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Effect of Asset-Liability Management on Bank Profitability: Evidence from Afghanistan Banking Sector

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Abstract

Much research has been carried out in various nations to examine the effect of ALM (Asset-liability Management) on Bank profitability. In developing nations, this issue of banks' profitability has attained relatively little attention. Existing literature, in the context of the Afghan commercial bank industry, has only related banks' endogenous factors and exogenous factors to banks' profitability and has not explicitly generated a clear relationship between balance-sheet both sides components (ALM) and the value of the bank. This paper attempted to find out the impact of Asset-liabilities components (AML), and macroeconomic factors on the banks' profitability, in the Afghanistan banking sector's context keeping control variables in place. The research was empirical in nature and the study period was between 2011 and 2021. The research population in Afghanistan consists of twelve commercial banks. The annual audited balance sheet, income statements of the commercial banks, national statistics, and World Bank dataset served as the source of secondary data. Random effect and fixed effect regression analysis was employed to analyze the data. The research accepts that there is a link between the majority of the categories of assets and liabilities, macroeconomics as their coefficients are confirmed to be statistically significant.

Keywords: ALM, Commercial banking, Profitability, Afghanistan

JEL Classification: G32, F52, C22, E58

Introduction

The existence of banks' operations is essential to every nation's economic development. Thus, every nation needs to maintain a sound banking system (Goodhart, 2004; Ayadi et al., 2015). Banks play roles as financial intermediaries that provide funds to deficit units and accept deposits from surplus units against receiving and paying a certain interest, respectively, in an economy. As result, banking system problems in a nation's economy will result in eroding the overall economy of that nation (Morris & Turner, 1996). AML as a responsible unit in a bank performs different types of functions, for example, the risk associated with liquidity management, trading, forecasting for planning projects, funding, making plans for the size of capital, and risk arising due to market changes (Haddad et al., 2019; Adebisi et al., 2020). It is the process to formulate strategies and plans for maintaining, implementing, and monitoring the firm's assets and liabilities (obligation). It helps the organization to analyze the risks and challenges associated with their business for the achievement of their financial goals (Romanyuk, 2010). It is the part of strategic management of the asset and liabilities of a financial institution (bank) to increase profitability, improve liquidity, and avoid different risks associated with banks (Brick, 2014). ALM is viewed as an important method that banks employ to initiate risk management processes for issues including interest rate risks, financial risks, market risks, and as well as other risks faced by the banking industry (Fabozzi & Konishi, 1991).

A good Assets-Liabilities (AL) component (management) ensures banks sustain for an indefinite period. While one of the main reasons for bank failures is proven to be weak management of both sides of the balance sheet including left-hand side items (assets) and as well as right-hand side items (liabilities) (Kapur et al., 1991; Daumont et al., 2004). As the basic role and function, Banks accepts deposit as liability and disperse facilities (assets) (Fama, 1980). For a bank, Cost incurs on liabilities (deposits from clients), and income is earned on assets (loans dispersed to clients). Thus, there is a need for an efficient ALM to increase the profit of banks to the maximum (Tektaş et al., 2005).

In addition, Afghanistan's economy is fragile in nature, even before the Taliban seized power, and it was hugely dependent on foreign aid; about 40 per cent of GDP came from international aid (Qazizada and Wani, 2020; Muram and Wani, 2020). According to a recent World Bank report, the new government is still under pressure to address economic issues such as rising inflation, currency depreciation, and job losses. BBC News (2022). In the current scenario, when the country faces a crisis, the institutions need to be strong and as such this study provides two important addition and contribution to the literature on bank profitability in Afghanistan. Firstly, as far as the researcher is concerned, this is the only research paper that employs the SCA method to determine the effect of balance sheet items composition and bank profitability in Afghanistan. Second, this paper is the first one to find the relationship between the composition of balance sheet items and bank profitability using bank size and bank age variables as control variables using the SCA approach. As a response to the study of Owusu and Alhassan (2021) suggestion that other independent factors be used to assess bank profitability, this study also responds to that suggestion. Thus, this paper's main research question is about the impact of asset-liability structure (management) and macroeconomic factors on the profitability of the banks in the context of the Afghanistan banking sector.

The remaining study is organized into four sections with section two discussing the empirical literature AML, and relevant theories including the Statistical Cost Accounting model, while section three encompasses a detailed discussion of the data and methodology used in the study. Section four describes the data analysis and findings of the study, and finally, section five concludes the paper along with some recommendations to policymakers and regulators.

2. Review of literature

ALM involves simultaneously monitoring and controlling the balance sheet on both sides (assets and liabilities), rather than monitoring and controlling individual assets and liabilities (Gup & Brooks, 1993). SCA is empirically tested based on accounting relationships to explore the effect of asset-liability management on the selected banking profitability. It traces fluctuations and variations in the earnings of a company's balance sheet structure, using book gains on the assets and liabilities of the bank. Several studies, (see Ukpong & Olowokudejo, 2021; Rahmi, 2021; Owusu, 2020; Onaolapo, 2020), have investigated the impact of liabilities and assets management on profitability in different countries. The results are startling stating positive, negative, and neutral results.

Rahmi and Sumirat (2021) studied Asset-liability management during the pandemic of covid-19 to find out its impact on banks' profitability in Indonesia by using liquidity risk, operational efficiency, capital adequacy, and interest rate risk as independent variables and ROA as regress and variable. The finding of the study highlighted that efficient management of AL ensures the banking sector is in a better position of profitability during the pandemic. In nutshell, the Profit of the bank will increase when assets and

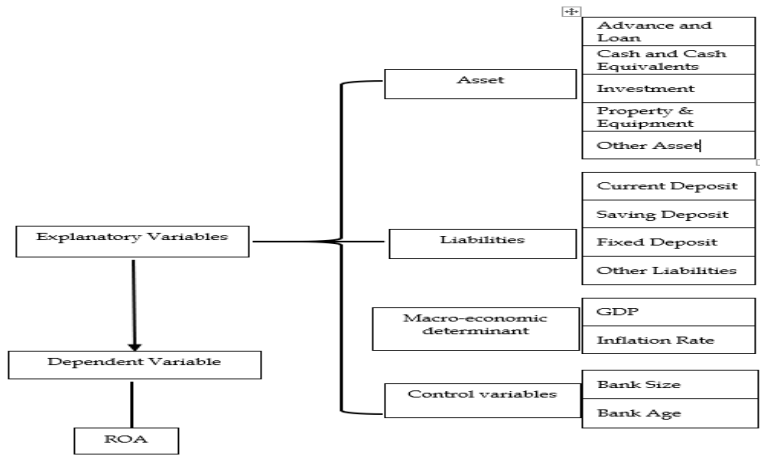
liabilities are monitored and controlled effectively. Likewise, Owusu and Alhassan (2021) applied the SCA model in studying the ALM of Ghana's banking sector to ascertain that the profit of commercial banks is affected by the management of AML. The finding confirmed that the proper management of Asset-Liability directly impacts the overall performance of banks. Onaolapo and Adegoke (2020) examine the effects of asset-liability management on the profitability in the environment of Nigerian deposit money banks. ROA and ROI were the proxy measurements for financial performance, and asset-liability indicators for measurement were loan & advance, NPL, loans & advances, borrowings, and demand deposit, respectively. The study's findings demonstrate that asset-liability management significantly affects the performance of Nigeria's deposit money institutions. Also, Ukpong and Olowokudejo (2021) did a study on AML that employed the SCA model on 10 insurance companies in Nigeria. ROA served as a proxy for profitability. The study pointed out that asset management plays a substantial role to bring positive changes in the profitability of life insurance companies except for property and equipment. In other words, better management of Asset-Liability will result in a higher return. Mun and Thaker (2016) empirically studied both Conventional and Islamic Malaysia's banks using CAMEL ratios to investigate the effect of Asset-liability management on the Return on Equity (ROE) ratio, measurements for profitability, over the financial years 2010 to 2013. The result of their study showed that asset-liability management has a significant effect on the bank's profitability (both conventional and Islamic banks). Haidary and Abbey (2018) examined the Afghan Banking sector's financial performance.

The studies tested both internal factors and as well as external factors' impacts. The result revealed that internal factors banks have significant positive relationships with bank profitability. Similarly, the Canonical Correlation Analysis tool was also used to determine the strength and nature of the relationship between liabilities and assets in Tunisia. The study concluded that the Tunisian banks were actively managing the balance sheet's components and its profitability depended on how well the assets are managed (Said & Rim, 2018). However, Shrestha (2015) researched the profitability of Nepal's banking sector, adopting POLS, to reveal. The indicator for profitability was ROA and AML indicators were Assets that last more than one-year, Other Assets, inflation, and Nominal GDP, respectively. The study presented that AML has a statistically significant impact on profitability in the banking environment. Loans and advances on the asset side as well as deposits on the liability side made major contributions. Said and Rim (2018) adopted the Canonical Correlation Analysis tool to determine the strength and nature of the relationship between liabilities and assets. The study concluded that the Tunisian banks were actively managing the asset-liabilities items and depended on how well the assets were handled and managed. Saeed (2014) covered in his study the industry-specific, bank-specific, and macroeconomics-specific variables on the financial performance of a United Kingdom bank. The outcome of his study shows that there is a positive contribution of bank size, loan, capital, and deposits are positive to bank profitability, measured by ROE and ROA. He further stated in his study that banks having a big size of the asset, deposit, capital, loans, equity, and macro-economic factors such as GDP and inflation can gain safety and competitive advantage and therefore gain higher profitability. Menicucci and Paolucci (2016) studied the relationship between bank internal factors and the profitability of the banking sector in the environment of Europe. The profitability is indicated by ROE. The finding of the research shows that bank size and capital ratio influence the financial performance of banks positively. Masindi (2021) stated in his study that inflation rate linkage with the profitability of the banking

sector is found both statistically significant and positive as measured by ROE. Baariu and Peter, (2021) also stated that the Inflation rate affects the positive but insignificant financial performance of the banking sector. The positive relationship between bank profitability and the inflation rate has also been confirmed by (Olowokudejo & Ukpong, 2021; Saeed, 2014; Al-Homaidi et al., 2018). Masindi (2021) stated in his study done in an African environment that real GDP has a positive significant relationship to the ratio of ROE. On the other hand, Rasjid et al. (2021) tested and proved empirically the effect of AML and the growth of companies on the value of firms in Indonesia. The study found that liabilities have insignificant positive effects on the value of the firm, whereas asset management has a considerably significant positive effect. Rashid (2022) empirically tested, by adopting GMM, the growth, and stability of conventional and Islamic banks combined in Pakistan. The outcome of the study revealed that bank-endogenous and as well as macroeconomics variables negatively affected both types of bank growth, profitability, and stability. However, this sort of risk is affecting banking institutions differently as the risks, raised due to liquidity, operation, capital, inflation, and currency, for Islamic banks were higher, but risks, which arose due to credit and interest, were higher for conventional banks. Although, corporate governance practices benefit banks in mitigating the impact of both sorts of risks in Islamic banks and as well as in Conventional banks. Kosmidou et al. (2004), also studied the linkage between AML (balance sheet components) and bank profitability Using the SCA model from the United Kingdom and found that more focus on liability management increases the profitability of banks than asset management. Saeed (2014) stated in his study that GDP effects negatively profits of the banking sector. Al-Homaidi et al. (2018) and Shrestha (2015) also confirmed in their studies that GDP does not have a positive impact on the profitability of banks. Likewise, Shrestha (2015) concluded that inflation effects negatively on bank profitability. However, Nishat and Khan (2019) explored the effects of AML on the profitability of banks in the environment of the Indian banking sector. The balance sheet asset items used for the analysis were Cash & Balances with RBI, Balances with Banks & money at Call, Investment, Advances, Fixed Assets, and Other Assets, and the balance sheet items used were Capital, Reserves, Deposits, Borrowings, Other liabilities & Provisions. The outcome of the research indicates that private bank treats differently with asset-liability management practice compared to public banks. Private Banks focus on asset management such as managing investments and advances to ensure profitability, liquidity, and control risk, but in contrast, public sector banks concentrate more on keeping increasing deposits from customers. Pavlovic and Charap (2009) claimed in their study that bank Profits and total assets of banks do not make a statistically significant relationship in the case of Afghanistan. San and Heng (2013) investigated in a study whether profitability is affected by endogenous variables related to banks and macroeconomic variables in the environment of Malaysia. The result observed that GDP neither affects positively nor negatively the profitability of the banking sector in Malaysia. Dembel (2020) performed research on seven Ethiopian commercial banks to examine the influence of CAMEL ratios on the performance of the banks. The finding reveals that the GDP has an insignificant impact on profitability as measured by ROA. San and Heng (2013) concluded in their study that Banks' earnings and profitability are unaffected by inflation. The research findings match with the findings of the investigation performed by Petria et al. (2015) in the environment of twenty-seven European countries to find out how internal and external factors affect profitability. Through the literature study, it was found that no study has been conducted to find out the linkage between asset-liability management and profitability in the case of Afghanistan as far as the

researcher is concerned the primary objective of this research is to attempt an answer to the research question that what is the effect of ALM by incorporating macroeconomic factors on banks' profitability in Afghanistan keeping control variables in place.

Figure 1. The Theoretical Framework of the study



Source: Author's compilation

Selection of the Explanatory variables in this paper has been selected based on the existing literature and economic theories. This study includes 13 independent variables that are considered to be substantial for commercial banks' performance, measured by ROA, in Afghanistan. The variables are Loan and Advances (A1), Cash and Cash Equivalents (A2), Investment (A3), Property & Equipment (A4), Other Asset (A5), Current Deposit (L1), Saving Deposit (L2), Fixed Deposit (L3), Other Liabilities (L4), GDP growth rate (M1), Inflation Rate (M2), Bank age (C1), Bank Size (C2). The following hypothesizes are developed:

- a) ROA: ROA is an indicator for profitability measurement. It shows the ability how efficiently and effectively the resources of the company managed to generate profit. It is computed as the ratio of net income for a year to the total assets for that same year.
- b) Assets: Assets are economic resources possessed by the bank. All the resources are exhibited on the right-hand side of a company's balance sheet. This study picked the following major component of assets from the balance sheet as they cover most of the asset's total balance:
 - A1 Loan and Advances: This is a component of the balance sheet it is the balance of total running finance, SME Loans, Term loans, and as well as Murabaha given to customers at a certain interest rate.
 - A2 Cash and Cash Equivalents: It is one of the asset components most liquidity asset of the bank. It consists of two components Cash in Hand and Balances with banks. There are local and foreign currencies held as Cash in hand and cash balance with banks consists of cash deposited in an overnight account and current in DAB also cash deposited in a current account in other local and foreign banks.
 - A3 Investment: it is a component of the assets. This represents the amount banks invest in either investment bonds, investment in equity, investment in gold, and Capital notes with DAB.
 - A4 Property & Equipment: this is also a component of an asset this consists of Property and equipment, capital work-in-progress, and right-of-use assets.

- A5 Other Asset: this mostly consists of restricted deposits with DAB, prepayments, receivable from western union, profit receivable, interest receivable, security deposit, deferred tax, receivable from a financial institution, staff loan, and others.

H1: The effect of the Asset component is positive but varies from asset to asset on the profitability of banks.

c) Liabilities: The bank has obligations when it owes money to clients or other parties. They are significant funding sources that the bank uses. This study selected the following main component of liabilities that covers the most major balance of the liabilities side:

- L1 Current Deposit: it is an account where banks do not give any interest to customers upon their deposits. However, the customer can withdraw their deposited cash upon demand.

- L2 Saving Deposit: it is a customer account where the customer receives a certain interest rate upon their deposits that ranges are different. It was recorded that customers received an interest rate of 1%-1.5% in 2020. However, the withdrawal is restricted as customers cannot withdraw more than 4 times in a month.

- L3 Fixed Deposit: it is also called term deposit. It carries interest ranging from 1.25% to 2.75% per annum with maturity ranging from three months to two years.

- L4 Other Liabilities: it consists of many components listed in the liabilities account. They are interest payable on customer deposits, withholding tax, and unearned commission on bank guarantees, accrued expenses, and other liabilities.

H2: The effect of the liability component is negative but varies across liabilities on the profitability of banks.

d) GDP growth rate: it reflects total economic activity and is adjusted for inflation.

H3: There is a positive relationship between GDP growth rate and Bank profitability.

e) Inflation rate: It is increasing the price of the general level of products and services generally. Besides that, it represents a currency's purchasing power (Singh & Sharma, 2016).

H4: There is a relationship between GDP growth rate and Bank profitability.

f) Bank Age: it reflects the total years of commercial bank business operation in the market (Halil & Hasan, 2012)

H5: There is a relationship between Bank Age growth rate and Bank profitability.

g) Bank Size: Total asset size of the banks is used as a proxy for bank size. Bank size is computed by taking the natural logarithm of total assets.

H6: There is a relationship between Bank Size growth rate and Bank profitability.

3. Research methodology

3.1 Data

The data on assets, liabilities components, and income were obtained from each bank's balance sheet and income statement whilst data on the macroeconomics and control variables factors were obtained from national statistics and world banks, respectively. The researcher used the deductive approach as it verifies the theories which are established already in the existing literature at some point. The study used panel data from seven commercial banks comprising government and private commercial banks in Afghanistan from 2011-2021. The sample selection technique uses the purposive sampling technique, so the sample size is more than fifty percent of bank exists in Afghanistan. The research period was selected based on the available data and formed a total of 77 observations. The following criteria were used for selecting which banks to be included in the study sample. Most importantly, the bank should be classified as either a domestic private commercial bank or a domestic government bank. Secondly, the

selective sample bank should at least release its balance sheet and as well as income statement for the study period. This research utilized secondary data and quantitative methods, respectively. The study employed fixed effect regression through the combination of both cross-section and time series datasets to test the developed model. STATA 14 software is used for testing this study model. The data used for this study is obtained from the website of the selected sample banks' balance sheets and income statements, national statistics, and the World Bank database.

3.2 Empirical model

The SCA model is used to assess ALM and Macroeconomics variable's effect, keeping in place the control variable in the environment of Afghanistan, on profitability. First, Hester & Zoellner proposed this in 1966. Later on, Hester & Pierce, Kwast & Rose, and others embraced it (Vasiliou, 1996). According to the SCA model, the rate of return on the balance sheet's left-hand side components is positive and each item of it has a different value and vice versa for the left-hand side component of the balance sheet. Additionally, the fundamental theoretical underpinning of the SCA model is predicated on the idea that, depending on other variables like macroeconomic conditions and market structure, the profitability of financial institutions may be affected by ALM either favourably or unfavorably.

Many researchers such as Shubiri (2010), Tamiru (2013), and Tee (2017) attempted to provide the conventional model of SCA with a modification by incorporating the macroeconomic elements. According to Tamiru (2013), the regression findings could be inaccurate and the coefficients skewed if certain variables are left out of the model. As a result, the SCA model is:

$$Y_{it} = \beta_1 + \sum \beta_{2i}A_{ilt} + \sum \beta_{3j}L_{jkt} + \mu_{lt} \dots \dots \dots (1)$$

Where Y stands for the bank's profitability, A_i stands for the i th asset, L_j stands for the j th liability, l represents the bank's number, T represents a period, β_{2i} represents the rate of return of the Asset, β_{3j} is the rate of cost for liabilities, A_1 stands for the constant term, μ_{lt} stands for the stochastic term

GDP and inflation are added to the model to account for the impact of macroeconomic factors in the analysis. Works by Tamiru (2013) and other authors lend credence to this (Tee, 2017). In light of this, the updated model provided in this paper is as follows:

$$Y_{it} = \beta_0 + \sum \beta_{2i}A_{ilt} + \sum \beta_{3j}L_{jkt} + GDP + INFR + \mu_{lt} \dots \dots \dots (2)$$

By putting the Asset-liability components and Macroeconomics factors in equation (2) it becomes:

$$Y_{it} = \beta_0 + \beta_1A_{1lt} + \beta_2A_{2lt} + \beta_3A_{3lt} + \beta_4A_{4lt} + \beta_5A_{5lt} + \beta_6L_{1lt} + \beta_7L_{2lt} + \beta_8L_{3lt} + \beta_9L_{4lt} + \beta_{10}M_{1lt} + \beta_{11}M_{2lt} + \mu_{lt} \dots \dots \dots (3)$$

This paper incorporates control variables into equation (3)

$$ROA_{it} = \beta_0 + \beta_1A_{1lt} + \beta_2A_{2lt} + \beta_3A_{3lt} + \beta_4A_{4lt} + \beta_5A_{5lt} + \beta_6L_{1lt} + \beta_7L_{2lt} + \beta_8L_{3lt} + \beta_9L_{4lt} + \beta_{10}M_{1lt} + \beta_{11}M_{2lt} + \beta_{12}C_{1lt} + \beta_{13}C_{2lt} + \mu_{lt} \dots \dots \dots (5)$$

Where:

- Dependent variable: Profitability = Return on Asset (ROA)
- Independent variables: A_1 =Loan and advances; A_2 = Cash and Cash equivalent; A_3 = Investment; A_4 = Property & Equipment ; A_5 = Other Asset ; L_1 = Customer Deposit; L_2 = Saving Deposit; L_3 = Fixed Deposit; L_4 = Other Liabilities; M_1 = Gross Domestic Product; M_2 = Inflation Rate; C_1 = Bank age; C_2 = Bank Size

- β_0 is constant co-efficient
- $\beta_1, \dots, \beta_{10}$ = co-efficient of each variable

Table 1. Variable, their symbol, measurement, expected sign, and prior studies' evidence

Variable Name	Symbol	Measurement	Expected Effect	Evidence Prior Studies
Dependent Variables				
Return on Asset	ROA	Net Income/Total Asset		Chowdhury & Rasid, (2017); Naderi, (2021)
Asset-Liabilities Composition/Structure				
Loan and advances	A1	Log of Loan and advances	(+)	Shrestha, (2015); Olowokudejo & Ukpong, (2021); (Owusu & Alhassan, 2021)
Cash and Cash Equivalents	A2	Log of Cash and Cash Equivalents	(+)	
Investment	A3	Log of Investment	(+)	
Property & Equipment	A4	Log of Property & Equipment	(+)	
Other Asset	A5	Log of other Asset	(+)	
Current Deposit	L1	Log of Current Deposit	(-)	
Saving Deposit	L2	Log of Saving Deposit	(-)	
Fixed Deposit	L3	Log of Fixed Deposit	(-)	
Other Liabilities	L4	Log of Other Liabilities	(-)	
Macroeconomics Factors				
GDP growth rate	M1	Annual Real GDP growth rate	(+)	Olowokudejo & Ukpong, (2021);
Inflation Rate	M2	Annual inflation rate	(+)/(-)	
Control Variables				
Bank age	C1	Number of years a bank has joined to become a financial institution		Halil & Hasan, (2012)
Bank Size	C2	How many assets are owned by a bank? To measure it, the total asset of bank value's natural log should be taken.		Chowdhury & Rasid, (2017); Naderi, (2021)

Source: Author's compilation

4. Empirical result

4.1 Descriptive statistics

This section provides an overview of the data set. This study mainly attempts to assess the influence of ALM, Macroeconomics factors, and keeping in place control variables, on the profitability of sample selected Afghan banking environment. The data is comprised both of cross-section and serial which organized a set of panel data from 7 domestic commercial banks running operations in Afghanistan from 2011-2021, with a total number of observations of 77. The count, mean, standard deviation, minimum, and maximum values for each independent variable and the dependent variable are displayed in the statistical summary. The summary statistics for all the factors included in this study are shown in Table 4.1. The source for the statistical summary is the raw data. ROA mean value for the taken samples of banks is negative 0.012. There is a wide gap among the liabilities of the selected banks shown by their standard deviation value. The sum of the customer deposits, composed of L1 (current deposit), L2 (saving deposit), and L3 (fixed deposit), have the highest mean value among the liabilities. The mean value of the L1 (current deposit), L2 (Saving deposit), and L3 (Fixed Deposit) stood at AFN 16,351.60 million, AFN 3,925.38 million, and 1,243.46 million, respectively. The L1 (current deposit) has the maximum deviation from its mean AFN 19,449.700 million while L4 has the minimum value, AFN 658.608 million. On the other hand, the total value of the mean of A1 (loans and advances) is the second highest among the assets. This confirms that the primary function of banks in Afghanistan is to receive deposits and disburse loans to customers. Likewise, the A3 (Investment) mean value stood at AFN 3848.03 million and with a standard deviation of AFN 5401.70 million, which shows that they are highly dispersed from their mean. A2 (Cash and Cash equivalent) with a

maximum value of AFN 33320.67 million and a minimum of AFN 1615.30 million indicates a greater variability. The macroeconomic factors studied in this paper have a mean value of 1.4 % and 5.0 % with a standard deviation of 6.4% and 3.3% for M1 (GDP) and M2(Inflation rate), respectively. It indicates that Afghanistan experienced average GDP growth of 1.4% during the study period with an average inflation rate of 5.0%. Regarding the control variables, the mean average value of C2 (Bank Size) stood at 23, indicating greater asset availability. The maximum value of BA (Bank age) implies that the first established Bank in Afghanistan has 89 years of experience in the banking sector.

Table 2. Descriptive Statistics

Variable	Count	Mean	Stand. Deviation	Minimum value	Maximum value
Dependent Variable					
ROA	77	-0.012	0.19526	-1.6966	0.10835
Assets and Liabilities Independent Variables					
Loan and Advances	77	4975.18	2658.19	1523.82	14816.9
Cash and Cash Equivalents	77	10435.28	6738.45	1615.30	33320.75
Investment	77	3848.03	5401.7	0	18915.8
Property & Equipment	77	654.804	526.075	1.283	2979.62
Other Asset	77	2657.5	7587.18	0.7234	47930.7
Current Deposit	77	16351.6	19449.7	14.0748	105667
Saving Deposit	77	3925.38	5702.57	4.37177	44592.8
Fixed Deposit	77	1243.46	2148.98	0.25	17591.5
Other Liabilities	77	475.892	658.608	20.909	3033.26
Macroeconomics Independent Variables					
GDP growth rate	77	0.01419	0.06373	-0.15	0.12752
Inflation Rate	77	0.05038	0.03348	-0.0066	0.11804
Control Independent Variables					
Bank age	77	26.1429	25.9172	13	89
Bank Size	77	23.6956	1.04624	16.7543	25.0334

Source: Author's computation from STATA 14

4.2 Correlation analysis

All the studied variables including the control variables underwent a correlation test. Concerning table 4.3, all the asset studied components have a negative relationship with the profitability ratio (ROA) except A3 (Investment). Aside from L1, all liability variables have a negative correlation with the ROA ratio (Current Deposit). According to this, a rise in the negatively correlated variables causes a decline in ROA (profitability). However, the controls C1 (Bank age) and C2 (Bank size) exhibit a positive correlation or link with ROA. This suggests that an increase in ROA is caused by both an increase in C1 (Bank age) and an increase in C2 (Bank Size). Regarding Macroeconomics variables, M1 (GDP) is positively correlated with ROA while C2 (Inflation) is negatively correlated. This indicates that a rise in the value of GDP leads to an increment of ROA while an increase in Inflation results in a decrease in profitability (ROA).

Table 3. Matrix of Correlation

Variables	ROA	A1	A4	A5	A6	A7	L1	L2	L3	L4	M1	M2	C1	C2
Loan & Advances	1.00													
Cash and Cash Equivalents	-0.013	1.00												
Investment	-0.009	0.114	1.00											
Property & Equipment	0.015	-0.034	0.301	1.00										
Other Asset	-0.100	0.277	0.257	-0.131	1.00									
Current Deposit	-0.038	0.074	0.236	0.065	0.066	1.00								
Saving Deposit	0.027	-0.024	0.482	0.302	0.004	0.193	1.00							
Fixed Deposit	-0.041	0.276	0.306	-0.050	0.322	0.019	0.366	1.00						
Other Liabilities	-0.015	0.152	0.198	-0.109	0.403	0.068	0.194	0.493	1.00					
GDP growth rate	-0.078	0.509	0.381	0.009	0.306	0.233	0.134	0.267	0.250	1.00				
Inflation Rate	0.299	0.032	0.010	0.211	0.004	-0.004	-0.005	0.122	-0.015	-0.071	1.00			
Bank age	-0.093	-0.145	-0.258	-0.118	-0.097	-0.167	-0.171	-0.074	-0.127	-0.017	-0.160	1.00		
Bank Size	0.068	-0.373	0.461	-0.018	0.300	0.151	0.245	0.410	0.367	0.185	0.000	0.000	1.00	
C2	0.762	0.111	0.515	0.265	-0.012	0.166	0.465	0.061	-0.005	0.224	0.172	-0.218	0.213	1.

Source: Author's computation from STATA 14

4.3 Multicollinearity test

VIF (Variance Inflation Factor) test was carried out to check the Multicollinearity among the variable. From Table 4.4, it can be observed that all the variables used in this study have VIF values less than 10. As per the rule of the VIF test, a greater than a 10 VIF value implies that there is a high correlation among the variables and vice-versa. In addition, the mean VIF value of the total variables also stood at 1.81 which is lower than 10 indicating a low correlation among the variables as a whole.

**Table 4. Multicollinearity Test
Variance Inflation Factor**

	VIF	1/VIF
Bank age	3.41	0.292832
Loan and Advances	3.34	0.299421
Saving Deposit	2.4	0.416436
Cash and Cash Equivalents	2.32	0.431886
Current Deposit	1.98	0.506077
Other Liabilities	1.92	0.519625
Bank Size	1.86	0.53834
Fixed Deposit	1.57	0.636736
Property & Equipment	1.52	0.657075
Investment	1.33	0.749294
GDP growth rate	1.21	0.827173
Inflation Rate	1.21	0.829836
Other Asset	1.16	0.86501
Mean VIF	1.94	

Source: Author's computation from STATA 14

4.4 Heteroskedasticity test

The Breusch-Pagan / Cook-Weisberg test was used to test for heteroskedasticity. Weighted regression was run for testing heteroskedasticity. All the independent variables were divided by $1/A3$. The test's null hypothesis states that there is evidence of constant variance (homoscedasticity) against the alternative hypothesis that there is evidence of heteroskedasticity in the regression models. Table 4.5 below shows that the P-value stood at 0.3079. As the model P-value is above 5% ($P\text{-value} > 0.05$), this indicated that there is no heteroskedasticity exists in the study models.

Table 5. Heteroskedasticity Test

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of ROA	
F (1, 74)	= 1.05
Prob > F	= 0.3079

Source: Author's computation from STATA 14

4.5 Hausman test

The Hausman test is carried out to compare and evaluate the selection between and random effects model and fixed effect model for a better fit for the data. Based on the assumption that one of the models does not match the facts, this hypothesis is made (Fielding, 2004). The null hypothesis reveals that the random model better model in the test for this study. An acceptance of the null hypothesis would result from a p-value of more than 5%. Table 4.8 shows the Hausman test analysis. A P-value with a 0.00 value implies that the alternative hypothesis is accepted and it implies that the random effect model is not appropriate compared to the fixed effect model for the examination of panel data using regression.

Hausman (1978) specification test	
	Coef.
Chi-square test value	255.34
P-value	0.00

Source: Author's computation from STATA 14

4.6 Empirical estimation

This part of the study reports the regression results. This section encompasses the fixed effect estimation method as suggested by the test of Hausman (Table 4.5)

4.6.1 Fixed effect estimation method

The output of the regression with fixed effect estimation is shown in Table 4.6. The fixed effect regression for the dependent variable has an R-square of 0.970, which indicates that it accounts for 97.0% of the relationship between the dependent variable (ROA ratio) and the other independent factors.

According to this regression, the return on A1 (Loan and Advances) and the ROA ratio have an insignificant negative relationship at the 99% level of confidence. This indicates that one unit increase in A1 (Loan and Advances) facilities value decreases the ROA ratio by 8 per cent. A2 (Cash and Cash Equivalents) has significant and as well as negative effects effect at a 99% level of confidence with the ROA ratio.

One per cent increase in A2 (Cash and Cash Equivalents) decreases the ROA ratio by 14.6 per cent. At a 99% degree of confidence, A3 (Investment) has a significant negative impact on the ROA ratio. One per cent increase in A3 (Investment) decreases the profitability ratio of ROA by 1.3 per cent. A4 (Property & Equipment) has a negative but insignificant influence on the ROA ratio.

One per cent increase in A4 (Property & Equipment) decreases the ROA ratio by 0.3% which marks the lowest impact among all other independent variables. A5 (Other Assets) has a negative but insignificant link with the profitability ratio of ROA. One per cent increase in A5 (Other Assets) decreases the ROA ratio by 7%. L1 (Current Deposit) effect is found significantly negative a 95% level of confidence with the ROA ratio. One per cent increase in L1 (Current Deposit) increases the ROA ratio by 3.8 per cent.

In contrast, the L2 (Saving Deposit) relation is found to have a significant and positive influence at a 95% level of confidence with the ROA ratio. One per cent increase in L2 (Saving deposit) increases the ROA ratio by 3.8 per cent. L3 (Fixed deposit) has also a positive insignificant effect on the ROA ratio. One per cent increase in L3 (Fixed Deposit) increases the ROA ratio by 1.3 per cent.

The L4 (Other liabilities) coefficient shows that there is an insignificant influence but a negative impact on the ROA ratio. One per cent increase in L4 (Other liabilities) decreases the ROA ratio by 1.3 per cent. Regarding the Macroeconomics variable, at a 99% level of confidence, the ROA ratio is positively impacted by both M1 (GDP growth rate) and M2 (inflation rate). One per cent increase in M1 (GDP growth rate), and M2 (inflation rate) increases the ROA ratio by 36.5 percent and 0.50 percent, respectively.

However, among control variables, C1 (Bank age) has no impact on the ROA ratio while the impact of C2 (Bank Size) is significantly positive on the ROA ratio at a 99% level of confidence. The ROA ratio rises by 22% for every unit increase in C2 (Bank size).

Table 7. Fixed-Effect Regression

ROA	Coef.	St. Err.	t-value	p-value	95% Conf	Interval	Sig
Loan and Advances	-.081	.043	-1.87	.067	-.167	.006	*
Cash and Cash Equivalents	-.146	.03	-4.82	0.00	-.206	-.085	***
Investment	-.013	.005	-2.70	.009	-.023	-.003	***
Property & Equipment	-.003	.01	-0.27	.785	-.023	.017	
Other Asset	-.007	.008	-0.92	.362	-.023	.008	
Current Deposit	-.038	.017	-2.24	.029	-.072	-.004	**
Saving Deposit	.013	.014	0.92	.364	-.015	.04	
Fixed Deposit	.004	.007	0.61	.544	-.009	.017	
Other Liabilities	-.013	.014	-0.95	.345	-.041	.015	
GDP growth rate	.365	.075	4.86	0.00	.215	.516	***
Inflation Rate	.501	.158	3.17	.002	.185	.816	***
Bank age	0	
Bank Size	.224	.006	38.35	0.00	.212	.236	***
Constant	-	.457	-5.66	0.00	-3.503	-1.673	***
	2.588						
Mean dependent var		-0.012	SD dependent Var				0.195
R-Square		0.970	Number of obs				77
F-test		154.130	Prob>F				0.000
Akaike Crit. (AIC)		-	Bayesian crit. (BIC)				-
		283.422					252.953

*** p<.01, **P<.05, *p<.1

Source: Author's computation from STATA 14

5. Conclusion

The objectives of the study were to analyze the effects of Asset-liability structure (management), and macroeconomic factors on the profitability of banks keeping control variables in place. The Statistical Cost Accounting (SCA) model is applied, together with panel data from 2011 to 2021 encompassing seven domestic commercial banks in Afghanistan. This paper used five categories of assets and four categories of liabilities for ALM, used GDP growth rate and inflation rate for macroeconomic factors, and Bank age and Bank size were used as control variables to find their effect on bank profitability, measured by ROA. The research findings confirmed the central hypothesis of the study to some limit that half of the estimated return rate on liabilities is negative and varies from liabilities to liabilities while the estimated rate of return on assets is also negative and varies across assets. The null hypothesis for the studied macroeconomic factors has been accepted that their contribution is significantly positive to the ROA ratio. Concerning the control variables, bank age does not have an importance on gaining profitability while bank size has a major significant effect on the ROA ratio. This study provides evidence that there is an effect of balance sheet items, and macroeconomic factors keeping control variables in place on bank profitability measured by ROA ratio since more than fifty percent of the coefficients of the regression result were statistically significant. The regression coefficient indicates that the ROA ratio, representing domestic commercial bank profitability, is not positively affected by assets while positively affected by fifty percent of the studied liabilities categories in the Afghanistan context. This result could be due to different reasons such as an untrusted future for investment, high rates of credit default, and legal issues. This study finding provided empirical support for the view made by (Kosmidou, 2004) that liability- management increases more the profitability of banks than asset management. This study has implications for Afghan banking sector regulators and bank management. This study alerts bank managers to the fact that different assets and liabilities contribute in different ways to the profitability of their bank, and it is important to pinpoint those assets and liabilities that boost bank profitability. And for regulators, as the study provides evidence that assets

contribute negatively to the ROA ratio, need to formulate guidelines, circulars, and policies for the commercial banks for providing any feasible opportunities to commercial banks for optimal using their resources both inside Afghanistan and as well across the the border to gain profitability on their assets.

5.1 Limitations of the study

There were certain limitations in the current study that could have affected the findings of this study. For instance, this researcher failed to assess the impact of off-balance sheet elements or components in this study. The study's findings might not be conclusive because of the aforementioned restrictions. Besides this, the researcher faced a shortage of earlier research studies on the subject because no researchers have focused on the topic of (Asset-Liability Management) impact on Afghanistan's commercial banks' profitability. Furthermore, not all macroeconomic variables that could influence the financial performance of commercial banks were considered in the study. Some of the variables influencing commercial banks' financial performance were difficult to measure, yet they can have a significant impact on their profitability. Some elements such as political unpredictability and commercial bank regulation were not considered.

5.2 Future Scope of the Study

The present study only examined the on-balance sheet components; however, other researchers are recommended to include the off-balance sheet items in their studies to determine how off-balance sheet components affect profitability. To further improve the models' ability to explain the financial value (profitability) of Afghan commercial banks, additional different ratios may be added.

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