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# IMPACT OF ASSET AND LIABILITY MANAGEMENT ON PROFITABILITY OF SELECTED COMMERCIAL BANKS IN ETHIOPIA

**Prof. P. Veni**[1*]

**Desalegn Wudu Negash**[**]

ABSTRACT

The main objective of this study was to investigate the impact of asset and liability management on banks profitability. 11 commercial banks those which have data on financial statements for 8 years, for the period between 2010- 2017were selected purposively and made use of SCA model to analyses data collected for the purpose of this study. Findings from this study reveal that all assets except fixed asset has positive and considerable effect on the profitability of commercial banks in the study area. Deposits and placing in other banks, loan and advance and short term investments have a positive and significant effect and the effect of long term investments and other assets is insignificant. However fixed asset is found to have a negative and significant effect. Furthermore from liability side, result of the study shows that saving and long term deposits are the main source of funds and on which commercial banks are incurring high cost followed by demand deposit. The surprising finding of this study was the effect of non-interest bearing liability on profitability of commercial banks in the country is found positive and significant. Banks in the country are recommended strength their asset and liability management especially for fixed assets.

Key word: Asset and Liability Management, statistical cost accounting, Profitability

[*] **Professor, Department of Commerce and Management, Andhra University, India**

[**] **Research Scholar, DCMS, Andhra University, India and lecturer at Woldia University, Ethiopia**

## INTRODUCTION

Banks profit is basically the difference between the earnings from the assets and the cost forgone for the use of funds [1]. Profitability of the bank is highly dependent on the quality of its balance sheet portfolio and this can be achieved via effective management of its asset and liabilities. Asset and liability management (ALM after this) is a type of risk management practice aimed at managing the balance sheet composition or the asset and liability portfolio of banks with the view of enhancing the return obtained from the assets, diminishing of the costs incurred for liabilities, maintaining the liquidity ability of the bank to meet its obligations, mitigating the adverse effect of interest rate risk and increasing the market value of banks[2]. Therefore ALM is an advanced method of controlling the overall activities of the bank for reducing possible risks (especially liquidity and interest rate risks) for achieving such multipurpose.

Asset and Liability Management (ALM) becomes an important and critical issue in financial institutions particularly in commercial banks starting from last half century [3,4,5,6]). The uncertainty of returns expected from their assets, risks associated with those assets and the need of liquidity enforces banks to give more attention for their assets and liability composition[7].

ALM is aimed at matching of the current resources with future obligations of the bank taking in to consideration current goals and future obligations having in mind the possibilities of risks ([8,9,10,11,12]). According to[13] effective ALM leads to manage basic balance sheet risks and leads to sustainable development as well as it will help institutions to answer some basic question like what is the optimal investment strategy in such a situation? How much will the loss be if liabilities are ignored? Therefore coordinated management of the two sides of balance sheet has assumed 'special significance with growing competition, complexity and risk in the banking sector[14]. These activities require strategic investment planning in the allocation of portfolio across broad asset classes with different values of yield and volatility. It is also important to consider the legal and policy constraints facing the institution, such as regulation authorities, efficiency and management constraints[15]. Increasing liquidity requirement, rapid change in interest rate and instability in financial markets increase the importance of asset and liability management in banking industry[16]. Banks operating in a market which is a full of uncertainty are highly dependent on the quality of their asset and liability management[17]. Therefore, understanding of the effect of each asset and liability on banks performance is the core task of financial managers in banking industry.

**Empirical reviews**

[18] From Nigeria investigates the effect of asset and liabilities on banks performance using ten deposit money banks data. They considered asset side of the balance sheet as loan and advance only and liabilities as deposits (demand, saving and fixed deposit) only. They have found that asset (loan and advance) has significant positive effect and deposit is negatively affecting the bank's profitability.

[19] Analyse the available asset and liability management strategies and their effect on banks performance. He classified the strategies as zero, positive and negative net interest income strategies and the outcome of the studies reveals that banks should have to apply or use the latest asset and liability management strategy.

[20] Make their investigation to see how the various banks goals can be achieved by managing their balance sheets. They classified the goals of bank as asset accumulation, liability reduction, shareholders' wealth, earning; profitability and an optimum management of the items in the financial statement. They have found that banks can achieve all goals except the goal of liability reduction through proper management of their balance sheet composition.

[21] Compared the asset and liability position of 56 banks (26 public, 20 private and 10 foreign banks) operating in India. They have applied maturity ladder method for their liquidity position of assets and liability. The output reveals that public owned banks are in a better and safe condition of short term liquidity position.

[22] Investigate the similarities and dissimilarities in asset and liabilities of Islamic and conventional banks. The result states that they are following different ALM approach and the profit sharing way applied by Islamic banks enhances the economic value of the bank.

[23] Analysed the impact of each asset and liability composition of balance sheets on the profitability which is measured as earning before tax (EBT) by extracting panel data of 26 public and 20 private banks from 2005 – 2013. They categorised banks as public and private banks and again as high and low profitable. Their finding states that public banks are enjoying more returns from loans and advances and deposits and placing to the banks. From liability side of the balance sheet the cheapest source of fund for both type of banks is short term funding. When the banks are split as high and low profitable, lower profitable banks are enjoying higher income from loan and advance, investment's and fixed assets than higher profitable banks.

[12] investigated the effect of balance sheet portfolio of banks on their earnings. They used 300 banks data obtained from 750 Tenth District member banks. They have found that the balance sheet composition has a significant positive (for assets) and negative (liabilities) effect on the earnings of banks.

[24] Assessed the effect of asset and liability variables of banks on their profits. They use 6 years (1996 -2002) financial statements data of 82 banks (36 are domestic and 46 are foreign banks) operating in United Kingdom. They have divided the asset of banks in to 5 as loan and advance, deposits and placing's, investment's and fixed assets and in the other hand liabilities as demand deposit, saving and time deposit, other short term loans, other funding's and other liabilities. The finding of their study reveals that domestic banks are getting their profit from loan and advances as well as fixed assets but others are not significant. Return on all assets is significant for foreign banks. From the liability side all except demand deposit and short term funding's are cheap source of funds. However demand deposit and short term are high cost sources of funds.

[25] Investigated the determinants of banks profitability using data's obtained from 32 private banks operated in United Kingdom from 1995-2002. They founds that efficiency and size have negative effect however liquidity has positive effect on return on average asset.

[26] Investigated factors affecting profitability of Greek banks using data extracted from 23 banks. The data covers from 1995 -2002. She founds that efficiency , well capitalized and size and GDP have positive significant effect on banks profitability but inflation negatively affects it.

[27] Used Statistical cost accounting measurement model to see the effect of asset and liability composition on banks profitability. They selected 41 high profitable and 39 low profit banks balance sheet from 1970-1977. They have concludes that high profitable banks low cost for some source of funds and they are better in efficiency.

[28] Analysed the effect of asset and liability management on banks performance using 4 years (2008- 2012) financial stamen obtained from 15 banks. They used the total asset and total asset liability as the two side composition of the balance sheet. They had found that both asset and liabilities have a positive significant effect on the returns of the bank.

[29] Used CAMEL approach to investigate the effect of asset and liability management on banks performance. They collect both primary data via questioner and secondary data from quarterly

repost of 11 banks and staffs of those banks. They revealed that asset and liability significantly and positively affects banks profit

[30] From Kenya investigates the effect of asset and liability management on the performance of banks especially on diamond trust bank. They use net interest income as dependent variable and customer deposit, loan and advance, non-performing loan and management loan from other banks as a balance sheet composition. They had concludes that banks should to give high emphasis on increasing deposits of customers and the loan and advances granted to customers in order to increase the profit of the bank.

[31] Analysed possible factors affecting the profitability of banks. They selected 38 commercial banks operating in Kenya. The use the balance sheet and income statement of those banks from 2002 – 2008.they have found that capital adequacy ratio, income diversification and liquidity have a positive effect however asset quality and credit risk have negative effect on banks performance. All market or macroeconomic variables are insignificant.

[32] Measured the asset and liability management position of Kotak Mahindra Bank by measuring ALM as credit risk, quick ratio, and interest expanded to interest earnings and other income to total spread sheet ratio. They have found that all of those variables are increasing in that particular bank.

[33] From Bangladesh assess the effect of asset and liability management on banks performance. They classified asset side of balance sheet in to 4 as loan, bill discount and purchased, deposit with other banks and government securities whereas the liability section is categorised as fixed time deposit, saving deposit, demand deposit and non-interest bearing liabilities and other borrowing funds. They have found that banks with higher profit are earned better profits from their assets and paid lower costs for their source of funds in comparison of lower profit banks. When banks are split in to two as large and small banks, large sized banks are well experienced in managing their assets than small sized banks but they are at the same level regarding to managing of their liabilities.

[34] Assessed the asset and liability composition practices and position of oromia corporate bank in Ethiopia. Based on the data's extracted from financial statements of the bank from 2008 – 2014, they have recommended that the bank should have to strength their asset management practices in order to enhance its performance of meeting its obligations at due date.

[35] From Nepal investigates the impact of asset and liability on banks performance. He uses 7 banks financial statements for 6 years for his study. He classified assets in to three as loan and advance and purchased bills, fixed assets and other assets and liabilities as deposits and other liabilities. The study reveals that all assets with the priority of loans and advances have a positive significant effect however liabilities specially deposits taken from customers negatively affects banks profitability.

[2] explored the condition of asset and liability of 5 private commercial banks in Indian financial market. They have applied GAP (difference between matured assets and matured liabilities) analysis and ratio techniques to see their maturity mismatch and their exposure to liquidity risk. They have found that those banks are exposed to liquidity problem.

[36] Had made a comparison between 1 public owned and 1 private owned commercial bank in Indian market. They have measuring their asset and liability position and their exposure to interest rate risk from the data extracted from financial statements of those banks. They have applied GAP analysis method to measure their exposure to interest rate risk. The finding of their study reveals that both banks are exposed to the interest rate risk but in comparison of both banks union banks which is a private owned bank has a better asset and liability composition than ICIC bank which is a public owned bank.

[37] From Bangladesh investigates the effect of Asset and liabilities on banks profitability. The asset side of the balance sheet is represented by loan and advance, deposits on other banks and investments. Liability section of the balance sheet is fixed deposit, current deposit and short term non-interest bearing liabilities and other borrowings. They states that only loan and advance have significant effect on the profitability of banks with a positive sign.

[11] assess the effect of asset and liability management on banks profitability based on the 2005 – 2010 data obtained from 8 commercial banks operating in Ethiopia. He had classified the assets as deposits placed on other banks, investments and other debt balances, loan and advance and fixed assets and the liability section of the balance sheet s demand deposit, saving and fixed deposit and other liabilities. He had incorporated inflation rate and GDP from macro-economic variables. His output stipulates that, from the asset side loan and advance has high significant positive effect on banks profitability. The other assets except fixed asset effect are positive but not significant. His output shows fixed asset negatively affects the profit of banks at insignificant

level. From the liability side saving and fixed deposit and other liabilities have negative significant effect on banks profitability. From macroeconomic variables only GDP is negatively correlated with profit.

[38] Linked asset and liability management with banks profitability. He uses 4 years financial statements of 7 banks in order to check the effect of asset and liability management on banks profitability. The output of his study indicates that total asset is a positively linked with profitability but total liability is negatively linked. From macroeconomic variables only inflation is found to be negatively correlated.

**Methodology of the study**

This study is aimed at investigating the linkage between the two sides of balance sheet variable with the profitability of banks. Therefore for achieving the required objective the researcher applied explanatory Research design.

In the study area there are 18 commercial banks (including development bank of Ethiopia). Using a purposive sampling method 11 commercial banks which attains the required specifications and with a full of 8 years financial statements are selected as a sample. The study use 8 years balanced panel data from 2010-2017 extracted from the balance sheet and income statement of those banks. Those annual reports are obtained from National bank of Ethiopia and from each bank website.

**Model specification**

In this research the statistical cost accounting (SCA) is applied. Statistical cost accounting model hypothesis states that earning from asset is positive but varies across asset and cost of liability is negatively but varies across liabilities. This implies that profit for the bank is the difference between returns realized from the asset and costs paid to liabilities [23], [13]**).** This can be written as:

$$\boldsymbol{NOP = \alpha 1 + \sum \alpha 2 Ailt + \sum \alpha 3 Lilt + \varepsilon lt} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textbf{EQ 1}$$

WHERE:

NOP= net operating profit after tax

α1= is the constant

α2 = is marginal rate of return from assets

α3= is marginal cost of liability

Ai= is the ith asset, i¼1, 2, . . . ,m

Lj = is the jth liability, j¼1, 2, . . . , n

L= denotes the number of banks, l¼1, 2, . . . , k

t = is the time period, t¼1, 2, . . . , T.

As stated by [23] using the book value of assets and liabilities make the estimation of coefficients inefficient. Therefore for avoiding this inefficiency equation 1 is divided by total asset and the new equation will be:

$$\frac{NOP}{TA} = \frac{\boldsymbol{\alpha 1}}{TA} + \sum \frac{\boldsymbol{\alpha 2 Ailt}}{TA} + \sum \frac{\boldsymbol{\alpha 2 Lilt}}{TA} + \mu lt \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots EQ\ 2$$

Where: NOP/TA is return on asset (ROA) and μlt is the stochastic term

**TABLE 1: DEFINITION OF VARIABLES**

| | Description | Notations |
|---|---|---|
| Dependent variable | Bank profit | ROA |
| Asset variables | Deposit and placing on other banks | A1 |
| | Loan and advances | A2 |
| | Short term investments | A3 |
| | long term investments | A4 |
| | Other assets | A5 |
| | Fixed assets | A6 |
| Liability variables | | |
| | Demand deposit | L1 |
| | Saving and time deposit | L2 |
| | Other interest bearing liabilities | L3 |
| | Other non-interest bearing liabilities | L4 |

## RESULTS AND DISCUSSIONS OF THE STUDY

This study was aimed at investigating the impact of asset and liability management on banks performance measured by ROA. Before directly proceeding to analyse the data collected for this study, all necessary assumptions of the CLRM were checked. The first assumption of classical leaner regression model is that residuals are normality distributed. Therefore, Normality test with the null of residuals are behaving normal was conducted using Sharipo-Wilk test and it is satisfied with the prob> z value of 0.15519. Variance inflation factor (VIF) is used to check if there is a mullticolinarity problem. The result of the test assured that the explanatory variables are free from such problems hence the highest VIF value is 4.53. Moreover hetrsocdasticity test was made with the null hypothesis that there is a constant variance among variables. The null is accepted due to the prob> chi2 is 0.2009 and it is conclude the variables are free from hetrsocdasticity problems. RAMESEY RESET test was made to test if any basic variable is omitted or insignificant variable is added to the model. The test assured that the model does not need any additional variables or there is not any variable to be dropped with the output of the prob >F= 0.2154. The last test was made to check if the variables are serialy correlated. In this study the null will be accepted at 5% significant only hence the prob >F = 0.0667

## MODEL SELECTION TESTS

The other basic task in research is selecting the appropriate model to be used for achieving the expected objective. Basic models for panel data can be classified in to three as pooled OLS, random effect model and fixed effect model. Therefore the appropriate model for the study should have to be selected carefully. For doing so the research had made the following tests. Whereas breusch and pagan lagrangian multiplier test (LM test) is made for comparing random effect and pooled OLS, housman test is made to select either random or fixed effect model.

Table 2: **Housman model selection test**

The first comparison was made between fixed and random effect model using hausman test. The result reveals that (as indicated in table 2), random effect is the appropriate models for this study hence the prob > chi2 is 0.1873

```
    Test:  Ho:  difference in coefficients not systematic

                 chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =   -13.70    chi2<0 ==> model fitted on these
                                        data fails to meet the asymptotic
                                        assumptions of the Hausman test;
                                        see suest for a generalized test

. hausman fe re

                 ---- Coefficients ----
                    (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                     fe           re         Difference          S.E.
-------------------------------------------------------------------------------
          A1     .0059252     .0423089       -.0363837        .0065702
          A2     .0084179     .0415229       -.0331051               .
          A3     .0075121     .0209496       -.0134375        .0069575
          A4     .0035798     .0092195       -.0056397        .0089713
          A5    -.0248735     .0065494       -.0314229               .
          A6    -.1601991    -.1056167       -.0545824        .0174318
          L1    -.0002218    -.0002522        .0000305               .
          L2     -.008267    -.0108428        .0025757               .
          L3     .0112903      .012805       -.0015148        .0160088
          L4     .0640235     .0507735          .01325               .
-------------------------------------------------------------------------------
                        b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                 chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       13.70
                Prob>chi2 =      0.1873
                (V_b-V_B is not positive definite)

.
```

Source: own computation using stata 14

**TABLE 3: BREUSCH AND PAGAN LAGRANGIAN MULTIPLIER TEST (LM TEST)**

The next step was to compare random effect and pooled OLS models. The researcher uses Breusch and pagan Lagrangian multiplier test (LM test). Based on the output of the test it is found that pooled OLS model is the appropriate model for this study.

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ROA[A,t] = Xb + u[A] + e[A,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                     ROA |    .0000546       .0073903
                       e |    .0000154       .0039216
                       u |           0              0

        Test:   Var(u) = 0
                              chibar2(01) =     0.00
                            Prob > chibar2 =   1.0000

.
```

Source: own computation using stata 14

**TABLE 4: OUTPUT OF POOLED OLS**

In order to achieve the required objective the researcher classified assets in to six groups as deposits and placing's (A1), loan and advances (A2), short term investments (A3), long term investments (A4), other assets (A5) and fixed assets (A6). The liability section of the balance sheet is also grouped as demand deposit (L1), saving and time deposit (L2), other interest bearing liabilities (L3) and other non-interest bearing liabilities (L4). The dependent variable or the profitability of banks is measured as return on asset (ROA).

The p- value of F statics indicates how the explanatory variables are reliable to explain the dependent variable. For this study, the independent variables are well reliable for explain it because the p value of the F statics is 0.0000.

R square of the study measures the power of independent variables to explain the dependent variable. In this study 61.40 % of dependent variable is explained by the independent variables incorporated in the mode and the remaining percentage is left for other variables which are not incorporated in the model. Its adjusted R square is also 56.39%.

The result of the investigation using pooled OLS model reveals that all assets except fixed asset has a positive effect on ROA and all liabilities except non-interest bearing loans have negative effect.

```
. regress ROA A1 A2 A3 A4 A5 A6 L1 L2 L3 L4
```

| Source | SS | df | MS | Number of obs | = | 88 |
|---|---|---|---|---|---|---|
| | | | | F(10, 77) | = | 12.25 |
| Model | .002917738 | 10 | .000291774 | Prob > F | = | 0.0000 |
| Residual | .001833946 | 77 | .000023817 | R-squared | = | 0.6140 |
| | | | | Adj R-squared | = | 0.5639 |
| Total | .004751684 | 87 | .000054617 | Root MSE | = | .00488 |

| ROA | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| A1 | .0423089 | .0129134 | 3.28 | 0.002 | .0165951 | .0680227 |
| A2 | .0415229 | .0146213 | 2.84 | 0.006 | .0124081 | .0706378 |
| A3 | .0209496 | .0114832 | 1.82 | 0.072 | -.0019163 | .0438155 |
| A4 | .0092195 | .0099401 | 0.93 | 0.357 | -.0105737 | .0290128 |
| A5 | .0065494 | .0142757 | 0.46 | 0.648 | -.0218772 | .0349761 |
| A6 | -.1056167 | .0420642 | -2.51 | 0.014 | -.1893771 | -.0218562 |
| L1 | -.0002522 | .0000274 | -9.22 | 0.000 | -.0003067 | -.0001978 |
| L2 | -.0108428 | .0052311 | -2.07 | 0.042 | -.0212592 | -.0004263 |
| L3 | .012805 | .0220109 | 0.58 | 0.562 | -.0310243 | .0566344 |
| L4 | .0507735 | .0192449 | 2.64 | 0.010 | .0124521 | .089095 |
| _cons | .0035406 | .008923 | 0.40 | 0.693 | -.0142272 | .0213085 |

Source: own computation using stata 14

The output of the study reveals that deposits and placing's made to other banks are one of the main source of profit for Ethiopian commercial banks. It states that as the banks depose one birr (Ethiopian currency) in other banks the profitability of those banks will enhanced by (other things remain constant ) 0.0423 at 1% significant level. Therefore deposit and placing's to other banks has a positive effect on banks profitability. This result supports the findings of have found the same result which is positive and significant for high profitable banks. However they have found insignificant positive effect for lower profitable banks and it is supported by 11.

The other main source of income for commercial banks loan and advance granted for customers. Banks are providing loan and advance for various customer. However the aggregate net loan and advance is used in this study. This study is in line with the result of , 11. Therefore as loans and grants made by banks increase the earning from such assets is also increase. This implies that there if a positive association between loan and advances and profitability at 1% significant level.

The link between short term investments and profitability is also found to be positive and significant. Those banks are realizing positive earnings from such investments which supports the positive relation between investment and profitability. However the effect of long term investment on ROA is positive but insignificant.

The other main finding of this study was the linkage between fixed asset and profitability. In regarding their relations 24 founds that they are positively and significantly correlated however 11 argued that they have insignificant negative relation. This study also reveals that fixed assets are negatively affecting the profit of the bank at a significant level of 5%. The result implies that the profit of bank is diminishing by 0.105 when fixed asset is increasing by 1 birr other things remain constant. This indicates that those banks are inefficient in utilization of fixed assets. As mentioned by 11 it can happen due to that, banks in the study area are highly engaged in the construction of big buildings and other big projects. But its effect is increasing very highly and they have to work on utilization of those basic assets in order to enhance their profit.

From liability side demand deposits has a significant negative effect on ROA of banks. But its coefficient indicates that is not that much higher cost hence its coefficient is 0.0002522.

The study reveals that there is a negative and significant effect of saving and time deposits on banks profitability. As indicated in the above table profit will decrease by 0.01084 birr when fixed and saving deposits are increasing by 1 birr (Ethiopian currency). This implies that banks

in Ethiopia are incurring high cost for such deposits. This can be due to the reason that those deposits are assumed the most stable source of funds. Therefore banks will pay higher interest for such deposits. This result is in line with the 24, 1). The effect of non-interest bearing liabilities on banks performance is positive. as non-interest bearing liabilities increase the profitability of banks will also increase significantly. this implies that commercial banks in Ethiopia are highly efficient in utilizing or in converting of those liabilities in to profit generating assets. This outcome contradicts with 24 results.

CONCLUSION

The study has found that all assets except fixed assets have a positive effect on banks profitability. In the other hand it also reveals that all liabilities except term non-interest bearing loans are negatively affecting profit of those banks.

From the study it is revealed that the main source of income for the banks is deposit and placing in other banks followed by loan and advances. The other main return is coming from short term investments. In the reverse of the expectation the effect of fixed asset is negative and significant. Therefore in order to increase the returns from loan and advances and other assets which have a positive effect they have to strength their asset management practice, it will be advisable to check the portfolio quality of their assets too. The effect of fixed affect indicates they are week in managing of their fixed assets. Therefore, fixed asset management needs special attention.

From liability side the highest cost is incurred for saving and time deposit. This can be due to that banks are believed as they are the most stable source of funds. In the other hand the effect of short term non-interest bearing liabilities is positive. Therefore as a general the study reveals that commercial banks in the study area are effective in managing their liabilities but they have some week sides in managing of their assets specially fixed assets.

Therefore it is recommended that commercial banks in Ethiopia should have to focus and revise their asset management practices. Particularly fixed asset management should have to be strengthening in order to decreases its negative effect on the profitability of banks.

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