

## ARTICLE NO.5

# ASSET-LIABILITY MANAGEMENT IN BANKS: A DYNAMIC APPROACH

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**Abstract.** *In India asset liability mismatch in balance sheet of commercial banks posed serious challenges as the banks were following the traditional methods of recording assets and liabilities at the book value. The liberalization process in the economy coupled with multifaceted global developments exposed banks for various kinds of risks viz. interest rate risk, liquidity risk, exchange risk, operational risk etc. which have direct impact on their operations, profitability and efficiency to compete with. The Central Bank of the country focused and advised banks for taking concrete steps in minimizing the mismatch in the asset-liability composition. There had been many positive impacts of various strategies followed by banks in the last one decade. This paper is an attempt to analyze the impact of measures and strategies banks undertook to manage the composition of asset-liability and its impact on their performance in general and profitability in particular*

**Keywords:** *Asset-liability management, Liquidity risk, Interest rate risk, Dynamic risk management*

### **Introduction:**

In the developing countries including India the regulatory regime, on the operations and control of banks and financial institutions, did not allow much competition in the financial system. The interest rates were by and large controlled by the Central bank, the Reserve bank of India (RBI). The balance sheet management did not pose many problems as the income was accounted for on accrual basis. Off balance sheet exposure for banks was minimum. It was only after liberalization process implemented in 1991, the banking sector had undergone the following major changes:

1. De-regulation of interest rates.
2. Non- recognition of Income on accrual basis.
3. Growth of forward contracts in foreign transactions and therefore higher off balance sheet exposure.
4. Diversification of banking products.
5. Growth of a healthy competition in banking sector.

The situation in pre liberalization era was that competition in the banks was negligible as the major business was handled by public sector banks. Therefore liabilities to the bank in terms of deposits did not pose many problems. Banks used to have major focus on asset management. But in the changing context after liberalization, liability management

also assumed significant importance. This is advocated by Peter and Sylvia (2010) “ confronted with fluctuating interest rates and intense competition for funds the bankers and many of their competitors began to devote greater attention to opening up new sources of funding and monitoring the mix and cost of their deposit and non-deposit liabilities.

In the changing global scenario, banks have been facing several risks in their business operations viz., credit risk, interest rate risk, exchange risk, liquidity risk and operational risk. While all these risks could manifest in more than one form, the banks are more concerned about liquidity risk and interest rates risk. The significance being former effects the bank’s commitment for meeting its liabilities in time impacting reputational risk while the later impacts the profitability of a bank. Milir Venkatesh and Bhargav (2008) focused on price matching and maintaining spreads.

Taking one step ahead, the banks now focus on integrated balance-sheet management where all the relevant factors which effect an appropriate balance sheet composition deserve consideration. Therefore various components of balance sheet are analyzed keeping in view the strengths of a bank. The earlier approach of managing certain deposits, loans and advances has no much relevance. The basic difference in earlier approach and dynamic approach can be described in term of focus on value addition, analysis of different scenarios, comprehensive risk and dynamic approach of balance sheet evaluation in the present ALM system.

The ALM is defined as "managing both assets and liabilities simultaneously for the purpose of minimizing the adverse impact of interest rate movement, providing liquidity and enhancing the market value of equity. It is also defined as “planning procedure which accounts for all assets and liabilities of a bank by rate, amount and maturity.”

Banks now focus on funds management approach to manage liability management and Interest rates risk. The features of this approach are:

- a. It focuses more control on volume, mix and return / cost of both assets and liabilities.
- b. Effective coordination on both, the assets and liabilities, to maximize the spread, and
- c. Revenues and costs affect both sides of the balance sheet. Therefore this approach suggests maximize returns and minimize costs.

### **The Process of ALM:**

Broadly, the process of ALM rests on the following three important pillars:

- i. ALM information system: This comprises of availability of information accuracy and its sufficiency.

- ii. ALM organization: Setting up of asset liability management committee and organizational set up at different levels.
- iii. ALM process: Management of liquidity risk, interest rate risk, market risk, trading risk, capital planning and profit planning.

### **Objectives of ALM:**

The broad objectives of the ALM Policy are profit planning, liquidity management, interest risk management, FOREX risk management, equity risk management and commodity price risk management. .

### **ALM implementation process:**

The Asset Liability Management (ALM) process involves management of liquidity risk, interest rate risk, market risk, trading risks etc. For this purpose each bank has set up Assets Liability Committee (ALCO) comprising top level management to attend the following functions:

1. Decide on interest rate and product pricing on both assets and liabilities and to optimize Net Interest Margin (NIM) / Net Interest Income (NII) and mix of incremental Assets and Liabilities.
2. Measure and monitor liquidity risks, interest rate risk, currency risks, operational/trading risks and equity price risk.
3. Decide on the funding mix (Fixed or floating rate funds, wholesale or retail deposits, money market or capital market funding, domestic or foreign currency funding).
4. To decide maturity profile of assets and liabilities.
5. To permit and monitor the use of derivative instruments to manage risks, in accordance with applicable regulatory norms and guidelines.

### **Objectives of the study:**

This paper has been developed keeping in view the following objectives;

- i) To compare and analyze the asset-liability maturity gap of scheduled commercial banks in India to measure liquidity risk
- ii) To assess the techniques of interest rates risk measurement in banks
- iii) To evaluate the impact of ALM on profitability of banks

### **Data and Methodology:**

This is an analytical study where data of various banks as published by the Reserve bank of India is made use of. The paper analyses asset-liability management in banks operating

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in India by determining the liquidity position of Banks in India through maturity profiling. The data used for this purpose pertains to 2005-2011 for both public and private sector banks. The asset liabilities were allocated and distributed in different maturity periods. To validate the findings, reference has also been made to a study conducted by the RBI.

To analyze the techniques of interest rates risk measurement, Duration analysis has used.

### **Literature Review:**

There has been good number of studies and plenty of literature relating to asset-liability management in banks is available. The Basel committee on banking supervision (2001) proposed and formulated the broad supervisory framework and suggested required standards for bringing best practices in the supervision mechanism of banking system. The motto behind this was to encourage global convergence towards common approaches and standards for banking system per-se. This body also suggested setting up of rigorous risk and capital management requirements to ensure adequate capital reserve for various risks exposure in the process of lending and borrowing operations. It infers banks need to hold larger capital amount for greater exposure of risks. This will ensure solvency and stability.

The Basel II norms (2004) focused on international standard for the amount of capital to be maintained by banks as a safeguard against various risks they come across in the banking business. Basel II proposed setting up rigorous risk and capital management requirements designed to ensure that a bank holds capital reserves appropriate to the risk the bank exposes itself to through its leading and investment practices. It infers that the greater risk to which the bank is exposed, the greater the amount of capital the bank needs to hold to ensure solvency and stability.

Gardner and Mills (1991) discussed the principles of asset-liability management as a part of banks' strategic planning and as a response to the changing environment in prudential supervision, e-commerce and new taxation treaties. Haslem et al (1999) used canonical analysis and the interpretive framework of asset/liability management in order to identify and interpret the foreign and domestic balance sheet strategies of large U.S. banks in the context of the "crisis in lending to LDCs." In their study it was revealed that the least profitable very large banks have the largest proportion of foreign loans, but they focus on asset/liability matching strategies.

Vaidyanathan (1999) discussed many issues in Indian context in asset-liability management and elaborates on various categories of risk that require to be managed by banks. Indian banks in the initial stages were primarily concerned about adhering to statutory liquidity ratio norms; but in the post liberalization era where banks moved away

from administered interest rate structure to market determined rates, it became important for banks to prepare themselves with some of these techniques, in order to immunize themselves against interest rate risk. Vaidyanathan concludes that the problem gets accentuated in the context of change in the main liability structure of the banks, namely the maturity period for term deposits. For instance, in 1986, nearly 50% of term deposits had the maturity period of more than five years and only 20%, less than two years for all commercial banks, while in 1992 only 17% of term deposits were more than five years whereas 38% were less than two years (Vaidyanathan, 1995). He also observed that many banks had inadequate and inefficient management systems. In this study he also observed that Indian banks were more exposed to international markets, especially with respect to FOREX transactions, therefore asset liability management became essential. It will enable banks to manage currency fluctuations. In this study it was also observed that an increasing proportion of investments by banks were being recorded on a market-to-market basis, thus an increased exposure to market risk.

Charumathi (2008) in her study on interest rate risk management concluded that balance sheet risks include interest rate and liquidity risks. Vaidya and Shahi (2001) studies asset-liability management in Indian banks. They suggested in particular that interest rate risk and liquidity risk are two key inputs in business planning process of banks. Rajan and Nallari (2004) used canonical analysis to examine asset-liability management in Indian banks in the period 1992-2004. According to this study, SBI and associates had the best asset-liability management in the period 1992-2004. They also found that, other than foreign banks, all other banks could be said to be liability-managed. Private sector banks were found to be aggressive in profit generation, while nationalized banks were found to be excessively concerned about liquidity. Dash and Pathak (2011) proposed a linear model for asset-liability assessment. They found that public sector banks have best asset-liability management positions, maintaining profitability, satisfying the liquidity constraints, and reducing interest rate risk exposure. The present study analyses the impact of RBI guidelines on effective management of ALM in banks.

### **Liquidity Risk Management**

Liquidity refers to bank's ability to meet its liabilities as they become due. Measuring and managing liquidity needs are vital not only to meet liabilities as they become due but also reduce the possibility of an adverse situation. It is not only important to measure the liquidity position on an ongoing basis but also to evaluate the liquidity requirement under crisis scenarios. The liquidity management is to ensure that adequate liquidity is maintained without compromising on net interest margin and without locking of funds idle in the system. The liquidity risk generally refers to situations whereby long-term assets are funded by short-term liabilities since liabilities are subject to rollover or funding risk.

## Statement of Structural Liquidity

In India the RBI has suggested banks to structural their liquidity position, which gives a clear indication about funds mismatch based on historical data as on a particular date. The outflow of funds, mainly arising from maturity or crystallization of liabilities and inflow of funds, mainly arising from maturity of assets are grouped under different time buckets as per RBI guidelines and behavioral pattern of such liabilities and assets. The difference between outflow of funds and inflow of funds is referred as mismatch. While the bank may not face serious problems with positive mismatch (excess of inflow over outflow), the negative mismatch situation (excess of outflow over inflow) the concerning issue for the banks to avoid liquidity crisis. The statement of structural liquidity helps to quantify the liquidity risk. The following tables represent the liquidity position of banks:

**Table 3: Bank Group-wise Maturity Profile of Select Liabilities/Assets  
(As at end March)**

Sr.No.	Assets/Liabilities	Public Sector Banks		Private Sector Banks	
		2	3	4	5
		2005	2011	2005	2011
<b>I.</b>	<b>Deposits</b>				
	a) Upto 1 year	36.3	48.2	53.9	46.4
	b) Over 1 year and upto 3 years	35.3	28.6	43.1	37.9
	c) Over 3 years	28.4	23.2	3.0	15.6
<b>II.</b>	<b>Borrowings</b>				
	a) Upto 1 year	41.8	40.1	51.2	41.7
	b) Over 1 year and upto 3 years	20.2	12.5	34.1	16.4
	c) Over 3 years	38.0	47.4	14.6	41.9
<b>III.</b>	<b>Loans and Advances</b>				
	a) Upto 1 year	36.7	36.0	39.7	36.3
	b) Over 1 year and upto 3 years	34.6	36.2	32.2	35.8
	c) Over 3 years	28.6	27.7	28.1	27.8
<b>IV.</b>	<b>Investment</b>				
	a) Upto 1 year	13.4	18.1	47.6	39.7
	b) Over 1 year and upto 3 years	12.7	12.7	27.5	25.3
	c) Over 3 years	73.9	69.2	25.0	35.0

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**Source: Reserve Bank of India, Trends & progress of banking**

An analysis of the above data reveals;

- a) The composition of short term deposits is comparatively higher in the overall deposits for both types of banks.
- b) There is no much significant difference in maturity wise deployment of funds by way of loans and advances during the period of study for both the banks.
- c) It indicates that short term liabilities are utilized to finance long term assets. This could result in the maturity mismatch and a bank may be at the liquidity exposure.
- d) Though RBI has clear guidelines on the subject, the banks are implementing in the phased manner.

The above findings are also evident from the data available in the following table.

**Table: Asset Liability Mismatches in the Indian Banking Sector**

(Percent)

Sr. No.	Bank group/year	Long-term Assets Financed by Short-term Liabilities		Percentage of short-term liabilities used to finance long-term assets	
		2009-10	2010-11	2009-10	2010-11
1	Public sector banks	22.6	22.0	28.5	27.9
	1.1 Nationalized Banks	24.1	22.3	27.3	24.6
	1.2 SBI Group				
2	Private sector banks	14.4	15.7	19.6	21.0
	2.1 Old private sector banks	18.9	13.4	23.8	17.0
	2.2 New private sector banks	13.1	16.3	18.2	22.1
3	Foreign Banks	-16.2	-25.0	-6.4	-9.0
	All SCBs	19.7	19.5	23.4	23.3

It is clear from the above data that almost one fourth of short term liabilities are used to finance long term assets.

To analyze the impact further, The RBI conducted a primary research covering 56 banks.

According to this study, Bucket-wise break-up of ALM positive gap shows that the banking sector has the highest ALM positive gap in the bucket more than five years followed by 3-5 years and 1-3 years. As at end-September 2010, ALM positive gap in the more than five years bucket constituted 42 percent of the total ALM positive gap, followed by 3-5 years bucket (31 percent) and 1-3 years bucket (27 percent).

An analysis of persistence of the positive ALM gap was carried out following the methodology developed by Marques (2004). The results are presented in the following table:

**Table: Measure of Persistence of ALM Positive Gap – Bucket – wise**

Time Buckets	Persistence ( $\gamma$ )	Significance $\frac{\gamma - 0.5}{\frac{0.5}{\sqrt{T}}}$
One to Three Years	0.60	1.483 <sup>b</sup> (0.0606)
Three to Five Years	0.47	-0.404 <sup>b</sup> (0.3264)
More than five years	0.47	-0.404 <sup>b</sup> (0.3264)
<b>Total</b>	<b>0.47</b>	<b>-0.405<sup>b</sup> (0.3264)</b>
<sup>b</sup> Acceptance of the null hypothesis of zero persistence at 5 percent level		
<b>Note :</b> Number of Observations used for the analysis is 5.5		

The value of  $\gamma$  for the ALM positive gap during the entire sample period, i.e., March 2006 to September 2010 for all SCBs is 0.47, which is slightly lower than 0.5. This indicates that there is no significant persistence in the ALM positive gap during the period under study at the aggregate level. The bucket – wise analysis of persistence shows that in none of the time buckets, the persistence is significant at five percent level. However, at ten percent level, it is persistence in the ‘one to three years’ time bucket. Thus, in sum, though at the aggregate level, the ALM positive gap is not significant, in the ‘one to three years’ bucket it is significant and calls for careful monitoring.

### Measurement of Interest Rate Risk

According to the existing practice being followed by banks based on Basel II recommendations, the assets and liabilities of a bank are classified in different time buckets. Therefore interest sensitivity is measured for the particular types of assets and liabilities in the defined time period, the interest rates charges applicable to such assets during the time period, repayment expected from such assets during the time period etc. This needs to be assessed for different time period and for particular group of assets and liabilities falling under that time bucket. This can be explained through an example. Suppose a bank wants to assess the impact of interest rate changes during the period of next six months. The bank is expected to take the following steps:

1. Identify all assets and liabilities which fall under the time bucket of zero to six months.



2. In view of changes in interest rates during the period, interest on assets falling under this category will have to be re-fixed. This is done based on re-investment principle.
3. Likewise interest on deposit during the six months will have to be revised.

Therefore, it is clear from the above that all assets, liabilities, investments falling under this category are interest rate sensitive. There are various methods to measure interest rate risks.

### **Methods of Interest Rate Risk Measurement**

#### *(i) Gap Analysis*

A simple gap analysis measures the difference between the amount of interest-earning assets and interest-bearing liabilities (both on- and off-balance sheet) that reprice in a particular time period.

A negative or liability-sensitive gap occurs when interest-bearing liabilities exceed interest-earning assets for a specific or cumulative maturity period, that is, more liabilities are re-priced than assets. In this situation, a decrease in interest rates should improve the net interest rate spread in the short term, as deposits are rolled over at lower rates before the corresponding assets. On the other hand, an increase in interest rates lowers earnings by narrowing or eliminating the interest spread.

A positive or asset-sensitive gap occurs when interest-earning assets exceed interest-bearing liabilities for a specific or cumulative maturity period, that is, more assets are re-priced than liabilities. In this situation, a decline in interest rates should lower or eliminate the net interest rate spread in the short term, as assets are rolled over at lower rates before the corresponding liabilities. An increase in interest rates should increase the net interest spread.

More sophisticated gap reports measure mismatches of an institution's principal and interest cash inflows and outflows (including final maturities), both on- and off-balance sheet, that re-price in a given period. Such gap reports measure potential risk to earnings, from changes in interest rates on these re-pricing gaps across the full maturity spectrum. This indicates how much net interest income is at risk, and, to some extent, the timing of the risk.

#### *(ii) Duration Analysis*

Duration is the time-weighted average maturity of the present value of the cash flows from assets, liabilities and off-balance sheet items. It measures the relative sensitivity of the value of these instruments to changing interest rates (the average term to re-pricing), and therefore reflects how changes in interest rates will affect the institution's economic value, that is, the present value of equity. In this context, the maturity of an investment is used to provide an indication of interest rate risk. The longer the term to maturity of an investment, the greater the chance of interest rates movements and, hence, unfavorable price changes.

We can explain the above aspects in a better way by the following example

#### Duration Gap Analysis

$$\% \Delta P \approx -DUR \times \frac{\Delta i}{1+i} \quad (1)$$

Where

$\% \Delta P = (P_{t+1} - P_t) / P_t$  = Percentage change in market value of the securities

$DUR$  = duration

$i$  = interest rate

The following is the hypothetical case of the bank where the assets and liabilities of the bank have been determined taking into an account the duration of all assets and liabilities. An attempt has been made to calculate the impact of changes in the interest rate on the market value of each asset and liability based on the above formula. The calculations have been arrived giving weighted duration for each asset and liability. The following process have been followed

- a) For each asset weighted duration is calculated by multiplying the duration times the amount of asset divided by total assets which is in this case is assumed as Rs.100 crore.
- b) For example in case of securities with maturities less than one year, a) 0.4 year of duration times Rs. 5 crore divided by Rs. 100 crore to get weighted duration of 0.02.
- c) By following the above process (b) a) an average duration of assets has been arrived as 2.70 years.
- d) The similar process has been followed for the liabilities where total liabilities excluding capital are Rs. 95 crore.

**TABLE 1** Duration of the First National Bank's Assets and Liabilities

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	Amount (Rs. crore)	Duration (years)	Weighted Duration (years)
<b>Assets</b>			
Reserves and cash items	5	0.0	0.00
Securities			
Less than 1 year	5	0.4	0.02
1 to 2 years	5	1.6	0.08
Greater than 2 years	10	7.0	0.70
Residential mortgages			
Variable-rate	10	0.5	0.05
Fixed-rate (30-year)	10	6.0	0.60
Commercial loans			
Less than 1 year	15	0.7	0.11
1 to 2 years	10	1.4	0.14
Greater than 2 years	25	4.0	1.00
Other Assets	5	0.0	0.00
Average duration			2.70
<b>Liabilities</b>			
Term deposits	15	2.0	0.32
Current deposit accounts	5	0.1	0.01
Savings deposits	15	1.0	0.16
CDs			
Variable-rate	10	0.5	0.05
Less than 1 year	15	0.2	0.03
1 to 2 years	5	1.2	0.06
Greater than 2 years	5	2.7	0.14
T. Bills	5	0.0	0.00
Borrowings			
Less than 1 year	10	0.3	0.03
1 to 2 years	5	1.3	0.07
Greater than 2 years	5	3.1	0.1
Average duration	6		1.03

Deposits is determined by multiplying the 2.0-year duration by Rs.15 million divided by Rs. 95 million to get 0.32. Adding up these weighted durations, the manager obtains an average duration of liabilities of 1.03 years to explain this situation is presumed.

The bank wants to know what happens when interest rates rise from 10% to 11%. The total asset value is Rs.100 million, and the total liability value is Rs.95 million. Use Equation 1 to calculate the change in the market value of the assets and liabilities.

With a total asset value of Rs.100 million, the market value of assets falls by Rs.2.5 million (Rs.100 million x 0.025 = Rs.2.5 million):

$$\% \Delta P \approx -DUR \times \frac{\Delta i}{1+i}$$

Where  $DUR$  = duration = 2.70  
 $\Delta i$  = change in interest rate = 0.11 – 0.10 = 0.01  
 $i$  = interest rate = 0.10

Thus:

$$\% \Delta P \approx -2.70 \times \frac{0.01}{1+0.10} = -0.025 = -2.5\%$$

With total liabilities of Rs.95 million, the market value of liabilities falls by Rs.0.9 million (Rs. 95 million x 0.009 = -Rs. 0.9 million) :

$$\% \Delta P \approx -DUR \times \frac{\Delta i}{1+i}$$

Where  $DUR$  = duration = 1.03  
 $\Delta i$  = change in interest rate = 0.11 – 0.10 = 0.01  
 $i$  = interest rate = 0.10

Thus:

$$\% \Delta P \approx -1.03 \times \frac{0.01}{1+0.10} = -0.009 = -0.9\%$$

The result is that the net worth of the bank would decline by Rs.

1.6 million (-Rs. 2.5 million - (- Rs. 0.9 million) = -Rs. 2.5 million + Rs. 0.9 million = -Rs. 1.6 million).

### **Findings and conclusion:**

- a) There are serious attempts by banks to minimize the asset liability mismatch since the implementation of RBI guidelines in 1997. Banks have made adequate follow up and monitoring arrangements at different levels.
- b) Individual banks have also fixed maximum tolerance limits under each time bucket for the mismatch for close monitoring.
- c) The study suggests much scope for banks to improve profitability by monitoring and reducing short term liquidity.
- d) The further break up of data into smaller time buckets indicates negative gap.
- e) To fill the short term liquidity gap, banks resort to market borrowings at higher rate of interest which reduces interest margin and profitability of banks.
- f) Banks have greater scope to manage interest rate risk through various techniques.

### **References:**

Trends and progress of banks in India, Reserve Bank of India, 2005-06, 2010-11 Basel II (2004) International convergence of capital measurement and capital standards: a revised framework, BIS

Dash, Venkatesh, Bhargav (2008), An analysis of asset-liability management, <http://ssrn.com/abstract=1760786>

Charumathi (2008), Asset Liability management in Indian banking industry, World congress on engineering, 2008 Vol. II

Basel committee on banking supervision (2001), Principles for the management and supervision of interest rate risk, BIS

Annual Report, 2010-11, State Bank of India

Dash.M and Pathak, R. (2011). A linear programming model for assessing asset liability management in banks,- ICFAI Journal of risk management

Black, R and Brown, K. (2002), Asset liability management: what does the future have in store? Balance sheet, Boston.

Haslem, J. A., Scheraga, C.A. and Bedingfield. J P (1999), "DEA efficiency profiles of US banks operating internationally," International review of economics & finance 8 (2)

Ravikumar T (2002), Asset liability management, ICFAI press

Vaidyanathan, R. (1999), Asset Liability Management: Issues and trends in Indian context,” ASCI Journal of Management, 29 (1).

Vaidya, P and Shahi, A (2001), “Asset liability management in Indian banks,” Spandan  
Rao, A V (2005), ALM systems in banks,” Treasury Management

Rajan, R. and Nallari R (2004), “Study of Asset Liability Management in Indian Banks-  
Canonical Correlation Analysis.” Spandan