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Influence of Interest Rate Risk Management on Asset-Liability Management of Non-Banking Financial Companies: Evidences in India

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Abstract
In the opinion of Reserve Bank of India (RBI), interest rate risk is one of the preliminary risks to be addressed through the mechanism of Asset-Liability Management. So, the interest rate risk position of NBFCs of India is analyzed in the study through Maturity Gap Analysis and Compound Annual Growth Rate techniques, based on consistent data available from financial year 2015-2016 to 2022-2023.Out of the top 10 Indian Non-Banking Financial Companies(NBFCs) according to Bombay Stock Exchange(Based on Market Capitalization), four NBFCs namely Cholamandalam Investment and Finance Company Ltd., Bajaj Finance Ltd., Sundaram Finance Ltd. and Muthoot Finance Ltd., were chosen, based on the availability of structured and consistent data according to the time maturity buckets prescribed by Reserve Bank of India. There were indications of interest rate risk prevalent in time buckets which were upto three years due to presence of negative Gap. A fall in interest rate may lead to depositors withdrawing their deposits and the lenders may also be reluctant to lend money due to fall in interest rate. In case of a rise in interest rates, a negative Gap will lead to increase in value of liabilities because of re-pricing at higher interest rates, and cause decrease in the interest income. Hence, Indian NBFCs must concentrate particularly on such maturity buckets, which are below three years, to mitigate interest rate risk and prevent fall in interest income. Policies and reforms need to be brought forth by Indian NBFCs to match the items of Assets and Liabilities according to their respective interest rate risk profiles.

Key Words: Asset-Liability Management; Interest Rate Risk, Indian NBFCs, Maturity Gap Analysis, Compound Annual Growth Rate.

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I. Introduction

The Indian financial market has undergone radical transformation over the last decades and has led to growing compliance of Indian financial market with the global market. This has further complicated the risks faced by Indian NBFCs. NBFCs need to decide upon the interest rates in domestic and foreign currencies for both deposits and advances. There is increased competition in the financial product market due to globalization, increased volatility in interest rates and foreign exchange rates, making it tough for NBFC's administration to decide upon interest spreads, profit margins and solvency margins. Asset-Liability Management needs to be framed in a dynamic manner to adapt to ever-changing global business environment. According to Reserve Bank of India, liquidity risk and interest rate risk are the two pivotal risks to be addressed through Asset-Liability Management. It helps in recognition, quantification and addressal of risks present in the balance sheet of a financial institution. The dilemma with respect to Asset-Liability Management however lies in the fact that no two Indian NBFCs are same as far as modus operandi is concerned. Hence each financial institution needs to design its own customized Asset-Liability Management Framework in accordance with its basic objectives, risk appetite, and legal constraints. At its very basis Asset-Liability Management basically addresses interest rate risk and thereby liquidity risk. Interest Rate Risk on the other hand deals in changing and re-pricing of interest rates. Normally, NBFCs have assets and liabilities that are subjected to changing interest rates in their balance sheets. Liquidity risk is the risk associated with meeting of present and future cash flow obligations, or in other words, in dispensing off with liabilities.

Financial organizations can meet their liability needs with the help of existing assets, debt obligations, and equity. Readily available income generated from assets in the case of NBFCs are interest and principal payments, service fees, and funds received due to various transactions. In case of adverse situations, NBFCs sell cash equivalent assets to pay off unexpected cash obligations. Such cash and cash equivalents must be managed properly and kept unencumbered. Another source of income for NBFCs is the asset securitization. The loans on the balance sheet such as mortgages are converted or transformed into securities that are sold to investors outside. The other source of funding for NBFCs comprises of issue of debts, such as commercial papers, bonds or short-

term repos. The chances of NBFCs getting access to such funding depend on its market perception. Hence the public credit rating of an NBFC plays a major role in getting access to such funds. Issuance of equity is far costlier compared to the other sources of funding.

Asset-Liability Management being the pivotal pillar of Risk Management denotes continuous and meticulous examination of sources and application of funds, so that the yields, maturities, costs, and re-pricings are well-balanced out. Asset-Liability Management does not only help in risk mitigation but also helps to increase net worth and profitability of financial intermediaries like NBFCs. For deciding upon the correct Asset-Liability Management practices various factors related to risk appetite of an NBFC and the financial market in which it is operating, must be taken into consideration. It serves a holistic purpose of considering capital adequacy, various regulatory issues and various hedging instruments available in financial market to fix upon an asset-liability portfolio that shall help in optimizing profit, ensure sustainability and shall provide a risk-return trade-off.

Interest rate risk is inherent in the functioning of NBFCs, them being exposed to adverse movements in interest rates. It has a direct effect on profitability and shareholder value. Evaluation of interest rate risk covers both assessment of quantitative exposure of a NBFC to interest rate movements as well as qualitative determination of the management process. Quantitative interest rate risk calculation involves the assessment of present and future effects of changes in interest rates on capital adequacy, earnings, asset quality, and liquidity.

It is a given fact that interest rate risk must be managed for businesses where the fluctuations in interest rates impact upon the profitability of such businesses. Any adverse change in interest rates has dynamo effect especially on financial institutions. The borrowing costs increase, the investors may get lower return on their investments, profit-earning capacity is reduced, the value of businesses gets affected due to changes brought about in discount rates. The incidence of interest rate risk may have its inception with the interest cost fluctuations due to interest rate fluctuations during the lifespan of a loan, interest rates may be reset by lenders, short-term investments such as commercial papers and bank bills are subject to frequent re-pricings. Interest rate changes also impact the long-term financial assets and liabilities for example, in case of borrowing through long-term bonds the financial liability of a borrower initially suffers loss if interest rates decrease and the lenders or investors initially gain from the decrease in interest rates. Such situational gains can however be only realized prior to the maturity of such bonds. The value of various interest rate derivatives such as interest rate swaps will change with change in interest rates which results in either gain or loss. Changes in interest rates also affect early payment discounts. Differences in domestic and foreign interest rates also affect various derivative instruments. The borrowers generally fear rise in interest rates as it increases the cost associated with sourcing of funds. This at first decrease the profitability and value of the business in the market. The borrowing margins increase due to deterioration in financial ratios. Consequentially, an increase in interest rates lead to reduction in the possibility of dividend disbursal, and also a hindrance in undertaking capital expenditures. There also arises chances of failure to meet obligations or liabilities. Lenders fear fall in interest rates as their cost of funds lent decrease thereby reducing the profit and market value. They may also face problems in dispensing off their obligations to stakeholders. It affects their future cash inflows. In such a situation offering of competitive interest rates to attract investors also reduces, with their own interest incomes moving towards a pitfall.

There are various ways in which NBFCs have to face interest rate risk. The difference in timing of interest re-pricing is among the most significant interest rate risks faced by a NBFC. NBFCs engage in maturity mismatching practices by borrowing short and lending long; or by borrowing long and lending short. This maturity mismatching becomes a crucial breeding ground of crisis due to changes in overall or relative changes in interest rates. When the rates earned and paid on different instruments are non-judiciously correlated it gives rise to basis risk, a type of interest rate risk. It impacts cash flows primarily. Interest rate risk also emanates in NBFCs from options which gives holders of such instruments a right but no obligation to buy or sell. They are used to advantage of customers. Complexity involved in transactions involving options can bring about asymmetry in options pay off with change in reference values.

Measurements of interest rate risk must be able to reflect uncertain amortization and prepayment of principal amount, caps and floors on loans and securities, characteristics and types of off-balance sheet exposures, and changing spread relationships. The quantity of interest rate risk depends on volume and interest sensitivity of various products, vulnerability including changes in yield curves under changing interest rate scenarios, and the exposures to basis and optionality risk. Quantitative value of interest rate risk should focus on concentration of particular types of investments or lending activities carried out by NBFCs. It also should involve assessment of composition of assets and the relative proportion of their holdings. The shorter the repricing period the greater the impact of change in interest rates on earnings. The longer re-pricing frequency the more sensitive value of an instrument.

II. Review of Literature

Kusy and Ziemba (1983) opined that bank's cash flows, cost of funds and returns, call for proper asset-liability management practices. The authors developed a multiperiod stochastic linear programming model that included institutional, legal, financial and bank-related considerations. In the opinion of the authors Asset-Liability Management is sensitive to asymmetry in cash flows. The simulation results conducted by the authors generate the fact that Asset-Liability Management is more progressive than stochastic decision tree in terms of problem-solving and policy generation.

Meer and Smink (1993) conducted their study based on the evaluation of different techniques and strategies namely, static, value-driven and return driven. The authors concluded that nearly all static techniques lack risk-return trade-offs. Compared to it passive immunization strategies provide a deeper dimension by taking into account the risks of duration mismatching. The active immunization strategies add to it by valuing potential returns.

Stein (1995) developed a bank asset and liability management model. The model was postulated based on the fact that information asymmetry is the reason banks rely on insured deposits rather than on funds raised through other instruments. The findings of the study laid basis for lending of banks and revealed how bond-market interest rates are affected by monetary policy.

Vaidyanathan (1999) elaborated on Asset-Liability Management and the various risks to be addressed in Indian parlance. At the very onset banks followed a nominal Asset-Liability Management policy of adhering to certain stipulated ratios of liquidity. But interest rates are no longer pre-determined in fact they are based on market movements. The relevance of interest rate risk has increased thereby. He also opined that NBFCs are exposed to foreign exchange risks. Many of the investments of banks in India are based on market-determined rates, thus exposing banks to market risks. With increases in interest rate risk, devising appropriate capital adequacy norms also becomes important.

Vaidya and Shahi (2001) opined that liquidity risk and interest rate risk are the key risks to be addressed by Asset-Liability Management in Indian banks.

Ranjan and Nallari (2004) examined the Asset Liability Management in Indian banks from the financial year 1993-1994 to 2003-2004, using canonical correlation analysis. They found that other than foreign banks, the public and private sector banks were liability-managed, which means they engaged in money market borrowings to meet obligations. Private banks were found to be engaged aggressively in profit maximization and public sector banks were risk-averse and had taken refuge in aggressively protecting liquidity.

Papi and Sbaraglia (2006) analyzed discrete-time dynamic programming to formulate an asset-liability management model that takes into consideration both transaction costs and constraints.

Giandomenico (2007) articulated a model in which the fair value of banks' liabilities was determined taking into consideration the possibilities of protection and surrender. The study also focussed on the fact that possibility of surrender shall reduce the effective duration of banks' liabilities. The author was of the opinion that banks must be careful while providing long-term maturity advances or they must balance their asset portfolio by investing in short-term bonds also.

Dash *et. al* (2011) analyzed the Asset-Liability Management of Indian banks with reference to liquidity of the banks through maturity buckets. The sample for the study consisted of all scheduled commercial banks except the rural banks for the period 2008-2009. The Maturity Gaps of 26 public sector banks, 20 private sector banks, and 10 foreign banks in India were compared. The results of the study indicated that public sector banks had the best short-term liquidity management with its conservative approaches. The foreign banks by focusing on long-term corporate lending weakened their liquidity positions.

Meena and Dhar (2014) compared the liquidity ratios and Asset-Liability Management practices of top three banks from public, private and foreign sectors in India for the financial years 2001-2002 to 2010-2011. The Maturity Gap profiles of the banks were compared against their respective group's Maturity Gap profiles. The authors concluded that the overall liquidity in Indian banks was stable. It was also found that Asset-Liability Management structure of banks was dependent on the management of the respective individual banks.

Chakraborty and Mohapatra (2015) analyzed Asset-Liability Management of public, private and foreign banks in India using canonical correlation to check the strength of relationship between assets and liabilities of banks. The findings testified to the fact that the ownership and structure of banks influenced the Asset-Liability Management practices of banks. The public banks had better Asset-Liability Management practices with proper maturity matching. The private banks being more ambitious as far as profit-making is concerned took the course of investing in long-term assets while borrowing short-term to increase the net interest.

Veni and Negash (2019) analyzed the relationship of Asset-Liability Management with the profitability of selected 11 commercial banks, from 2009-2010 to 2016-2017. Statistical Cost Accounting model was used for analysis. All assets except the Fixed Assets exerted a positive and significant influence on the profitability of banks. Savings and long-term debts were costly and the main source of funds for banks succeeded by demand deposits.

According to, Kilari (2021) Asset-Liability Management is related to the net worth of a company. American banking Sector was considered in the study, of which Asset-Liability Management of 31 commercial banks was analyzed. The loans and advances policies of the banks were analyzed. The main conclusion was that the Asset-Liability Management framework of a bank plays an important role in determining liquidity position.

Thus, the studies on Asset-Liability Management focussed on the principles. constructs and fair practices to be followed for proper Asset-Liability Management.

III. Objectives of the Study

The objective of the present study is to measure and analyze the interest rate risk of select Indian NBFCs and provide suggestions based on the findings.

IV. Research Method

The research method followed for the study are elaborated as follows:

Data Source

Secondary Data was considered for the analysis and was obtained from the annual reports of the select NBFCs. Out of the top 10 Non-Banking Financial Companies (NBFCs) according to Bombay Stock Exchange (Based on Market Capitalization), four NBFCs namely Cholamandalam Investment and Finance Company Ltd., Bajaj Finance Ltd., Sundaram Finance Ltd., and Muthoot Finance Ltd, were chosen based on the availability of structured and consistent data according to the time maturity buckets prescribed by Reserve Bank of India.

Period of Study

The data are analyzed from the financial year 2015-2016 to 2022-2023 as consistent and structured data required for analysis were available for the selected analytical technique during the afore-mentioned period.

Methodology

The methodology adopted for analysis are as follows:

Maturity Gap Analysis

The most popular tool of measuring Interest Rate Risk is the traditional Gap analysis. Maturity Gap analysis serves as a planning technique. NBFCs need to minimize Maturity Gap to avoid any interest rate risk and thereby liquidity crisis. This also means that the cash inflows and outflows in each maturity bucket must be matched. The Maturity Gap is the difference between Rate-Sensitive Assets (RSAs) and Rate-Sensitive Liabilities (RSLs), in the various time buckets stipulated by the Reserve Bank of India. The items to be considered as stipulated by Reserve Bank of India, for Rate-Sensitive Assets are Advances, Investments, and Foreign Currency Assets; for Rate-Sensitive Liabilities are Deposits, Borrowings, and Foreign Currency Liabilities. A positive Gap means Rate-Sensitive Assets are greater than Rate-Sensitive Liabilities. A negative Gap means Rate-Sensitive Assets are lesser than Rate-Sensitive Liabilities. This helps to devise plans for future cash inflows and outflows, taking into consideration the re-pricing of assets and liabilities so that the NBFC can maximize its Net Interest Income (difference between interest income and interest expenses).

Compound Annual Growth Rate

Compound Annual Growth Rate is a measure of annual growth rate, with compounding taken into account. The value of the compound annual growth rate is found as follows:

Compound Annual Growth Rate= $(Value\ at\ the\ end \div Value\ at\ the\ beginning)^{1 \div t} - 1$

Here t represents time in years.

V. Results and Discussion

The analysis and findings of the study are based on Compound Annual Growth Rate results of Maturity Gaps in the stipulated time maturity buckets prescribed by the Reserve Bank of India. The results of the analyses are given in Table 1.

TABLE 1: Compound Annual Growth Rates(CAGRs) of Maturity GAPs of Select NBFCs according to RBI Stipulated Maturity Buckets

Upto 1-month time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	-31404	-37970	-49627	-149742	-69892	-85825	-50060	-261845	30.3564%
Sundaram Finance Ltd.	30423.33	60527.39	97299.52	64289.93	90156.49	156801.26	1456.82	2129.21	-28.282%
Muthoot Finance Ltd.	404838.9152	494031.7285	540180.5	600632.1	437986.5	1071624.6	772089.6	1136671	13.7743%
Bajaj Finance Ltd.	159151	613667	276266	657817	1518423	1422056	561625	1361172	30.7715%
Over 1-month Upto 2-months' time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	-50715	-38370	-95196	-39929	-73282	-117054	80945	-252574	22.244%
Sundaram Finance Ltd.	-94352.01	66857.83	54321.96	62169.54	-42510.85	-71738.17	1020.08	426.22	-150.917%
Muthoot Finance Ltd.	-0.0066797	200801.076	364799.9	375400	407995.6	459739.3	569069.3	920538.6	-11.409%
Bajaj Finance Ltd.	39439	-148022	242308	437087	9221	13087	490084	142959	17.4656%
Over 2-months Upto 3-months' time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	-113138	-42122	-83783	3394	-147646	-226308	-254776	-12167	-24.326%
Sundaram Finance Ltd.	58308.66	34784.57	-101836.72	14921.87	-17889.98	37203.43	228.98	-208.02	-149.436%
Muthoot Finance Ltd.	191882.1777	168711.1991	216163.7	211173.4	-18752.8	179346	58151.2	203086.1	7.119%
Bajaj Finance Ltd.	186307	126405	204692	-416456	-221427	196823	70588	-81771	-190.219%
Over 3-months Upto 6-months' time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	-115042	33461	106669	45319	-53158	-174990	-74160	-64946	-6.897%
Sundaram Finance Ltd.	15381.84	78220.07	159612.98	140705.54	-19596.66	71321.04	1658.21	-57.78	-149.756%
Muthoot Finance Ltd.	365692.6496	601244.1363	678392.9	846934.7	815575.9	1107440.1	988651.7	498314.1	3.9437%
Bajaj Finance Ltd.	264684	482164	275807	1111635	-496205	884871	1082307	784000	14.5377%
Over 6-months Upto 1-Year time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	-81446	36676	440265	-16369	-47545	189244	-76346	108377	-203.635%
Sundaram Finance Ltd.	-54942.82	-194032.59	-95596.38	-44276.32	-46647.3	162755.25	184.68	407.84	2.43%
Muthoot Finance Ltd.	-407252.2293	-533458.2117	-454148.3	-558736.6	594789.1	-10829.2	577491.8	73213.4	-180.694%
Bajaj Finance Ltd.	29259	176286	656675	1757884	498545	589227	52557	261194	31.4734%

Over 1-Year Upto 3-Years time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	145035	-161759	-51783	-135163	-212391	-206603	-360114	-881439	-225.304%
Sundaram Finance Ltd.	205376.76	354228.38	369140.46	389594.76	603064.99	322789.34	3607.55	6285.31	54.6244%
Muthoot Finance Ltd.	-293407.4878	-273826.3182	-243305.3	-414508	-996449.9	-1779362.8	-1779362.8	-1448463.6	22.0899%
Bajaj Finance Ltd.	-349438	-324963	2518792	-1902177	29036	-667435	-8326	1212800	-216.829%
Over 3-Years Upto 5-Years time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	256554	246398	151730	69284	28301	136158	191545	224492	-1.655%
Sundaram Finance Ltd.	74257.42	108938.25	134281	216244.43	261273.86	260098.27	1134.42	382.41	-48.242%
Muthoot Finance Ltd.	-24814.27	-26319.7395	-95539.8	-181554.8	-602196.7	-4545.4	-179106	317.5	-157.994%
Bajaj Finance Ltd.	-479374	-529894	648159	-930575	122455	434337	916718	385135	-19.73%
Over 5 -Years time bucket									
NBFCs	2016	2017	2018	2019	2020	2021	2022	2023	CAGR
Cholamandalam Investment and Finance Company Ltd.	287802	366922	412746	531153	622649	864179	1266023	2231344	29.1767%
Sundaram Finance Ltd.	68378.31	68931.48	36678.62	-8693.81	61064.64	14018.03	334.41	1177.59	-39.812%
Muthoot Finance Ltd.	-4893.5859	7984.976786	26273.1	87812.1	88858.5	0	78589.7	72753.9	-214.392%

Bajaj Finance Ltd.	824723	855101	682054	-725081	474965	368356	595225	549545	-4.948%

Source: Researcher's Own Computation Note: Figures below each financial year ended represent amount in ₹ in Billions

IV. Results

On observation of Table 1 it can be observed that, in case of the Maturity Gaps upto 1-month time bucket , the differences between Rate-Sensitive Assets and Rate-Sensitive Liabilities are declining in case of Sundaram Finance Ltd in the one-month time bucket. Also, there are many negative GAPs in the select years of analysis in case of Cholamandalam Investment and Finance Company Ltd.

If the Maturity Gaps from 1-month upto 2-months are analyzed then it can be seen that negative Gaps have been mostly reported in absolute values in the cases of Cholamandalam Investment and Finance Company Ltd. and Sundaram Finance Ltd. For Muthoot Finance Ltd. and Cholamandalam Investment and Finance Company Ltd., the Maturity Gaps are declining at a rapid pace over 100% during the period of study. It means that the Rate-Sensitive liabilities exceeded the Rate-Sensitive assets for them in most cases over the period of study.

In over 2-months upto 3-months' time bucket, in cases of Cholamandalam Investment and Finance Company Ltd., Sundaram Finance Ltd, mostly negative GAPs were reported over the period of study; and the compound annual growth rates in cases of Cholamandalam Investment and Finance Company Ltd., Sundaram Finance Ltd and Bajaj Finance Ltd. were declining.

In 3-months upto 6-months' time bucket, the maximum number of negative GAPs were reported in case of Cholamandalam Investment and Finance Company Ltd., and the decline in maturity GAP was maximum in case of Sundaram Finance Ltd.

If the maturity GAPs from 6-months upto 1-year time bucket are analyzed then taking negative growth rates and negative maturity GAPs in absolute values into consideration, it can be said that Cholamandalam Investment and Finance Company Ltd., Sundaram Finance Ltd. and Muthoot Finance Ltd. were the worst-case scenarios. For the same reasons in over 1-year upto 3 years' time bucket Cholamandalam Investment and Finance Company Ltd., Muthoot Finance Ltd. and Bajaj Finance Ltd. can be said to have the worst interest rate risk positions taking into consideration declining growth rates and maturity GAPs in absolute values.

In over 3-years upto 5-years all the NBFCs recorded negative annual growth rates as far as maturity GAPs are concerned.

In over 5 years maturity buckets, except for Cholamandalam Investment and Finance Company Ltd., all the NBFCs had a declining growth rate of maturity GAPs, the maximum being in case of Muthoot Finance Ltd.

V. Discussion

It can be said that in case of all the NBFCs analyzed for the study, the interest rate risk position remains precarious. The negative values of Maturity GAPs and declining compound annual growth rates in most of the cases over the various time periods and maturity buckets denote the risky positions of NBFCs, as far as interest rate risk is concerned. This is not a favourable scenario as Rate-Sensitive Assets generate interest income and Rate-Sensitive Liabilities lead to interest expenses. Also, in a declining interest rate scenario, a negative Gap indicates that the aforementioned NBFCs of India have to pay a lower rate of interest for liabilities. However, on the other hand, if interest rates increase, it would imply that the liabilities would be re-priced at higher interest rates.

The fact that negative Gaps have been mostly reported in absolute values in case of the select NBFCs, means that the Rate-Sensitive liabilities exceeded the Rate-Sensitive assets mostly for the aforementioned NBFCs over the period of study. If interest rate decreases, a negative Gap would imply that an NBFC has to pay less rate of interest for liabilities, which shall increase its Net Interest Income. However, it also means that due to a fall in interest rate, lenders may not want to lend money. On the other hand, if interest rates increase, liabilities shall be re-priced at higher interest rates, and thereby cause a decrease in net interest income (which is the difference between interest income and interest expenses). Thus, the results establish claims of Vaidyanathan (1999) and Vaidya and Shahi (2001) of interest rate risk being an important and decisive factor in Asset-Liability Management.

VI. Conclusion

At the macro-level Asset-Liability Management in NBFCs is concerned with proper capital policy formulations and pricing strategies. NBFC's main earning is the interest margin they earn on financial products, which is the difference between interest income and interest expenses. They need to optimize their pricing strategies. However, to maintain higher profit margin, NBFCs many times lend long and borrow on a shorter horizon, which can lead to weak liquidity position for NBFCs. Liquidity can be maintained by matching assets and liabilities according to their respective maturity profiles so that payment obligations can be met on time. The

fact that interest rate risk has a strong inter-connection with the liquidity of NBFCs further complicates the situation for NBFCs, if assets and liabilities are not matched according to respective interest risk profiles. Changes in interest rates lead to re-pricing of major asset and liability items present in the balance sheet of NBFCs. This can create volatility and ultimately can create a liquidity crisis for an NBFC. There has to be devised a trade-off between profitability and interest rate risk to mitigate liquidity risk and ensure solvency. Hence Asset-Liability Management deals with quantification and mitigation of risks to stabilize profitability and long-term sustenance. Market interest rates affect the value of NBFC's assets and liabilities, by impacting directly upon loan servicing and asset-securitization transactions. The limits defined for interest rate risk management should be in sync with the size and complexity of the NBFC structure. Limits can also be segregated and defined separately for portfolios and instruments. Judgement on interest rate risk must be made taking into consideration both reported earnings and the Economic Value Added of the NBFC. The limits of interest rate risk on earnings addresses the effect of change in interest rates on NBFC's financial condition. The limits defined in case of interest rate risk with respect to economic value show the efforts taken by management to minimize the effect of changing market rates on present and future earnings generated from current holdings of the NBFC. Changes in a NBFC's economic value due to changes in interest rates can be calculated by assigning weights to assets and liabilities. Weights can be assigned to estimate change in value of maturing or re-pricing instruments in a particular time bucket given a particular interest rate scenario.

The changes in market interest rates have a direct impact on NBFCs' profits as they alter the interest income. Stress scenarios related to interest rates include changes in term structure of interest rates, relationships among key market rates, liquidity and volatility present in the financial market. The magnitude of change created in the interest income from interest-yielding assets and interest expenses in the case of interest-bearing liabilities depends on re-pricing timings as well as maturity terms. Changing interest rates also affect the Net Present value of financial instruments. Although a prudent way to bypass interest rate risk is to match the assets and liabilities in specific repricing buckets, in the case of financial institutions where interest income forms a major part of their profits, this becomes difficult when the rate sensitivity of assets is different from the liability items. The Modus Operandi of financial intermediaries exposing them to interest rate risks necessitates the use of various tools such as interest rate derivatives to manage the risk. This management of interest rate risk takes care of credit risk for financial intermediaries like NBFCs. It shall help to circumvent any cost related to financial distress as well. Aversion of interest rate risk reduces tax implications and enhances credibility in the eyes of lenders. There is also the threat of macro-economic shocks looming large on financial institutions like NBFCs. There may be recession affecting countries worldwide in the era of globalization due to faults in the economy of one or more countries, a hike in inflation or there may be volatility in interest rates. Protection from external and significant shocks should also be taken into account by the risk managers. Interest Rate Risk Management decisions to be taken by the Asset-Liability Management Committee of Indian NBFCs must not only focus on matching the maturities of rate-sensitive assets and liabilities but also must take into account off-balance sheet financial instruments such as interest rate derivatives. There are various means through which interest rates may be managed. Indian NBFCs may draw contracts with lenders to fix the interest rates of their loans over the period of the loan. If the borrowing takes place through floating-rate financial instruments, then an interest rate cap or option can act as insurance against rising interest rates. A premium money may have to be paid for such an insurance the cost of which shall be far lower than the cost of borrowing to be paid in a rising interest rate scenario. Borrowers can also convert fixed-rate loan to a floating-rate loan in case of a decrease in interest rates with the help of the derivative instrument known as interest rate swap. Interest rate swaps also provide such benefits wherein the floating rates may be locked for years extending upto five years. However, if the interest rate falls then the difference from the swap rate has to be paid to the other party. In order to combat a fall in income due to a reduction in interest rates lenders can also invest in fixed-rate assets compared to floating-rate assets. This also again can result in loss to a lender if interest rates increase and they do away with their investments prior to maturity term.

One of the important functions of NBFCs is Risk Management, as it provides financial services and is involved in making decisions based on risk-return trade-offs. Asset-Liability Management forms the crux of Risk Management. The study has pointed out several instances or breeding grounds of interest rate risk in case of NBFCs of India especially and mostly in case of Cholamandalam Investment and Finance Company Ltd., Muthoot Finance Ltd. and Sundaram Finance Ltd. for maturity buckets upto three years. In comparison, Bajaj Finance Ltd. performed better with respect to Maturity Gaps, or, interest rate risk during the period of study. There has been evidence of the presence of interest rate risk prevalent in granular buckets extending upto three years, due to presence of negative Gaps and declining growth rates in Maturity Gaps. A fall in interest rate may lead to the lenders may also not lend money due to decline in interest rate. In case of rise in interest rates, a negative Gap will lead to rise in value of liabilities because of re-pricing at higher interest rates, thereby decreasing the interest income. Hence, NBFCs of India must concentrate particularly on the maturity buckets, which are upto three years, to mitigate interest rate risk and prevent fall in interest income. Interest rate risk is pivotal with respect to risk management or Asset-Liability Management. Policies must be formulated by NBFCs of India to match Assets and Liabilities according to their interest rate risk profiles to manage risks. It is evident from the analyses that the

formation ground for liquidity crisis in the Indian NBFC sector had started as early as the financial year ended 2016 (as interest rate risk often leads or is the predecessor to liquidity risk or crisis), after which it took a mammoth and dangerous proportion erupting in an acute liquidity crisis in the Indian NBFC sector during financial year ended 2019.

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