

## **ASSETS-LIABILITIES MANAGEMENT OF INDIAN COMMERCIAL BANKS: A CANONICAL ANALYSIS**

**Shabnam Nishat**

Research Scholar, Dept. of Commerce,  
Vidyasagar University, Midnapore (W),  
*E-mail id: syeda.shabnam786@gmail.com*

**Tagar Lal Khan**

Professor, Dept. of Commerce,  
Vidyasagar University, Midnapore (W),  
*E-mail id: tagarkhan@yahoo.com*

### **Abstract**

In the fast-growing economy like India, maintenance and development of an efficient banking system is essential. The banking system is the backbone of any country's economy because the stability of the financial system leads the growth of the industry and thereby its economy. For the success of banks, a sound strategy on the bank asset-liability management is essential. RBI introduced ALM technique for banks and all financial institutions to utilize their resources in a befitted manner, so as to maximize the returns by minimizing risks. Using canonical correlation approach, the study investigates asset and liability management strategy of the Indian public and private sector banks. The study reveals that for public sector banks the assets mix strategy depends on the liability structure, but in case of private sector banks the picture is reverse. Considering common size balance sheet approach, the study also reveals that the reserves, deposits, advances positions very significantly differ for private banks compared to the public sector banks.

**Key words:** *Asset-liability mix, Balance sheet management, Canonical correlation, Redundancy index, Indian commercial banks*

### **Introduction**

The banking sector has seen significant changes in recent times due to new regulations, economic changes, increasing consumer expectancies, digital banking and competition. Intense competition has created pressure on bank management for maintaining an effective balance on asset and liability management. Risk is considered as a complex phenomenon for banking industry which has to manage different types of risks- credit risk, interest rate risk, foreign exchange risk, liquidity risk and operation risk etc. In this rapidly changing world, banker needs to reduce these risks and increase the shareholders return on continuous basis. Hence, for better performance, a bank must have an efficient strategy tool for the risk management system. To develop a sound banking system, the RBI introduced Asset and liability management (ALM) on 1 April 1999 ([rbi.org.in](http://rbi.org.in)). Asset and liability management is one strategy to combat the risk of the bank. Asset and liability management (ALM) is a matching of asset and liability by which the risk are mitigated and greater efficiency and profitability are achieved. The main aim of ALM is to maintain liquidity requirement, managing credit quality improve asset quality and funding and capital planning. Hence, the role of ALM is not limited to only balance sheet management but even it is the management

of off-balance sheet activities. As per RBI guidelines, the ALM process has three pillars i.e., ALM information system, ALM organisation, and ALM process.

The present study analyses synergies and strategies of the asset and liability management (ALM) of Indian Public and Private sector bank. The study also compares the difference in strategies in the Assets-Liabilities management process by the public and private banks in India.

### **Review of Literature**

There are numerous works that address the issues of asset and liability in banks. Some of the studies that are noteworthy are mentioned below. Long time back, Fraser *et al.* (1974) studied the interdependencies of asset and liability management applying the Canonical correlation approach. They estimated the association between the performances of banks with demand, cost etc, of the banking services in a multidimensional structure. Vaidyanathan (1990) addressed the issue of assets and liabilities management of Indian banks and different types of risk that the banks manage. The researcher found that most of the banks were not efficient in managing their assets and liabilities properly. Haslem *et al.* (1992) examined the balance sheet strategy of US foreign and domestic large sized banks by using the canonical approach and also investigated whether such strategies reflect the profitability performance. They found that very large banks with low profit had the higher percentage of foreign loans, but they focussed on domestic balance sheet strategy. On contrary, large banks with high profit had the smaller percentage of a foreign loan, yet they followed foreign balance sheet matching strategy.

Ranjan and Nallari (2004) used canonical analysis to examine asset and liability management of Indian banks during 1992 to 2004. They found that SBI and their associates managed their asset and liability very well. On the other hand, the private banks gave more emphasis on earning profits rather than managing their balance sheet. Yong (2007) analysed asset and liability relationship and trend of U.S commercial bank over the period 1995-2005. By applying the canonical correlation approach, the study observed that asset and liability relationships were high in large banks as compared to small banks. Fenghua and Thakor (2007) in their paper addressed relationship banking in loan financing and opined that relationship banking loan suffers from liquidity problem and pay-back, which would have an adverse effect on bank valuation and foster bank fragility. The paper also examined the matching of assets-liabilities of competing banks for assessing their performance. Jaiswal (2010) tested the interdependencies between the two sides of the balance sheet and found their strong existence, however, with a decreasing trend over time due to exposure to off-balance sheet transactions.

Chaudhary and Sharma (2011) mentioned that Indian public sector banks must maintain their assets and liabilities properly and must pay attention to their risk management that contradicted the results of Chabraborty and Mohapatra (2007) which found that Indian public sector banks had an efficient asset-liability maturity pattern. They also observed that the interest rate risk and liquidity risk were the most noticeable risks that were regularly



With this backdrop, we have adopted canonical correlation approach for analysing the self relationship and cross relationship of different items of balance sheet and thereby understand the strategies applied by the bank management for their asset-liability optimal mix.

### **Analysis and Findings**

In this study for the purpose of examining the strategies of assets and liabilities mix in the balance sheet by public and private sector banks, and comparing the same between the two sectors we have applied the common size balance sheet approach to ensure the comparability. The common size balance sheet is measured in terms of proportion of various items of assets and liabilities in the balance sheet in respect of the total size of that balance sheet. After calculating the proportion of different items of assets and liabilities in the balance sheet independent sample t- test has been applied to find out any significant difference between the items of assets and liabilities in the balance sheet for the public and private sector banks operating in India. The results are presented in Table 1 below.

**Table 1: Mean Difference Test on Proportions (Public Bank Vs Private Banks)**

Liabilities	Mean Proportion		t-Value	Sig. Level
	Public Bk.	Private Bk.		
Capital	0.0068	0.0072	-0.1242	0.451
Reserves	0.0494	0.0887	-5.2831***	0.000
Deposits	0.8571	0.7641	2.7688***	0.005
Borrowings	0.0571	0.1052	-1.6638*	0.053
Other Liabilities & Provisions	0.0277	0.0339	-1.8539**	0.037
<b>Assets</b>				
Cash & Balances with RBI	0.0494	0.0462	0.4484	0.329
Bal. with Banks & money at Call	0.0422	0.0276	1.6317*	0.056
Investments	0.2749	0.2453	1.6673*	0.053
Advances	0.5690	0.6233	-2.5566***	0.008
Fixed Assets	0.0105	0.0488	1.2106	0.118
Other Assets	0.0540	0.0488	0.8323	0.206

Source: Own calculation

The above table (Table 1) shows the average proportion difference of various items of balance sheet of public and private sector banks by pulling the data of all three years of our study. Independent sample t-test has been applied to test whether the differences are statistically significant. It is observed that equity capital in the liabilities side and cash & balances with RBI, fixed assets, other assets under assets side do not have any significant difference for the private and public banks. It confirms that both types of banks maintain the same percentage of capital in their balance sheet to their total size of balance sheet. Percentage of fixed assets and other assets also do not have any significant difference for public sector banks compared to the private sector. Cash and balances with RBI also show insignificant difference for public and private sector banks. The reason might be that banks

need to maintain a threshold limit of cash with RBI on daily basis, which is presently Rs. 10 cr.

On the other hand, the study finds significant differences in respect reserves, deposits, borrowings and other liabilities under the liabilities side of the balance sheet. The public banks are keeping reserves of 4.94% of their balance sheet whereas the private banks are keeping 8.87% reserves. Since the public banks are supported by the Indian government the management enjoys better stability and support compared to the private sector banks. In case of deposits the public sector banks significantly outperform the private sector banks. Till the present socio-economic scenario, people show more trust towards the public sector banks than the private sector banks for depositing their hard earn money. Market borrowing for public sector banks is found to be significantly less compared to the private sector banks due to the fact of their strong deposit strength and the government support. In case of other liabilities and provisions private banks outperform the public sector banks. The private banks are issuing more overdraft facility, holding more bills payables etc. to facilitate their customers. As regards to advances private banks are better off than the public sector banks. Those banks are disbursing more loans to the customers and earning more income from that. Private Banks are imposing better lending policies and techniques, bearing more risk on lending and hence, performing better. On contrary the public banks maintain safe lending policies and techniques to minimize the risk and hence making lesser disbursement of advances to customers and business owners.

### Canonical correlation

In order to understand the relationship and inter-linkages of various items of assets and liabilities in the bank balance sheet, canonical correlation approach is applied. The significances of linear structures of the canonical variables are tested with the help of Wilks' lambda and Roy's F statistic. The results are presented in Table 2 and Table 3 below.

**Table 2: Canonical correlation**

Public banks			Private banks		
C1	C2	C3	C1	C2	C3
.793	.024	.020	0.7481	0.1322	0.0181

Source: Own computation

**Table 3: Significance test of canonical correlation**

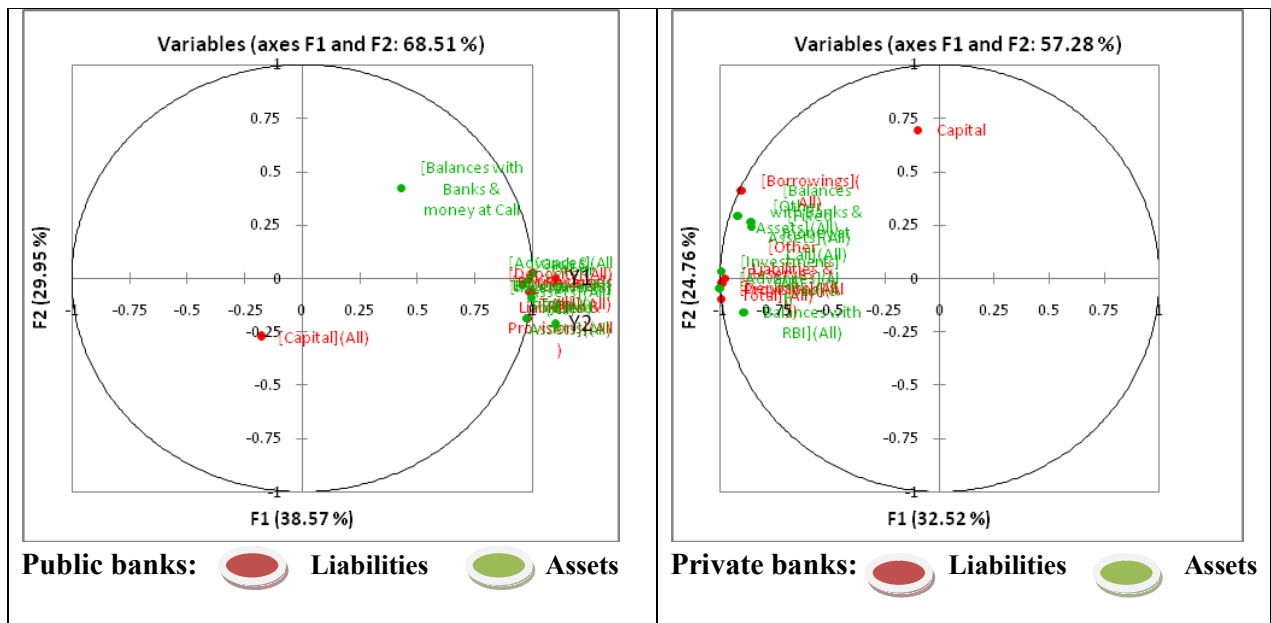
#### Wilks' Lambda test

Variate	Lambda	Public banks				Lambda	Private banks			
		F	DF1	DF2	Sig.		F	DF 1	DF 2	Sig.
C1	.001	244.4459	30	174	0.0001	.001	645.41	30	138	0.000
C2	.080	8.3881	20	147	0.0001	.031	10.76	20	117	0.000

Source: Own computation

From the estimated canonical correlation coefficients, it can be said that for canonical functions 1 and 3, the public banks show better relation between the sets of assets and liabilities than the private banks. Value of canonical correlation for first canonical variate (C1) and third canonical variate (C3) are comparatively higher in case of public sector banks compared to the private sector banks. For the second function (C2) the relation of asset and liabilities for private banks is better than the public sector banks. Considering Wilks' lambda and Roy's F- statistic, it is observed that the both the canonical variate C1 and C2 confirm their linear structure with high levels of statistical significance.

**Distribution of variables into two canonical axes:**



**Fig. 1**

**Fig. 2**

The figures above shows the explanatory power of two canonical axes F1 and F2. It is observed that two significant axes explained about 60% of the variation in the underline dataset. Though the explanatory power of the axes for the public sector banks is more, for private sector banks also it is satisfactory. In case of public sector banks all the variables under assets and liabilities concentrate on the second axis F2 which shows uniform linear pattern of the variables. Variable capital is lying on the different axis F1 for both the private and public sector banks. The distance of balance with banks and money at call from the axis is more in case of public sector banks and the item borrowings in case of private sector banks.

**Table 4: Canonical loading (squared cosine)**

Public banks		Liabilities	Private banks	
C1	C2		C1	C2
0.0320	0.0756	<b>Capital</b>	0.0098	0.4830
0.9920	0.0040	<b>Reserves</b>	0.9742	0.0007
0.9980	0.0007	<b>Deposits</b>	0.9900	0.0092

0.9821	0.0040	<b>Borrowings</b>	0.8100	0.1681
0.9624	0.0346	<b>Other Liab. &amp; Prov.</b>	0.9565	0.0000
		<b>Assets</b>		
0.9178	0.0010	<b>Cash &amp; Balances with RBI</b>	0.7903	0.0246
0.1832	0.1772	<b>Bal. with Banks &amp; money at Call</b>	0.7327	0.0692
0.9860	0.0081	<b>Investments</b>	0.9880	0.0011
0.9980	0.0005	<b>Advances</b>	0.9960	0.0023
0.9487	0.0342	<b>Fixed Assets</b>	0.7362	0.0590
0.9643	0.0000	<b>Other Assets</b>	0.8391	0.0858

*Source: Own calculation*

From the table of canonical loading (Table 4) calculated by squared cosine (square of correlation coefficient between the canonical variate with its own input variables), it is observed that deposits and reserves are the top two variables under liabilities side which have higher relationship in case of public sector banks. These items have higher explanatory power to liabilities than other items of liabilities. Except capital all other items of liabilities have good relation and explanatory power with the latent liability. Under assets side except balance with bank & money at call, all have good contribution towards the bank assets in case of public sector banks. For liability variables of private banks the picture is more or less similar. However, for the items of assets unlike public sector banks balance with bank & money at call variable bears higher weight towards clarifying the assets. Other items of assets of private banks carry relation and weight at par with the public sector banks.

**Table 5: Canonical cross loading (squared cosine)**

<b>Public banks</b>		<b>Liabilities</b>	<b>Private banks</b>	
<b>C1</b>	<b>C2</b>		<b>C1</b>	<b>C2</b>
0.0320	0.0586	<b>Capital</b>	0.0098	0.3684
0.9920	0.0031	<b>Reserves</b>	0.9742	0.0005
0.9980	0.0005	<b>Deposits</b>	0.9900	0.0071
0.9821	0.0031	<b>Borrowings</b>	0.8100	0.1282
0.9624	0.0269	<b>Other Liab. &amp; Prov.</b>	0.9565	0.0000
		<b>Assets</b>		
0.9178	0.0008	<b>Cash &amp; Balances with RBI</b>	0.7903	0.0188
0.1832	0.1376	<b>Bal. with Banks &amp; money at Call</b>	0.7327	0.0529
0.9860	0.0062	<b>Investments</b>	0.9880	0.0008
0.9980	0.0004	<b>Advances</b>	0.9960	0.0018
0.9487	0.0266	<b>Fixed Assets</b>	0.7362	0.0449
0.9643	0.0000	<b>Other Assets</b>	0.8391	0.0650

*Source: Own calculation*

Canonical cross loading indicates the relation between the original variables under the assets side with the latent extracts of the opposite side that is the liabilities side and vice versa. It is found that borrowing of private banks have comparative lesser relation with private bank liabilities. For public banks, on the other hand, balance with banks and money at call has lesser explanatory power of the liabilities compared to private banks.

### **Redundancy analysis:**



Canonical redundancy index is the amount of variation of one data table (Dependent) is explained by another data table (independent), like linear regression.

**Table 6: Redundancy Index of Assets and Liabilities of Indian Commercial Banks**

	Public banks			Private banks		
Year	2016-17	2017-18	2018-19	2016-17	2017-18	2018-19
<b>Liabilities</b>	0.8659	0.8520	0.8084	0.7474	0.7664	0.7468
<b>Assets</b>	0.7875	0.8022	0.8693	0.8808	0.8218	0.9096
<b>Liabilities</b>	Independent	Independent	Dependent	Dependent	Dependent	Dependent
<b>Assets</b>	Dependent	Dependent	Independent	Independent	Independent	Independent

Source: Own calculation

From the redundancy index (Table 6), it is observed that in case of public sector banks, for the year 2016-17, the assets variables variance is explained by liabilities canonical variate is 86.59%, whereas, the liabilities variables variance is explained by assets canonical variate is 78.75%. Thus, the explanatory power of assets canonical variate is less compared to the liabilities canonical variate. So, the elements of liabilities get more freedom than the asset items in the balance sheet or the strategy is liabilities led assets strategy. In other words the bank management decide about the investment mix only after the obtaining fund from bank customers or other financial institutions. We get similar picture for the year of 2017-18 and reverse picture for the year 2018-19 in case of public sector banks. In case of private sector banks in all the years of our study the liabilities variance is better explained by the assets canonical variate as the redundancy index of assets canonical variate is more compared to the liabilities canonical variate. Thus, in case of private banks, items of assets get more freedom than the liabilities elements. So we observe an opposite strategy on assets liabilities management of the public sector and private sector banks in India.

### Conclusions

The study analyses the pattern of assets and liabilities of Indian commercial banks and the strategies adopted by bank managers towards the management of two sides of balance sheet for their prosperity and growth. Empirical results show that the strategies and practices of assets-liabilities management in public sector bank are different from the private banks. They use their resources and funds differently. Observations from the redundancy analysis confirm that interdependencies between assets and liabilities are reverse for private and public banks; private banks are more actively focusing on assets management; managing investments and advances, to attain profitability, liquidity and to control risk. In contrast, public sector banks give emphasis on accumulating funds from people and concentrating more on deposits. So, for ensuring better earnings, the public sector banks should give emphasis on their assets management also and try to mobilise advances in a more efficient manner. By keeping a good proportion of reserve in the balance sheet, private sector banks are better capable to absorb shocks compared to the public sector banks; and thus the public sector banks need to depend more on government funding at time of their crisis.

### References



- Chakraborty, S. & Mohapatra, S. (2007). An Empirical Study of Asset Liability Management Approach by the Indian Banks, *The IUP Journal of Bank Management*, 8 (3&4), 7-13.
- Chaudhary, K. & Sharma, M. (2011). Performance of Indian Public Sector Banks and Private Sector Banks: A Comparative Study. *International Journal of Innovation, Management and Technology*. 2 (3), 249-256.
- Dash, M. & Pathak, R. (2009). Canonical Correlation Analysis of Asset-Liability Management of Indian Banks. *SSRN Electronic Journal*. [https://doi.org/10.2139/ssrn.1412739]
- De Young, R. & Yom, C. (2008). On the independence of assets and liabilities: Evidence from U.S. commercial banks, 1990–2005. *Journal of Financial Stability*, 4(3), 275–303 [https://doi.org/10.1016/j.jfs.2008.04.001]
- El-Ansary, O. & Abou-El-Sood, H. (2017). Asset-liability management in Islamic banks: Evidence from emerging markets. *Pacific Accounting Review*, 29(1), 55–78. [https://doi.org/10.1108/PAR-04-2016-0050]
- Fenghua Song & Thakor, A. V. (2007). Relationship Banking, Fragility, and the Asset-Liability Matching Problem. *The Review of Financial Studies*, 20(5), 2129-2177.
- Fraser, D. R., Phillips, W. & Rose, P. (1974). A Canonical Analysis of Bank Performance, *Journal of Financial and Quantitative Analysis*, 9 (2), 287–295.
- Haslem, J. A., Scheraga, C. A. & Bedingfield, J. P. (1992). An Analysis of the Foreign and Domestic Balance Sheet Strategies of the U.S. Banks and Their Association to Profitability Performance. *MIR: Management International Review*, 32(1), 55–75.
- Jaiswal, S. (2010), Relationship between assets and liability of commercial banks in India-1977-2008, *International Research Journal of Finance and Economics*, 49, 43–58.
- Karthigeyan, A., Mariappan, V. & Rangaiah, B. (2013). Assets-Liabilities management in India private sector banks: a Canonical Correlation Analysis, *International Journal of Management*, 4 (5), 6–13.
- Meena, A. K. & Dhar, J. (2014). An Empirical Analysis and Comparative Study of Liquidity Ratios and Asset-Liability Management of Banks Operating in India, *International Journal of Economics and Management Engineering*, 8 (1), 342-348.
- Ranjan, R. & Nallari, R. (2004), Study of Asset Liability Management in Indian Banks Canonical Correlation Analysis, *Spandan*.
- Shetty, C., Patel, P. & Nandini (2016). An Analysis of Private Banks Exposure to the Asset and Liability Management, *International Journal of Research in IT and Management*, 6(10), 92-98.
- Singh, K. (2013). Assets-liability management in banks: a dynamic approach. *AIMA Journal of Management and Research*, 7 (2-4), 1–14.
- Stowe, J. D., Watson, C. J., & Robertson, T. D. (1980). Relationships between the Two Sides of the Balance Sheet: A Canonical Correlation Analysis. *The Journal of Finance*, 35(4), 973–980. [https://doi.org/10.1111/j.1540-6261.1980.tb03514.x]
- Uddin, Md. S. & Haque, A. (2016). The impact of Asset and liability Management on Profitability of selected Bank in Bangladesh. *The Cost and Management*, 44(4), 176-191.

Vaidyanathan, R. (1999). Asset-Liability Management: Issues and Trends in the Indian Context. *ASCI Journal of Management*, 29(1), 39-48.