

The Impact of Assets Liability Management on the Financial Performance: Evidence from Licensed Commercial Banks in Sri Lanka

¹Madhushani W. I. and ²Perera, K. H.

^{1,2}Department of Accountancy, University of Kelaniya, Sri Lanka

¹Ishumadhushani1996@gmail.com, ²hasinip@kln.ac.lk

Abstract

The banking sector in Sri Lanka is one of the most dynamic and vibrant sectors of the economy. The banks are influenced by various types of risks and discrepancies which have a direct impact on the profitability of their short-term & long-term operations and sustainable capacity of earnings. The effective Assets Liability Management process will closely monitor and equalize both assets and liabilities and focus on the stability of adverse influences of both risks and discrepancies. The study aims to examine the significant impact of ALM on the financial performance of the licensed commercial banks in Sri Lanka from the financial year 2011 to 2020. Capital Adequacy Ratio (CAR), Non-Performing Loan Ratio (NPLR), Income Diversification Ratio (IDR), Liquidity Ratio (LR) and Operational Efficiency Ratio (OER) were used as asset liability indicators while Return on Assets (ROA) and Return on Equity (ROE) used as financial performance indicators. This study used secondary sources to collect data, such as published annual reports of licensed commercial banks and a central bank web site and selected all 24 licensed commercial banks in the population as the sample. The study used descriptive statistics, correlation analysis, and regression analysis to establish the relationship and effect of the ALM on the financial performance of the commercial banks in Sri Lanka. The findings indicate a significant negative relationship between NPLR and both ROE and ROA. The income diversification had a significant positive relationship with the ROA and also the ROE. Operational efficiency had a significant negative relationship with both ROE and ROA. The level of liquidity had a significant negative relationship with both ROA and ROE. The level of capital adequacy had a significant negative relationship with ROE. There is no significant relationship between CAR and the ROA. Based on the findings, which have the greatest implications for the policymakers who govern the financial performance of the banking sector, regulators who make regulatory requirements related to the banking sector, potential investors who invest in the banking sector and all other stakeholders & future researchers who are interested in the banking sector.

Keywords: *Assets liability management, financial performance, commercial bank*

Introduction

Background of the Study

The banking sector in Sri Lanka is one of the most dynamic and vibrant sectors of the economy. Commercial banks are the most important sources of financing for most businesses in the financial sector. They operate underlying discrepancies between the long-term assets and highly liquid liabilities within a financial position. Vossen (2010) stated a sound, progressive, and equalized banking system is the key fundamental requirement of the economically developing country. The bank's main objective is to maximize profits and lower their risk exposure. Commercial banks are influenced by various types of risks and that directly impacted to the profitability and earnings of the short-term and long-term as well as the sustainable capacity of those earnings.

The Assets Liability Management model mainly focuses on the adverse influences on the commercial banks. This can be achieved through the optimal combination of levels of assets and liabilities in financial institutions. So, ALM is the strategy that addresses the risks in banks due to discrepancies between assets and liabilities through the changes in the financial sector. Because interest rate and liquidity risk are the most important risks affecting financial performance, traditional ALM focused on them. But now it seeks to broaden areas such as capital management, efficiency management, and diversity management.

So the core objective of ALM is provide high stabilization, high quality and increasing flow of net interest income. This can be achieved through the optimal combination of levels of assets and liabilities in financial institutions. That not a solution to hedging the risk and discrepancies arising between assets and liabilities. But it provides the long term prospects for the success of the process of maximizing profits when properly meeting their complex liabilities (Saunders, 2008).

This study focused on the financial performance of commercial banks. Better financial performance is creating stabilization of the financial system in the banking sector. The profitability of the bank is a very important financial performance source to the banking sector. Because that profit can be reinvested in the business. This is a greater contribution to the safety of the banking industry because it promotes the stabilization of the financial system. But the high profitability of the banks may create market power for large banks in the banking sector. Which is harmful to the financial intermediation activities of the banks. Because of their strong market power, banks reserve a low return for depositors while charging a higher percentage of interest on loans and advances. And the low market power banks discourage the depositors and the shareholders because of the lower profitability. This should result in the fall of banking operations activities to maintain adequate capital. Therefore, maintaining a sustainable financial performance system is more important for the banks. And maintaining proper ALM management for stabilization of financial performance is the key indicator in the banking sector. So, this research has been focused on the asset liability management of the financial performance of the commercial banks in Sri Lanka.

Statement of the Problem

The competition in the financial market will require greater efficiency in the management of the assets and liabilities in commercial banks. The entry of new competitors into the industry and the provision of a wide range of financial services to the public requires an effective mechanism for prudent management of the financial institution industry as well as strategies to attract the public toward the banks rather than other financial institutions to increase their financial performance and success in the future. The discrepancies between the maturity of assets and liabilities create insecurities in the systematic nature of financial institutions. If financial institutions have an effective asset liability management process that will closely monitor and equalize both assets and liabilities. As a result, banks should play a larger role in the optimal combination of assets and liabilities, as well as a confidential financial system, in order to maximize financial performance while minimizing risk and discrepancies. The developing countries give little attention to that ALM, and most researchers have done this research in different environmental situations that are not linked with the developing countries, like Sri Lanka. And also given gaps in an empirical review such as contradictions of most researchers' findings with each other's, which gave a greater contribution to the research question "the impact of asset liability management on the financial performance of the licensed commercial banks in Sri Lanka."

Significance of the Study

The debate about the asset liability management and the financial performance of commercial banks has not yet been settled. As a result, ALM assists in determining the risk and discrepancies caused

by changes in the banking sector, as well as how to monitor the risks through various appropriate strategy activities. This study is expected to benefit the banks in appreciating the concept of ALM and encourage the risk management tool to the adoption. And the research gives greater contribution to commercial banks to assess and get information about their risks, risk controlling techniques, how to reduce the non-performing loans, how to diversify their income sources, how to improve the strength of capital, how to increase the efficiency in operating activities, how to increase profitability and the liquidity in the banking sector. Shareholders, creditors, and depositors can come to a greater understanding about whether to provide a reasonable return on assets, possibly repay the debit and possibly provide withdrawal requirements or not. Customers can understand the stability and the capability of bank business operations activities and how ALM helps to identify the failures & strength of the bank management practices. Managers can understand the relationship of ALM, how they improve their performance and take actions to overcome their problems. Investors can compare selected banks' financial performance, and external investors can choose the best opportunity for their investment. Regulators can make and govern the policies and regulations for the commercial banks to effectiveness of asset liability management, thereby reducing the failure of the commercial banks.

The objective of the Study

The main objective of this research is to identify the impact of asset liability management on the financial performance of licensed commercial banks in Sri Lanka.

The research question of the study

The study was conducted to answer the following research question, “what is the impact of asset liability management on the financial performance of the licensed commercial banks in Sri Lanka.” Accordingly, the impact of asset quality, liquidity, operational efficiency, non-performing loan and capital adequacy on the financial performance of the licensed commercial banks are assessed.

Literature Review

Theoretical Framework

The researchers have given different theories about the variables indicated in financial institutions, such as the liability management theory, the asset allocation theory, and the market power hypothesis theory, that will give greater insights into investigating the impact of asset liability management on the financial performance of commercial banks.

Based on the evaluation of assets and liability management, (Gardner, 1994) conducted a multivariate analysis for a study on the risk classification of residential mortgage loans. He found that until 1970, the banking business consisted of extension with credit. Which was simple intermediation of deposits that were raised at a relatively low cost, and bank managers faced fairly simple decisions on the loan volumes and investments. The volatile interest and inflation rates during the 1970s and early of 1980s, then management of both assets and liabilities become necessary to maintain satisfactory performance. In the 1990s, the environment underscored the need for competitive pricing and increased engagement of liabilities to maximise profit as well as control exposure to related risk. (Sinkey, 1992) investigated the commercial bank financial performance and he found that ALM was earlier carried out in a fragmented manner in the institutions. Furthermore, different ALM activities were carried out at different levels, such as risk management by the treasury group, investment planning by the investment planning group, and capital planning done by the corporate finance department. These fragments lead to various approaches, including logical and methodological approaches.

The asset allocation theory says assets held by the commercial banks can be divided into four parts, such as primary reserves, secondary reserves, investments, and bank loans (Kidwell, 1990). Primary reserves include the cash assets on the commercial bank balance sheet. That includes deposits with corresponding banks, deposits with the central bank and vault cash. Secondary reserves include short term assets that are easily converted into cash at a price near their purchase price. According to his view, the main purpose is to provide additional liquidity to the bank while earning interest income safely.

Based on the market power hypothesis theory, (Tregenna, 2009), stated there are two approaches under the market power hypothesis theory. Structure, conduct performance, and relative market hypothesis are some examples. This assumes that a higher market concentration is the main source of market power. The relative market hypothesis uniquely identifies the bank with a large market share and diversifying products that will exert their market power to determine the price and make profits. According to the structure conduct performance approach, the level of concentration in the banking market gives rise to potential market power by banks. That may rise their financial performance.

Based on the liability management theory, since the early 1960s, the loan portfolios of commercial banks have been affected by the urgent need for a new theory. Which become known as the liability management theory. According to this theory, banks can satisfy their assets liability management needs by borrowings in the capital market as well as the money market. The core contribution of this theory considers both sides of a bank's balance sheet (Emmanuel, 1997). Maintaining high assets quality and a strong capital base that will reduce the assets liability management needs and which improve the bank's profitability. There is a short-run trade-off between ALM and banks' profitability. If management is successful in managing ALM in the short-run, then long-run earnings will increase rather than other banks' earnings (McDonald's, 2003).

Factors influencing on the bank financial performance

Ramlall, (2009) stated the financial performances of banks can be hindered due to both internal and external factors. Internal factors are related to the management of the banks and surround the ALM of the banks, and external factors reflect the economic and legal environment, which affect the financial performance of the banks. Based on the study that used the five bank-specific variables concerning assets liability management which make differences in bank financial performances.

Assets quality effects on the financial performance

This ratio measures the borrower's becoming 90 days past due on its contractual payments to total loans and advances to the customer. This expressed the non-performing loan of the bank as a percentage. Karim *et. al* (2010) researched bank efficiency and non-performing loan evidence from Malaysia and Singapore and also used the actual data of both Malaysian and Singaporean banks from the period 1995 to 2000. The results stated that there are not any significant differences in the cost efficiency level between commercial banks in Singapore and Malaysia, although banks in Singapore have a higher average cost efficiency score. And also further indicated that the higher non-performing loans reduce cost efficiency. The effect of credit risk management on the profitability of the commercial banks in Kenya and data on the credit level, level of non-performing loans and profitability of the company were collected from 2004 to 2008. The findings clearly state that the bulk of the profit of commercial banks is not affected by the amount of credit and non-performing loans. As a result, other variables besides credit and non-performing loans may have an impact on profit (Kithingi 2010). Funso *et. al* (2012) researched the credit risk and commercial bank performances in Nigeria using panel data analysis for the period of 2000 to 2010 and five banks were chosen from twenty existing commercial banks. They found a 100% increase in non-performing loans

reduces profitability by about 6.2%. Felix & Claudine (2008) researched the relationship between bank performance and credit risk management. They found both returns on assets and returns on equity were inversely related to the ratio of nonperforming loans to total loans of financial institutions. Kargi (2011) investigated the impact of credit risk on the profitability of Nigerian banks. Data was collected from the annual reports and accounts of sampled banks from 2004 to 2008. The findings indicated that banks' profitability is adversely affected by the level of loans and advances and, non-performing loans. That leads to greater risk of liquidity and financial distress. Chimkono *et. al* (2016) investigated the effects of non-performing loans and other factors on the performance of commercial banks in Malawi. Data was collected by using secondary sources for the 2008 to 2014-time period with ten commercial banks in Malawi. They found that the non-performing loan ratio had a significant effect on the performance of banks in Malawi. Khalid (2012) investigated a study on the impact of asset quality on the profitability of private banks in India. That found asset quality had a positive and significant effect on the financial performance of banks, such as assets quality, income diversification, liquidity, operational efficiency, and capital adequacy.

Income diversification effects on the financial performance

Income diversification is the growth into new income earnings from financial products and services rather than traditional intermediation services. Nguyen *et. al* (2015) investigated the effects of diversification of income on the risks of banks in Vietnam using domestic banks from 2005 to 2012-time period. The results indicated that a rise in non-interest earnings will reduce risk compared to the ones with high-interest earnings. So they found there was a positive correlation between diversification and risk in banks. Kiweu (2012) investigated the effect of income diversification on banks' financial performance (ROA & ROE) by using the 35 commercial banks in Kenya from the 2000 to 2010-time period. The results indicated the income source diversification in Kenyan banks, which leads to reduced individual bank and systematic risk and improved earnings. Pennathur *et. al* (2012) investigated the impact of ownership on income diversification in Indian banks for the period 2001 - 2009. That study examined both non-interest income and the impact of diversification on various profitability and measures of insolvency risk for public sector, private domestic and foreign banks. The result of this research found that fees and commission-based income in the Indian banking system significantly reduce the risk measured by profitability variables for the public sector banks in India.

Capital adequacy effects on the financial performance

The financial strength and ability of the bank are measured by the ratio of capital adequacy. Ikpefan (2013) investigated the impact of capital adequacy and management performance on the financial performance of the commercial banks in Nigeria for the period of 1996 to 2006. The results found that the capital adequacy ratio hurts the earnings and efficiency of management and operational expenses have a negative correlation to the return on capital. Ben Moussa (2013) investigate the relationship between capital and financial performance in Tunisia for the period of 2000 to 2010 using the 19 banks in Tunisia. The results found that a positive relationship existed between capital and financial measures such as ROA, ROE and NIM. Ali (2016) investigated determinants of profitability in the case of Jordanian commercial banks from 2005 to 2014 using panel data analysis. The author stated that there is a positive association between capital adequacy, leverage, and banks profitability. And further found that improving Jordanian banks' profitability needs well-capitalized banks accompanied by a high level of capital adequacy.

Liquidity effect on the financial performance

Liquidity can be defined as an ability to meet banks' financial obligations as they are due. Khan & Ali (2016) investigated the impact of liquidity ratio on the profitability of the commercial banks in

Pakistan for the period 2008 - 2014 using secondary data. The results found that there is a positive and significant relationship between liquidity and profitability of commercial banks in Pakistan. Lartey *et. al* (2013) investigated the impact of liquidity on the profitability of the listed banks in Ghana's stock exchange for the period 2005 to 2010. The results found that the liquidity and financial performance of the banks in Ghana have a positive weak relationship. Abdullah & Johan (2014) investigated the impact of liquidity on commercial banks' performance in Bangladesh for five periods of time using panel data for the investigation. The results of the research clearly stated that there is not any significant relationship between liquidity and profitability of the listed commercial banks in Bangladesh.

Operating efficiency effects on the financial performance

The efficiency of management in the bank can be managed by operating cost efficiency. Samad (2015) investigated both bank-specific factors and macro-economic variables' impact on the profitability of the Bangladesh banks. Panel data analysis with 42 Bangladesh commercial banks was used to collect data. The results found that there is a significant impact on loan deposit ratio, loan loss provision to total assets ratio and operational efficiency ratio with the profitability indicators of Bangladesh banks and macro-economic variables, but there is no impact on profits. Obamuyi (2013) investigated the impact of bank-specific factors and macroeconomic factors on the financial performance of the commercial banks in Nigeria for the period 2006 - 2012 using the 20 commercial banks in Nigeria. The results found that bank capital, bank size, and operational efficiency factors contribute to the bank's higher performance and growth. Sporta (2017) investigated the effect of operational efficiency as a financial distress factor on the financial performance of commercial banks in Kenya for the period 2005 - 2015 by using 38 commercial banks. The results indicated there is a positive, significant relationship between operational efficiency and the financial performance of commercial banks in Kenya.

Based on the literature review, some research evidence shows there is a positive relationship between ALM indicators and financial performance indicators of commercial banks like Ali (2016). Further, some researchers show there is no impact of ALM indicators on the financial performance indicators of the commercial banks like Abdullah & Johan (2014), Kithingi (2010), as well as some researchers, show there is a negative relationship like Ikpefan (2013), Funso *et. al* (2012). The debate over ALM and commercial bank financial performance has yet to be resolved, as most researchers have done in different environmental situations unrelated to developing countries like Sri Lanka. A few researchers conducted research on the effects of ALM on commercial bank performance in Sri Lanka, but they analyzed the results using a small sample of commercial banks consisting of a maximum of five commercial banks and a small period consisting of a maximum five-year research analysis. So it is important to conduct this research. The research question is "what is the impact of ALM on the financial performance of the commercial banks in Sri Lanka?" for the last 10 years and a sample of fifteen commercial banks listed on the Colombo stock exchange. This study should be a bridge to the gap.

Methodology

The research used the quantitative research approach, descriptive research design, and the fixed panel method to analyze the impact of ALM on financial performance. The research is based on seven indicators such as Non-Performing Loan Ratio (NPLR), Income Diversification Ratio (IDR), Liquidity Ratio (LR), Operational Efficiency Ratio (OER), Capital Adequacy Ratio (CAR), Returns on Equity (ROE) and Returns of Assets (ROA).

Sample and Population

The population of this study consists of all 24 licensed commercial banks in Sri Lanka to the date of March 2021. The sample of the study is limited to the 15 licensed commercial banks in Sri Lanka due to the lack of available data for eight foreign bank branches and one domestic private commercial bank was eliminated because of its establishment later than the beginning of the sample period. Two government-owned commercial banks, ten domestic private commercial banks and three foreign bank branches are included in the sample.

Data Collection

This research used secondary sources to obtain the data, such as published annual reports of licensed commercial banks in Sri Lanka and the central bank of Sri Lanka for the period of ten financial years from 2011 to 2020.

Data Analysis

The research used the E-Views software to analyze the collected data in the study. Descriptive statistics, multiple regression analysis and correlation analysis have been used to study the impact of assets liability management on the financial performance of the licensed commercial banks in Sri Lanka.

Variables and the measurement of the variables are given in the table I below:

Table I: Measurement of Variables

Concept	Variables	Notation	Measurement
Dependent Variables	Return on Assets	ROA	<u>Profit after tax</u> Average Total assets
	Return on Equity	ROE	<u>PAT – Preference Dividend</u> Average Total equity
Independent Variables	Non-Performing Loan Ratio	NPLR	<u>Non-performing loans</u> Total loans and advances
	Income Diversification Ratio	IDR	<u>Non-interest income</u> Total income
	Liquidity Ratio	LR	<u>Liquid Assets</u> Total liability deposit
	Operational Efficiency Ratio	OER	<u>Operating cost</u> Net operating income
	Capital Adequacy Ratio	CAR	<u>Total capital</u> Total risk-weighted assets

Source: The author constructed

The conceptual framework between the dependent and independent variables is given in the figure I below:

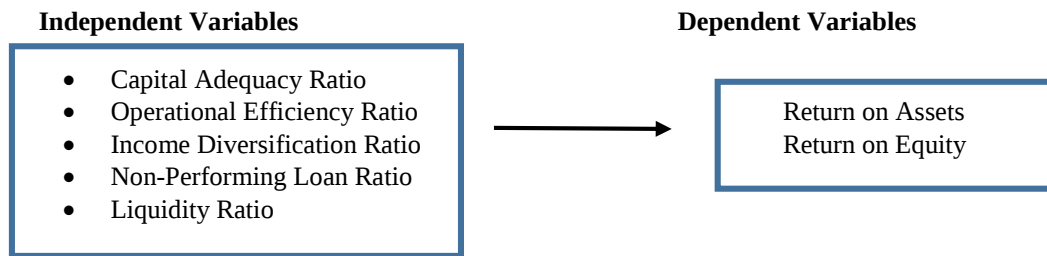


Figure I: Conceptual Framework (Source: Martha, 2015)

Hypothesis

Hypothesis one

H₁ = There is a relationship between asset quality and the financial performance of the commercial bank.

Hypothesis two

H₁ = There is a relationship between income diversification and the financial performance of the commercial bank.

Hypothesis three

H₁ = There is a relationship between capital adequacy and the financial performance of the commercial bank.

Hypothesis four

H₁ = There is a relationship between liquidity and financial performance of the commercial bank.

Hypothesis five

H₁ = There is a relationship between operational efficiency and the financial performance of the commercial bank.

Model specification

Based on regression analysis, the following model has tested the relationship between the dependent and independent variables of the research and has tested the hypothesis that asset liability management impacts the financial performance of commercial banks in Sri Lanka.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \quad (1)$$

Y denotes the financial performance of the commercial banks in Sri Lanka (ROA & ROE).

α denotes the amount of intercept.

β denotes the coefficient of the independent (X) variables.

ϵ denotes the error term.

X₁ denotes asset quality.

X₂ denotes income diversification.

X₃ denotes capital adequacy.

X₄ denotes liquidity.

X₅ denotes operational efficiency.

This is tested as significant at a 95% confidence level for all variables in the model. If the variables are above 0.05%, the researcher will accept the null hypothesis and reject the alternative hypothesis. If the variables are below 0.05%, the researcher will accept the alternative hypothesis and reject the null hypothesis in the model. And this research computed the correlation coefficient and coefficient of determination for the selected variables in the model to test the hypothesis in this research.

Data Analysis and Interpretation

Table II: Descriptive Statistics

	N	Mean	Minimum	Maximum	Standard Deviation
ROA	150	1.611267	0.320000	5.250000	0.931915
ROE	150	14.71027	1.900000	28.40000	6.136653
LR	150	24.21807	13.29000	39.45000	4.887080
OER	150	52.73726	28.76432	78.54000	11.03597
IDR	150	14.88091	6.605153	35.71000	6.271083
NPLR	150	3.407867	0.560000	6.100000	1.139724
CAR	150	16.52699	10.50000	24.86000	3.214139

Source: Survey data

Table II illustrate that the return on assets has a mean value of 1.611267, a maximum value of 5.250000, and a standard deviation of 0.931915. It also has a minimum value of 0.320000. The return on equity has a mean value of 14.71027, a maximum value of 28.40000 and a standard deviation of 6.136653. It also has a minimum value of 1.900000. The liquidity ratio has a mean value of 24.21807, a maximum value of 39.45000, and a standard deviation of 4.887080. It also has a minimum value of 13.29000. The operational efficiency ratio has a mean value of 52.73726, a maximum value of 78.54000 and a standard deviation of 11.03597. It also has a minimum value of 28.76432. The income diversification ratio has a mean value of 14.88091, a maximum value of 35.71000, and a standard deviation of 6.271083. It also has a minimum value of 6.605153. The non-performing loan ratio has a mean value of 3.407867, a maximum value of 6.100000, and a standard deviation of 1.139724. It also has a minimum value of 0.560000. The capital adequacy ratio has a mean value of 16.52699, a maximum value of 24.86000, and a standard deviation of 3.214139. It also has a minimum value of 10.50000.

Table III: Regression Model 1 with ROA

Variable	Coefficient	Standard error	Probability
C	5.496326	0.576128	0.0000
CAR	-0.014092	0.011092	0.2062
OER	-0.024971	0.004661	0.0000
LR	-0.107701	0.016384	0.0000
NPLR	-0.067880	0.030239	0.0265
IDR	0.033893	0.014563	0.0215

R-squared	0.941807
F-Statistic Pro(F- statistic)	0.000000

Source: Survey data

Table III illustrate coefficient of determination (R^2) is 94.1%. That shows how many independent variables are explained by the dependent variables in the model. The overall model is statistically significant based on the above table. Because the F statistics probability value is less than the 0.05 level in the model. It represents the 0.000000 value in the table. When considering the probability values of the individual variables, all independent variables are statistically significant at the 0.05 level, except the capital adequacy ratio in the model. The probability values are 0.0000, 0.0000, 0.0265 and 0.0215 for the operational efficiency, liquidity, non-performing loans and the income diversification ratio. The probability value is 0.2062 for the capital adequacy ratio in the model. The variable of CAR is not statistically significant with the model of ROA. But this variable cannot be excluded from the model of ROA. Because CAR is the most prominent variable in the model specification, the goodness of fit in the overall model is increased. If we exclude the CAR variable from the model of ROA, the coefficient of determination decreases by a higher amount. So, the CAR variable gives a significant contribution to the goodness of fit in the overall model.

Based on the results of the above table, which can be developed into the following equation.

$$ROA = C + \beta_1 CAR + \beta_2 NPLR + \beta_3 IDR + \beta_4 LR + \beta_5 OER + \epsilon \quad (2)$$

$$ROA = 5.496326 - 0.014092 CAR - 0.067880 NPLR + 0.033893 IDR - 0.107701 LR - 0.024971 OER + \epsilon \quad (3)$$

Table IV: Regression Model 2 with ROE

Variable	Coefficient	Standard error	Probability
C	38.72933	5.303190	0.0000
CAR	-0.218944	0.102103	0.0339
OER	-0.126160	0.042903	0.0039
LR	-0.885091	0.150815	0.0000
NPLR	-0.677696	0.278343	0.0163
IDR	0.671829	0.134051	0.0000
R-squared	0.886291		
F-statistic Probability (F-statistic)	0.000000		

Source: Survey data

Table IV illustrate the coefficient of determination (R^2) is 88.6%. The overall model is statistically significant based on the above table. Because the F statistics probability value is less than the 0.05 level in the model. It represents the 0.000000 value in the table. When considering the probability values of the individual variables, all independent variables are statistically significant at the 0.05 level with the return on equity. The probability values are 0.0339, 0.0163, 0.0000, 0.0000, and 0.0039 for the capital adequacy, non-performing loan, income diversification, liquidity and the operational efficiency ratio in the model.

Based on the results of the above table, which can be developed into the following equation.

$$ROE = C + \beta_1 CAR + \beta_2 NPLR + \beta_3 IDR + \beta_4 LR + \beta_5 OER + \epsilon \quad (4)$$

$$\text{ROE} = 38.72933 - 0.218944 \text{ CAR} - 0.677696 \text{ NPLR} + 0.671829 \text{ IDR} - 0.885091 \text{ LR} - 0.126160 \text{ OER} + \epsilon \quad (5)$$

Table V: Correlation Analysis

Ratio		NPLR	IDR	LR	OER	CAR
Coefficient	ROA	-0.427258	0.694278	0.564096	-0.718121	0.368107
	ROE	-0.268430	0.081276	-0.046913	-0.539375	-0.216888
Probability	ROA	0.0004	0.0000	0.0000	0.0000	0.0019
	ROE	0.0026	0.0000	0.0373	0.0000	0.0000

Source: Survey data

The table V illustrate the significant weak positive relationship between the return on assets and the capital adequacy ratio and it reflects the 0.368107 as well as there is a significant weak negative relationship between the capital adequacy ratio and the return on equity. It reflects the ratio of -0.216888. And there is a significant weak negative relationship between the return on assets and the non-performing loan ratio. That reflects the -0.427258 correlation coefficient. The table shows the significant weak negative relationship between the non-performing loan and the return on equity. That represents the -0.268430 correlation coefficient. The relationship between the return on assets and the income diversification ratio is significant moderate positive. That represents the 0.694278 correlation coefficient. The relationship between the return on equity and the income diversification ratio is significantly weak and positive. That represents the 0.081276 correlation coefficient. The relationship between the return on assets and the liquidity ratio is significant moderate positive. That represents the 0.564096 correlation coefficient. The relationship between the return on equity and the liquidity ratio is significantly weak and negative. That represents the ratio of -0.046913. And the relationship between the operational efficiency and the return on assets is significant moderate negative. That represents -0.718121 of the correlation coefficient. The relationship between return on equity and operational efficiency is significant moderate negative. That represents -0.539375 of the correlation coefficient.

Findings and Discussion

Based on the correlation analysis the capital adequacy ratio has a significant weak positive relationship with the return on assets and also a weak negative relationship with the return on equity. The income diversification ratio has a significant moderate positive relationship with the return on assets and a significant weak positive relationship with the return on equity. And non-performing loan ratio has a significant weak negative relationship with both return on assets and return on equity. The liquidity ratio has a significant moderate positive relationship with the return on assets and a significant weak negative relationship with the return on equity. The operational efficiency has a significant moderate negative relationship with both of return on assets and the return on equity in the model.

Based on the regression analysis, the capital adequacy ratio is not statistically significant with ROA individually. The CAR hurts the return on equity in the banks. If the capital adequacy increased by 1 unit, the ROE would decrease by 0.218944 units. This ratio is statistically significant with the ROE individually. Income diversification has a positive impact on both ROA and ROE in the banks. If the income diversification increased by 1 unit, ROA would increase by 0.033893 units and if the income diversification increased by 1 unit, ROE would increase by 0.671829 units. This ratio is statistically significant with both ROA and ROE.

The non-performing loan ratio hurts both ROA and ROE in the model. The NPLR increased by 1 unit, the ROA decreased by 0.067880 units, the NPLR increased by 1 unit, and the ROE decreased

by 0.677696 units. NPLR is statistically significant with both ROA and ROE. The liquidity ratio harms both ROA and ROE and which ratio is statistically significant individually with both ROA and ROE. If the liquidity increased by 1 unit, the ROA decreased by 0.107701 units and if liquidity increased by 1 unit, the ROE decreased by 0.885091 units. Operational efficiency ratio harms both ROA and ROE and which ratio is statistically significant individually with the ROA and ROE. If operational efficiency increased by 1 unit, the ROA decreased by 0.024971 units, and if liquidity increased by 1 unit, the ROE decreased by 0.126160 units.

Conclusion and Recommendation

This study examined the impact of asset liability management on the financial performance of licensed commercial banks in Sri Lanka. This study covered the 15 licensed commercial banks in Sri Lanka for the ten years from 2011 to 2020 by using five independent variables (NPLR, CAR, IDR, OER and LR) and two dependent variables (ROA and ROE). Based on the findings of this research, there is a significant impact of ALM on the licensed commercial banks in Sri Lanka. In model one with ROA, the ratio of CAR was not significant individually at 0.05 level with ROA. But the ratio of CAR is significant at a 0.05 level with ROE. Therefore, alternative hypothesis three is accepted in this study. Because the ratio of CAR is significant compared to ROE. And, with both ROA and ROE, all of the other variables (IDR, NPLR, LR, and OER) are statistically significant at the 0.05 level. Therefore, accept all alternative hypotheses and reject all null hypotheses relating to the individual variables. Based on the findings, the relationship between NPLR and ROE contradicts to Kithingi, (2010), NPLR and ROA are similar to Felix & Claudine (2008) and contradict Khalid (2012). The relationship between the IDR and ROE/ROA is similar to Nguyen *et. al* (2015), and CAR and ROE are similar to the Ikpefan (2013) and also contradict to Ben Moussa (2013). The relationship between the LR and ROE/ROA contradicts Khan & Ali (2016) and OER and the ROA/ROE contradicts to Obamuyi (2013).

The research recommends that banks ensure the proper level of NPL that does not have a harmful impact on bank performance, and banks should be within an optimal range of NPL. And to ensure the optimal level of working capital to face unexpected losses or liabilities and implement an effective liquidity management strategy in the banks. Banks should be working on ways to increase the bank's performance with efficiency on the cost of sales and increasing the revenue via the diversity of income sources. Banks should need to improve the diversity of income-generating by non-interest income rather than relying on interest income and should need to provide an awareness program to the customer about the various financial services available in the bank and provide information and attract them to the various financial services. And also to ensure the value of capital should be sustainable and adequate for their operating activities and a sustainable amount of capital will secure the return on equity in the banks.

Limitations and Future Research directions

The research data was collected from the only available annual reports of banks and central bank websites in Sri Lanka. Lack of available data for some banks and some foreign bank branches' data correlated with other banks' data. Therefore, some banks were eliminated from the sample. Because of this situation, this research-based only 15 licensed commercial banks in Sri Lanka. Therefore, this study suffers from the lack of data for some banks. The study only collected data for Sri Lanka. The findings were not related to the other banks in other countries. This research only represents one sector, like the banking sector. But findings of the research may be different in different sectors. The study is based on only on secondary data. Therefore, the conclusion of the research depends on the sample, which is subject to the accuracy and reliability of the data used. The research did not consider the macroeconomic variables that impacted the financial performance of the commercial banks. Such

things as political environment and government regulatory environment for the banking sector were not considered.

The following suggestions for future research should be considered for the improvement of future studies.

The study represented one sector of the economy. Therefore, similar studies should be conducted in other sectors to ensure the impact of ALM on the financial performance of other sectors, such as the insurance sector. Because the insurance sector is similar to the banking sector. Future research can be done with the comparison of the specialized banks in Sri Lanka to identify the ALM impact on the financial performance of both licensed and specialized banks and future researchers can be interested in various frequencies of data such as monthly or quarterly data, which is not always based on the annual data. And another researcher can concentrate on the longer time horizon of the research, such as 10, 20, or more than 20 years. Another researcher can add the different ratios to the model to determine the ALM impact on the financial performance, such as loan to deposit ratio, net interest margin ratio, and reserve for doubtful loans credit ratio. And another researcher can shift the primary data from the secondary data to analyze the results of assets liability management impact on the financial performance. Finally, this study was carried out using of e-views software, but future researchers can use other latest statistical packages.

References

Abdullah, M.N., & Johan, N. (2014), The impact on liquidity on profitability in banking sector of Bangladesh, *International Journal of economic and business review*, 2(10), pp.17-22, Available at: <http://www.researchgate.net/publication/320944167>. (accessed 15 December 2021).

Ali, S.A. (2016), Determinants of banks profitability in Jordan, *Investment management and financial innovations*, 13(1), pp.84-91, DOI.org/10.2151/imfi.13(1).2016.08.

Alkhatib, A., & Harashesh, M. (2012), Financial performance of Palestinian commercial banks, *International Journal of business and social science*, 3(3), pp.175 – 184, Available at: <http://www.researchgate.net/publication/263963615>. (accessed 17 December 2021).

Ben Moussa, M.A. (2013), Impact of capital on the financial performance of banks, the case study of Tunisia, *Journal of banks and bank systems*, 8(4), pp.47-54, Available at: <http://www.researchgate.net/publication/299408526>. (accessed 18 December 2021).

Chimkono, E.E., Muturi.W., & Njeru, A. (2016), Effect of non-performing loans and other factors on the performance of the commercial bank in Malawi, *International Journal of economics commerce and management*, 4(2), pp.549-563, Available at: [http://www.scirp.org/\(S\(czeh2tfqw2orz553k1w0r45\)\)/reference/referencepapers.aspx?referenceid=3129796](http://www.scirp.org/(S(czeh2tfqw2orz553k1w0r45))/reference/referencepapers.aspx?referenceid=3129796). (accessed 20 December 2021).

Choudry.M. (2011), Banks assets liability and liquidity risk management, Chapter 2, pp.13-61.

The central bank of Sri Lanka (2018). www.cbsl.gov.lk. Retrieved December 22, 2021, Guidelines on the opening of new banks in Sri Lanka Available at: http://www.cbsl.gov.lk/sites/default/files/cbslweb_documents/laws/banks.pdf

Central bank of Sri Lanka (2018), Available at:[http://www.cbsl.gov.lk/en/financial system/financial system stability/banking sector](http://www.cbsl.gov.lk/en/financial%20system/financial%20system%20stability/banking%20sector), Retrieved from www.cbsl.gov.lk.

Ebrahim.A., & Hasan. I. (2008), The value relevance of product diversification in commercial banks, *Review of accounting and finance*, 7(1), pp.24-37, DOI.org/10.1108/14757700810853833.

Funso, K.T., Kolado, A.R., & Ojo, O.M. (2012). Credit risk and commercial bank performance in Nigeria, *Australian Journal of business and management research*, 2(2), pp.31-38. Available at:http://ajbmr.com/articlepdf/aus_20_70i2n2a4.pdf. (accessed 24 December 2021).

Ikpefan, O. (2013), Capital adequacy management and performance in the Nigerian commercial banks, *African journal of business management*, 7(30), pp.2938-2950. DOI.org/10.5897/AJBM09.258.

Elyor, S. (2009), Factors affecting the performance of foreign banks in Malaysia, a thesis submitted in partial fulfilment of the requirements of university Utara Malaysia for the degree of master of science (banking), Available at:http://etd.uum.edu.my/1760/2/1.saidov_Elyor_Ilhomovich.pdf. (accessed 26 December 2021).

Ismail, A., Hanif. R., Choudhary. S., & Ahamad. N. (2014), Income diversification in banking sector of Pakistan, *The Journal of Commerce*, 7(1), pp.2-18, Available at:<http://www.researchgate.net/publication/316739104..net/publication/316739104>. (accessed 28 December 2021).

Joseph. K.S., & Tabitha. N. (2016), Effect capital on the financial performance of commercial banks in Kenya, *Asian Journal of business and management*, 4(5), pp. 221-238, Available at:<http://www.ajouronline.com/index.php/AJBM/Article/view/4210/2265>, (accessed 31 December 2021).

Kargi. H.S. (2011), Credit risk and the performances of Nigerian banks, *European Journal of finance management*, 7(5), pp.67-69, Available at:<http://www.academia.edu/8637351>, (accessed 02 January 2022).

Karim. M., Chan. C.G., & Hassan. S. (2010), Bank efficiency and non-performing loans, evidence from Malaysia and Singapore. *Prague economic paper*, 2, pp.118-132, DOI: 10.18267/j.pep.367.

Khalid. A.C. (2012), The impact of assets quality on the profitability of private banks in India, *Journal of African microeconomic review*, 2(1), pp.1-22.

Khan. R.A., & Ali. M. (2016). Impact of liquidity on the profitability of commercial banks in Pakistan, An analysis on the banking sector. *Global Journal of management and business research & finance*, 16(1), pp. 2249-4588, Available at:http://globaljournals.org/GJMBR_Volume16/4-impact-of-liquidity-on-profitability.pdf. (accessed 04 January 2022).

Kithingi. A.M. (2010), Credit risk management and profitability of commercial banks in Kenya, *African Journal of management policy*, 3(7), pp.139-257, Available at:<http://hdl.handle.net/11295/40437>. (accessed 05 January 2022).

Kiwu. J.M. (2012), Income diversification in the banking sector and earnings volatility, evidence from Kenyan commercial banks, *Working papers*, KBA Centre for research on financial markets and policy, Available at:<http://ir.mkusu.ac.ke/handle/123456780/1928>. (accessed 06 January 2022).

Kosmidou. K., & Pasiouras. F. (2004), Linking profits to assets liability management of domestic and foreign banks in the UK. *Applied financial economics*, 14(18), pp.1319-1324, DOI:10.1080/0960310042000293146.

Lartey. V.C., Antiwi. S., & Boadi. E.K. (2013), The relationship between liquidity & profitability listed bank in Ghana, *International Journal of business and social science*, 4(3), pp. 48-56. Available at:http://ijbssnet.com/journals/Vol_4_No_3_March_2013/5.pdf. (accessed 08 January 2022).

Muthuva. D.M. (2009), Capital Adequacy, cost-income ratio and the performance of commercial banks, *International Journal of Applied Economics & Finance*, 3(2), pp. 35-47, DOI: 10.3923/ijaef.2009.35.47.

Nguyen. T., & Nghiem. S.H. (2015), The effects of competition on efficiency in the Vietnamese banking industry, *The Singapore economic review*, 65(3), pp. 1-30, DOI: 10.1142/S0217590817500114.

Pennathur. A.K., Subrahmanyam. V., & Vishwasrao. S. (2012), Income diversification and risk. an empirical examination of Indian banks, *Journal of banking & finance*, 36(8), pp. 2203-2215, DOI: 10.1016/j.jbankfinan.2012.03.021.

Samad. A. (2015), Determinants bank profitability, evidence from Bangladesh commercial banks, *International Journal of financial research*, 6(3), pp.173-179, DOI: 10.5430/ijfr. v6n3p173.

Sounders. A., Cornett. M. (2008), *A risk management approach*, Financial institutions management, 6th edition.

Sporta. F.O., Ngugi. P.K., Ngumi. P.M., & Nanjala. C.S. (2017), The effect of operational efficiency as a financial distress factor on financial performance on commercial banks in Kenya, *International Journal of Business & Management*, 5(7), Available at:<http://www.internationaljournalcorner.com/index.php/theijbm/artcle/view/124264/85340>. (accessed 10 January 2022).

Tektas. A., G Gunay. E.N., & Gunay. G. (2005), Assets liability management on financial crisis, *The journal of risk finance*, 6(2), pp. 135-149, DOI: 10.1108/1526594051085806.

Tregenna. F. (2009), The structure and profitability of US banking sector in the pre-crisis period, *Cambridge Journal of economic*, 33(10), pp. 609-630, DOI:10.1093/cje. bep025.

Ramlall. I. (2009), Bank specific, Industry-specific and macroeconomics determinants of profitability in the Taiwanese banking sector, *International journal of finance and economics*, (34), pp.160-7, DOI:10.12691/ijbrm-1-1-3.

Vossen B. (2010), *A Study on bank liquidity management*, State University of New York, University of Albany, Available at:http://scholarsarchive.library.albany.edu/honorscollege_business/39.