK Governance Code - A Review of Corporate Governance in UK Banks and Other Financial Industry Entities 2010; [3]Japan's Corporate Governance Code (by the Financial Services Agency and Tokyo Stock Exchange) 2015; [4]Guidance on Corporate Governance of Joint Stock Commercial Banks, People's Bank of China 2002 & Chinese Banking Regulatory Commission Guidelines on Corporate Governance of Commercial Banks 2011; [5]SEBI Clause 49 [LODR] 2015 (amended 2017) and Companies Act (CA) 1956 (amended in 2009 and 2013); and [1,2,3,4,5]Thematic Review on Corporate Governance, Financial Stability Board 2017.
Source: Authors' compilation from corporate governance reports by national and international jurisdictions.

Annexure-II

Comparison of Governance Guidelines by Legislative Authorities in India

Table II.1: Governance Reforms in India

Parameter	Provisions by various Committees of Reserve Bank of India	SEBI Clause 49 [Listing Obligation and Disclosure Requirements] Regulations, 2000 (amended 2005, 2009, 2015)	Companies Act, 1956 (amended 2009, 2013)
Applicability	All commercial banks, public sector as well as private banks	Companies listed on the BSE and NSE, including listed banks	All public and private limited companies, including private banks and other PSBs (IDBI Ltd.)
Board of Directors#	• An optimum mix of executive and non-executive directors with a strong representation of non-executive directors and minimum board size of 10 for banking companies with net-worth of INR 15 crore or more; • A non-executive Chairman (nominated by Bank Investment Company) and a CEO (nominated by the board) should be separate positions • Should not exceed two (one by GoI and one by RBI), and RBI/GoI nominees should not be considered as independent directors	• The board should have an optimum combination of executive and non-executive directors, with at least 50 per cent of the board comprise of non-executive directors • Chairman of the board should be non-executive (non-mandatory), and Chairman and Managing Director/CEO should be separate positions (non-mandatory) • Nominee directors should not be treated as independent directors • Board must have at least one woman director	• A minimum no. of three directors, in the case of a public company, two directors, in the case of a private company, and one director in the case of a One Person Company, and a maxi. of 15 directors • A strong representation of non-executive directors • The chairperson of the company may be executive or non-executive. But as per the Ministry of Finance, Department of Financial 11 Services, Circular F. No. 4/4/2015-BO.I (pt.) dated 18 Aug. 2015, Chairman of the Board shall be Non-Executive (mandatory). • Nominee directors should not be treated as independent • Board must have at least one woman director
Board Independence	• In strict compliance with Clause 49 of SEBI's Listing Guidelines, at least one-third (33%) of the board, in case of the non-executive chairperson; and at least half (50%), in case of executive chairperson	• An independent director in relation to a company means a director other than a managing director, a whole-time director, or a nominee director. • At least one-third (33%)of the board, in case of non-executive chairperson and at least half	• At least one-third of the total no. of directors as independent directors • No person shall hold office as a director in more than 20 companies at the same time, and the maximum number of public companies in which a person can

Parameter	Provisions by various Committees of Reserve Bank of India	SEBI Clause 49 [Listing Obligation and Disclosure Requirements] Regulations, 2000 (amended 2005, 2009, 2015)	Companies Act, 1956 (amended 2009, 2013)
	• Directorship on not more than three listed companies in case of executive director, and not more than six (seven) listed companies for PSBs (private banks), respectively, for a non-executive independent director • As per Patil Committee recommendations, the listed company shall provide suitable training to independent directors and disclosed in the annual report	(50%) of the board, in case of executive chairperson • Chairmanship/Directorship on not more than three listed companies for executive directors and not more than seven listed companies for independent directors • Suitable training to independent directors and details disclosed in the annual report or website of the company	be appointed as a director shall not exceed ten
Board meetings, tenure and diversity	• A minimum no. of 4 meetings in a year • A chairman should have a minimum of 5-year tenure, executive directors to have a minimum of 3 years tenure, and the maximum term for other directors restricted to 7 years	• The board should meet at least 4 times a year • The chairperson should have a minimum of 5-year tenure, executive directors to have a minimum of 3 years tenure, and independent director to have a minimum of 5 years tenure, reappointed for 5 years with a cooling period of 3 years	• A minimum no. of four meetings of its Board of Directors every year • Independent director shall hold office for a term up to 5 consecutive years, for more than two consecutive terms
Board conduct	• Committee recommended the strict compliance to SEBI Clause 49 under the listing agreement • Separate corporate governance report by banks as a part of the annual report • Information on related party holdings • Senior management of the bank shall submit their affirmation on compliance with the Code of Conduct • A company should follow the whistle blower mechanism and allow employees' direct access to the Chairperson of the Audit Committee in exceptional cases	• The listed company shall establish a Whistle Blower Policy (i.e., vigil mechanism) for directors and employees. The company shall disclose the details of the establishment of such a vigil mechanism on the company's website or annual report • The Board shall lay down a code of conduct for all Board members and senior management of the company • Disclosures on related party transactions shall be made to the audit committee	• The company shall establish a vigil mechanism for directors and employees • Independent director shall report the concerns about the code of conduct or ethic's policy • Disclosures on related party transactions shall be made
Internal controls (Appointments, Audit,	• The board should have a risk, audit and remuneration and nomination committee and in addition to, stakeholder's grievance committee	• The board should have at least three committees, which includes risk, audit and remuneration and nomination committee	• The board should have at least 3 committees, which includes audit and remuneration and nomination committees

Parameter	Provisions by various Committees of Reserve Bank of India	SEBI Clause 49 [Listing Obligation and Disclosure Requirements] Regulations, 2000 (amended 2005, 2009, 2015)	Companies Act, 1956 (amended 2009, 2013)
Remuneration and Risk)	• Minimum of 3 members in each committee with all as non-executive and independent directors • Committees should meet at least 3 or 4 times a year • Committees should have majority independent directors, with the audit committee having all independent directors, and justifiable reason for the inclusion of non-independent director shall be reported • Chairperson of audit, nomination and remuneration committee shall be an independent non-executive director • A bank should have an executive director as chief risk officer	• Minimum three members with all non-executive and at least two-thirds of the members as independent directors. • Committees should have an independent director as it chairman • There must be an appointed external auditor • Chief risk officer for top 100 listed companies	• A minimum of 3 directors with independent directors forming a majority • There must be an appointed external auditor for statutory audits • A company should have a risk management policy taken care off by the audit committee • The chairperson of the company (whether executive or non-executive) shall not chair the remuneration committee
Disclosure and Transparency	• Banks are required to maintain transparency and disclosures in accordance with the SEBI (Listing Obligation and Disclosure Requirement) Regulations-2015 ('Listing Regulations') • Banks are required to make disclosures on accounting standards AS 18-Related Party Disclosures; accounting standards AS 17-all applicable Accounting Standards; details on need-based training programmes organised for directors; certificate for proof of the independence of the audit firm be attached with the report as per M/o. Corporate Affairs; penalties if any imposed, should be disclosed in the report.	• The company shall disclose the policy on dealing with Related Party Transactions in the annual report • Financial accounting standards followed by bank shall be disclosed in the annual report • All pecuniary relationship or transactions of the non-executive directors vis-à-vis the bank shall be disclosed in the Annual Report • A Management Discussion and Analysis report should form part of the annual report to the shareholders. • The details of training imparted to Independent Directors shall be disclosed in the Annual Report • CEO/CFO shall certify that the board has complied with accounting standards & code of conduct set by the bank • The company shall obtain a certificate from either the auditors or practicing company	• Disclosures on related party transactions; accounting policies to shareholders; details on remuneration or sitting fees paid to directors, criteria of making payments, *etc*.; separate section on Management Discussion and Analysis in the report; disclosures on the training imparted to directors of the company; a secretarial audit and compliance report, by a company secretary in practice; *etc*. • If a company makes any default in complying with the legal provisions, the company and director of the company who is in default shall be liable to a penalty.

Parameter	Provisions by various Committees of Reserve Bank of India	SEBI Clause 49 [Listing Obligation and Disclosure Requirements] Regulations, 2000 (amended 2005, 2009, 2015)	Companies Act, 1956 (amended 2009, 2013)
		secretaries regarding the compliance of conditions of corporate governance and disclose it in the annual report. • Details of non-compliance by the company, penalties, and strictures imposed on the company by Stock Exchange or SEBI or any statutory authority, on any matter related to capital markets, during the last 3 years shall be disclosed in the annual report	
Ownership pattern and Shareholder's rights and information	• In the case of listed banks, there is 'market oversight' by the listing agency, which subjects them to post-listing disclosures. • The bank should have a stakeholder's grievance committee • Presence of company secretary as a compliance officer • The committee shall look into the matters relating to investor complaints	• A company should have a stakeholder's relationship committee to consider and resolve the grievances of the stakeholder's holders of the company with a non-executive director as the chairman of the committee • A company should have a company secretary as the compliance officer • The company shall disclose the details on annual general meetings, mode of means of communication of information to the shareholders, changes in the board (appointments & resignations) of directors, listing details on the stock exchange, Details on the no. of investor's complaints; dividend policy and details of interim and final dividend paid, if any; information on market price data of shares; procedure of share transfer and shareholding pattern, the proportion of dematerialised shares held, *etc*. in the annual report	• Company shall constitute stakeholder's relationship committee with the non-executive director as chairperson • Company Secretary shall be the compliance officer • Removal or resignation or cessation of directors, and profiles of directors newly appointed or re-appointed directors shall be disclosed in the report • The company shall disclose the details of annual general meetings held during the year • The company shall provide the details in respect of shares held, shareholding pattern, *etc*., in the annual report

Source: Authors' elaboration from various legal and regulatory acts on corporate governance standards in India.

Annexure-III

List of Banks

Public Sector Banks

1	Allahabad Bank
2	Andhra Bank
3	Bank of Baroda
4	Bank of India
5	Bank of Maharashtra
6	Canara Bank
7	Central Bank of India
8	Corporation Bank
9	Dena Bank
10	IDBI Bank
11	Indian Bank
12	Indian Overseas Bank
13	Oriental Bank of Commerce
14	Punjab National Bank
15	Punjab & Sind Bank
16	State Bank of Jaipur & Bikaner
17	State Bank of India
18	State Bank of Mysore
19	State Bank of Travancore
20	Syndicate Bank
21	UCO Bank
22	Union Bank of India
23	United Bank of India
24	Vijaya Bank

Private Banks

25	Axis Bank
26	Catholic Syrian Bank
27	City Union Bank
28	DCB Bank
29	Dhan Laxmi Bank
30	Federal Bank
31	HDFC Bank
32	ICICI Bank
33	Indusind Bank
34	Vysya Bank
35	Jammu & Kashmir Bank
36	Karnataka Bank
37	Karur Vysya Bank
38	Kotak Mahindra Bank
39	Lakshmi Vilas Bank
40	RBL Bank
41	South Indian Bank
42	Yes Bank

Indicators, Norms and Dimensions of Bank Soundness and Governance

Indicators and Dimensions of Bank Soundness

Tables IV.1 provides the list of indicators and dimensions used in the construction of the bank soundness index. Broadly, the study follows the framework of RBI (2010) in constructing the composite index of bank soundness. We use 14 ratio indicators that are combined to compute 5 dimensional indices, namely "capital adequacy", "asset quality", "profitability", "liquidity", and "management efficiency", which are mutually distinct from each other. The *asset quality* dimension is based on two ratios- net non-performing loans to total advances and gross non-performing loans to total advances. Deterioration in asset quality increases credit risk and instability. The *management efficiency* indicates a situation where a bank with a low operating cost is expected to boost soundness, whereas *capital adequacy* and *profitability* capture bank buffers. The higher capital buffer ensures the bank's ability to withstand the shocks, implying lower leverage and an improvement in soundness. Higher profitability is expected to improve bank soundness. The last dimension of *liquidity* reflects the bank's capability to absorb liquidity risk.

Table IV.1: Summary Statistics of the Non-normalised Ratio Indicators of Bank Soundness - 2009-2018

Aspect	Ratio Indicators (relation with soundness)	Normalisation Method	All Banks	PBs	PSBs
Asset Quality*	Net non-performing assets to total advances (-)	Min-Max#	1.979 (3.479)	1.190 (1.195)	3.513 (3.530)
	Gross non-performing assts to total advances (-)	Min-Max#	4.204 (6.063)	2.655 (1.995)	6.248 (6.252)
Management Efficiency*	Intermediation cost to total assets (-)	Min-Max#	2.562 (2.117)	2.223 (0.518)	1.590 (0.252)
	Ratio of wage bill to total expense(-)	Min-Max#	17.936 (9.867)	13.869 (3.728)	13.429 (2.924)
Capital Adequacy*	Capital to risky asset ratio (CRAR) (+)	Max-Min	27.301 (32.195)	14.827 (2.798)	12.182 (1.249)
	Tier I capital to Tier II capital (+)	Max-Min	38.341 (82.418)	11.549 (10.496)	2.729 (1.032)
	Leverage ratio (Total assets to equity capital) (-)	Min-Max#	0.187 (0.196)	0.088 (0.027)	0.055 (0.008)
Profitability*	Non-interest income to total assets (+)	Max-Min	1.809 (2.458)	1.320 (0.481)	0.937 (0.223)
	Return on Assets(+)	Max-Min	0.983 (1.505)	1.105 (0.625)	0.383 (0.813)
	Return on Equity (+)	Max-Min	7.469 (10.430)	12.112 (7.378)	6.783 (14.854)
	Net Interest Margin(+)	Max-Min	2.974 (1.209)	2.780 (0.586)	2.230 (0.386)

Liquidity*	Total demand deposits to total assets(+)	Max-Min	8.038 (8.763)	7.119 (3.948)	5.525 (2.442)
	Liquid assets to total assets(+)	Max-Min	11.523 (13.688)	7.332 (3.639)	6.837 (2.636)
	Demand and saving bank deposits to total deposits(+)	Max-Min	32.384 (20.326)	29.287 (9.920)	31.226 (6.241)

Notes: i) All ratio indicators are winsorised at 10% to mitigate the effect of the outliers in the data series;
ii) '#' indicates that min-max normalisation criterion is adopted for ratios that seem to have a negative polarity with bank soundness;
iii) '*' indicates that each dimensional index is normalised at mean 100 and standard deviation 10 to account for zero and one values (see Vidoli and Fusco, 2018 for more details); and
iv) The reported values in last three columns are mean (standard deviation) of the ratio indicators for the period 2009-2018.
Source: Authors' elaboration.

Norms and Dimensions of Bank Governance

Table IV.2 provides a list of norms and dimensions used in the construction of the governance index. In particular, we adopted the self-structured framework of Gulati *et al.* (2020) to create the bank governance index. In order to represent the homogeneity in defining the 48 governance norms, we coded each governance norm as a dummy variable, with a value of '1', signifying that a bank adheres to the governance regulation and '0' otherwise. The percentage compliance by banks on individual norms in each dimension of governance for the years 2009 and 2018 is provided in the last two columns of the table. We find that of a total of 48 provisions under consideration, the sampled banks reportedly complied with twenty provisions in 2018, which shows improvement over that of compliance on only seven provisions in 2009. All banks include a separate corporate governance report as part of their annual report in 2018, which is an essential requirement, especially for listed banks. About 13.2 per cent of sampled banks in 2018 showed non-compliance with the norm of having at least one woman director on the board. Further, there was reportedly 100 per cent compliance in adherence to the norm on adopting a "whistle-blower policy" in 2018 when this norm was made mandatory from formerly being voluntary to comply. Overall, persistent and effective oversight by listing agencies and banking regulators, preventing penalties or strictures or restrictions for non-compliant business practices, have compelled banks in India to adhere to the governance regulations during the sampled years. One example which deserves mention in the present context of stringency in adherence to governance norms is the imposition of a penalty of INR 1,42,000 for the non-appointment of a woman director on the board by the Bank of Maharashtra during the financial year 2016-17. Although the level of governance compliance has reportedly improved over the years, shreds of evidence suggest that under compliance to bank governance norms is still prevalent in India. In 2018, about 40 per cent of the banks did not have non-busy outside directors on the board, only 44.74 per cent of banks held separate meetings of independent directors in the

financial year, and appointed independent non-executive chairman for the audit committee.

Table IV.2: Norms, Dimensions, and Sub-dimensions of Corporate Governance Index

Dimensions/ Indicators	Banks adhere to each norms of governance (%)	
	2009	**2018**
1. Board effectiveness (Impact on CI_G: + ; Adjustment: Normalisation#)		
Size of board	97.50	100.00
Proportion of non-executive directors	97.50	97.37
Number of nominee directors	100.00	100.00
Female director	57.50	86.80
No busy executive directors	77.50	81.58
No busy non-executive/ independent directors	45.00	60.53
Number of board meetings	100.00	100.00
Chairman of the board	35.00	65.79
No CEO duality	45.00	86.84
Number of board committee	95.00	100.00
Proportion of independent directors	80.00	52.63
Training to independent directors[*]	30.00	81.58
Declaration by independent director[**]	-	47.37
A separate meeting of independent directors[**]	-	44.74
2. Audit function (Impact on CI_G: + ; Adjustment: Normalisation#)		
Presence of Audit Committee	100.00	100.00
Size of the audit committee	100.00	100.00
Independence of audit committee	42.50	36.84
Chairman of the audit committee	47.50	44.74
Number of meetings held by the audit committee	100.00	100.00
Auditor's compliance certificate	92.50	97.37
3. Risk management (Impact on CI_G: + ; Adjustment: Normalisation#)		
Presence of the RMC	92.5	97.37
Presence of a non-executive chair	22.5	57.89
Size of the RMC	92.5	100
Meetings of the RMC	92.5	97.37
4. Remuneration (Impact on CI_G: + ; Adjustment: Normalisation#)		
Presence of Remuneration Committee	80.00	94.74
Remuneration to directors	75.00	100.00
All non-executive directors	80.00	55.26
5. Shareholders' rights and information (Impact on CI_G: + ; Adjustment: Normalisation#)		
Presence of stakeholder's grievance committee	97.50	100.00
Chairman of the stakeholder's grievance committee	92.50	94.74
Presence of a compliance officer	67.50	92.11
No. of investors' complaints	92.50	89.47
Annual General Meeting	90.00	100.00
Listing on the stock exchange	95.00	97.37
Dividend policy	97.50	39.47
Market Price Data	95.00	97.37
Share transfer agent and system	20.00	89.47
Shareholding pattern	95.00	100.00

Dematerialised shares	95.00	100.00
6. Disclosure and transparency (Impact on CI_G: + ; Adjustment: Normalisation#)		
Related party transactions	97.50	100.00
Certificate of Code of conduct by senior management	72.50	100.00
Accounting treatment	100.00	100.00
Whistleblower policy[*]	57.50	100.00
Management discussion and analysis report	95.00	94.74
New appointments on the board	75.00	78.95
Resignation or cessation of directors	100.00	100.00
CEO/CFO certification	27.50	97.37
Details about penalties/ punishments imposed by regulators in the last three years	97.50	100.00
Means of communication of information to shareholders	95.00	100.00

Notes: i) Interested readers are directed to refer Gulati *et al.* (2020) for a definition of the selected governance indicator, ii) * indicates voluntary provision under revised clause 49, 2009; ** indicates provision introduced as per new clause 49, 2015; *** indicates voluntary provision under new clause 49, 2015; and iii) # indicates that normalisation is done at mean 100 and standard deviation 10 to account for zero and one values of the dimensional index (see Vidoli and Fusco, 2018 for more details).

Source: Authors' compilation from Gulati *et al.* (2020) and norms/standards set by RBI (2001, 2002, 2014), Ministry of Corporate Affairs (2013), and SEBI (2015, 2017).

Annexure-V

Table V.1: Description of Variables

Notation	Variable and Group	Description
$CI\_S_{j,t-1}$	Bank soundness index	BoD-based bank soundness index
$CI\_G_{j,t-s}$	Governance index	BoD-based bank governance index
$BOARD_{j,t-s}$	k^{th} dimensional index of governance where k=1,2,…,6 under the six-dimensional framework of governance for a bank	Board effectiveness
$AUDIT_{j,t-s}$		Audit Function
$RISK_{j,t-s}$		Risk Management Function
$REMUNERATION_{j,t-s}$		Remuneration
$SHAREHOLDER_{j,t-s}$		Shareholders' Rights and Information
$DISCLOSURE_{j,t-s}$		Disclosure and Transparency
$PROFEFF_{j,t-s}$	Risk-adjusted alternative profit efficiency	Risk-adjusted profit efficiency score
$FORBRANCH_{j,t-s}$	Bank-specific control variables	Bank's international branches
$SIZE_{j,t-s}$		Natural logarithm of total assets of the bank
$OWNSHARE_{j,t-s}$		Ownership shareholdings of a bank with the government in percent
$CRISIS_t$	Dummy variables and its interaction	Dummy for local banking crisis taking value 1 for the period from 2013-2017, and 0 otherwise
$DREFORM_{j,t-s}$		Dummy for new governance regulatory reforms taking value 1 for the period 2014-2018, and 0 otherwise
$CRISIS×PUBLIC_{j,t-s}$		Joint effect of the local banking crisis and being a PSB
$DREFORM× OWNSHARE_{j,t-s}$		Joint effect of the DREFORM and ownership shareholding
$CRISIS× OWNSHARE_{j,t-s}$		Joint effect of local banking crisis and ownership shareholding
$PUBLIC_{j,t-s}$		Dummy taking value 1 for PSBs
$DREFORM× PUBLIC_{j,t-s}$		Joint effect of regulatory reforms and being PSB
$BOARDSIZE_{j,t-s}$	Selected governance norm corresponding to the dimensional index of BOARD	Total no. of directors in the boardroom
$BINDP_{j,t-s}$		Proportion of independent non-executive (outside) directors to the total board size
$BMEET_{j,t-s}$		Total no. of board meetings conducted
$CEOD_{j,t-s}$		A dummy variable that takes the value 1 if the same person holds two positions of chairperson and CEO, and 0 otherwise
$BCOMM_{j,t-s}$		Total no. of board-level committees
$WOMENP_{j,t-s}$		The proportion of female directors to the total no. of directors in the boardroom
$AUDITSIZE_{j,t-s}$	Selected governance norm corresponding to the dimensional index of AUDIT	Total no. of directors on the audit committee
$AUDITINDP_{j,t-s}$		Proportion of independent non-executive (outside) directors on the audit committee
$AUDITMEET_{j,t-s}$		Total no. of meetings conducted by the audit committee
$AUDITCOMP_{j,t-s}$		Dummy taking value 1 if an auditor compliance certificate is disclosed as a part of corporate governance report
$RISKSIZE_{j,t-s}$		Total no. of directors on the risk committee

RISKNEX$_{j,t-s}$	Selected governance norm corresponding to the dimensional index of RISK	Dummy taking the value of 1 if the chairman of risk committee is a non-executive director
RISKMEET$_{j,t-s}$		Total no. of meetings conducted by the risk committee
REMCOMM$_{j,t-s}$	Selected governance norm corresponding to the dimensional index of REMUNERATION	Dummy taking the value of 1 if board constitute remuneration committee
REMMEET$_{j,t-s}$		Total no. of meetings conducted by the remuneration committee
Ln(EXREM)$_{j,t-s}$		Natural logarithm of the sum of cash remuneration to executives

Source: Authors' elaboration.

Table V.2: Panel Stationary Test for Key Bank Governance, Soundness and Efficiency Variables

Variables↓	**Fisher-type-Phillips and Perron test**	
	H$_0$: There is a unit root	
	Intercept	**Intercept & Trend**
CI_S$_{j,t}$	80.514	123.904***
CI_G$_{j,t}$	108.216**	147.046***
BOARD$_{j,t}$	102.58*	83.51*
AUDIT$_{j,t}$	59.42*	106.39***
RISK$_{j,t}$	63.93**	65.10**
REMUNERATION$_{j,t}$	129.82***	84.35***
SHAREHOLDER$_{j,t}$	108.00***	125.47***
DISCLOSURE$_{j,t}$	102.665***	115.68***
PROFEFF$_{j,t}$	188.92***	191.01***

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' elaboration.

Testing for the Significance of the differences in Governance, Efficiency, and Soundness across distinct Bank Groups

Sub-sections 6.1.1, 6.2.1 and 6.3.1 previously offered a lucid discussion on the levels of governance compliance, soundness, and profit efficiency in public and private banking groups in the Indian banking industry. In what follows here, we extend the analysis to investigate the sub-periods differences in distributions of governance, efficiency and soundness levels across i) generational private banks categorised based on new and old generation, and ii) the banks of distinct size classes defined on the basis of total assets. We again applied the *SZL* test and reported the relevant test statistics in Table VI.1. The test statistics confirm significant differences in regulatory adherence to governance norms and soundness levels across new private and old private banks. We note that new private banks fared better regarding bank governance and soundness in India. However, the observed profit efficiency differences are not statistically significant between new and old private banks. In addition, we cannot safely conclude that large banks are better governed (or more stable) than small banks since we find no statistically significant differences in distributions of governance and soundness indices across large and small banks. However, efficiency differences in banks across distinct size classes hold in the distinct sub-periods. In particular, we find that small banks are more profit efficient than large banks.

Table VI.1: *SZL* Test across distinct Bank Groups

Bank Groups↓	Variables↓	$H_0 : pdf\ (G1_{2008/09-2017/18}) =$ $pdf\,(G2_{2008/09-2017/18})$	$H_0 : pdf\ (G1_{2008/09-2012/13}) =$ $pdf\,(G2_{2008/09-2012/13})$	$H_0 : pdf\ (G1_{2013/14-2017/18}) =$ $pdf\,(G2_{2013/14-2017/18})$
Public vs Private	*CI_G*	17.303(0.000)***	4.794(0.002)***	19.298(0.000)***
	CI_S	10.535 (0.000)***	8.949 (0.000)***	25.079 (0.000)***
	PROEFF	10.171(0.003)***	3.107(0.052)*	4.692(0.000)***
New private vs Old private	*CI_G*	4.897(0.047)**	3.561(0.003)***	2.055(0.002)***
	CI_S	7.025(0.000)***	0.566(0.342)	8.200(0.000)***
	PROFEFF	2.968(0.733)	-0.131(0.582)	-0.289(0.41)
Large vs Small banks	*CI_G*	-0.393(0.224)	-0.443(0.261)	-0.355(0.642)
	CI_S	0.618(0.31)	1.180(0.141)	0.203(0.244)
	PROFEFF	40.350(0.077)*	15.396(0.071)*	9.881(0.077)*

Note: i) G1 and G2 indicate first versus second bank groups; ii) banks that came into existence after 1993 are new generation banks, and banks with mean total assets in the *t*-th year falls in the category of large banks; and iii) *, **, & *** indicates significance at 10%, 5% & 1% levels, respectively.
Source: Authors' calculations.

Annexure-VII

Results of mean unconditional regressions

Table VII.1: Coefficients of the Reform Effect

CI_S	D_1	D_2	D_3	D_4	D_5
All Banks	-0.0115***	-0.0168***	-0.0193***	-0.0194***	-0.0204***
	(0.0022)	(0.0025)	(0.0027)	(0.0027)	(0.0030)
PSBs	-0.0187***	-0.0240***	-0.0282***	-0.0293***	-0.0317***
	(0.0019)	(0.0018)	(0.0017)	(0.0015)	(0.0018)
PBs	-0.0019	-0.0072	-0.0074	-0.0061	-0.0054
	(0.0036)	(0.0045)	(0.0045)	(0.0044)	(0.0046)

Note: *, **, and *** indicates significance at 10%, 5% and 1% levels, respectively.
Source: Authors' calculations.