



The Impact Of Asset Liability Management On The Profitability Of Commercial Banks In India

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Abstract: This study aims to examine the impact of ALM on commercial bank profitability in the Indian financial system. The SCA model was used to compare profitability, as measured by ROA, to balance sheet and macroeconomic explanatory variables. This study chose eight commercial banks from 2014 to 2023. The study's hypotheses state that the rate of return on earning assets is positive and varies by asset, but the rate of cost on liabilities is negative and varies by obligation. The pooled OLS regression analysis revealed that all assets, with the exception of fixed assets, primarily loans and advances, have a positive impact on profitability, while all liabilities, primarily savings and fixed deposits, as well as other liabilities and credit balances, have a significant and negative impact on commercial bank profitability. In terms of macroeconomic variables, the real GDP growth rate reduces commercial bank profitability. As a result, the study suggested that commercial banks focus on improving public awareness in order to mobilise more savings and fixed deposits, which would improve their ability to provide loans and advances to consumers.

KEY WORDS: Asset Liability Management, Commercial banks, Profitability, Statistical Cost Accounting Model

I. INTRODUCTION

For many years, Indian banks were indifferent about risk management due to the highly protected environment, but this is changing now. Asset Liability Management is currently a buzzword in the banking world. It is a component of the entire risk management system in banks. According to Memmel and Scherteler (2010), traditional perceptions of such financial intermediaries follow a simple logic: a bank accepts deposits with short maturities from a big number of people and makes loans with long maturities to a limited number of borrowers. These transformation efforts subject a bank to interest rate, credit, and liquidity concerns.

Commercial banks are one of the financial intermediaries that historically raise funds by issuing checkable/demand deposits, savings deposits, and time/fixed deposits (Mishikin, 2004). Because our country's financial system is still in its infancy, commercial banks are authorised to provide all banking services in the financial market. Because there is no organised financial market, commercial banks handle the vast majority of money and capital market transactions and activities.

II. REVIEW OF LITERATURE

According to **Mishikin (2004)**, a commercial bank's liability is primarily financed by current, saving, and fixed deposits, as well as equity (contributed by shareholders), while its asset is primarily comprised of investments, loans, and advances. Given the legal requirements of commercial banks, each bank creates its unique mix of obligations and assets, which establishes its own operating goal: maximise shareholder equity (profit). The profitability of commercial bank is critical for a country's financial system to function properly (**Tektas et al., 2005**). Despite the fact that our country's financial industry is controlled in the same way that other nations' financial sectors are, it contributes significantly to the health of the country's financial system. As a result, individuals in charge of policymaking and day-to-day operations in the sector are primarily concerned with its profitability. ALM is one of the most important variables influencing profitability of commercial bank (**Kosmidou, 2004; Shubiri, 2010; Sayeed and Hoque, 2008; Asiri, 2007**).

Asset and Liability Management (ALM) has been conceptualized by various authors, including Gup and Brooks (1993), Zawalinska (1999), and Charumati (2008). According to Charumati (2008), ALM is a dynamic and strategic process involving the planning, organization, coordination, and control of assets and liabilities with respect to their composition, volume, maturity, yield, and cost, with the primary objective of achieving a targeted net interest income (NII). Essentially, ALM aims at the optimal allocation of assets to meet both current goals and future financial obligations. It plays a critical role in managing risks associated with liquidity mismatches, interest rate volatility, and foreign exchange fluctuations. As emphasized by **Zawalinska (1999)**, ALM focuses on aligning the maturity and interest rate sensitivity of assets and liabilities to mitigate interest rate and liquidity risks. ALM is an important microeconomic predictor of commercial bank profitability.

Hester and Zoellner (1966) conclude that there is a statistically significant association between ALM and profitability, rejecting the null hypothesis that there is none. On the contrary, **Kosmidou et al. (2004)** discovered that liability management plays a critical role in determining profitability differences across commercial banks. However, prior to this study, **Vasiliou (1996)** proposed that asset management, rather than liability management, plays a critical role in explaining disparities in bank profitability.

III. RESEARCH METHODOLOGY

• Data

This study analysed eight Indian commercial banks (State Bank of India, UCO Bank, Axis Bank, HDFC Bank, ICICI Bank, Bank of India, Bank of Baroda, and Canara Bank). The data for this study were gathered from the RBI (which is in charge of maintaining the audited financial statements of all banks operating in India and regulating their operations), the Indian statistical agency, and each sampled commercial bank's website. The primary rationale for this study's concentration on commercial banks was to minimise comparisons across different types of thrifts such as cooperative banks, development banks, microfinance institutions, and so on, as well as to ensure data consistency.

- *Model Specification*

To investigate the effect of ALM on commercial bank profitability in India, a modified SCA model was used. That is, the SCA model examines how ALM regresses operating profit in Indian commercial banks. The SCA model, as described by **Hester and Zoellner (1966)**, is a regression model that assumes the rate of return on earning assets is positive and varies across assets, while the rate of cost on liabilities is negative and varies across liabilities. A bank's revenue comes from a variety of sources, the most common of which are interest income, service fees and commissions from assets, and income from the use of liabilities. On the other hand, bank costs are derived from the bank's assets and liabilities.

These expenses include interest on deposits, other liabilities, and administrative costs. Now, subtracting operating costs from operating revenues yields net operating income for banks. The standard SCA model, developed by **Hester and Zoellner (1966)** for bank b in time t and employed in this investigation, is as follows:

$$\pi_{bt} = \alpha_0 + \sum \alpha_{1i} A_{ibt} + \sum \alpha_{2j} L_{jbt} + \varepsilon_{bt} \dots \dots \dots Eq. (1)$$

Where:

π_{bt} = Operating profit of a commercial bank

A_i = i^{th} asset of a bank; $i = 1, 2, 3 \dots n$

L_j = j^{th} liability of a bank; $j = 1, 2, 3 \dots m$ b = banks; $b = 1, 2, 3 \dots z$

t = Time period; $t = 1, 2, 3 \dots T$

α_{1i} = Marginal rate of return on assets

α_{2j} = Marginal cost of liabilities

α_0 = Constant term

ε_{bt} = Stochastic term

Because commercial banks' business volumes vary greatly, all of the variables in equation (1) have to be divided by their average total assets. This is done to minimise inefficient coefficient estimation due to residual heteroscedasticity (**Kosmidou et al. 2004**).

$$\frac{\pi_{bt}}{ATA_{bt}} = \frac{\alpha_0}{ATA_{bt}} + \sum \alpha_{1i} \frac{A_{ibt}}{ATA_{bt}} + \sum \alpha_{2j} \frac{L_{jbt}}{ATA_{bt}} + \mu_{bt} \dots \dots \dots Eq. (2)$$

ATA_{bt} ⁵ = Average total assets for bank b at time t

$$\mu_{bt} = \pi r^2 = \frac{\varepsilon_{bt}}{ATA_{bt}}$$

The models outlined above imply that all banks have the same interest rates on their assets and liabilities (Shubiri, 2010). However, in practice, several factors can have a substantial impact on the profitability of commercial banks. The real GDP growth rate and the overall inflation rate are the most important (Sayeed and Haque, 2008). According to various researchers, including Ramlall (2009), rapid

economic expansion boosts profitability for a large number of countries. As a result, changes in general activity levels are projected to have a direct impact on commercial banks' profitability. Inflationary pressures can have a significant impact on financial system stability and the regulator's ability to control the solvency of financial intermediaries. As a result, inflation has a significant indirect influence on commercial banks' customers, changing the demand for various types of financial services (**Staikouras and Wood, 2001**).

Kwast and Rose (1982), Shubiri (2010), and Sayeed and Hoque (2008) added macroeconomic aspects into their models to give a modified version of the standard SCA model. The following modified SCA model was used for the study:

$$ROA_{bt} = \frac{\alpha_0}{ATA_{bt}} + \sum a_{1i} \frac{A_{ibt}}{ATA_{bt}} + \sum a_{2j} \frac{L_{jbt}}{ATA_{bt}} + \alpha_3 GDP_t + \alpha_4 INF_t \dots \dots \dots Eq. (3)$$

Where:

ROA_{bt} = Return on assets for bank b at time t

GDP_t = Rate of gross domestic product at time t

INF_t = General rate of inflation at time t

α_3 = Coefficient of real growth rate in GDP

α_4 = Coefficient of general rate of Inflation

- **Explanatory variables**

The balance sheet of commercial banks served as the study's primary explanatory variable. Researchers have typically disaggregated bank assets into independent variables based on several key characteristics, including maturity structure, federal insurance or guarantee status, the presence of an active secondary market, and the availability of collateral (**Hester & Pierce, 1975; Kwast & Rose, 1982; Vasiliou, 1996; Kosmidou et al., 2004; Asiri, 2007; Sayeed & Hoque, 2008; Shubiri, 2010**). This breakdown of commercial bank assets was useful for testing several critical theories. However, assets held by Indian commercial banks lack insured or federally guaranteed status, as well as an active secondary market. As a result, assets are decomposed into variables based on maturity and collateral. The banks' share capital and retained earnings are not included on the right side of the balance sheet because it is assumed that their cost rate is zero (**Kosmidou et al., 2004**). The same is true for the assets of cash on hand and reserve accounts held by the National Bank of India. These accounts have no interest rate and are kept solely to ensure the bank's liquidity and compliance with legal obligations. The table below lists the balance sheet explanatory factors based on these data.

Table 1: Explanatory Variables

VARIABLES	DESCRIPTION
Asset variables	
A1	Deposits in other banks
A2	Other Investments and debit balances
A3	Loan and Advances
A4	Fixed Assets
Liability variables	
L1	Demand Deposits
L2	Saving and Fixed Deposits
L3	Other Liabilities and credit balances
Macroeconomic variables	
GDP	Real Growth rate in GDP
INF	General rate of Inflation

IV. DATA ANALYSIS AND INTERPRETATION

The validity and reliability of the regression relationship are determined by the tests performed on the data used in analysis. The study employed STATA 11 software to alter and infer data. A regression analysis was done to determine the link and significance of ALM on commercial bank profitability. To determine the adequacy of the method adopted, the Hausman test was used to distinguish between fixed effect and random effect methods. The test results confirmed the use of the random effect approach, and additional discrimination was achieved by using the Breusch-Pagen Lagrangian multiplier (LM) test. The test results recommended using Pooled Ordinary Least Squares (OLS) to obtain efficient and consistent estimators. To address multicollinearity, the Pearson correlation matrix and Variance Inflation Factor (VIF) tests were used. Cluster regression was performed to determine the presence of autocorrelation, and there was no autocorrelation problem. According to **Gujurati (2004)**, heteroscedasticity can be caused by outliers. The Breusch-Pagen Godfrey test, which is sensitive to normality, was used to assess heteroscedasticity. Furthermore, the normalcy test was performed using the Anderson-Darling (Skewness-kurtosis), Shapiro-Francia, and Chapiro-Wilk tests. In addition to the models discussed above, descriptive statistics were employed to describe the mean, standard deviation, minimum, and maximum values of explanatory and explained variables.

- *Descriptive Statistics*

Table 2 shows the descriptive statistics for the study's explanatory and explained variables. It is based on a panel data set collected from eight commercial banks participating in the Indian financial industry between 2014 and 2023. Looking at them in general, the statistics show a wide range of variability in both balance sheet and macroeconomic variables that affect commercial bank profitability. The ROA has an average value of 4.45% and a standard deviation of 0.92%. The average value of deposits made at other banks (A1) is 12.19%, with a standard deviation of 6.85%. Total investments and other debit balances (A2) variable has a mean of 12.34% and a standard deviation of 8.11%. The loans and advances variable (A3) has a mean value of 61.78%, indicating that loans and advances account for more than half of commercial banks' total assets. It had a standard deviation of 17.20%, indicating that there was more variability than any other asset variable utilised in the study. Fixed assets variable (A4) has a mean of 1.65% and a standard deviation of 0.74%. This could signify that money utilised to acquire fixed assets have a lower proportion than other asset items.

The first liability variable, current deposits (L1), has an average value of 26.04% and a standard deviation of 10.66%. Savings and fixed deposits variable (L2) have a mean value of 59.31% and a standard deviation of 13.45%. Although there is no hard rule for comparing the means and standard deviations of current deposit variables to those of saving and fixed deposits, the mean value of the latter is higher and the standard deviation is lower, indicating that it is the primary source of funds for commercial banks with less variability than current deposits. It is because commercial banks are financial intermediaries with a simple logic: accept short-term deposits from a large number of people and provide long-term loans to a limited number of borrowers. The other liabilities and credit balances variable (L3) has a mean value of 15.11% and a standard deviation of 8.15%.

The macroeconomic variables included in this study had mean values of 11.23% and 16.16%, with standard deviations of 0.89% and 11.69% for the real GDP growth rate and the general rate of inflation, respectively. The comparison of minimum and maximum values to the mean value of real growth rate in GDP reveals that the variable has less variability. Nonetheless, the overall rate of inflation is more unpredictable and has a large standard deviation when compared to the real growth rate in the GDP variable.

Savings and fixed asset deposits account for a considerable share of the source of funds variables. Loans and advances have a larger mean value and share than other fund-related factors. This suggests that the majority of commercial banks operating in India throughout the study period were financed by savings and fixed deposits, and they used the funds to provide loans and advances. In terms of standard deviations, fixed assets and other liabilities and credit balances are less variable, but loans and advances and current deposits are more variable, based on the usage and source of funds, respectively.

Table 2: Descriptive statistics of the variables

Variable	Mean	Std. Dev.	Min	Max
ROA	.044541	.0092574	.0179986	.0601423
A1	.121981	.0685912	.0212676	.3319955
A2	.1234925	.0811356	.0073634	.5886134
A3	.6178178	.1720643	.2461145	.8723945
A4	.0165248	.0074324	.0060767	.0375386
L1	.2604345	.1066678	.0892826	0.495444
L2	.5931867	.1345714	.3295344	.7966835
L3	.151191	.0815913	.0290235	.4638278
GDP	.1123346	.0089756	.097	.125
INF	.1616678	.1169792	.029	.368

Source: Panel Data Estimation, 2014-23

• Regression results

As shown in Table 1, this study categorizes asset-related explanatory variables into four groups: deposits in other banks (A1), other investments and debit balances (A2), loans and advances (A3), and fixed assets. The pooled regression results, presented in Table 3, indicate that all asset categories except fixed assets have a positive effect on the profitability of commercial banks. This implies that sound asset management

practices contribute significantly to improved profitability. These results are consistent with prior empirical evidence reported by Vasiliou (1996), Asiri (2007), Sufian and Habibullah (2009), Miller and Noulas (1997), and Ali et al. (2011), who also found that effective asset management positively influences commercial bank performance.

Loans and advances make a considerable contribution to commercial bank profit production at the 0.01 level of significance. This is congruent with theoretical and empirical findings. Other things remaining constant, **Naceur et al. (2003)** indicated that more deposits are converted into loans to generate interest from borrowers. The bigger the interest rate margins, the higher the profits, and banks can protect themselves from credit risk caused by adverse selection and moral hazard. **Kosmidou et al. (2004)** discovered that loans and advances are the asset categories that cause the profitability difference between domestic and foreign banks.

All other types of assets have no major impact on commercial banks' profitability. Except for the fixed asset variable, they have a positive impact on profitability. This conclusion is obtained because the spread that commercial banks realise from the difference between the rate of return on loans and advances and the rate of cost of deposits is substantial. As a result, loans and advances may be the primary source of revenue for commercial banks in India.

The only asset item variable with a negative coefficient, however insignificant, is fixed assets, implying that fixed assets have a negative relationship with commercial banks' profitability. Although this finding is consistent with **Asiri (2007)**, it contradicts **Kosmidou et al. (2004)**, who reported a positive relationship between fixed assets and profitability.

According to **Kosmidou et al. (2004)**, large banks place a greater emphasis on lowering fixed assets in order to earn profits. In contrast to this finding, Indian commercial banks are paying large costs in order to acquire fixed assets and establish depositor trust. This will accentuate the opportunity cost gap between renting and purchasing fixed assets. Fixed assets may have a different impact on commercial banks as they grow in size.

The positive and significant value of α_0/ATA indicates diseconomies of scale. As **Kosmidou et al. (2004)** discovered, a positive significant constant indicates the presence of diseconomies of scale. As a result, during the study period, there was no substantial cost difference between major and small banks in the Indian commercial banking sector, despite the fact that the average total assets size ranged from 66,820.5 (in millions) in CBE to 5,274 (in millions) in UB in 2010.

In terms of liability variables, the explanatory variables are divided into three categories: current deposits (L1), savings and fixed deposits (L2), and other liabilities and credit balances. This decomposition takes into account the liability's characteristics and maturity. Commercial banks' share capital and retained earnings were not considered because their cost rate is assumed to be zero (**Kosmidou et al., 2004**).

Table 2 illustrates that saving and fixed deposits, as well as other liabilities and credit balances, considerably reduce the profitability of commercial banks in the Indian financial market at the 0.1 level of significance. It could be because savings and fixed deposits are the only large base sources of funds, whereas other liabilities and credit balances are expensive sources of funds because they have a narrow foundation. This could be because commercial banks operate on the simple premise that they accept deposits with short

maturities from a large number of individuals while making long-term loans to a limited number of borrowers. As a result, they have a higher level of savings and fixed deposits than their counterparts, such as microfinance institutions, saving and credit associations, and so on. That could explain why they are experiencing significant charges on their savings and fixed deposits. Furthermore, it is likely that it is the sole major source of funding accessible to commercial banks to finance their assets, as opposed to other types of liability.

Nonetheless, the existing deposit variable does not considerably reduce commercial bank profits. This could be because commercial banks in the country do not pay interest on current deposits. This finding contradicts the findings of **Kosmidou et al. (2004)**, who discovered that liability management has a favourable effect on producing profitability differences between local and international banks. Recently, **Asiri (2007)** discovered that asset management positively and liabilities management adversely correlated with commercial bank profitability.

Table 3: Pooled OLS regression result

ROA	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
A1	.0333332	.0224752	1.49	0.143	-.0121651	.0788289
A2	.0095667	.0145889	0.64	0.519	-.0199672	.039111
A3	.0494283	.0117360	4.24	0.000*	.0256723	.0731871
A4	-.003059	.1827811	-0.04	0.983	-.3730876	.366948
L1	-.0165931	.0226812	-0.76	0.465	-.0625089	.0293239
L2	-.0430798	.0193114	-2.20	0.031**	-.0821719	-.0039872
L3	-.0420712	.0218649	-1.89	0.063***	-.0863361	.002196
GDP	-.6291631	.1699919	-3.72	0.001*	-.9732914	-.2850342
INF	-.0004756	.011441	-0.05	0.965	-.0236187	.0226668
_cons	.1157948	.0232287	4.96	0.000*	.0687696	.1628192
Number of Observations = 48 F(9, 38) = 4.62 Prob > F = 0.000041 R-Squared = 0.5232 Adj. R-Squared = 0.4104 *, **, *** = Significant at 0.01, 0.05, and 0.1, respectively						

Source: Panel Data Estimation, 2014-23

Table 3 shows that both the real growth rate in GDP and the general rate of inflation have a negative impact on commercial bank profitability. However, the real growth rate in GDP has had a significant impact at the 0.01 level of significance. The real GDP growth rate is predicted to have an impact on a variety of factors affecting loan and deposit supply and demand. Favourable economic conditions will increase demand and supply for commercial bank services while having either a positive or negative impact on commercial bank profitability (**Sufian and Habibullah, 2009**). As a result, the real growth rate in GDP will have a negative impact on commercial banks' profits.

As shown in table 3, the pooled OLS regression analysis result indicates that all liabilities have a negative impact on commercial bank profitability. According to **Hester and Zoellner's (1966)** hypothesis, the SCA model, as a regression model, implies a negative rate of cost on liabilities that varies across liabilities. The findings from the observations of eight commercial banks between 2014 and 23 show that liabilities have a detrimental impact on bank profitability. In other words, liability management has a detrimental impact on Indian commercial banks' profitability.

The negative and insignificant relationship between profitability and the general rate of inflation exists either because bank managements are unable to accurately predict future inflation rates or because it occurs unexpectedly. This could be because bank management's ability to accurately predict inflation can positively affect the bank's profitability by allowing the bank to adjust interest rates in the desired direction to increase profit, whereas failure to accurately predict inflation may raise costs due to imperfect interest rate adjustment, reducing the bank's profit.

In general, this study was conducted in the Indian commercial banking market using the SCA model, and it was discovered that assets management, primarily loans and advances, contributes positively to commercial bank profitability, whereas liability management, specifically saving and fixed deposits, as well as other liabilities and credit balances, contributes negatively. This discovery is compatible with the assumptions of the SCA model, developed by **Hester and Zoellner (1966)**. The SCA model, as a regression model, posits that the rate of return on earning assets is positive and varies across assets, whereas the rate of cost on liabilities is negative and varies across liabilities.

V. CONCLUSIONS

The primary goal of this study was to experimentally assess the effect of ALM on commercial bank profitability in India using the SCA model. A balanced panel data of eight commercial banks from 2014 to 2023 was used. The regression results were estimated using the pooled OLS method, and the conclusions were drawn accordingly.

The empirical findings of this study show that asset management improves the profitability of commercial banks in India, with the exception of fixed assets, which are negatively impacted by liability management.

Loans and advances, in particular, have a substantial impact on commercial bank profitability, as measured by the operating income-to-ATA ratio. All other asset variables have no substantial impact on commercial banks' profitability. This implies that India's commercial banks' asset base is excessively limited. They are unable to produce income from alternative sources. In particular, the other investments and debit balances variable is less prominent than in other countries. Asset portfolio investment in bonds, commercial papers, and the like does not exist due to the lack of connected markets such as money, capital, bond, equity, and so on.

Although the other asset variables do not provide income for Indian commercial banks, loans and advances contribute significantly to profitability. This leads us to conclude that the spreads on loans and advances in the Indian commercial banking industry are attractive. This could explain why an increasing number of commercial banks are being established.

The positive α_0/ATA indicator suggests diseconomies in scale. As Kosmidou et al. (2004) discovered, a positive significant constant indicates the presence of diseconomies of scale. As a result, during the study period, there was no substantial cost differential between large and small banks in the Indian commercial banking industry.

Savings and fixed deposits, as well as other liabilities and credit levels, have a major negative impact on commercial bank profitability. The cost of savings and fixed deposits is significant since they are a larger

source of money for commercial banks. It may have no effect on the cost of this kind of funding. As a result, commercial banks' performance is tied to their capacity to recruit individual depositors.

The current deposits variable has a negative and small impact on commercial banks' profitability. This is because commercial banks are getting higher service charges on current deposits, which can pay the liquidity costs of their off-balance-sheet activities.

The macroeconomic variables included in this study model were the real GDP growth rate and the general rate of inflation. They have a negative impact on commercial bank profits. The real growth rate in GDP has a substantial negative impact because it is dependent on the economic conditions that exist in the economy. Favourable economic conditions will have a favourable impact on the demand and supply of commercial banking services, as well as profitability.

When the general rate of inflation is taken into account, it has a negative impact on profitability, however small. This aspect is dependent on commercial bank management's predictive capacity. If estimates prove true, such interest rate modifications could be factored into inflation expectations to boost profits. In this situation, the impact on bank profitability turns positive. A positive association between inflation and bank profitability would imply that banks can forecast the impact of inflation expectations on operating expenses, resulting in increased profits. According to this result, if the forecast is erroneous, the effect of inflation on bank profitability may be negative or less significant.

Asset management, particularly loans and advances, adds positively to commercial bank profitability, with the exception of fixed assets. Liability management, particularly saving and fixed deposits, as well as other liabilities and credit balances, have a negative impact on commercial bank profitability. As a result, in the Indian commercial banking industry, asset management positively affects profitability whereas liability management negatively affects profitability.

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