

*Determinants of Loan Loss Provisions: The Case of Indian Banks**

The study attempts to examine the pro-cyclicality in loan loss provisioning in India. The study finds empirical evidence of pro-cyclicality in loan loss provisioning by Indian banks as well as existence of income smoothing via loan loss provisioning. Further, the study finds that provisioning by public sector banks (PSBs) is more pro-cyclical as compared to private sector banks (PVBs).

Introduction

The global financial crisis (GFC) has drawn attention to the pro-cyclicality in banks' operations. In the aftermath of the GFC, there has been a renewed interest in the accounting practices followed by banks. One such area is the loan loss provisions, the amount which banks set aside to offset future loan losses on outstanding loans.

During an upswing the financial conditions of firms improve with reduced likelihood of loan defaults, whereas downswings have the opposite effect. However, apparently favourable conditions during the boom period can lead to an excessive increase in credit growth and a less critical assessment of creditworthiness of borrowers as loan defaults are low. Hence, loan loss provisions also decline as they are generally backward-looking in nature. This leads to build-up of risk and financial imbalances during the upswing that increases the likelihood of economic contraction in future. On the other hand, during downswing phase, when credit growth is low and loan defaults increase, loan loss provisioning also rises. As provisions have to be carved out of the bank profits, it negatively affects bank capital during these

bad times which in turn leads to lower credit growth, thus reinforcing the downturn. Thus a pro-cyclicality is witnessed in loan loss provisioning, however, it is negatively related to growth cycles and credit cycles. Recognising this cyclical pattern, an efficient loan loss provision management entails that banks should build up loan loss reserves during good times, to provide a cushion when the economy is experiencing a cyclical downturn.

In the aftermath of the GFC, the merits of having forward looking provisioning practices have been recognised. Availability of adequate loan loss provisioning helps in buttressing the dent which the mounting losses may make on banks' earnings and capital. During the GFC, the banking system in India remained largely unscathed unlike many banking systems in other advanced and emerging market economies. However, starting with 2011-12, the weakening domestic macroeconomic conditions combined with subdued global growth and associated spill-over risks posed challenges to the banking sector. Further, excessive credit growth during 2006-2011 when bank lending to industrial sector grew at an average rate of over 20 per cent, which was far in excess of the nominal growth of the industrial sector, contributed to considerable increase in asset impairments and dip in the profitability of banks.

There are only a few studies on loan loss provisioning in India. Ghosh (2007) examined the existence of discretionary provisioning practices in India through income smoothing, capital management and signalling during 1997-2005. In a cross-country study focusing on provisioning practices in South Asia, Packer and Zhu (2012) analysed loan loss provisioning for the period 2000-2009. In the recent period, the weakening growth impulses and rising proportion of impaired assets in India and the consequent adverse impact it had on the health of the banking system has made it pertinent to study whether provisioning practices by Indian banks have been pro-cyclical thus exacerbating the business cycles.

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In this backdrop, the study attempts to fill the gap in the existing literature by keeping in mind the following objectives:

- 1) To study the existence of cyclicity in the loan loss provisions by Indian banks;
- 2) Examine the discretionary and non-discretionary determinants of loan loss provisioning post-2005; and
- 3) To study the differences in loan loss provisioning practices between public and private sector banks in India.

The rest of the paper is organised as follows: Section II presents the conceptual understanding and significance of loan loss provisions. Section III gives a comprehensive account of existing provisioning practices in India. Section IV provides evidence from the literature on the determinants of loan loss provisions. Data and methodology have been discussed in section V. Empirical results are presented in Section VI. Section VII concludes the paper.

II. Conceptual Understanding and Treatment of Loan Loss Provisions

II.1 Loan Loss Provisions: Definitional Aspects

A loan loss provision is an expense that is set aside for defaulted loans. Banks set aside a portion of the expected loan repayments from all loans in their portfolio to cover the losses either completely or partially. In the event of a loss, instead of taking a loss in its cash flows, the bank can use loan loss reserves to cover the loss. Since the bank does not expect all loans to become impaired, there is usually enough in the loan loss reserves to cover the full loss for any one or small number of loans when needed. An increase in the balance of reserves is called loan loss provision. The level of loan loss provisions is determined based on the level expected to protect the safety and soundness of the bank.

II.2. Significance of Loan Loss Provisions

It is generally assumed that unexpected losses by banks would be covered by bank capital, whereas expected losses would be covered by loan loss provisions. In reality, however, the distinction may be blurred. Whereas specific provisions are linked to impaired loans, general provisions are often based on a broad assessment of possible future losses on the entire portfolio. Besides, when loan loss reserves and future margin income are inadequate to cover expected losses due to downturn or some other issues, these losses eat into the capital reserves (Bikker and Metzmakers, 2005).

Prudential reserve management practices result in higher provisioning ahead of a crisis so that banks build up reserves prior to actual losses (Packer and Zhu, 2012). This results in income smoothing as it reduces the negative impact of asset volatility on bank capital. It may also lead to a reduction in pro-cyclicality in banks' lending operations since loan loss provisioning potentially creates a feedback mechanism between the financial and real sectors of the economy.

II.3. Accounting Treatment of Loan Loss Provisions

The loan loss reserves account can be termed a 'contra-asset' account, which reduces the loans by the amount the bank expects to lose when some portions of the loans are not repaid. Bank's managers have to decide how much to add to the loan loss reserves account, and charge this amount against the bank's current earnings. This is recorded as an expense item on the bank's income statement. It has a significant bearing on bank's earnings and regulatory capital. The level of loan loss provisions is determined by the bank managers and thus there is potential for banks to provision more or less than necessary as a way to smoothen their income. Higher provisioning is generally the result of a more cautious approach to building up reserves prior to future losses (Balla *et al*, 2012).

III. Trends in Provisioning in India

Loan loss provisions are largely divided into two parts - specific and general provisioning. The former refers to ex-post provisions made on account of NPAs based on evidence of asset impairment whereas the latter makes up ex-ante provisions on a portfolio of standard assets based on quantitative or qualitative assessment of expected loss. Additionally, Indian banks also make floating provisions and provisions against the diminution in the fair value of restructured assets. The former is usually not made against any identified losses or assigned against any particular loan accounts, therefore, they are also counted as general provisions. General provisions/loan loss reserves can be included in Tier 2 capital up to a limit of 1.25 per cent of risk weighted assets.

III.1. Trends in General Provisioning in India

Over the past decade, India has inched closer to international norms in terms of loan classification

standards. In order to strengthen its loan classification standards and counter pro-cyclical trends, the Reserve Bank had introduced the concept of counter-cyclical provisioning in 2004. It was adopted for all sectors with an additional focus on sectors such as residential housing, commercial real estate (CRE), personal loans, capital market and systemically important non-deposit taking non-bank financial companies (NBFCs-ND-SI). From November 2005, the Reserve Bank raised the general provisioning requirement for standard advances from 0.25 to 0.40 per cent which remains the same till date (Table 1). Over the years provisioning requirements and risk weight on loans to select sectors have been rationalised across sectors in order to dampen exuberance in credit supply as a macro-prudential tool (Verma, 2018).

III.2. Trends in Specific Provisioning in India

Between 2005 and 2016, provisioning rates for NPAs have also been rationalised in accordance with the evolving situation (Table 2).

Table 1: Trends in General Provisioning

Year	Agriculture and SME	CRE	Housing Loans	Other Retail	Capital Market	NBFCs-ND-SI	General Provisioning Requirement
2005-2006	0.25	0.25-0.4	0.25-0.40	0.25-0.40	0.25-0.40	0.25-0.4	0.25-0.4
2006-2007	0.25	0.4-2	0.4-1	0.4-2	0.4-2	0.4-2	0.4
2007-2008	0.25	2.0	1.0	2	2.0	2.0	0.4
2008-2009	0.25	0.4-2.0	0.4-1.0	0.4-2	0.4-2.0	0.4-2.0	0.4
2009-2010	0.25	0.4-1	0.4	0.4	0.4	0.4	0.4
2010-2011	0.25	1.0	0.4-2	0.4	0.4	0.4	0.4
2011-2012	0.25	1.0	0.4-2	0.4	0.4	0.4	0.4
2012-2013	0.25	1.0	0.4-2	0.4	0.4	0.4	0.4
2013-2014	0.25	0.75*	0.4-2	0.4	0.4	0.4	0.4
2014-2015	0.25	0.75*	0.4-2	0.4	0.4	0.4	0.4
2015-2016	0.25	0.75*	0.4-2	0.4	0.4	0.4	0.4
2016-2017	0.25	0.75*	0.25	0.4	0.4	0.4	0.4

Note: 1. CRE: Commercial Real Estate.

2. *: Pertains to Commercial Real Estate – Residential Housing (CRE-RH). For other CRE, general provisioning requirement remained unchanged.

Source: RBI.

Table 2: Trends in Specific Provisions

Year	Non-Performing Asset Classification	NPA Duration	Provisioning Rates
2005-10	a) Sub-standard: i) Secured ii) Unsecured		10 per cent 20 per cent on all loan types
	b) Doubtful	i. <1 year ii. 1-3 years iii. >3 years	20 per cent (secured) and 100 per cent (unsecured) 30 per cent (secured) and 100 per cent (unsecured) 100 per cent on both secured and unsecured
	c) Loss assets		Write-off or 100 per cent (if remains in books)
2010-11	a) Sub-standard: i) Secured ii) Unsecured		10 per cent 15 per cent on infrastructure loans and 20 per cent on other loan types
	b) Doubtful	i. <1 year ii. 1-3 years iii. >3 years	20 per cent (secured) and 100 per cent (unsecured) 30 per cent (secured) and 100 per cent (unsecured) 100 per cent on both secured and unsecured
	c) Loss assets		Write-off or 100 per cent (if remains in books)
2011-16	a) Sub-standard: i) Secured ii) Unsecured		15 per cent 20 per cent on infrastructure loans and 25 per cent on other loan types
	b) Doubtful	i. <1 year ii. 1-3 years iii. >3 years	25 per cent (secured) and 100 per cent (unsecured) 40 per cent (secured) and 100 per cent (unsecured) 100 per cent on both secured and unsecured
	c) Loss assets		Write-off or 100 per cent (if remains in books)

- Notes:** 1. Sub-standard assets: Assets which have remained NPA for a period less than or equal to 12 months.
2. Doubtful assets: An asset is classified as doubtful if it has remained in the sub-standard category for a period of 12 months.
3. Loss assets: A loss asset is one where loss has been identified by the bank or internal or external auditors or the RBI inspection but the amount has not been written off wholly.

Source: RBI.

IV. Literature Review

Empirical literature on the determinants of loan loss provisions mainly takes into account two components; namely, non-discretionary and discretionary provisioning. The former is more related to the concept of credit risk, where banks make loan loss provisions to cover expected credit losses based on the underlying quality of the loan portfolio. Discretionary component of provisioning mostly arises from the uncertainty and subjectivity in the course of valuing expected losses. Discretionary loan-loss provisions are largely used to smoothen income, manage capital and signal financial strength.

IV.1. Non-discretionary provisioning

Most of the studies found a positive impact of NPAs and total loans on loan loss provisions (Cavallo and Majnoni (2002); Hasan and Wall (2004); Bouvatier and Lepetit (2012); Curcio and Hasan (2015)). Laeven and Majnoni (2003) reported a negative impact of loan growth on provisioning consistent with the fact that with the surge in newer loans there is a consequent decline in provisions. Bikker and Metzmakers (2005) found a positive impact of loan growth on loan loss provision specifically for US banks, reflecting prudent provisioning.

Literature found GDP to be negatively related to loan loss provisions (Laeven and Majnoni, 2003; Ghosh, 2007; Bikker and Metzmakers, 2005; Packer and Zhu, 2012; Fonseca and Gonzalez, 2008; and Malgorzata and Pipien, 2016). Additionally, the stronger the negative coefficient on real GDP growth, the greater the procyclicality of loan loss provisioning.

Real interest rate is mainly used to take into account the monetary policy stance where a high real interest rate would raise the cost of funding for borrowers which makes repayment difficult, leading to further deterioration in asset quality and compelling banks to increase provisions. In line with this, Ghosh (2007) found a positive impact of real interest rate on loan loss provisioning for Indian banks during 1997-2005.

Asset prices capture changes in the ability of borrowers to repay their bank debt and, therefore, can be an important determinant of loan loss provisioning (LLP) through the collateral channel. Financial or real assets are taken as collateral on loans where a fall in asset prices will reduce the value of the collateral leading to greater defaults which in turn compels banks to increase provisioning (Davis and Zhu, 2009). Thus, LLP can amplify the credit cycle through the collateral channel.

IV.2. Discretionary Provisioning

Literature suggests that banks may use discretionary provisioning with three objectives in mind: income smoothing/earnings management, signalling and capital management.

Income smoothing/earnings management *via* LLP is based on the hypothesis that managers save current income for future periods by overstating LLPs in the current period due to information decay. On the other hand, banks smoothen their earnings by drawing down loan loss reserves when actual losses exceed expected losses. It can reduce provisioning procyclicality (Laeven and Majnoni, 2003).

To overcome information asymmetry between bank managers and investors, the former may use signalling tool to communicate inside information regarding future performance to investors through LLP. Bank managers use discretionary component of LLP to signal to investors regarding their private information about future prospects of banks as an unexpected increase in LLP gives a signal of a bank's financial strength (Ghosh, 2007; Bouvatier and Lepetit, 2008).

According to capital management hypothesis, banks can use LLPs to partially meet minimum regulatory capital requirements. In the pre-Basel Accord (1988) period, there was an incentive for

bank managers to engage in capital management as banks with low regulatory capital could increase loan loss provisions to meet the regulatory capital criteria. However, in this regime the incentive to manage earnings was lower due to the fact that if a bank reduced loan loss provisions to show higher earnings, it would have an adverse impact on its capital adequacy ratio as loan loss reserves were a part of the numerator. Thus, earnings management could only be achieved at the expense of risk management and *vice versa* (Anandarajan *et al*, 2007). In the Basel I regime and thereafter, general provisions/loan loss reserves could be included in Tier 2 capital only up to a limit of 1.25 per cent of risk weighted assets. With this change, earnings management could now be achieved without much costs (Ahmed *et al*, 1999).

Kanagaretnam *et al* (1995), Bhat (1996) and Anandarajan *et al* (2007) found that LLPs were used to smoothen income by banks. On the other hand, Beatty *et al* (1995) and Ahmed *et al* (1999) found no relationship between loan loss provisions and income smoothing. Ghosh (2007), Curcio and Hasan (2015) and Packer and Zhu (2012) found evidence of earnings management through loan loss provisions for a sample of Indian banks, Euro-area banks and Asian banks, respectively.

Most of the pre-Basel era studies found greater incentive to manage regulatory capital ratios *via* loan loss provisions given the fact that provisions were included in the primary capital (Moyer, 1990). However, the incentive to manage regulatory capital ratios *via* loan loss provisions was significantly reduced after the Basel Accord of 1988 as LLPs were no longer a part of Tier I ratio and could make only limited contribution to Tier II capital (Ahmed *et al*, 1999; Bikker and Metzmakers, 2002; Anadarajan *et al*, 2006 and Ghosh, 2007).

The signalling *via* loan loss provision hypothesis posits that LLPs can be used as a signal regarding future expected cash flow rather than future credit losses (Curcio and Hasan, 2013). Similarly, Ghosh (2007) and Bouvatier and Lepetit (2008) too found the evidence of signalling for Indian and European banks, respectively. However, others concluded that loan loss provisions were not used for signalling purposes (Ahmed *et al.*, 1999 and Anandarajan *et al.*, 2006).

Thus, the studies on loan loss provisions provide a mixed evidence regarding the determinants of LLPs. Similarly, the motives behind discretionary component of LLPs also differ across countries and across different time periods.

V Methodology

VI Model Specification

We model the determinants of loan loss provisioning as a function of bank specific variables, banking industry specific variables and macro-economic variables using a dynamic panel model. It includes various determinants of loan loss provisioning – credit risk considerations, macro-economic environment and discretionary provisioning. This model is suitable for this study given the various criteria suggested by Roodman (2006) such as small T and large N panels; presence of lagged dependent variable; not strictly exogenous independent variables; fixed individual effects; and heteroskedasticity and autocorrelation within but not across individuals.

The general specification to test the hypotheses can be written as:

$$1) \quad LLP_{it} = B_0 + B_1LLP_{it-1} + B_2\Delta LD_{it} + B_3LD_{it-1} + B_4\Delta NPA_{it} + B_5\Delta IncomeSmooth_{it} + B_6\Delta Buffer_{it} + B_7SIG_{it} + B_8GDP_{t-1} + B_9InterestRate_t + B_{10}AssetPrices_t + B_{11}AssetPrices_t + DummyAQR + DummyBank + e_{ij}$$

where,

LLP_{it-1} = Lagged value of the Ratio of Loan Loss Provision to Average Total Assets of bank.

ΔLD_{it} = Change in Loan to Deposit Ratio for bank *i* at time *t*.

LD_{it-1} = Lagged value of Loan to Deposit Ratio for bank *i* at time *t*.

ΔNPA_{it} = Change in Gross NPAs to Total Assets for bank *i* at time *t*.

$\Delta IncomeSmooth_{it}$ = Change in Operating Profit before Loan Loss Provision to Average Total Asset Ratio of bank *i* at time *t*.

$\Delta Buffer_{it}$ = Change in Minimum Tier I to Total Regulatory Capital Ratio for bank *i* at time *t*.

SIG_{it} = Price to Book value for bank *i* at time *t*.

GDP_{t-1} = Lagged Real GDP Growth Rate at Market Prices at time *t*.

$InterestRate_t$ = Real Interest Rate at time *t*.

$AssetPrices_t$ = log of S&P BSE Realty Index at time *t*.

$DummyAQR = 1$ for the years 2015-2016 and 2016-2017 and 0 otherwise.

$DummyPublic = 1$ for Public Sector Bank and 0 for Private Sector Bank.

Additionally, two additional specifications have been modelled to have a relative understanding of the provisioning practices of public sector banks (PSBs) and private sector banks (PVBs) by introducing dummy and interaction variables. A more detailed description regarding this is provided in Section VI. The econometric specification is provided below:

$$2) \quad \Delta LLP_{it} = B_0 + B_1\Delta LLP_{it-1} + B_2\Delta LD_{it} + B_3LD_{it-1} + B_4\Delta NPA_{it} + B_5\Delta IncomeSmooth_{it} + B_6\Delta Buffer_{it} + B_7\Delta Signalling_{it} + B_8GDPgrowth_{t-1} + B_9RealInterestRate_t + B_{10}\Delta \log(AssetPrices_t) + B_{11}DummyAQR + B_{12}DummyBank + B_{13}DummyBank * \Delta IncomeSmooth_{it} + B_{14}DummyBank * GDPgrowth_{t-1} + e_{ij}$$

$$3) \quad \Delta LLP_{it} = B_0 + B_1\Delta LLP_{it-1} + B_2\Delta LD_{it} + B_3LD_{it-1} + B_4\Delta NPA_{it} + B_5\Delta IncomeSmooth_{it} + B_6\Delta Buffer_{it} + B_7\Delta Signalling_{it} + B_8GDPgrowth_{t-1} + B_9RealInterestRate_t + B_{10}\Delta \log(AssetPrices_t) + B_{11}DummyAQR + B_{12}DummyBank + B_{13}DummyBank * DUMMYHIGHNPL * \Delta IncomeSmooth_{it} + B_{14}DummyBank * DUMMYHIGHNPL * GDPgrowth_{t-1} + e_{ij}$$

Bank specific variables including loan loss provisions and operating profit are scaled by total assets. Total loans are scaled by total deposits.

The study uses Arellano-Bover/Blundell-Bond or system GMM estimator which is a significant improvement over Arellano-Bond as it dramatically improves efficiency of the model by allowing the introduction of more instruments. Given an unbalanced panel data set, we use the forward orthogonal deviation transformation of the original equation as proposed by Arellano and Bover (1995) which in place of subtracting the previous observation from the contemporaneous one (difference transformation), subtracts the average of all future available observations of a variable. Then the dynamic model is applied in the two-step form as they are more

asymptotically efficient than one-step estimators. However, using the two-step variant to system GMM can give a downward bias to the coefficient standard errors (Arellano and Bond, 1991); hence, the standard errors of coefficients reported in the paper are finite sample corrected standard error given by Windmeijer (2005). The GMM-style instruments are applied to both lagged dependent variables and other endogenous dependent variables except bank type which is exogenous.

V.II Data Description

For estimation of the model, bank-wise data have been obtained for the period 2004-05 to 2016-17 from *Statistical Tables Relating to Banks in India* published by the Reserve Bank (Table 3). This is the most

Table 3: Data Description and Variables

Nomenclature	Description of Variable	Source	Expected Sign
1. Bank Specific Variables			
1.1 Non-discretionary			
ΔLLP_{it-1}	Lagged first difference of LLP to average Total Asset Ratio	Statistical Tables Related to Banks in India, various issues	+
ΔLD_{it}	First difference of Loan to Deposit Ratio	Statistical Tables Related to Banks in India, various issues	+
ΔLD_{it-1}	Lagged first difference of Loan to Deposit Ratio	Statistical Tables Related to Banks in India, various issues	+
ΔNPA_{it}	First difference of NPA to Asset Ratio	Statistical Tables Related to Banks in India, various issues	+
1.2 Discretionary			
$\Delta IncomeSmooth_{it}$	First difference of Operating Profit before LLP and Taxes to average Total Asset Ratio	Statistical Tables Related to Banks in India, various issues	+
$\Delta Buffer_{it}$	First difference of Actual Regulatory Capital before loan loss provisions (Tier I) to Minimum Required Regulatory Capital Ratio	Statistical Tables Related to Banks in India, various issues	+
$\Delta Signalling_{it}$	First difference of Price to Book value Ratio	Bloomberg	+
2. Macro-variables			
GDP_{growth_t}	Real GDP growth rate at market prices	Handbook of Statistics on Indian Economy, various issues	-
$RealInterestRate_t$	Real Interest Rate = $(i - \pi)/(1 + \pi)$, where i and π stands for weighted average lending rate and Consumer Price Index.	- Database on Indian Economy - Report of the Expert Committee to Revise and Strengthen the Monetary Policy Framework (2014)	+
$\Delta \log(AssetPrices_t)$	$\log(S\&P\ BSE\ REALTY\ INDEX_t) - \log(S\&P\ BSE\ REALTY\ INDEX_{t-1})$	Bombay Stock Exchange	-
3. Banking Industry Specific			
DummyAQR	AQR=1 in 2015-16 & 2016-17 or 0 otherwise		+
4. Bank Type			
DummyBank	Public Sector Bank =1 or Private Sector Bank=0		-
5. Interaction variables			
DUMMYHIGHNPL	DUMMYHIGHNPL=1, when NPL is greater than median of all banks or 0 otherwise		-

significant period to study since many changes in provisioning practices in India were introduced after 2005. Asset quality review (AQR) of banks was also undertaken during this period which led to significant increase in provisioning requirements. It would be interesting to discern if provisioning practices amplified the business cycle during these episodes. The sample consists of 47 scheduled commercial banks which include 27 public sector banks and 20 private sector banks.

VI. Empirical Analysis

Regression results suggested that lagged value of loan loss provision was a positive and significant determinant of loan loss provisioning. This suggests that loan loss provisioning for Indian banks exhibits a high level of persistence meaning banks adjust their provisions slowly to recognise potential losses against loans (Table 4).

The determinants of non-discretionary provisioning linked to credit risk were found to be positive and significant which is in line with the evidence in literature. Positive coefficient suggests prudent provisioning on the part of Indian banks. Positive and highly significant value of change in NPAs to total assets, which is used to proxy for the specific component of loan loss provisioning, suggests that on average Indian banks increase provisioning in the face of deterioration in asset quality. Further, the positive and highly significant value of change in loan to deposit and lagged loan to deposit, which is used to proxy for the general component of loan loss provisioning, means that on average Indian banks increase provisioning in the face of higher exposure to credit risk. The size of the coefficients of loan to deposit and lagged loan to deposit suggests that provisions do not increase proportionately with increasing exposure to credit risks.

In terms of non-discretionary provisioning linked to the macro-economic environment, lagged real GDP growth was found to be negative and highly

Table 4: Dynamic Panel Data Estimation (System GMM Model) - Dependent Variable: Loan Loss Provisions

Independent Variable	Coefficient
1. Bank Specific Variables	
1.1. Non-discretionary	
Lagged Loan Loss Provision (-1)	.51**** (.087)
Loan to Deposit	.041*** (.014)
Lagged Loan to Deposit	.014** (.006)
NPA to Total Assets	.47**** (.138)
1.2 Discretionary	
Income Smoothing	.53**** (.58)
Capital Management	.002 (.005)
Signalling	-.002** (.001)
2. Macro-Specific variables	
Growth in Real GDP	-.03*** (.010)
Real Interest Rate	-.023 (.021)
Asset Prices	.003**** (.003)
3. Banking Industry Specific variables	
AQR Dummy	.002 (.005)
4. Bank Type Dummy	
AR (1)	.002
AR (2)	.174
Sargan Test	.35
Hansen Test	.36

Notes: 1. Figures in parentheses refer to Windmeijer Standard Errors.
2. ****, ***, ** and * indicate significance at 0.1%, 1%, 5% and 10% level, respectively.

significant which confirms the existence of strong pro-cyclicality in provisioning by Indian banks. This is in line with Ghosh (2007) which found pro-cyclicality in provisioning by Indian banks indicating that banks do not make sufficient provisions during upswings which further exacerbates the business cycle.

Asset prices were found to have positive impact on provisioning and were also found to be significant

contrary to expected negative relationship. It suggests that the collateral channel does not amplify the credit channel *via* loan loss provisioning. There may be two possible explanations for this. Firstly, the positive result can be driven by the fact that the RBI had started increasing standard-asset provisioning from 2005 onwards for sensitive sectors such as commercial real estate, commercial real estate-residential housing and housing in response to excessive credit growth in these sectors as a macro-prudential measure. Secondly, the variable used to proxy for asset prices is the log of S&P BSE realty index which reflects the equity prices of the real estate firms listed in the BSE. However, the S&P BSE realty index only comprises of a sample of 10 real estate firms which may not be representative of all real estate firms in India. Additionally, stock prices of real estate firms lag behind the extent of increases witnessed in other real estate asset price indicators such as National Housing Bank's Residex or RBI's housing prices index (Singh and Pattanaik, 2012). Hence, due to lack of better proxy for asset prices in India the result cannot be interpreted to be very conclusive.

The impact of real interest rate on provisioning was found to be negative and not significant. Additionally, apart from the weighted average lending rate used in the existing model to measure interest rate, estimates using other measures such as 364-day Treasury-Bill rate and call money rates were also not found to be significant. This is not in line with the expected relationship between the two as high interest rates are expected to lead to more loan defaults. Similar result was reported by Pain (2003) finding that real interest rate calculated using retail price inflation did not have a significant impact on provisioning for UK banks.

Tier I regulatory capital ratio to minimum required total regulatory capital ratio measuring capital management was found to be positive but not significant which indicates that for Indian banks there is no capital management *via* loan loss

provisioning. The coefficient on loan loss provision can be significant for banks in two scenarios: 1) the bank is poorly capitalised; therefore, increasing provisions to the extent of 1.25 per cent of risk weighted assets as part of Tier II capital to meet the minimum total regulatory capital requirement, *i.e.*, a negative relationship or, 2) the bank is poorly capitalised but is still less willing to use provisions as it can reduce Tier I capital *via* its impact on earnings, *i.e.*, positive. However, in case of Indian banks, the CRAR was above 10 per cent for mostly all scheduled commercial banks during 2005-2017 which is higher than the minimum regulatory capital of 9 per cent specified by the RBI. Therefore, the non-significant relationship between LLPs and capital management holds ground in the Indian scenario, as the capital management hypothesis is more valid for banks with low regulatory capital (Shrieves and Dahl, 2003).

Operating profit to total assets ratio, a proxy for income smoothing, was found to have positive and significant impact on provisioning, which is in line with the income smoothing hypothesis. This result is also in consonance with Ghosh (2007) and Packer and Zhu (2012). Large coefficient of the variable suggests that income smoothing exerts a strong impact on loan loss provisioning. It may be attributed to the fact that after Basel I, the costs associated with earnings management through regulatory capital buffers on banks have reduced as loan loss reserves are not a very significant part of the numerator of capital adequacy ratio. This in turn might have led banks to aggressively indulge in earnings management through loan loss provisions. Fonseca and Gonzalez (2005) found that income smoothing tends to decrease in countries with high investor protection, high accounting disclosures, restrictions on banking activities and more stringent supervision. According to the Ease of Doing Business Index of the World Bank, India has been generally classified as a country with medium ease of doing business from which it can be reasoned that our finding is consistent with Fonseca and Gonzalez

(2005). Finally, this countercyclical provisioning through income smoothing can be somewhat instrumental in mitigating the impact of business cycles as Indian banks seem to provision for loan losses considerably better when their earnings are higher and vice versa.

The price to book value ratio, a proxy for signalling, was found to be negative and significant. The sign of the variable was not found to be consistent with the signalling hypothesis which assumes a positive coefficient. The finding can be interpreted as increasing LLPs in the case of India is viewed as expense rather than future profitability which is in line with Anandarajan *et al*, 2007. However, these results are in contrast with Ghosh (2007) as our model used a more nuanced measure for signalling, *i.e.*, price to book ratio which was not extensively available during his study period as many Indian banks did not report such data at that time.

Finally, for the bank type dummies, it was found that PVBs on average provision less than PSBs (significant at 10 per cent level). However, the dummy AQR which was used as a banking industry specific variable was not found to be significant but appeared with expected sign of the coefficient.

Provisioning by PSBs vs PVBs

We could not conduct separate regressions for PSBs and PVBs because to conduct GMM it requires N should be sufficiently greater than t. In our case, dividing the sample into two parts would significantly reduce the number of banks in turn not meeting the required conditions to conduct dynamic panel regression using GMM. Hence, some interaction terms were included in the model to glean the different provisioning patterns for PSBs and PVBs.

We interacted the bank type dummy variable with the GDP and earnings management variables to find if there were differences in provisioning strategies across PSBs and PVBs. It was found that there was no significant difference across PSBs and PVBs in terms

of using provisioning *via* income smoothing and provisioning across the business cycle (Table 5).

Table 5: Dynamic Panel Data Estimation (System GMM Model) - Dependent Variable: Loan Loss Provisions

Independent variable	Coefficient	Coefficient
1. Bank Specific Variables		
1.1. Non-discretionary		
Lagged Loan Loss Provision	.54**** (.128)	.62**** (.011)
Loan to Deposit	.03 (.04)	.045*** (.015)
Lagged Loan to Deposit	.013 (.017)	.015* (.008)
NPA to Total Assets	.44**** (.15)	.53**** (.12)
1.2 Discretionary		
Income Smoothing	.05 (.40)	.046**** (.142)
Capital Management	.002 (.008)	.006 (.007)
Signalling	-.002** (.001)	-.002** (.001)
2. Macro variables		
Growth in Real GDP	-.017 (.094)	-.02** (.011)
Real Interest Rate	-.03 (.034)	-.002 (.03)
Asset Prices	.002* (.008)	.002** (.001)
3. Banking industry specific variables		
AQR Dummy	.002 (.001)	.001 (.001)
4. Bank Type Dummy		
	-.004 (.015)	-.003 (.002)
5. Interaction Terms		
Public * Growth in Real GDP	-.012 (.17)	
Public * Income Smoothing	-.18 (.33)	
Public*HIGHNPL*Growth in Real GDP		-.03** (.018)
Public*HIGHNPL*Income Smoothing		-.26 (.48)
Test Statistics	AR(1) .04 AR(2) .36 Sargan Test .18 Hansen Test .19	AR (1) .00 AR(2) .11 Sargan Test .46 Hansen Test .63

Notes: 1. Figures in parentheses refer to Windmeijer standard errors.
2. ****, ***, ** and * indicate significance at 0.1%, 1%, 5% and 10% level, respectively.

Further, in order to check if PSBs or PVBs with low credit quality had adopted different provisioning strategies in terms of provisioning *via* income smoothing and provisioning across the business cycle, an additional dummy variable was added where a value of 1 was assigned for banks whose NPA ratio was greater than the median NPA ratio for all banks and 0 otherwise. This low credit quality dummy was interacted with bank type variables along with GDP and earnings management variables separately. It was found to be positive and significant which suggested that PSBs with high NPA ratio tend to be more procyclical in terms of provisioning across business cycles as compared to PVBs.

VII. Conclusion

The paper attempted to examine the impact of both discretionary and non-discretionary factors on loan loss provisioning by Indian banks during 2005-2017. Most of the non-discretionary factors were found to be quite significant in explaining the changes in provisioning while amongst the discretionary factors only income smoothing *via* loan loss provisioning existed in Indian banks.

Our findings suggest that India's loan loss provisioning is pro-cyclical which can amplify the business cycles. Moreover, it was found that provisioning by PSBs was more pro-cyclical as compared to PVBs. In this context, the implementation of Indian Accounting Standards (Ind-AS), which requires banks to make provisions for expected credit losses from the time a loan is originated rather than awaiting 'trigger events' signalling imminent losses, is expected to help address this issue. Recognising and providing for actual and potential loan losses at an earlier stage in the credit cycle could potentially reduce pro-cyclicality and foster financial stability as Ind-AS requires a dynamic approach to provisioning based on expected credit losses, instead of the current system which is based on days-past-due.

For further research it would be interesting to explore which kind of provisioning practices are more pro-cyclical, *i.e.*, specific or general provisioning as that would give an intuition in terms of the direction that dynamic provisioning should focus on. Additionally, it would be interesting to see whether corporate governance *via* earnings management is a significant determinant of loan loss provisioning.

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