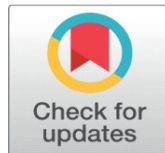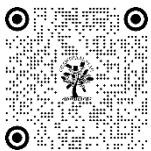# A COMPARATIVE STUDY OF ASSET-LIABILITY MANAGEMENT OF SELECTED BANKING COMPANIES IN INDIA

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ABSTRACT

In developing countries like India, the regulatory framework governing banks has historically constrained competition within the financial system. However, significant changes occurred following the liberalization process and first-generation reforms initiated during 1991-92, resulting in a more intricate risk profile for banks, which was later followed by the emergence of new investment opportunities and technologies, including blockchain and cryptocurrencies, which further complicated the financial landscape. This transformation affects banks' liquidity positions and necessitates reassessing asset and liability management strategies. This study examines and compares the asset-liability management (ALM) practices of the State Bank of India (SBI) and HDFC Bank over five financial years (2019-2024). The methodology thoroughly analyses secondary data from annual reports, utilizing statistical tools such as ratio analysis and T-tests. The findings reveal that while both banks exhibit commendable ALM practices, HDFC Bank stands out as the leader in asset and liability management, demonstrating superior performance in several critical areas. The study's findings highlight the need for continuous innovation and adaptation in ALM practices to ensure long-term viability and competitiveness in the ever-evolving financial environment.

Keywords: Asset-Liability Management, ALM, Risk Sensitivity, Risk Management, Asset Management, Banking, Liability

JEL Code: E43, E58, G10, G21, G30, L25

1. INTRODUCTION

In developing countries, including India, the regulatory framework governing the operations and oversight of banks and financial institutions has historically limited competition within the financial system. The Reserve Bank of India predominantly regulated interest rates; balance sheet management did not pose any significant challenges because income was recognised on an accrual basis, and off-balance-sheet exposure for banks was minimal.

The banking sector underwent significant changes only after the liberalisation process initiated in 1991. With the Integration of domestic markets with external markets, the risk profile of banks became even more complex. Banks started functioning in a relatively deregulated environment, requiring them to independently set interest rates on deposits and loans in domestic and foreign currencies. This process is done dynamically, adapting to changing market conditions. With the increasing volatility in the domestic interest rates and foreign exchange rates, banks started operating under immense pressure to find a good balance between spreads, profitability and long-term viability.

Asset Liability Management (ALM) has become an essential strategic tool for banks in managing the complex array of risks inherent in the contemporary financial environment. Banks are exposed to credit risk, which involves the potential default of borrowers failing to meet their obligations, impacting their asset quality and profitability. Interest rate risk is another critical concern arising from fluctuations in market interest rates that can affect the bank's net interest margins and the economic value of its assets and liabilities. Additionally, operational risk-encompassing failures in internal processes, systems, or external events such as cyber-attacks—can lead to significant financial losses and reputational damage.

Asset Liability Management (ALM) in banks is crucial in today's rapidly evolving financial landscape due to the advent of new investment avenues and technologies. The emergence of blockchain technology and cryptocurrencies has introduced transformative changes in mobilising savings and the overall financial landscape. Blockchain's decentralised ledger system enables peer-to-peer transactions without the need for traditional intermediaries like banks, potentially reducing the reliance on conventional banking services for savings and investments. Cryptocurrencies offer alternative investment avenues, attracting a segment of savers who might otherwise deposit funds with banks. This shift can impact banks' liquidity positions and demands a recalibration of how they manage their asset and liability portfolios. As financial technology (FinTech) continues its meteoric rise, banks face new opportunities and challenges that necessitate a thorough and strategic approach to managing their liabilities and assets. Emerging technologies, such as Artificial Intelligence (AI), Blockchain, and Big Data, have transformed how banks operate and interact with customers, pushing them to innovate and stay competitive.

By proactively adopting robust ALM strategies, banks can safeguard against traditional financial risks and position themselves to capitalise on new opportunities presented by technological advancements. This includes developing hybrid products that bridge conventional banking and digital assets attracting and retaining clients interested in traditional and emerging financial services.

2. CONCEPTUAL FRAMEWORK OF ALM

ALM is defined as "managing both assets and liabilities simultaneously to minimize the adverse impact of interest rate movement, provide liquidity and enhance the market value of equity. It is also defined as a "planning procedure which accounts for all assets and liabilities of a bank by rate, amount and maturity."

This concept brings down broad guidelines regarding interest rate and liquidity risk management systems in banks, forming part of the Asset-Liability Management (ALM) function. The initial focus of the ALM function would be to enforce the risk management discipline, viz., managing business after assessing the risks involved. The objective of a sound risk management program should be that these programs will evolve into strategic tools for bank management.

ALM Process

The ALM process Rests on three pillars:

1) **ALM information systems**
   - Management Information System
   - Information availability, accuracy, adequacy and expediency

2) **ALM organisation**
   - Structure and responsibilities
   - Level of top management involvement

3) **ALM process**
   - Risk parameters
   - Risk identification
   - Risk measurement
   - Risk management
   - Risk policies and tolerance levels

1) ALM information systems

Information is the key to the ALM process. Considering the large network of branches and the lack of an adequate system to collect information required for ALM which analyses information on the basis of residual maturity and behavioural pattern it will take time for banks in the present state to get the requisite information. The problem of ALM needs to be addressed by following an ABC approach i.e. analysing the behaviour of asset and liability products in the top branches accounting for significant business and then making rational assumptions about the way in which assets and liabilities would behave in other branches. In respect of foreign exchange, investment portfolio and money market operations, in view of the centralised nature of the functions, it would be much easier to collect reliable information. The data and assumptions can then be refined over time as the bank management gains experience in conducting business within an ALM framework. The spread of computerisation will also help banks in accessing data.

2) ALM organisation

- The Board should have overall responsibility for management of risks and should decide the risk management policy of the bank and set limits for liquidity, interest rate, foreign exchange and equity price risks.

- The Asset - Liability Committee (ALCO) consisting of the bank's senior management including CEO should be responsible for ensuring adherence to the limits set by the Board as well as for deciding the business strategy of the bank (on the assets and liabilities sides) in line with the bank's budget and decided risk management objectives.

- The ALM desk consisting of operating staff should be responsible for analysing, monitoring and reporting the risk profiles to the ALCO. The staff should also prepare forecasts (simulations) showing the effects of various possible changes in market conditions related to the balance sheet and recommend the action needed to adhere to bank's internal limits.

The ALCO is a decision-making unit responsible for balance sheet planning from risk - return perspective including the strategic management of interest rate and liquidity risks. Each bank will have to decide on the role of its ALCO, its responsibility as also the decisions to be taken by it. The business and risk management strategy of the bank should ensure that the bank operates within the limits / parameters set by the Board. The business issues that an ALCO would consider, inter alia, will include product pricing for both deposits and advances, desired maturity profile of the incremental assets and liabilities, etc. In addition to monitoring the risk levels of the bank, the ALCO should review the results of and progress in implementation of the decisions made in the previous meetings. The ALCO would also articulate the current interest rate view of the bank and base its decisions for future business strategy on this view. In respect of the funding policy, for instance, its responsibility would be to decide on source and mix of liabilities or sale of assets. Towards this end, it will have to develop a view on future direction of interest rate movements and decide on a funding mix between fixed vs floating rate funds, wholesale vs retail deposits, money market vs capital market funding, domestic vs foreign currency funding, etc. Individual banks will have to decide the frequency for holding their ALCO meetings.

Composition of ALCO

The size (number of members) of ALCO would depend on the size of each institution, business mix and organizational complexity. To ensure commitment of the Top Management, the CEO/CMD or ED should head the Committee. The Chiefs of Investment, Credit, Funds Management / Treasury (forex and domestic), International Banking and Economic Research can be members of the Committee. In addition, the Head of the Information Technology Division should also be an invitee for building up of MIS and related computerization. Some banks may even have sub-committees.

3) ALM process

The scope of ALM function can be described as follows: ·

- Liquidity risk management
- Management of market risks (including Interest Rate Risk)
- Funding and capital planning
- Profit planning and growth projection
- Trading risk management

3. PRESENT STATE OF KNOWLEDGE

The empirical investigation of the interdependency between banks' assets and liability accounts was pioneered by Fraser et al. (1974). They used CCA as it allows measuring simultaneous associations between two sets of variables with multiple inter-correlated outcome variables. In an attempt to measure the degree of correlation and integration between more than one dependent variable and independent variables simultaneously, the most important determinants of bank performance were the bank's cost, deposits and loan composition.

The attention has been directed to the interest rate mismatch between assets and liabilities (Simonson et al., 1983). The unbalanced structure based on the maturities of assets and liabilities is because of financing interest-sensitive assets with long-term liabilities, financing long-term loans with short-term deposits or using financial assets such as accounts receivables and real-estate assets as collateral for short-term loans and mortgage loans. Obben (1992) and Jain and Gupta (2004) examined the ALM structures to manage liquidity, increase profitability and control interest rate risk. The investigation of ALM patterns has been extended to examine the dimensions of bank size (DeYoung & Yom, 2008) and bank type (Memmel & Schertler, 2012). Kosmidou and Zopounidis (2004) apply goal programming for banks in the context of ALM. They combined optimisation and simulation procedures to generate optimal asset allocation solutions for interest rate scenarios.

Eatman and Sealey (1979) developed a multi-objective linear programming model for commercial bank balance sheet management that considers profitability and solvency objectives that are subject to policy and managerial constraints.

Giokas and Vassiloglou (1991) developed a goal programming model for bank asset and liability management. They argued that apart from the goal of maximizing revenues, management also needs to meet other goals including minimizing risks involved in the allocation of the bank's capital, retaining its market share, increasing the size of its deposits and loans, and the like

Kusy and Ziemba (1986) employed a multi-period stochastic linear programming with the capability to model ALM in banks while maintaining computational tractability for realistically sized problems. Their results point out that ALM is theoretically and operationally superior to the deterministic linear programming model, and the efforts required for implementation are comparable with the deterministic model.

Mulvey and Ziemba (1998) present a more detailed overview of various assets and liability modelling techniques, including models for individuals and financial institutions such as banks and insurance companies

In an emerging market economy like India, Dash and Pathak (2016) showed that ALM was efficient in IBs and generated maximum profitability. Jaiswal (2010) found strong interdependencies between the two sides of the balance sheet, with a decreasing trend over time due to exposure to off-balance sheet transactions. The mismatching problem between the two sides of the bank's balance sheet encouraged Singh (2013) and Karthigeyan et al. (2013) to study the ALM behaviour of Indian commercial banks

(Ema et al., 2023) through a literature survey conducted on 25 Indonesian banks highlights the importance of ALMA in optimizing bank balance sheets and enhancing liquidity management, which is crucial for banks to remain competitive in the financial market.

4. NEED OF THE STUDY

As economic uncertainties, regulatory changes, and technological advancements reshape the banking sector, robust ALM practices are crucial for risk management, compliance, and financial stability. Banks can navigate these challenges through innovative research, optimize profitability, and enhance overall performance, ensuring resilience and competitiveness in an ever-evolving environment.

Thus, ALM is crucial, and this research examines asset-liability management of the top public and private sector bank, namely State Bank of India and HDFC Bank.

5. RESEARCH GAP

Prior studies have been conducted on Asset-Liability Management in various banks. Still, very few studies have been conducted comparing the Asset-liability management of the following banks & eventually, no study has been conducted covering recent years & determining which is best among them.

6. OBJECTIVES

- To Analyze the Assets- Liability Management of selected banks
- To Compare the Assets-Liability management of selected banks

7. MATERIAL AND METHODS

- **Sample size**: State Bank of India, HDFC Bank
- **Sample selection criteria:** Highest Market Cap. as of 1st April 2019 at NSE of public and private sector banks.
- **Duration of the study:** Five financial years viz. 2019-20, 2020-21, 2021-22, 2022-23 & 2023-24
- **Data collection:** This research is based on secondary data taken from the annual reports of SBI & HDFC bank, published and unpublished sources, web data, journals, newspapers, magazines, etc.
- **Statistical tools:** Ratio Analysis, Descriptive Statistics, T-test
- **Presentation tools:** For the presentation of the data, tables, bar graphs etc., are used.

8. ANALYSIS & INTERPRETATION
8.1. ANALYSIS OF RATIOS OF STATE BANK OF INDIA YEARLY
8.1.1. THE PERFORMANCE OF PROFITABILITY RATIOS IN STATE BANK OF INDIA:

Table No.1.1: Profitability Ratios

Year	Interest Spread Ratio	Return on Equity Ratio	Net Profit Margin	Adj. Cash Margin
2019-20	6.59	6.95	5.63	5.88
2020-21	7.06	8.86	7.69	7.68
2021-22	6.62	12.33	11.49	11.05
2022-23	6.58	16.75	15.12	14.51
2023-24	6.58	17.46	14.71	13.80
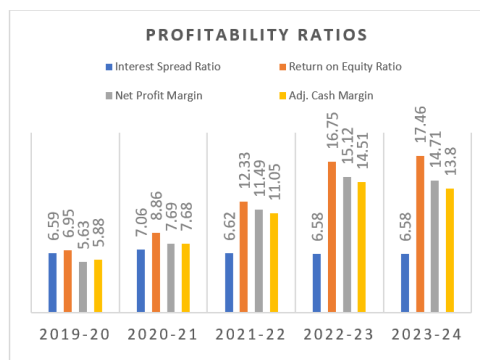
Figure 1.2: Profit and Loss Account Ratio

Interpretation:

Table 1.1 displays State Bank's profitability ratios, with overall interest spread and return on equity values of 33.43 and 62.35, respectively. Net profit margin and adjusted cash margin values were 54.64 and 52.92, respectively. The interest spread ratio remained almost constant from 6.59% to 6.58%, while the return on equity increased drastically from 6.95% to 17.46%; the net profit margin and adjusted cash margin also improved severely from 5.63% to 14.71% and 5.58% to 13.8% from 2019-20 to 2023-24. The overall profitability ratios indicate good health.

8.1.2. THE PERFORMANCE OF PROFIT AND LOSS ACCOUNT RATIOS OF ICICI BANK:

Table No 1.2: Profit and Loss Account Ratio

Year	Int. Expended to Int. Earned	Other Income to Total Income	Operating Exp. To Total Income
2019-20	61.88	14.95	38.08
2020-21	58.25	14.09	39.96
2021-22	56.18	12.84	36.26
2022-23	56.39	9.93	30.09
2023-24	61.49	11.07	27.08
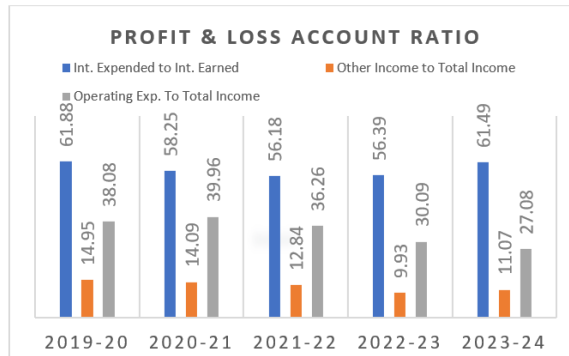
Figure 1.2 Profit and Loss Account Ratio

Interpretation:

Table 1.2 displays the State Bank's Profit & Loss Account ratios, with overall interest expended to interest earned, other income to total income and Operating expenses to total Income, recorded the mean value of 58.84, 12.58 & 34.29, respectively. Interest Expended to Interest Earned Ratio remained almost consistent from 61.88 to 61.49. At the same time, Other Income to Total Income & Operating Expenses to Total Income shows a decreasing trend with the value from 14.95 to 11.07 and 38.08 to 27.08 from 2019-20 to 2023-24, respectively.

8.1.3. THE PERFORMANCE OF BALANCE SHEET RATIOS OF ICICI BANK:

Table 1.3: Balance Sheet Ratios

Year	Capital Adequacy Ratio	Current Ratio	Quick Ratio
2019-20	13.13	0.09	17.05
2020-21	13.74	0.09	16.56
2021-22	13.85	0.08	14.49
2022-23	14.68	0.08	14.11
2023-24	14.28	0.09	15.17

Figure 1.3: Balance Sheet Ratios

Interpretation:

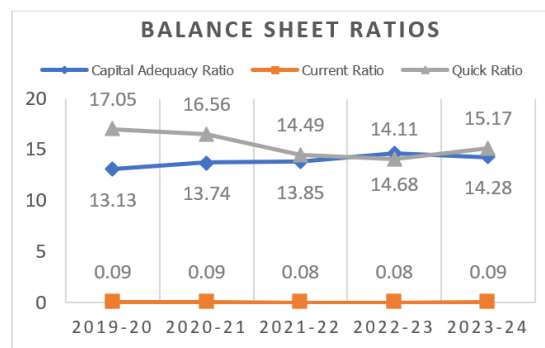Table No. 1.3 depicts the performance of the Balance Sheet Ratios of State Banks computed into three categories: Capital Adequacy Ratio, Current Ratio, Quick Ratio, etc. The overall capital adequacy ratio, current ratio, and quick ratio recorded the mean value of 13.97, 0.09 and 15.48, respectively. The capital adequacy ratio shows an increasing trend from 13.13 to 14.28. Further, the current ratio remained constant while the quick ratio showed a decreasing trend with the value from 17.05 to 15.17 from 2019-20 to 2023-24, respectively.

8.1.4. THE PERFORMANCE OF DEBT COVERAGE RATIO IN KOTAK MAHINDRA BANK

Table No.1.4: Debt Coverage Ratio

Year	Credit Deposit Ratio	Cash Deposit Ratio	Total Debt to Owner Fund
2019-20	73.32	5.59	17.08
2020-21	68.97	5.49	17.80
2021-22	67.03	6.09	17.44
2022-23	70.01	5.96	16.40
2023-24	73.91	5.06	15.77
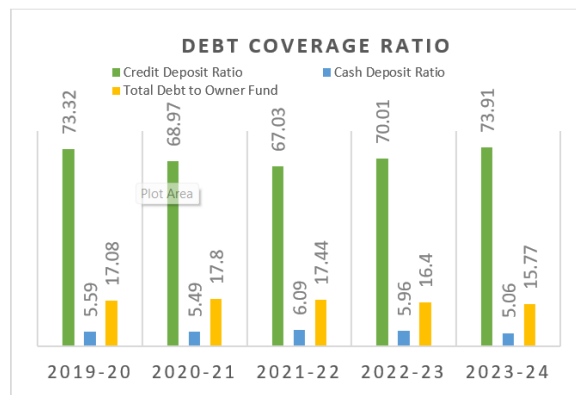
Figure 1.4: Debt Coverage Ratio

Interpretation:

Table 1.4 depicts the performance of Debt Coverage Ratios of the State Bank of India. The overall credit deposit ratio and cash deposit ratio, as well as the total debt to owner fund, recorded a value of 353.24, 28.19 and 84.49, respectively. In the credit & cash deposit ratio context, the values show an irregular trend from 2019-20 to 2023-24, respectively. Further, the Total Debt to Owner fund shows a decreasing trend and recorded a value of 17.08 to 15.77 from 2019-20 to 2023-24.

8.2. ANALYSIS OF RATIOS OF HDFC BANK YEARLY
8.2.1. THE PERFORMANCE OF PROFITABILITY RATIOS IN HDFC BANK:

Table No.2.1: Profitability Ratios

Year	Interest Spread ratio	Return on Equity Ratio	Net Profit Margin	Adj. Cash Margin
2019-20	7.02	15.35	22.86	19.88
2020-21	6.86	15.27	25.74	22.19
2021-22	6.14	15.39	28.93	24.52
2022-23	6.52	15.74	27.29	24.04
2023-24	5.47	14.71	24.92	20.68
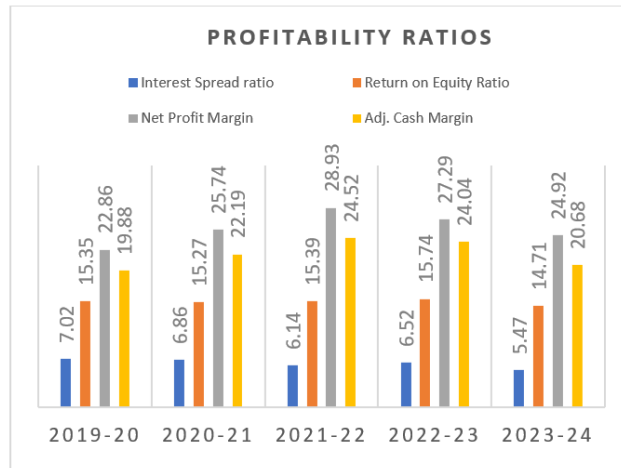
Figure 2.1: Profitability Ratios

Interpretation:

Table 2.1 represents the performance of the profitability ratios of the HDFC Bank. The overall interest spread and return on equity were recorded at 32.01 and 76.46, respectively. The overall net profit margin followed this, and the adjusted return on net worth was recorded at 129.74 and 111.31, respectively. The interest spread ratio decreased rapidly from 7.02 to 5.47, while the return to equity ratio showed a slight downtrend from 15.35 to 14.71. Net profit margin & adj. cash margin recorded irregular trends from 2019-20 to 2023-34, respectively.

8.2.2. THE PERFORMANCE OF PROFIT AND LOSS ACCOUNT RATIOS OF HDFC BANK:

Table No.2.2: Profit and Loss Account Ratio

Year	Int. Expended to Int. Earned	Other Income to Total Income	Operating Exp. To Total Income
2019-20	51.06	16.85	30.16
2020-21	46.32	17.26	32.26
2021-22	43.63	18.76	32.37
2022-23	46.26	16.19	29.74
2023-24	57.99	16.01	27.33
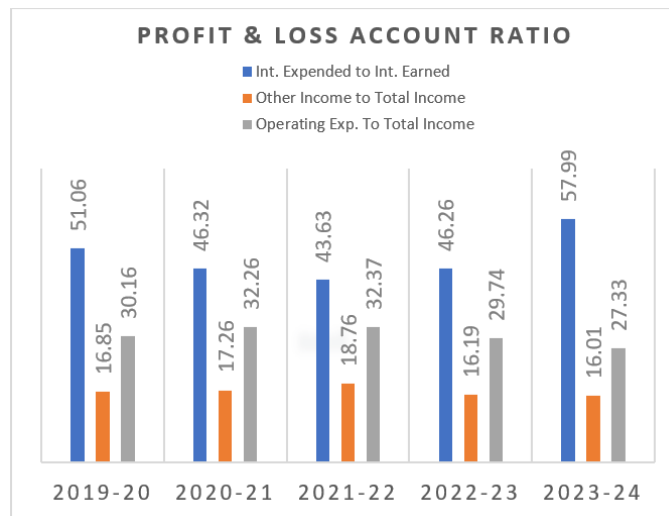
Figure 2.2: Profit and Loss Account Ratio

Interpretation:

Table 2.2 presents HDFC Bank's Profit and Loss Account performance metrics. The ratios for the overall interest expended to interest earned, other income to total income, and operating expenses to total income were recorded at 245.26, 85.07, and 151.86, respectively. The interest expended to interest earned ratio exhibits an upward trend, increasing from 51.06 in 2019-20 to 57.99 in 2023-24. In contrast, the other income to total income and operating expenses to total income depict a downtrend from 16.85 to 16.01 & 30.16 to 27.33 from 2019-20 to 2023-24, respectively

8.2.3. THE PERFORMANCE OF BALANCE SHEET RATIOS OF HDFC BANK:

Table No.2.3: Balance Sheet Ratios

Year	Capital Adequacy Ratio	Current Ratio	Quick Ratio
2019-20	18.52	0.04	16.62
2020-21	18.79	0.03	17.58
2021-22	18.90	0.05	18.77
2022-23	19.26	0.07	19.48
2023-24	18.80	0.08	21.14
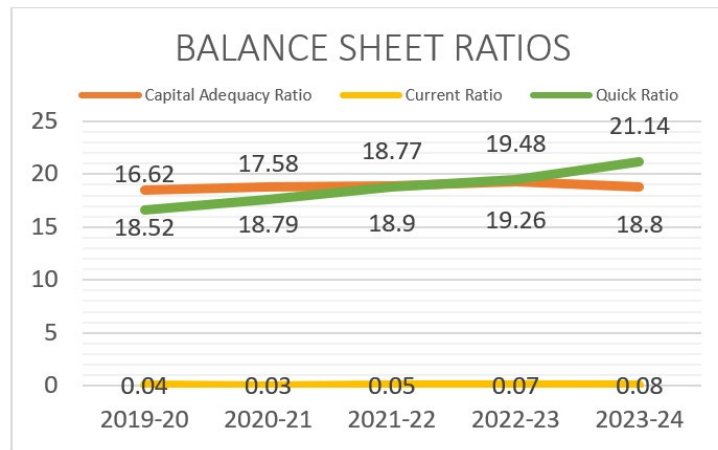
**Figure2.3:** Balance Sheet Ratio

Interpretation:

Table 2.3 depicts the performance of the Balance Sheet Ratios of HDFC Bank. The overall capital adequacy, current, and quick ratios were recorded at 94.27, 0.27 and 93.67, respectively. In the context of capital adequacy, the ratio remained constant while the current ratio & quick ratio kept increasing, recording a value of 0.04 to 0.08 & 16.62 to 21.14 from 2019-20 to 2023-24, respectively.

8.2.4. THE PERFORMANCE OF DEBT COVERAGE RATIO IN HDFC BANK

Table No.2.4: Debt Coverage Ratio

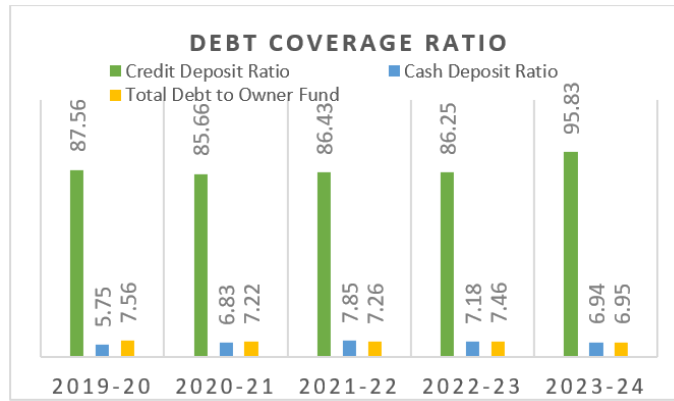| Year	Credit Deposit Ratio	Cash Deposit Ratio	Total Debt to Owner Fund
2019-20	87.56	5.75	7.56
2020-21	85.66	6.83	7.22
2021-22	86.43	7.85	7.26
2022-23	86.25	7.18	7.46
2023-24	95.83	6.94	6.95

Figure 2.4 Debt Coverage Ratio

Interpretation:

Table 2.4 illustrates the performance of the Debt Coverage Ratios for HDFC Bank. The overall credit deposit ratio, cash deposit ratio, and total debt-to-owner funds were recorded at 441.73, 34.55, and 36.45, respectively. In this context, the credit deposit and cash deposit ratios show an increasing trend, rising from 87.56 to 95.83 and from 5.75 to 6.94, respectively. Conversely, the total debt to owner funds demonstrates a decreasing trend, with values dropping from 7.56 to 6.95 between 2019-20 and 2023-24.

9. COMPARISON OF PERFORMANCE OF SELECTED BANKS
9.1. COMPARISON OF PROFITABILITY RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Interest Spread Ratio	Interest Spread Ratio		*Interest Spread Ratio*	*Interest Spread ratio*
2019-20	6.59	7.02	Mean	6.686	6.402
2020-21	7.06	6.86	Variance	0.04398	0.38572
2021-22	6.62	6.14	t Stat	3.4787605	
2022-23	6.58	6.52	P(T<=t) two-tail	0.013162377	
2023-24	6.58	5.47	t Critical two-tail	2.446911851	

Ho = There is no significant difference between Interest Spread Ratio of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between the interest spread ratio of SBI and HDFC banks.

9.2. COMPARISON OF NET PROFIT MARGIN OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Net Profit Margin	Net Profit Margin		*Net Profit Margin*	*Net Profit Margin*
2019-20	5.63	22.86	Mean	10.928	25.948
2020-21	7.69	25.74	Variance	17.68642	5.33227
2021-22	11.49	28.93	t Stat	-9.38933	
2022-23	15.12	27.29	P(T<=t) two-tail	0.000717	
2023-24	14.71	24.92	t Critical two-tail	2.776445	

Ho = There is no significant difference between Net Profit Margin of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means there exists a significant difference between the Net Profit Margin of SBI and HDFC bank.

9.3. COMPARISON OF RETURN ON EQUITY RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Return on Equity Ratio	Return on Equity Ratio		*Return on Equity Ratio*	*Return on Equity Ratio*
2019-20	6.95	15.35	Mean	12.47	15.292
2020-21	8.86	15.27	Variance	21.68515	0.13822
2021-22	12.33	15.39	t Stat	-1.350769058	
2022-23	16.75	15.74	P(T<=t) two-tail	0.248125453	
2023-24	17.46	14.71	t Critical two-tail	2.776445105	

Ho = There is no significant difference between the Return on Equity Ratio of SBI and HDFC Bank

Ho stands accepted, as the p-value is more than 0.05, which means no difference exists between the Return on Equity ratio of SBI and HDFC bank.

9.4. COMPARISON OF INTEREST EXPENDED TO INTEREST EARNED RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Int. Expended to Int. Earned	Int. Expended to Int. Earned		*Int. Expended to Int. Earned*	*Int. Expended to Int. Earned*
2019-20	61.88	51.06	Mean	58.838	49.052
2020-21	58.25	46.32	Variance	7.42257	32.14427
2021-22	56.18	43.63	t Stat	3.4787605	
2022-23	56.39	46.26	P(T<=t) two-tail	0.013162377	
2023-24	61.49	57.99	t Critical two-tail	2.446911851	

Ho = There is no significant difference between Int. Expended to Int. Earned ratios of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between the interest expended to the earned ratio of SBI & HDFC bank.

9.5. COMPARISON OF ADJUSTED CASH MARGIN OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Adj. Cash Margin	Adj. Cash Margin		*Adj. Cash Margin*	*Adj. Cash Margin*
2019-20	5.88	19.88	Mean	10.584	22.262
2020-21	7.68	22.19	Variance	14.13353	4.11042
2021-22	11.05	24.52	t Stat	-6.113557995	
2022-23	14.51	24.04	P(T<=t) two-tail	0.000873966	
2023-24	13.8	20.68	t Critical two-tail	2.446911851	

Ho = There is no significant difference between Adj. Cash Margin of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between the Adj—cash Margin of SBI & HDFC bank.

9.6. COMPARISON OF OTHER INCOME TO TOTAL INCOME OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS

	Other Income to Total Income	Other Income to Total Income		Other Income to Total Income	Other Income to Total Income
2019-20	14.95	16.85	Mean	12.576	17.014
2020-21	14.09	17.26	Variance	4.31678	1.20573
2021-22	12.84	18.76	t Stat	-4.22283434	
2022-23	9.93	16.19	P(T<=t) two-tail	0.005543861	
2023-24	11.07	16.01	t Critical two-tail	2.446911851	

Ho = There is no significant difference between Other Income to Total Income of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between Other Income to Total Income of SBI & HDFC bank.

9.7. COMPARISON OF OPERATING EXPENSES TO TOTAL INCOME OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Operating Exp. to Total Income	**Operating Exp. to Total Income**		*Operating Exp. To Total Income*	*Operating Exp. To Total Income*
2019-20	38.08	30.16	Mean	34.294	30.372
2020-21	39.96	32.26	Variance	30.00448	4.31367
2021-22	36.26	32.37	t Stat	1.49703053	
2022-23	30.09	29.74	P(T<=t) two-tail	0.194644546	
2023-24	27.08	27.33	t Critical two-tail	2.570581836	

Ho = There is no significant difference between Operating Exp. to Total Income of SBI and HDFC Bank

Ho stands accepted, as the p-value is more than 0.05, which means no significant difference exists between Operating Exp. to Total Income of SBI & HDFC bank.

9.8. COMPARISON OF CAPITAL ADEQUACY RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Capital Adequacy Ratio	**Capital Adequacy Ratio**		*Capital Adequacy Ratio*	*Capital Adequacy Ratio*
2019-20	13.13	18.52	Mean	13.936	18.854
2020-21	13.74	18.79	Variance	0.34183	0.07138
2021-22	13.85	18.9	t Stat	-17.1075617	
2022-23	14.68	19.26	P(T<=t) two-tail	2.5529E-06	
2023-24	14.28	18.8	t Critical two-tail	2.446911851	

Ho = There is no significant difference between Capital Adequacy Ratio of SBI and HDFC Bank

Ho stands accepted, as the p-value is more than 0.05, which means no significant difference exists between the Capital Adequacy Ratio of SBI and HDFC bank.

9.9. COMPARISON OF CURRENT RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Current Ratio	**Current Ratio**		*Current Ratio*	*Current Ratio*
2019-20	0.09	0.04	Mean	0.086	0.054
2020-21	0.09	0.03	Variance	0.00003	0.00043

2021-22	0.08	0.05	t Stat	3.336230625
2022-23	0.08	0.07	P(T<=t) two-tail	0.020637537
2023-24	0.09	0.08	t Critical two-tail	2.570581836

Ho = There is no significant difference between the Current Ratio of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between the current ratio of SBI and HDFC bank.

9.10. COMPARISON OF QUICK RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Quick Ratio	**Quick Ratio**		*Quick Ratio*	*Quick Ratio*
2019-20	17.05	16.62	Mean	15.476	18.718
2020-21	16.56	17.58	Variance	1.64608	3.03652
2021-22	14.49	18.77	t Stat	-3.350074632	
2022-23	14.11	19.48	P(T<=t) two-tail	0.012249511	
2023-24	15.17	21.14	t Critical two-tail	2.364624252	

Ho = There is no significant difference between Quick Ratio of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between the quick ratio of SBI and HDFC banks.

9.11. COMPARISON OF CREDIT DEPOSIT RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Credit Deposit Ratio	**Credit Deposit Ratio**		*Credit Deposit Ratio*	*Credit Deposit Ratio*
2019-20	73.32	87.56	Mean	70.648	88.346
2020-21	68.97	85.66	Variance	8.52322	17.97673
2021-22	67.03	86.43	t Stat	-7.687527205	
2022-23	70.01	86.25	P(T<=t) two-tail	0.000117449	
2023-24	73.91	95.83	t Critical two-tail	2.364624252	

Ho = There is no significant difference between the Credit Deposit Ratio of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means a significant difference exists between the Credit Deposit Ratio of SBI and HDFC banks.

9.12. COMPARISON OF CASH DEPOSIT RATIO OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Cash Deposit Ratio	**Cash Deposit Ratio**		*Cash Deposit Ratio*	*Cash Deposit Ratio*
2019-20	5.59	5.75	Mean	5.638	6.91
2020-21	5.49	6.83	Variance	0.16657	0.57735
2021-22	6.09	7.85	t Stat	-3.297683689	
2022-23	5.96	7.18	P(T<=t) two-tail	0.016455326	
2023-24	5.06	6.94	t Critical two-tail	2.446911851	

Ho = There is no significant difference between the Cash Spread Ratio of SBI and HDFC Bank

Ho stands rejected, as the p-value is less than 0.05, which means that there exists a significant difference between the Cash Deposit Ratio of SBI and HDFC banks.

9.13. COMPARISON OF TOTAL DEBT TO OWNER FUND OF SBI & HDFC BANK

Year	SBI	HDFC	ANALYSIS		
	Total Debt to Owner Fund	Total Debt to Owner Fund		*Total Debt to Owner Fund*	*Total Debt to Owner Fund*
2019-20	17.08	7.56	Mean	16.898	7.29
2020-21	17.8	7.22	Variance	0.66522	0.0558
2021-22	17.44	7.26	t Stat	25.30138766	
2022-23	16.4	7.46	P(T<=t) two-tail	1.80028E-06	
2023-24	15.77	6.95	t Critical two-tail	2.570581836	

Ho = There is no significant difference between Total Debt to Owner Fund of SBI and HDFC Bank

Ho stands accepted, as the p-value is more than 0.05, which means no significant difference exists between the Total Debt to Owner Fund of SBI and HDFC bank.

10. FINDINGS & CONCLUSION

Ratios	P-Value	H$_o$	Better Performing Bank
∗ Profitability Ratios			
Interest Spread Ratio	0.0136	Rejected	SBI
Net Profit Margin	0.0007	Rejected	HDFC
Return on Equity Ratio	0.2481	Accepted	No Diff
Adj. Cash Margin	0.0008	Rejected	HDFC
∗ Performance of P&L			
Int. expended to Int. earned	0.0131	Rejected	HDFC
Other Income to Total Income	0.0055	Rejected	HDFC
Operating Expenses to Total Income	0.1946	Rejected	HDFC
∗ Balance Sheet Ratios			
Capital Adequacy Ratio	2.5529	Accepted	No Diff
Current Ratio	0.0206	Rejected	SBI
Quick Ratio	0.0122	Rejected	HDFC
∗ Debt Coverage Ratio			
Credit Deposit Ratio	0.0001	Rejected	SBI
Cash Deposit Raio	0.0164	Rejected	HDFC
Total Debt to Owner Fund	1.8002	Accepted	No Diff

From the above facets, it is evident that HDFC emerges as the leader when it comes to asset–liability management. SBI, on the other hand, although demonstrating commendable practices, lags behind HDFC in certain critical aspects of ALM. The analysis indicates that SBI's ALM framework, while comprehensive, requires further refinement to meet the dynamic financial landscape's challenges.

This study underscores the importance of ALM in maintaining financial stability and profitability in banking institutions. The exemplary ALM practices of HDFC can serve as a benchmark for other banks aiming to enhance their financial management frameworks. Future research could delve deeper into specific areas where SBI can improve and explore how adopting best practices from industry leaders like HDFC can bolster overall financial health.

CONFLICT OF INTERESTS

None.

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