Liquidity and Business Performance : A Study of Selected Indian Banks

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Abstract

Banks across the globe are facing liquidity issues. Sound liquidity management can reduce the probability of serious problems. Ideally, a bank needs to maintain enough high-quality liquid assets to meet its liquidity needs to withstand all kinds of possible stress situations. During the early phase of the 2008 financial crisis, many banks did not manage their liquidity prudently. These banks experienced major difficulties despite adequate levels of capital reserves. The Indian banks responded to the crisis by adopting cautious liquidity management policies. Alternatively, higher liquidity could work unfavorably for banks and mean smaller business. In this context, the present study attempted to understand the liquidity management by Indian banks and its impact on their business. The study focused upon selected large public and private sector banks so as to analyze and compare the liquidity and business performance of banks before the financial crisis (2001-02 – 2007-08) and after the crisis (2008-09 – 2018-19). The results revealed that Indian banks preferred higher liquidity in the post-crisis phase. At the same time, they cautiously managed to grow their business, albeit at a slower pace.

Keywords : **liquidity, business, public sector banks, private sector banks, Indian banks, SBI, PNB, HDFC, ICICI, pre crisis, post crisis**

JEL Classification : E0, G2, M2

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Liquidity or the access to sufficient liquid assets and ability to meet financial obligations as they come due is crucial to the viability of any banking organization. Sound liquidity management can reduce the probability of serious problems. The importance of liquidity cannot be undermined as it goes beyond the issues of a single bank. A liquidity shortfall in a single bank can lead to repercussions for the entire banking industry. Banks across the globe are facing liquidity issues because of poor liquidity management. Ideally, banks need to maintain enough high-quality liquid assets to meet their liquidity needs and withstand all kinds of possible stress situations.

During the early phase of the financial crisis that began in 2008, many banks did not manage their liquidity prudently. These banks experienced major difficulties despite maintaining adequate levels of capital reserves. The crisis did drive home the importance of liquidity for proper functioning of financial markets and the banking sector. Prior to the crisis, asset markets were buoyant and funding was readily available at low cost. The rapid

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reversal in market conditions led to the understanding as to how quickly liquidity can evaporate, and that illiquidity can last for an extended period of time, which could put the systems under stress for prolonged periods. Post crisis, the Basel III committee focused on reforms directed towards promoting a more resilient banking sector, with better ability of liquidity risk management (Bank for International Settlements, 2013). The recent technological changes and financial innovations have developed new ways of funding the banks' activities and managing their liquidity. The banks' dependence on core deposits have reduced over time and the lingering effects of global financial turmoil has changed the way banks view liquidity. In response to the global crisis, regulators have demanded higher capital and liquidity standards, stronger supervision, and more explicit resolution frameworks for banks. This calls for the need for continuous assessment of liquidity risk management framework and liquidity position of banks for ensuring proper bank functioning.

Although the world is slowly seeing an end to the crisis, but what started as an excessively loose monetary policy in major developed economies transformed into global imbalances and a full-blown financial and economic disaster for the rest of the economies of the world. The ripples of the financial turmoil were felt by countries across the orb, including India. However, the Indian financial market was relatively less exposed to the U.S. mortgage market and to the stressed international financial institutions. In fact, the deepening of the crisis and subsequent deleveraging and risk aversion were the factors that primarily affected the Indian economy and slowed its growth momentum. In the new operating landscape, Indian banks are increasingly focusing on adopting an integrated approach to risk management. Banks have embraced the international accord of banking supervision and regulation. Majority of the banks have already met the capital requirement of Basel III. Banks have significantly enhanced their balance sheets and funding resilience, and have curbed their involvement in complex activities. The Indian banks have responded to the crisis by adopting prudent liquidity management policies. They are now risk averse and are inclined to maintaining higher liquidity buffers for fear of failure of repayment by borrowers. If high liquidity is maintained and funds are not invested, there is bound to be a loss in business for banks. Contrarily, in case of paucity of liquidity or resorting to huge investment activities, banks may fail to meet their financial commitments or need to avail high-cost liquidity. The investment policy of banks needs to be a balanced approach towards managing their assets and liabilities.

The present study aims at understanding the liquidity management by Indian banks and its impact on bank business. The main focus is some of the large domestic banks in India, public and private sector banks. A comparison is made between the pre-financial crisis period and the post-financial crisis period to determine whether there has been any major change in the liquidity position of banks and their business performance as an outcome of the global financial crisis. Statistical tests are engaged to explore whether Indian banks have become risk conscious following the crisis and does their banking business suffer the blow on account of higher liquidity.

Literature Review

Koundal (2012) measured the relative performance of commercial banks in India for the period from 2007 – 2010. Ratio analysis was employed to examine financial ratios of public sector banks, old private sector banks, new private sector banks, and foreign sector banks. The study confirmed the positive impact of reforms on banks and concluded that although the public sector banks showed an improvement on different financial parameters, they happened to lag behind their counterparts. Devanand and Prasad (2015) examined the performance of scheduled commercial banks in India for the post-reform period. Enhancing productivity, profitability, and operational efficiency in the banking sector emerged as the main purpose of financial reforms in India. Budhedeo and Pandya (2018) measured and evaluated the financial performance of the public sector bank group in India for a two decade period post reforms, that is, from 1995 – 2016. The performance of the bank group was assessed on the

basis of five pillars – bank profitability, bank productivity, bank efficiency, bank health, and bank credit quality. The findings of the study advocated that although the Indian public sector bank group witnessed positive trends in all financial indicators prior to the crisis, it experienced falling trends post crisis, which worsened over time. Chandra and Awasthi (2019) assessed the insolvency risk of four major commercial banks in India – State Bank of India, Punjab National Bank, Bank of Baroda, and Canara Bank for the period from 2005 – 2017. They inspected whether the regulatory capital requirement as per the Reserve Bank of India norms was enough to insulate commercial banks from the potential threat of insolvency risk. The results confirmed a significant rise in insolvency risks of the banks studied.

Sahota and Dhiman (2017) compared the financial, operational, and managerial health of the largest public sector, private sector, and foreign banks in India for the period from 2001 – 2010. Panel data for ratio based CAMEL model parameters was engaged in the study. CAMELS methodology has been widely used in literature on bank performance. To mention some of the Indian studies – Misra and Aspal (2012) ; Kumar and Sharma (2014) ; Karri, Meghani, and Mishra (2015) ; Nageshwaran and Krishnan (2016) ; and Nair, Mallawat, and Konreddy (2018) also studied bank performance using the CAMELS framework. A recent study by Koley (2019) also measured and compared the financial position, performance, and efficiency of the largest public and private sector banks in India – SBI and HDFC using the CAMEL model for the period from 2013 – 2017.

Methodology

The present study examines the liquidity position and its possible impact on business for selected large public and private sector banks in India. The analysis period ranges from 2001-02 – 2018-19. This period has been segregated into two phases, pre-financial crisis phase : 2001-02 – 2007-08 and post-financial crisis phase : 2008-09 – 2018-19. The trends and growth in liquidity and business ratios have been analyzed for the selected banks and domestic bank group (aggregate) so as to compare their performance between the pre and post financial crisis periods. Data employed in the study have been sourced from various issues of RBI publications.

(1) Variable Specification and Definition : The liquidity position of banks is assessed on the basis of two liquidity ratios – liquid ratio and current ratio. Liquid ratio (LIQR) represents the proportion of total assets that banks maintain as liquid assets. It is computed as the ratio of current assets to total assets. Current ratio (CUR) measures a bank's ability to pay its short-term obligations and indicates short-term financial strength of the bank. It is derived as a ratio of current assets to current liabilities. Here, current assets are the aggregate of cash in hand, balance with RBI, balance with banks in India, money at call and short notice, and balance with banks outside India. Current liabilities are taken as a total of bills payable, inter-office adjustment, interest accrued, subordinate debt, deferred tax liabilities, and others (which include provisions).

The business performance of banks has been traced by two ratios – total business and credit-deposit ratio. Total business (BUS) is the ratio of total business (sum of credit and deposit) to total assets, while credit-deposit ratio (CDR) is the ratio of credit advanced by banks from the deposits they have mobilized. The growth rate in credit-deposit ratio (GRCDR) has also been worked out to analyze the trends within. Mean and compound annual growth rates have been estimated for all financial parameters for individual banks and domestic bank group for both the pre and post-financial crisis periods.

(2) Selection of Banks : Two large banks have been selected each from among the public sector bank group and private sector bank group. The choice of bank is based on the total number of bank branch expansion by public and private sector banks as in March 2019.

Public Sector Bank		Private Sector Bank	
State Bank of India (SBI)	23,384 branches	HDFC Bank Ltd. (HDFC)	5,035 branches
Punjab National Bank (PNB)	7,127 branches	ICICI Bank Ltd. (ICICI)	4,874 branches

Empirical Analysis and Results

Liquidity management is a crucial aspect for banks as they are liable to provide funds to depositors on demand. At the same time, higher liquidity is generally a deterrent to profits and business generated by banks. This issue has been addressed in this section.

(1) Trends in Liquidity and Business - Pre and Post Crisis : In this section, the average trend and growth rate of preferred financial ratios have been evaluated to understand the liquidity position of banks and their business performance. Table 1 displays the trend in bank's liquidity and business over the pre and post financial crisis phases for the banks selected for the study. To get an aggregate picture, liquidity and business performance ratios for the domestic bank group have been presented in Table 2. Table 3 enables a comparison of banks' performance between the two crisis periods in terms of their mean and compound annual growth rate.

The following observations have been drawn from Tables 1, 2, & 3:

- India's largest public sector bank (SBI) maintains higher CUR (1.2) in the post-crisis period than before, while it is still below the preferred industry average of 1.33 (The Institute of Company Secretaries of India, 2014). However, the average of LIQR has declined, though at a slower pace than in the pre-crisis phase. The average BUS for the bank is higher post-crisis at 138% as against 124% prior to crisis. However, the CAGR is only 0.4% post-crisis as compared to 2.7% pre-crisis. Similar pattern is observed for average CDR, which increased from 60% to 80% from pre to post-crisis period.

- PNB witnesses a lower average LIQR (9.1%) but a more than doubling of CUR (3.3) in the post-crisis phase as compared to the previous phase. CUR of the bank is much beyond the industry average and undoubtedly points towards an over cautious approach towards liquidity management. The CAGR of LIQR and CUR reveal patterns comparable to their averages. The average business performance of PNB is higher in the post-crisis phase both in terms of BUS (146%) and CDR (74%). However, the two business ratios exhibit a CAGR of – 0.1% and – 0.8%, respectively post - crisis.

- The trends in liquid ratio and current ratio exhibit a preference for higher liquidity by public sector banks in reaction to the financial crisis. The business for the two banks has gone up, but the trends in CDR and BUS reflect slower business growth in the post-crisis period, suggesting possible adverse impact of holding higher liquidity on business performance.

- The largest private domestic bank in India, HDFC shows lower average LIQR (8.2%) with a declining CAGR (–3.7%) in the post-crisis phase. The CUR for the bank has improved from 0.9 in the pre-crisis period to 1.2 in the post-crisis period, and so is the case in CAGR which increases from –9.1% to 3.4% over the two time phases. In terms of business, HDFC has expanded its BUS from near 118% average to 135% between the pre and post-crisis phases. However, the CAGR of BUS is as low as 0.6% in the post-crisis phase as opposed to 3.1% in the period before crisis. The same is true for trends in CDR.

Table 1. Liquidity and Business of Indian Banks : Pre and Post Crisis

	Public Sector Banks										Private Sector Banks									
Years	**SBI**					**PNB**					**HDFC**					**ICICI**				
	LIQR	***CUR***	***BUS***	***CDR***	***GRCDR***	***LIQR***	***CUR***	***BUS***	***CDR***	***GRCDR***	***LIQR***	***CUR***	***BUS***	***CDR***	***GRCDR***	***LIQR***	***CUR***	***BUS***	***CDR***	***GRCDR***
Pre Crisis																				
2001–02	18.6	1.2	112.4	44.7	-	8.8	1.3	135.1	53.6	-	14.5	1.6	102.9	38.6	-	12.3	0.8	76.0	146.6	-
2002–03	12.0	0.8	115.4	46.5	4.2	9.4	1.4	134.6	53.1	–1.0	10.4	0.9	112.2	52.5	36.1	6.1	3.8	95.0	110.6	–24.5
2003–04	10.7	0.8	116.9	49.6	6.6	8.6	1.1	132.1	53.7	1.2	8.6	0.5	113.8	58.4	11.1	6.8	0.5	104.0	91.2	–17.6
2004–05	8.6	0.8	123.8	55.1	11.2	8.8	0.9	129.6	58.6	9.0	8.7	0.8	120.4	70.3	20.5	7.7	0.6	114.1	91.6	0.4
2005–06	9.0	0.8	129.9	68.9	24.9	17.1	2.6	133.8	62.4	6.5	9.4	0.7	123.6	62.8	–10.6	6.8	0.7	71.5	88.5	–3.3
2006–07	9.2	0.9	136.4	77.5	12.4	9.6	1.5	145.6	69.1	10.8	9.9	0.7	126.3	68.7	9.4	10.8	1.0	123.7	85.0	–4.0
2007–08	9.4	0.8	132.2	77.6	0.1	9.5	1.3	143.7	71.8	3.9	11.1	0.9	123.3	62.9	–8.4	9.5	0.9	117.6	92.3	8.6
Post Crisis																				
2008–09	10.8	1.3	133.2	73.1	–5.7	8.7	2.1	147.6	73.8	2.7	9.6	1.1	131.9	69.2	10.0	7.9	1.6	115.1	100.0	8.3
2009–10	8.2	1.1	136.3	78.6	7.5	7.9	2.3	147.0	74.8	1.5	13.5	1.5	131.8	75.2	8.6	10.7	2.5	105.5	89.7	–10.3
2010–11	10.0	1.2	138.2	81.0	3.1	7.8	2.4	146.7	77.4	3.4	10.7	1.0	132.9	76.7	2.0	8.4	2.1	108.8	95.9	6.9
2011–12	7.3	1.2	143.1	83.1	2.6	6.3	2.1	147.0	77.4	0.0	6.2	0.6	130.8	79.2	3.3	7.4	1.1	104.1	99.3	3.5
2012–13	7.3	1.2	143.6	86.9	4.6	5.7	1.8	146.2	78.9	1.9	6.8	0.8	133.9	80.9	2.2	7.7	1.3	108.6	99.2	–0.1
2013–14	7.4	1.4	145.3	86.8	–0.2	8.2	3.0	145.5	77.4	–1.9	8.1	1.0	136.4	82.5	1.9	7.0	1.2	112.8	102.1	2.9
2014–15	7.6	1.1	140.5	82.5	–5.0	9.3	3.3	146.2	75.9	–1.9	6.2	1.1	138.2	81.1	–1.7	6.5	1.3	115.9	107.2	5.0
2015–16	7.1	1.1	135.5	84.6	2.6	11.3	4.6	144.6	74.6	–1.8	5.3	1.1	136.5	85.0	4.9	8.3	1.7	118.9	103.3	–3.6
2016–17	6.4	1.1	133.6	76.8	–9.2	12.3	5.5	144.5	67.5	–9.5	5.7	0.9	138.7	86.2	1.3	9.8	2.2	123.6	94.7	–8.3
2017–18	5.6	1.1	134.3	71.5	–6.9	12.5	4.4	140.5	67.5	0.1	11.6	2.7	136.0	83.5	–3.1	9.6	2.8	122.1	91.3	–3.6
2018–19	6.0	1.5	138.5	75.1	5.0	9.7	5.1	146.4	67.8	0.4	6.5	1.5	140.0	88.8	6.4	8.3	2.1	128.5	89.8	–1.6

Note. Except *CUR,* rest all financial variables are in percentage.

GRCDR : Refers to growth rate in credit-deposit ratio.

Table 2. Liquidity and Business of Domestic Bank Group : Pre and Post Crisis

Pre Crisis						Post Crisis					
Years	***LIQR***	***CUR***	***BUS***	***CDR***	***GRCDR***	***Years***	***LIQR***	***CUR***	***BUS***	***CDR***	***GRCDR***
2001 – 02	13.0	1.4	121.9	52.5	-	**2008 – 09**	9.3	1.9	139.4	73.6	–0.5
2002 – 03	9.5	1.1	197.6	28.2	–46.2	**2009 – 10**	8.9	2.0	140.4	73.8	0.3
2003 – 04	7.9	0.9	196.1	28.7	1.6	**2010 – 11**	8.9	3.1	141.6	76.3	3.4
2004 – 05	8.9	1.1	128.4	61.4	114.1	**2011 – 12**	7.3	2.6	142.5	78.4	2.8
2005 – 06	9.0	1.1	134.2	69.2	12.7	**2012 – 13**	7.3	1.9	142.5	78.6	0.3
2006 – 07	9.9	1.2	138.2	72.9	5.3	**2013 – 14**	7.9	2.0	143.0	78.8	0.2
2007 – 08	9.8	1.2	137.4	74.0	1.6	**2014 – 15**	8.0	2.0	142.6	78.2	–0.7
						2015 – 16	8.2	2.0	139.4	78.2	0.0
						2016 – 17	9.8	2.5	138.1	73.1	–6.5
						2017 – 18	8.4	2.5	137.0	74.1	1.5
						2018 – 19	7.7	2.3	139.1	75.5	1.8

Note. Except *CUR*, rest all financial variables are in percentage.

Table 3. Liquidity and Business of Indian Banks : Mean and CAGR

	Mean								CAGR (%)							
Bank	**Pre Crisis Phase**				**Post Crisis Phase**				**Pre Crisis Phase**				**Post Crisis Phase**			
	LIQR	***CUR***	***BUS***	***CDR***	***LIQR***	***CUR***	***BUS***	***CDR***	***LIQR***	***CUR***	***BUS***	***CDR***	***LIQR***	***CUR***	***BUS***	***CDR***
SBI	11.1	0.9	123.9	60.0	7.6	1.2	138.4	80.0	–10.9	–6.6	2.7	9.6	–5.7	1.6	0.4	0.3
PNB	10.2	1.4	136.3	60.3	9.1	3.3	145.7	73.9	1.3	–0.1	1.0	5.0	1.1	9.1	–0.1	–0.8
HDFC	10.4	0.9	117.5	59.2	8.2	1.2	135.2	80.7	–4.4	–9.1	3.1	8.5	–3.7	3.4	0.6	2.5
ICICI	8.6	1.2	100.3	100.8	8.3	1.8	114.9	97.5	–4.2	2.0	7.5	–7.4	0.5	2.6	1.1	–1.1
DBG	9.7	1.1	150.5	55.3	8.3	2.2	140.5	76.2	–4.5	–2.1	2.0	5.9	–1.8	2.1	0.0	0.2

Note. Except *CUR,* mean for other financial variables is in percentage.

DBG refers to Domestic Bank Group.

↳ The average LIQR is almost the same for ICICI over the two crisis periods. The CAGR shows a rise from – 4.2% pre-crisis to 0.5% post-crisis. The bank has also managed a higher CUR (1.8) in the post-crisis phase, indicating a clear preference for higher liquidity due to the crisis. CUR has also grown at a faster rate over this crisis period. Despite a higher ratio of BUS in the post-crisis period, the CAGR for this business measure reveals a slower growth in the bank's business. The average CDR is lesser post-crisis.

↳ Just like public sector banks, the private sector banks too were impacted by the financial crisis. In response, they resorted to maintaining higher liquidity. The crisis affected the business performance of private sector banks. Although the business of banks rose after the crisis, the growth was relatively poor during this phase.

↳ The liquidity and business data for the domestic bank group is an aggregate of public sector banks and private sector banks. It gives an overall picture of trends in liquidity and business performance ratios of the domestic bank group in India. On an average, the bank group maintains lower LIQR but higher CUR post-crisis. The financial

crisis manifests into a fall in BUS for the domestic bank group. The CDR has increased post-crisis, but its CAGR is barely 0.2% as against a high rate of 5.9% in the pre-crisis phase. The preference for higher liquidity by domestic banks tends to have an adverse impact on their business at large.

↳ Higher CUR of the sample banks in the post-crisis period supports a preference for higher liquidity by Indian banks. Alternatively, the trends in business parameters of banks also reveal an average increase post-crisis. The only concern being the slower growth in the business ratios of banks post-crisis vis-à-vis the pre-crisis period.

(2) Pre and Post Crisis Liquidity and Business Performance : *t*-Test : In this section, student's *t*-test has been employed to compare the liquidity and business performance of Indian banks in the study sample between the pre and post crisis phases. The hypothesis has been framed in favor of one-tailed *t*-test for the financial variables – LIQR, CUR, BUS, and CDR. The formulated hypotheses have been tested for two independent sample *t*-test.

Testing of Hypotheses

The hypotheses for assessing the liquidity and business performance of banks have been developed considering the mean values of financial ratios for the pre-crisis phase (μ_X) and for the post-crisis phase (μ_0). Framing of hypotheses involves considering whether the mean values are higher or lower than the hypothesized value, allowing for both left-tailed and right-tailed tests. One tailed *t*-test enables comparison of the sample means with the hypothesized value to arrive at a significant difference between the two. The hypothesis is accepted or rejected at the 5% level of significance. The rejection criterion for null hypothesis is specified as under :

One - Tailed Student's *t*-test Rejection Criterion for Null Hypothesis

Null Hypothesis (H_0)	Alternative Hypothesis (H_a)	Critical Region Reject H_0 if	One-tailed Test
$\mu_x = \mu_0$	$\mu_x > \mu_0$	*t*-calculated > *t* - tabulated	Right-tailed
$\mu_x = \mu_0$	$\mu_x < \mu_0$	*t*-calculated < (–) *t* - tabulated	Left-tailed

Source : Gujarati (1999)

The results obtained for *t* - calculated are compared with *t* - tabulated values to determine if there is any significant difference between the liquidity position and business performance of banks in the post-crisis period in comparison to the pre-crisis period. On this basis, the inference on acceptance and rejection of hypothesis is drawn. In case of right-tailed *t*-test, if *t*-calculated is greater than critical value or *t* - tabulated, the null hypothesis gets rejected. Conversely, for left-tailed *t*-test, if *t*-calculated is smaller than *t*-tabulated, null hypothesis is rejected in favor of the alternative hypothesis.

The *t*-test results for liquid ratio, current ratio, total business, and credit-deposit ratio of banks have been reported in Tables 4, 5, 6, and 7, respectively.

An interpretation of *t* - test results from Tables 4 – 7 lists out some important observations :

↳ SBI and HDFC have lower LIQR in the post-crisis period as compared to the pre-crisis period. PNB and ICICI do not witness any significant change in LIQR over the two time phases.

Table 4. Liquid Ratio (*LIQR*) : Pre and Post Crisis

	Testing of Hypothesis					
Bank	**H_0**	**H_a**	***t*-calculated**	***t*-tabulated**	**Acceptance/ Rejection of H_0**	**Acceptance/ Rejection of H_a**
SBI	$\mu_x = \mu_0$	$\mu_x > \mu_0$	2.85	1.74 Right-tailed	Reject H_0	Accept H_a
PNB	$\mu_x = \mu_0$	$\mu_x > \mu_0$	0.95	1.74 Right-tailed	Accept H_0	Reject H_a
HDFC	$\mu_x = \mu_0$	$\mu_x > \mu_0$	1.83	1.74 Right-tailed	Reject H_0	Accept H_a
ICICI	$\mu_x = \mu_0$	$\mu_x > \mu_0$	0.27	1.74 Right-tailed	Accept H_0	Reject H_a

Table 5. Current Ratio (*CUR*) : Pre and Post Crisis

	Testing of Hypothesis					
Bank	**H_0**	**H_a**	***t*-calculated**	***t*-tabulated**	**Acceptance/ Rejection of H_0**	**Acceptance/ Rejection of H_a**
SBI	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–4.65	–1.74 Left-tailed	Reject H_0	Accept H_a
PNB	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–3.51	–1.74 Left-tailed	Reject H_0	Accept H_a
HDFC	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–1.31	–1.74 Left-tailed	Accept H_0	Reject H_a
ICICI	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–1.59	–1.74 Left-tailed	Accept H_0	Reject H_a

Table 6. Total Business *(BUS)* : Pre and Post Crisis

	Testing of Hypothesis					
Bank	**H_0**	**H_a**	***t*-calculated**	***t*-tabulated**	**Acceptance/ Rejection of H_0**	**Acceptance/ Rejection of H_a**
SBI	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–4.55	–1.74 Left-tailed	Reject H_0	Accept H_a
PNB	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–4.84	–1.74 Left -tailed	Reject H_0	Accept H_a
HDFC	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–6.48	–1.74 Left -tailed	Reject H_0	Accept H_a
ICICI	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–2.17	–1.74 Left -tailed	Reject H_0	Accept H_a

↳ Both the public sector banks have maintained higher CUR in the post-crisis period. The private sector banks – HDFC and ICICI do not show any significant difference in CUR between the pre and post-crisis phases.

↳ Total business (BUS) generated by all banks in the study is found to be higher in the post-crisis phase vis-à-vis the pre-crisis phase.

Table 7. Credit-Deposit Ratio *(CDR)* : Pre and Post Crisis

	Testing of Hypothesis					
Bank	**H_0**	**H_a**	***t*-calculated**	***t*-tabulated**	**Acceptance/ Rejection of H_0**	**Acceptance/ Rejection of H_a**
SBI	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–4.24	–1.74 Left-tailed	Reject H_0	Accept H_a
PNB	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–4.83	–1.74 Left -tailed	Reject H_0	Accept H_a
HDFC	$\mu_x = \mu_0$	$\mu_x < \mu_0$	–5.59	–1.74 Left -tailed	Reject H_0	Accept H_a
ICICI	$\mu_x = \mu_0$	$\mu_x > \mu_0$	0.49	1.74 Right -tailed	Accept H_0	Reject H_a

↳ SBI, PNB, and HDFC banks manage higher CDR in the post-crisis phase as against the pre-crisis phase. However, ICICI does not reveal any significant difference in CDR between the two phases.

Banks happen to maintain either a smaller LIQR in the post-crisis phase or there is insignificant difference between the two phases. CUR gives a clearer picture of bank's liquidity position as it shows the bank's ability to cover its short-term debts. It is important to note that it is the public sector banks that have managed higher CUR post-crisis. The business performance of public as well as private sector banks turns out to be better in the post-crisis period. The CDR is also higher for banks with the exception of ICICI. To sum up, although some of the banks in the study have maintained higher liquidity to safeguard the interest of the banks and their depositors in reaction to the financial crisis of 2008, this does not appear to have any major adverse impact on their banking business. The Indian banks are risk-averse, and with prudent measures, they managed to sail through the crisis. They showed greater resistance and robustness, avoiding any major catastrophic effects of the crisis.

Conclusion and Implications

The present study examines the approach of Indian banks towards liquidity management and its likely impact on bank business. The analysis period 2001-02 – 2018-19 has been segregated into two phases : pre-financial crisis period (2001-02 – 2007-08) and post-financial crisis period (2008-09 – 2018-19). The average trend and growth in liquidity and business parameters has been analyzed for selected large public and private sector banks in India. Also, an attempt is made to determine whether the financial ratios have undergone any significant change after the financial crisis, and *t*-test has been used to compare the liquidity and business performance of the selected banks in the post-crisis period vis-à-vis the pre-crisis period.

The trend analysis reveals higher preference for liquidity in the post-financial crisis period. The business performance of banks also increased post-crisis, albeit at a slower speed. The results of *t* - test show that public sector banks maintained higher liquidity post-crisis, but private sector banks did not show any considerable difference in their liquidity preference between the two time phases. On the business front, public as well as private sector banks in the study performed better in the post-crisis period as compared to the pre-crisis period.

The study concludes that Indian banks fundamentally exhibited a preference for higher liquidity subsequent to the financial crisis. At the same time, they managed to keep their business growing despite the slower pace. Prudent business management has enabled Indian banks to avert any major impact of the crisis. Adequate amount

of liquidity is a must as a precautionary step for banks, but idle liquidity does hamper their business in the long-run. Appropriate policy mix and balance of assets and liabilities need to be managed by banks to counter any possible setbacks and financial shocks.

Limitations of the Study and Scope for Future Research

The present study has focused on the assessment of liquidity and business performance for the selected Indian banks. The study could be extended for a bigger sample of banks inclusive of foreign banks. Also, a broader range of financial ratios could be involved to give a better perspective on impact of liquidity on bank business.

Authors' Contribution

Dr. Shradha H. Budhedeo conceived the idea, developed the theoretical background, and prepared the qualitative and quantitative design to undertake the empirical study. Neha Pandya extracted research papers for literature review and performed the computations and analytical calculations. Dr. Shradha H. Budhedeo took lead in writing of the manuscript. Both authors contributed to the interpretation of the results and final version of the manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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