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An Analysis of Maturity Patterns and Interest Rate Risk in Public and Private Banks in India: an Asset Liability Management Approach

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Abstract: ***Asset liability management (ALM) was prioritized by the RBI for banks. In addition to attempting to match assets and liabilities according to maturities and interest rate sensitivity, ALM focuses primarily on the risk management concept. ALM assists banks in identifying the risk that results from an asset and liability mismatch. ALM uses a variety of strategies to assist banks in mitigating risk. It is dependent upon the banks' ability to estimate their risk exposures and manage risk. This paper assesses the interest rate risk and maturity patterns of 4 public and 4 private banks from March 2020 to March 2022. The analytical research and secondary data that form the basis of this study. The information was gathered from the database Indian economy. The approach of data gap analysis was employed for the analysis. The banks' maturity patterns and the effects of various interest rate scenarios on NII are examined in this study. According to the outcome, HDFC Bank exposed itself to interest risk and Canara Bank performed well in selected banks. The banks should emphasize either lowering their RSL or raising their RSA to bring down the negative gap. This study will be helpful for bank management and upcoming researchers to know the banks' profitability.***

Keywords: ***Asset Liability Management, Gap Analysis, Interest Rate Risk, Maturity Patterns, Net Interest Income.***

1. INTRODUCTION

The premise of the ALM was established as a mitigating measure against the risk of financial intermediation. Since the start of the 1970s, ALM has existed as a discipline. When it came to risk analysis, the management first cited the basic gap model, which examines cash flows and

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mismatches or gaps between assets and liabilities. The current rise in the capital markets, improvements in risk analysis theory and technology, and knowledge of financial intermediaries regarding the need and application of ALM are some of the factors propelling the field's rapid development. (jain et al., 2020). Asset-Liability Management (ALM) is one of the key topics on which banks are focusing in the altered financial landscape. Large financial firms' inadequate management of their assets and liabilities is primarily to blame for the current global financial unrest.

The Reserve Bank of India (RBI) maintains constant surveillance of and oversees the banking sector in India. The RBI has released an intricate structure on asset-level management (ALM) that banks in India must adhere to, as one of several guidelines envisioned to foster a robust banking sector. Measures including the earnings and economic value approach, the duration gap analysis, the earnings-at-risk method, the simulation method, and the fund transfer price are included. Furthermore, there are enormous amounts of research studies on the use of different methodologies in ALM. Confronting objectives like returns, liquidity, and solvency can be conquered with a goal programming model and the stimulation analysis technique in an ALM. On the advice of Narshima Committee RBI introduced asset-liability management in India in 1998–1999. RBI declared ALM guidelines in February 1999, and they came into effect on 1 April 1999.

For example, if liabilities have floating interest rates and assets have fixed interest rates, then any increase in interest rates will squeeze banks' net interest margin. Similarly, a bank may experience a liquidity crisis if the maturity of its assets exceeds that of its liabilities. The banks' profitability and liquidity are amalgamated by ALM.

Longevity gap models, which consider more than just the difference between the market values of a bank's rate-sensitive liabilities and rate-sensitive assets in response to interest rate fluctuations, progressively replaced cash flow gap models as financial institutions' experiences with risk management developed.

2. RELATED WORK

Banks are now treating ALM with greater diligence compared to their predecessors in this situation. Effective ALM procedures protect banks' liquidity and stability, which construct their profitability. ALM serves as a tool to mitigate the risk that banks encounter when their RSA<RSL. Interest rate structures or the maturity profile could be to blame for the discrepancy. Any such discrepancy poses a threat to banks. As a result, it is crucial to continuously check the identity of assets and liabilities. Instead of endeavoring to eradicate risk, ALM aims to manage it in an approach that balances risk, liquidity, and profitability (Prasad & Suprabha, 2014). According to (Vij, 2005) an essential strategy for managing interest rate and liquidity risk is asset liability management, which was examined in this study through a case study of four banks, regarding all four of the banks under examination, IDBI was in the leading position when taking into account the cumulative gaps of all the banks. Over time, Citibank had the largest disparity of all the banks. Among the four banks, SBI had the lowest short-term discrepancy. According to (Darshan & Yogashree, 2019) in this study, we analyze the interest rate and liquidity risk in the Axis Bank. The result showed that the bank has a good liquidity position in the long term and a liquidity issue in the short term and medium term. Prompt

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attention to liquidity issues is required. The bank has a strong asset liability management approach and generally performs well in terms of profitability.
(Santhosh & Sharma, 2016) An evaluation of the interest rate risk is attempted in this study for both ICICI and Bank of Baroda during the period 2010 -2014. This analysis revealed that for each of the five financial years, 2009–14, Bank of Baroda had a negative gap. A positive gap has been observed in all five financial years 2009–14 for ICICI Bank, except 2011–12.
(Charumathi, 2008) The objective of the study is to evaluate the interest rate risk that the ICICI Bank assumed during the period 2005-2007. The results showed that interest rate risk was a concern for the bank. The NI decreased in 2004–05 and grew in 2005–06 as a result of negative alterations, and positive changes increased in 2006–2007.
(Guduru, 2022) In this study, seven of the best public banks were chosen to assess NII increases and analyze gap patterns from 2018 to 2021. The result demonstrated that, in the event of rising interest rates, which could cause the bank to experience liquidity problems, the bank had a negative NII value regardless of SBI's asset liability management strategy. To be able to maintain an effective ALM policy, banks must rigorously evaluate the liquidity and repricing dates of their assets and liabilities.

Objectives:
1. To analyze the maturity pattern of selected public and private banks in the Indian banking sector.
2. To analyze the interest rate risk in selected public and private Indian banks.

Hypothesis:
H0- There is no significant Impact of interest rate fluctuation on net interest income.
H1- There is a significant impact of interest rate fluctuation on net interest income.

3. RESEARCH METHODOLOGY

The data is collected from the annual reports of banks, and RBI's website during the period 2020- 2022, and the data is analyzed through gap analysis. For this study analytical research is conducted.
Gap analyze:
RSA - RSL When
RSA>RSL, Positive gap
RSA<RSL, Negative gap
RSA=RSL, Zero gap
Based on this gap position and strategy are worked out to maximize the NII.
The decision to hold a positive gap or a negative will depend on the expectation of the movement of interest rates.

S.NO.	Gap position	Change in interest rate	Change in NII
1.	RSA = RSL	Increase	NO change
2.	RSA = RSL	Decrease	NO change
3.	RSA > RSL	Increase	NII Increase

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4.	RSA > RSL	Decrease	NII Decrease
5.	RSA < RSL	Increase	NII Decrease
6.	RSA < RSL	Decrease	NII Increase

Source: (Bastray & Sheela, 2016)

4. RESULTS AND DISCUSSION

Obj.1. To analyze the maturity pattern of public and private banks

Table 1 Maturity pattern of SBI bank during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on 31 March 2020								
GAP	-109787.8	-44060.5	-143890	-237119.7	-472356.8	-424319.5	-15929880	220309
Cumulative GAP	-109787.8	-153848.3	-297738.3	-534858	-1007214.8	1431543.3	-17361414	--17141105
As of 31 March 2021								
Gap	1436489.9	565988.8	3711665.2	343739.8	-620225.7	33134571	112695.7	-3223841
Cumulative Gap	1436489.9	20022477.9	5714142.9	6057882.7	5437657	38572228	36884923.7	35461082.7
As of 31 March 2022								
Gap	-114227.1	-224267.8	-22603.4	-325330.8	-656626.8	377039.5	109854	1298911
Cumulative Gap	-114227.1	-338494.9	-361098	-686428.8	-1343055.6	-966016.1	-856162.1	-442748.9

Source: annual reports

In Table 1, the maturity pattern of SBI Bank is analyzed. In 2020, very short-term buckets, short-term buckets, and long-term maturity reported a negative gap, which means that the bank had a higher amount of rate-sensitive obligations when compared to the amount of rate-sensitive assets. As a result, it is noted that changes in interest rates were not advantageous tobanks and may have a bad effect on their financial position and liquidity. In 2021, only very short-term maturity buckets indicated a positive gap and both maturity buckets 6-12 months and above 5 years showed a negative gap but overall maturity buckets showed a positive gap. However, the cumulative gap recorded a positive gap in all maturity buckets in 2021. In year

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2023 revealed that both the very short-term and long-term maturity buckets have a positive gap, but the long-term has a negative gap; however, cumulative gaps have reported a negative gap in all maturity buckets.

Table 2 Maturity pattern of PNB bank during the period 2020-2022 (incrore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on March 2020								
GAP	-36666.4	3016	2194.6	-20162.2	-17661.7	78307.2	-123473.5	72671.9
Cumulative GAP	-36666.4	-33650.4	-31455.8	-51618	-69279.7	9028.2	-114445.3	-41827.4
As on 31 March 2021								
Gap	-49219.4	-34859.6	-94170.7	22935.9	28761.6	32695.6	-46468.9	28428.3
Cumulative Gap	-42219.4	-77079	-171249.7	-142313.8	-113552.2	-80856.6	-127325.2	98896.9
As of 31 March 2022								
Gap	-42516.9	10561.6	13110.4	-28609.7	10234.6	-6966.6	-62138.8	20907.9
Cumulative Gap	-42516.9	-31955.3	-19845.3	-48455	-38220.4	-45187	-107325.8	-86418.3

Source: annual reports

PNB Bank's maturity pattern is displayed in Table 2. The bank's liquidity position is not strong in 2020, despite a prosperous year. The cumulative gap in all maturity buckets was negative. The bank had RSA<RSL, indicating a liquidity issue; in very short-term buckets, short-term buckets, and long-term maturity, negative gaps were exhibited. This means that variations in interest rates were not in the bank's optimal interests and might have exerted constraints on the liquidity and profitability of banks. The bank's liquidity situation is resilient in the short term, but there was a negative gap in the long and very short terms of 2021. The bank faces a liquidity issue in 2022 if RSA<RSL prevails in all maturity buckets.

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Table 3 Maturity pattern of CANARA bank during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As of March 2020								
GAP	-22343.7	3147.5	-2058.6	-5089.1	-41834.9	-202735.7	-31036	-66113.2
Cumulative GAP	-22343.7	-19196.2	-21254.8	21762.8	-63597.7	-266333.4	-297369.4	-363479.6
As of 31 March 2021								
Gap	-28988.1	-192.5	-33670.6	-43682.5	-113901.9	-197427.6	-51920.8	305948.7
Cumulative Gap	-28988.1	-290073.6	-323744.2	-367426.7	-481328.6	-678756.2	-730677	-424728.3
As on 31 March 2022								
Gap	-44771.9	-7585.4	-43027.3	-21945.2	-31443.5	-203470.7	19720.2	185534
Cumulative Gap	-44771.9	-52357.3	-95384.6	-117329.8	-148773.3	352244	-332523.8	-146989.8

Source: annual reports

Table 3 displays Canara Bank's maturity profile. 2020 saw a negative gap in very short-term, short-term, and long-term maturity buckets, signifying that the bank had more obligations than assets. In 2021, the bank had a positive gap in the above 5-year maturity buckets, which indicates long-term strong asset liability management. In 2023, the bank had a negative gap in every maturity bucket and a positive gap in 3-5 years and above 5-year maturity buckets.

Table 4 Maturity pattern of Bank of Baroda during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on March 2020								
GAP	-1440.5	-15860.5	-49819.3	-24758	-88253.4	85483.4	150470.2	-65731

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Cumulative GAP	-1440.5	-17301	-67120.3	-91878.3	-180131.7	-94648.3	55821.9	--9909.1
As on 31 March 2021								
Gap	-117000.6	-22705	-45215.3	-72497.2	-72497.2	125946.1	83802.3	-25494.1
Cumulative Gap	-117000.6	-34405.6	-79620.9	-152118.1	-224615.3	-98669.2	-90366.9	-115861
As on 31 March 2022								
Gap	-4453.1	-18883.4	-44884.8	-57223.3	-57214.3	142507.3	36881.7	-82963.4
Cumulative Gap	-4453.1	-23336.5	-68221.3	-125444.6	-182658.9	-40151.6	-3969.9	-86233.3

Source: annual report

In table 4 examines the maturity profile of BOB. In 2020, very short-term buckets, short-term buckets, and long-term maturity exhibited a negative gap, which means that the bank had more RSL as compared to the amount of RSA. Thus, it is worth mentioning that changes in interest rates proved not to be convenient to the bank and possibly put constraints on both the profitability and liquidity of banks. In 2021, the bank had a positive gap in 1-3 years and 3-5 years, but the cumulative gap demonstrated a negative gap in all maturity patterns. In 2023, banks experienced a positive gap in 1-3 years and 3-5 years; nevertheless, cumulative gaps exhibited a negative gap in all maturity patterns, showing the same result (negative cumulative gap) as shown in 2021

Table 5 Maturity pattern of KOTAK bank during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on March 2020								
GAP	-12490.8	-2498.9	1525	-10732.7	-1419.7	-33873.9	21532.3	31862.4
Cumulative GAP	-12490.8	-15039.7	-13514.7	-24247.4	-25662.1	--59536	-38003.7	-6141.3
As on 31 March 2021								

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Gap	23790.8	1082	4742.7	-16017	3095.3	-27353.2	29130.8	32037.9
Cumulative Gap	23790.8	24872.8	29615.5	13598.5	16693.8	-10659.7	18471.1	50509
As on 31 March 2022								
Gap	-34652	2899.8	4180.1	-13079.3	10836.1	-22126.6	29233.2	44940.5
Cumulative Gap	-34652	-31752.2	-27572.1	-40651.4	-29815.3	-51941.9	-22708.7	22231.8

Source: annual reports

Table 5 presents the maturity pattern of Kotak Bank in 2020, with the short-term bucket recording the highest negative gap. In 2021, the bank had a negative gap in only 3-6 months and 1-3 years buckets. The bank has a profitable and liquidity position in 2021 as compared to 2020 and 2022. In 2022, the maturity buckets 1–14 days, 3-6 months, and 1-3 months showed a negative gap; however, all maturity buckets exhibited a positive gap, and the cumulative gap demonstrated that all maturity buckets except those above 5 years showed a negative gap.

Table 6 Maturity pattern of ICICI Bank during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on March 2020								
GAP	-8265.5	7856.1	8173.7	2425.3	13243.7	86100.7	-103413.6	-42134.8
Cumulative GAP	-8265.5	-409.4	7764.3	10189.6	23433.3	109534	6121	-36013.8
As on 31 March 2021								
Gap	14641.6	1036.2	27563.5	30027.5	32037	111133.9	-130274.4	-94801
Cumulative Gap	14641.6	15677.8	43241.3	73268.8	105305.8	216439.4	86165	-8636
As on 31 March 2022								

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Gap	33046.4	6887.6	29752.8	23827.1	43044.4	119173	-188660	-110221
Cumulative Gap	33046.4	39934	69687.8	93514.9	136559.3	162173	-26442.6	-83778.4

Source: annual reports

ICICI Bank's maturity pattern is examined in this table. In 2020, the bank had an overall positive maturity bucket but had a negative gap in 1–14 days, 3-5 years, and above 5 years. The bank may face an unprofitable situation in the long term. In 2021, the bank had a strong financial position in very short-term and short-term buckets; they have a positive gap and the cumulative gap has an overall positive gap. In 2022, the bank maintained the same strategy used in 2021, maintaining a good financial position in very short-term and short-term buckets. 2021 and 2022 reported the same result; both have a negative gap in the 3-5 year and above 5-year maturity buckets.

Table 7 Maturity pattern of Indusland Bank during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on March 2020								
GAP	360.9	-1576.1	-16603.2	-4403.6	-2069.2	22874.5	6140.7	-9594.5
Cumulative GAP	360.9	-1215.2	-15388	-21006.8	-23076	-201.5	5939.2	-3655.3
As on 31 March 2021								
Gap	1184.4	-5452.5	-4653.5	-10117	-8335.5	14247.3	-2387	-23364.9
Cumulative Gap	1184.4	-4268.1	-8921.6	-190386	-27374.1	-13099.8	-15486.8	-38851.7
As on 31 March 2022								
Gap	7177.8	-2282.9	-1633.2	-64.5	-2039.2	12797.6	-2549.9	-42388.2

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Cumulative Gap	7177.8	4894.9	3261.7	3197.2	1158	13955.6	16505.5	-25882.7

Source: annual reports

This table represents the maturity pattern of the IndusInd Bank. In 2020 in very short-term buckets, short-term buckets, and long-term maturity, there was a negative gap. In 2021, the bank has an overall negative gap. In 2022, the bank has an overall negative gap but a positive gap in only 1–14 days and 1-3 years. Instead, the cumulative gap is overall positive.

Table 8 Maturity pattern of HDFC bank during the period 2020-2022 (in crore)

Maturity profile	**Very Short-term maturity**			**Short-term maturity**		**Long term maturity**		
	1-14 Days	15-28 Days	29-3 Months	3-6 Months	6-12 months	1-3 years	3-5 years	Above 5 years
As on March 2020								
GAP	129708.3	12136.4	35565	34293	2300350.6	41910	867118	-162842.2
Cumulative GAP	129708.3	141844.7	177409.7	211702.7	2512053.3	2553963.3	2640675.1	2477832.9
As on 31 March 2021								
Gap	-143224.5	16476.4	20195.4	23892.7	30778.7	56983.7	109514.7	178758.6
Cumulative Gap	-143224.5	-126748.1	-106552.7	-82660	-51881.3	5101.4	114616.1	293374.7
As on 31 March 2022								
Gap	28750.6	-471	8200.3	23740	-1163.5	2216.2	164733	-146127.7
Cumulative Gap	28750.6	28279	36479.3	60219.3	59055.8	61272	226005	79877.3

Source: annual reports

The maturity profile of HDFC Bank is presented in this table. In 2020, the bank has a positive gap in every bucket except those above 5 years, although the cumulative gap is positive in every bucket. In 2021, 1–14 days have a negative gap; otherwise, there is a positive gap in all maturity buckets. Aside from the 15–28 day range and the period over 5 years, banks have an overall positive gap in 2023; however, the cumulative gap is positive across all maturity buckets. The result exhibited that HDFC and ICICI Bank performed well.

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Obj.2 To analyze the interest rate risk sensitivity of public and private banks.
The impact of two distinct interest rate scenarios on the bank's net interest revenue has been taken into consideration. This type of study is crucial for the bank to adapt its asset-liability profile to mitigate the detrimental impact of anticipated interest scenarios on its NII.
NII = Interest Income- Interest Expenses
Change of NII = Gap x (Change in interest rate)

The Two Different Scenarios Analyzed are
Scenario 1: Interest rates decrease by 50 basis points.
Scenario 2: Interest rates increase by 100 basis points.

Table 9 When Interest rates decrease by 50 basis points on Public Banks (in crore)

Time buckets	**1-14 Days**	**15-28 days**	**28-3 months**	**3-6 months**	**6-1 year months**	**1-3 year**	**3-5 year**	**Over 5 years**
SBI bank								
year	Change of NII = Gap x (Change in interest rate)							
March 2020	54893..9	22030.2	71945	118559.9	236178	21215.9	796494	-110154
March 2021	-718244.98	-282994	185532.6	-171869.9	-310112.8	-165672.8	-56347.8	161192
March2022	57113.5	112133.9	1130.1	162665.4	-328313.4	-18851.7	-5492.7	-64945.5
PNB bank								
year								
March 2020	18333.2	-1508	-1097.3	10081.1	-8330.5	-39153.6	6171.7	-36335.9
March 2021	246097	17429.8	47085.3	-11467.9	-14350.8	-163478	23234.4	14214.1
March 2022	22608.4	-5280.8	-6555.2	14304.8	5117.3	34833	31159.4	-19453.9
Canara bank								
year								

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March 2020	11171.5	-1573.7	1029.3	2544.5	20917.4	101366.7	15518	33056.6
March 2021	1449.05	96.25	16835.3	21841.3	56950.9	9872.3	25960	-152974.3
March2022	22385.9	3792.7	21513.6	10972.6	15722.1	101735.5	-9860.1	9276.5
Bank of Baroda								
year								
March 2020	720.25	7930.25	24909.6	12379	44126.7	-44241.7	-75235.1	32865.5
March 2021	5850.3	11352.5	22607.6	36248.7	36248.7	-62973.05	-19401.1	12747.05
March2022	2226.5	9441.7	22442.4	28611.6	28607.1	-71253.6	-18440.5	41481.7

The interest rate sensitivity of five public banks is examined in this table. According to data from SBI Bank, short-term maturity buckets had a favorable effect on net interest income (NII) when interest rates rose by 50 basis points in 2020 and 2022. It indicates that while the bank has had a strong financial position over the last three years, it has had a detrimental long-term influence on NII. The greatest decline in NII occurred in 2021, falling by 71824.4 cr. In 2020, the bank had a robust investment portfolio strategy. PNB Bank exposed interest risk in 2020 since the bank lacked a solid plan. The bank is in excellent economic condition as of March 2022.

In all three years, CANARA Bank's extremely short-term maturity buckets have had an uplifting impact on NII. In comparison to all five banks, the results showed that the bank had an excellent asset-liability management approach for all three years. Both 2021 and 2022 indicated that banks had a positive impact on NII from extremely short-term and short-term maturity buckets. BOB had a favorable strategy in the very short-term and short-term maturity buckets. In all three years, the NII has been positively impacted by both of the aforementioned maturity buckets. However, in the long-term buckets, the bank had the largest negative gap on NII by 75235.1cr in 2020.

Table 10 Interest rate increases by 100 points (in crore)

Time buckets	**1-14 Days**	**15-28 days**	**28-3 months**	**3 -6 months**	**6 months -1 year**	**1-3 years**	**3-5 years**	**Over 5 years**
SBI bank								
year	Change of NII = Gap x (Change in interest rate)							

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March 2020	-109787.8	-44060.5	-143890	-237119.7	-472356.8	-424319.5	-1592880	220309
March 2021	1436489.9	565988.8	3711665.2	343739.8	-620225.7	33134571	112695.7	-3223841
March 2022	114227.1	224267.8	-22603.4	-325330.8	-656626.8	377039.5	109854	1298911
PNB Bank								
year								
March 2020	-36666.4	3016	2194.6	-209162.2	-17661.7	78307.2	-123473.5	72671.9
March 2021	-49219.4	-34859.6	-94170.7	22935.9	28761.6	32695.6	-46468.9	28428.3
March 2022	-42516.7	10561.6	13110.4	28609.7	10234.6	-6966.6	-62138.8	20907.9
CANARA bank								
year								
March 2020	-22343.7	3147.5	-2058.6	-5089.1	-41834.9	-202735.7	-31036	-66113.2
March 2021	-28988.1	-192.5	-33670.6	-43682.5	-113901.9	-197427.6	-51920.8	305948.7
March 2022	-44771.9	-7585.4	-43027.3	-21945.2	-31443.5	-203470.7	19720.2	185534
BANK OF BARODA								
year								
March 2020	-1440.5	-15860.5	-49819.3	-24758	-88253.4	85483.4	150470.2	-65731
March 2021	-11700.6	-22705	-45215.3	-72497.2	-72497.2	125946.1	83802.3	-25494.1
March 2022	-4453.1	-18883.4	-44884.8	-57223.3	-57214.3	142507.3	36881.7	-82963.4

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In this table of public banks, interest rate sensitivity is analyzed at +100 basis points. When the interest rate rose by 100 basis points, the interest risk was not exposed. The Banks' strategy was able to face difficulties when interest rates fluctuated.

Table 11 When Interest rates decrease by 50 basis points on Private Bank (in crore)

Time buckets	**1-14 Days**	**15-28 days**	**28-3 months**	**3 -6 months**	**6 months -1 year**	**1-3 years**	**3-5 years**	**Over 5 years**
Kotak bank								
year	Change of NII = Gap x (Change in interest rate)							
March 2020	6345.4	1249.4	-762.5	5366	709.8	16936.9	-10766	-15931.2
March 2021	-1195.4	-541	-2371.3	8008.5	-1547.6	13676.6	-14565	-16013.9
March2022	17326	-1449.7	-2090.05	5189.6	-5418.05	-11063.3	11063.3	-22470.2
ICICI bank								
year								
March 2020	4132.7	-3928.05	-4086.8	-1226.1	-6621.8	-43050.3	1706.8	21067.4
March 2021	-7320.8	-518.1	-13781.7	-15013.7	-16018.5	-55566.9	65137.2	47400.5
March2022	-16523.2	-3443.8	-13376.4	-11913.5	-2152.2	-59586.5	94330	55110.5
Induskand bank								
year								
March 2020	-180.4	78,05	8301.6	2201.8	1034.5	-11437.2	-3070.3	4797.2
March 2021	-592.2	2726.2	2326.7	5058.5	4167.7	-7136	1193.5	11682.4
March2022	-358.8	1141.4	816.6	32.25	1019.6	-6398.8	1274.9	21194.1

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HDFC bank								
year								
March 2020	-64854.1	-6068.2	-17782.5	-17146.5	-1150175.3	-20595	-43355.9	81421.1
March 2021	71612.2	-8238.2	-10097.7	-11946.3	-15389.3	-28491.8	-54757.3	-89379.4
March2022	-14375.3	370.5	-4100.1	-11870	581.7	-1108.1	-82366.5	73063.8

This table examines the interest rate risk sensitivity of five private banks. Of them, Kotak Bank had the largest long-term negative impact on net interest income (NII) in 2021. Long-term maturity indicated that the bank had the highest interest rate risk exposure, and NII dropped with a long-term maturity of 16013.9. In contrast, short-term maturity has a positive impact on NII. It indicated that the Bank has a robust investment portfolio with a short-term maturity. ICICI Bank demonstrated that interest rate variations in 2020, 2021, and 2022 all had a positive effect on net interest income (NII) in long-term maturity buckets. This indicates that the bank has a prudent asset-liability investment portfolio strategy in long-term maturity buckets. However, in 2022, short-term maturity buckets demonstrated a negative impact on NII, with NII anticipated to decline by 59585.5 crore. The Industrial Bank's NII reached 21194.1cr in 2022, with the largest growth observed in long-term maturity buckets between 2021 and 2022. The three years of data from HDFC Bank show how interest rate fluctuations have a detrimental effect on NII. The asset liability management approach of HDFC Bank is inadequate.

Table 12 Interest rates increase by 100 basis points (in crore)

Time buckets	**1-14 Days**	**15-28 days**	**28-3 months**	**3 -6 months**	**6 months -1 year**	**1-3 years**	**3-5 years**	**Over 5 years**
Kotak bank								
year	Change of NII = Gap x (Change in interest rate)							
March 2020	-12490.8	-2498.9	1525	-10732.7	-1419.7	-33873.9	21532.3	31862.4
March 2021	23790.8	1082	4742.7	-16017	3095.3	-27353.2	29130.8	32037.9

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March 2022	-34652	2899.8	4180.1	-13079.3	10836.1	-22126.6	29233.2	44940.5
ICICI bank								
year								
March 2020	-8265.5	7856.1	8173.7	2425.3	13243.7	86100.7	-103413.6	-42134.8
March 2021	14641.6	1036.2	27563.5	30027.5	32037	111133.9	-130274.4	-94801
March2022	33046.4	6887.6	29752.8	23827.1	43044.4	119173	-188660	-110221
Indusland bank								
year								
March 2020	360.9	-1576.1	-16603.2	-4403.6	-2069.2	22874.5	6140.7	-9594.5
March 2021	1184.4	-5452.5	-4653.5	-10117	-8335.5	14247.3	-2387	-23364.9
March 2022	7177.8	-2282.9	-1633.2	-64.5	-2039.2	12797.6	-2549.9	-42388.2
HDFC bank								
year								
March 2020	129708.3	12136.4	35565	34293	2300350.6	41910	86711.8	-162842.2
March 2021	-143224.5	16476.4	20195.4	23892.7	30778.7	56983.7	109514.7	178758.6
March2022	28750.6	-471	8200.3	23740	-1163.5	2216.2	164733	-146127.7

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In this table, private banks, interest rate sensitivity was analyzed at +100 basis points. When the interest rate rose by 100 basis points, the interest risk was not exposed. The Banks' strategy was able to face difficulties when interest rates fluctuated.

5. CONCLUSION

The banks should keep a careful eye on the gap analysis, a robust asset liability management strategy, and a well-diversified investment portfolio. When analyzing interest rate risk, public banks performed very well as compared to private banks. Canara Bank outperformed all other public banks, while HDFC Bank performed poorly in the private sector. It predicts a shift in the interest rate scenario, which could cause obstacles to the financial stability and sustainability of banks. To prevent the NII from being hampered by interest rate fluctuations, the bank should initiate measures.

In this study, we selected only 8 banks for the period 2019–2022. The data is analyzed through the gap analysis technique. For further research, other techniques can be used, e.g., duration analysis, VaR techniques, simulation techniques, etc., and the period can be changed.

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