AN EXPLORATORY FACTOR ANALYSIS ON VARIABLES AFFECTING THE PROFITABILITY OF SRI LANKAN LOCAL COMMERCIAL BANKS

D. S. P. Nishantha De Silva[1i],
Karuthan Chinna[2],
S. M. Ferdous Azam[1]
[1]Management & Science University,
Malaysia
[2]Taylor's University,
Malaysia

Abstract:
The main purpose of this study is to investigate the relationship between bank-specific factors and the profitability of local commercial banks in Sri Lanka. Thus, finding the main internal and external characteristics for achieving higher profitability. In this research, Exploratory Factor Analysis (EFA) is used as an alternative approach to examine the relationships between bank-specific characteristics of bank's profitability for a sample of 11 major Sri Lankan local banks during the 12 years period from 2006 to 2017. The findings reveal that assets base and size of branch network are the main determinants of banks' profitability, by showing a significant relationship with all measures of profitability. Net profits of banks show a significant relationship with size of branch networks and total assets, but insignificant with deposit interest ratio. However, loan interest ratio and deposit interest ratio together have a significant effect on net interest margin thus leading an impact on banks' profitability.

Keywords: profit after tax (PAT), bank branch network, total assets, average weighted deposit rate, average weighted lending rate, net interest margin (NIM), exploratory factor analysis, Sri Lankan Local commercial banks

1. Introduction

Banks act as financial intermediaries between money-savers and the money-borrowers helping to transfer funds from one to another, the first to earn interest and the latter to pay interest. Hence, banks represent one of the most vital groups in the financial market. Accordingly, the banking sector fulfils a crucial economic lifeline to grow and

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[i] Correspondence: email desilva.nishantha9@gmail.com, nishantha_desilva@combank.net

sustain GDP (Gross Domestic Production) of a country. As per a recent study carried-out by Faisal Afzal Siddiqui (2017), under the title of 'Uncovering Key Performance Indicators for Private Sector Banks in Pakistan: An Application of Exploratory Factor Analysis'; disclosed that efficiency of banking system leads to efficient allocation of scarce resources by the financial system of a country. Accordingly, Bank's efficiency is ascertained through different mechanisms. Under that study, asset size of total of 25 Pakistani commercial banks (including 5 State Banks) were analyzed for the five years period from 2011 to 2015. Statistical technique of Exploratory Factor Analysis (EFA) had been applied on 28 different financial ratios to uncover four categories of possible KPIs namely, Interest Coverage, Assets Coverage, Deposits Efficiency and Loan Efficiency. Accordingly, current study is an extended attempt to verify variables affecting the Profitability of Sri Lankan Local Commercial Banks based on different variables such as Average weighted deposit rate, Average weighted lending rate, Net interest margin, Size of branch network and Total assets of the bank.

2. Literature Review

Several studies have attempted to examine the effect of bank characteristics on its profitability in many countries of the world. Following the early work edited by Short (1979) and Bourke (1989), an extensive number of recent studies have examined the major determinants of banks' performance and profitability in many countries of the world. Some researches undertaken are based on profitability analysis of a panel of countries and majority of studies are focused on the banking Industry in a single country performance as quoted by Ben Naceur and Goaeid (2001), Athanasoglou et al., (2008), Garcia-Herrero et al., (2009). In addition, previous studies have classified the depth of variables ranging from mere 02 variables up to 15-20 variables. The study of banks profitability variables is important for directors, financiers and government, as they can evaluate the bank's effectiveness and maintain the government plan, depositors' choices and banks mangers strategies to achieve the planned goals (E. Mamatzakis and Remoundos, 2003). According to Ayanda et al. (2013) the term profitability refers to the ability of the business organization to maintain its profit year after year. Profitability of a bank according to Podder (2012) is the efficiency of a bank at generating earnings. Profitability apart from ensuring the sustainability of the companies, it has also wider implications of the economy as a whole.

Akroush (2015) conducted a comparative study on the structure-profit relationship of commercial banks in Korea and the USA to assess the profitability of the sample banks based on ROA and ROE. In that study, those two variables were used as dependent variables. They also used seven independent variables namely: shareholders' equity to total assets, liquid assets to assets, total loans to total deposits, fixed assets to total assets, total borrowed funds to total assets, reserves for loans to total assets and a reciprocal value of total assets. He concluded that the banks in Korea lag far behind the USA banks in terms of efficiency and profitability. As per a study

carried-out by Kawshala & Panditharathna (2017) on Sri Lankan banking industry, (covering 12 Sri Lankan local commercial banks) over the period 2011-2015; many variables have been identified as independent to arrive Profitability of banks. Those bank specific independent variables were bank size, capital ratio, deposits ratio, liquidity ratio and overhead expense management. These were considered internal determinants of bank profitability. Macroeconomic factors such as inflation, GDP and Market Capitalization etc. were also considered as vital for profitability as external factors. Accordingly, many researchers in different countries have investigated determinants of bank profitability in different ways. Because, they have found that different factors have affected bank profitability at different impact levels. Finally, it is observed that researchers do not have a standard model or variables to measure determinants of bank profitability. Hongxing et al (2018) found that banks in Pakistan disburse majority of loans into capital investment purposes and tend to be more secure and lower non-performing loans which lead them to higher profitability. In the same study it was found that higher cost to income ratio indicates inefficiency of banks because of poor input utilization which lead to reduction in profit.

3. Research Methodology

The statistical technique used for the analysis can be termed as Exploratory Factor Analysis (EFA) or descriptive factor analysis which assumes that any indicator or variable may be associated with any factor. Factor analysis is a technique that is used to reduce a large number of variables into fewer numbers of factors. This technique extracts maximum common variance from all variables and puts them into a common score. As an index of all variables, we can use this score for further analysis. Hence, Factor analysis is also a part of general linear model (GLM) and this method also assumes several assumptions: there is linear relationship, there is no multicollinearity, it includes relevant variables into analysis, and there is true correlation between variables and factors.

4. Data Collection and Sample Selection

The population data of this research includes all listed and non-listed (government owned) local commercial banks in the Sri Lankan banking industry, including both private and government banks. As per CBSL report published for 2018, the total number of such banks operating in the Sri Lankan market was 11. The collected data in this research are collected from secondary sources, and the main source of the research data is the banks' website where the banks disclose the audited annual reports for their stakeholders. Using a convenience sampling technique, a selected sample of 11 working banks registered with CBSL during the period of 2006 to 2017 were selected for data collection of this study. Twelve years data records amounting to 792 data relating to five independent and one dependent variable were taken into consideration.

5. Dependent and Independent Variables

5.1. Dependent Variables
Although there are various measures for profitability among previous banking studies are available such as return on assets, return on equity; keeping in line with research model, 'Profit after Tax' was identified as sole dependent variable of this study as which is the KPI all stake holders are interested in.

5.2. Independent Variables
Based on the literature review on which the previous studies on banks' profitability, there are several bank-specific variables that help in determining the profitability and performance of banks. However, the following five independent variables were based to the current study.

5.2.1. Average Weighted Deposit Interest Rate (AWDR)
Generally, deposits are considered as the crucial source of funding for banks. As discussed in many studies, one of the major impacts to the profitability is caused by low cost CASA (Current and Savings) deposits. This has been discussed in many prior studies such as El-Ansary et al., (2016); Saeed (2014).

5.2.2. Average Weighted Lending Interest Rate (AWLR)
The average loan interest rate is used to examine the efficiency of the banks' asset portfolio management. With reference to various previous literatures, loan interest rate is commonly measured by weighted average loan interest rates of bank's loan product portfolio (Menicucci et al., 2016; El-Ansary et al., 2016; Saeed, 2014; Tariq et al., 2014; Ben Naceur, 2013).

5.2.3 Net Interest Margin (NIM)
An important measure of bank profitability is the net interest margin (NIM). It is expressed by the difference between the interest income generated by banks and the amount of interest the bank must pay to its depositors and creditors from whom it has borrowed funds, divided by the average amount of their interest-earning assets. The NIM is used in various studies of bank performance since it quantifies the profitability of the bank's interest-earning business as explained by Menicucci et al., 2016, Garcia et al., 2016, and Ben Naceur and Goaied, 2001.

5.2.4. Size of Branch Network (SIZBRAN)
The majority of the previous studies used size of branch network as a key indicator of bank performance, such as Kohlscheen et al., (2018); Kawshala and Panditharathna (2017); Menicucci et al., (2016); Yakubu (2016); Pradhan and Shrestha (2016); Flamini et el., (2015); Aladwan (2015); Saeed (2014); and Ally (2014).

5.2.5. Total Assets (ASEETS)

Total assets of a bank can be considered the main determinant of profitability especially loan portfolio of the bank which generates interest income as per Trujillo-Ponce (2007). Total assets are mainly consisted with interest earning loans and advances portfolio which is generally over 90% of total assets and a nominal share of assets are represented by fixed assets such as lands and buildings which mostly generate a nominal rental income.

6. Research Model

A linear regression model can be used to test the relationship between banks' Net Profit and bank-specific variables of profitability such as Average Weighted Deposit Interest Rate, Average Weighted Lending Interest Rate, Size of Branch Network and Total Assets. Accordingly, most of the previous studies on banks' profitability, such as Short (1979), Bourke (1989), Molyneux and Thorton (1992), Demirguc-Kunt and Huizinga (1999), Athanasoglou et al., (2006), Garcia-Herrero et al., (2009), and Goddard et al., (2004a) used linear models to assess the impact of different factors that may be significant in explaining profitability. To examine the profit determinants of Sri Lankan local commercial banks, a linear regression model can be formulated to build a Research Framework as depicted under Figure 1 as follows;

Figure 1: Research Framework
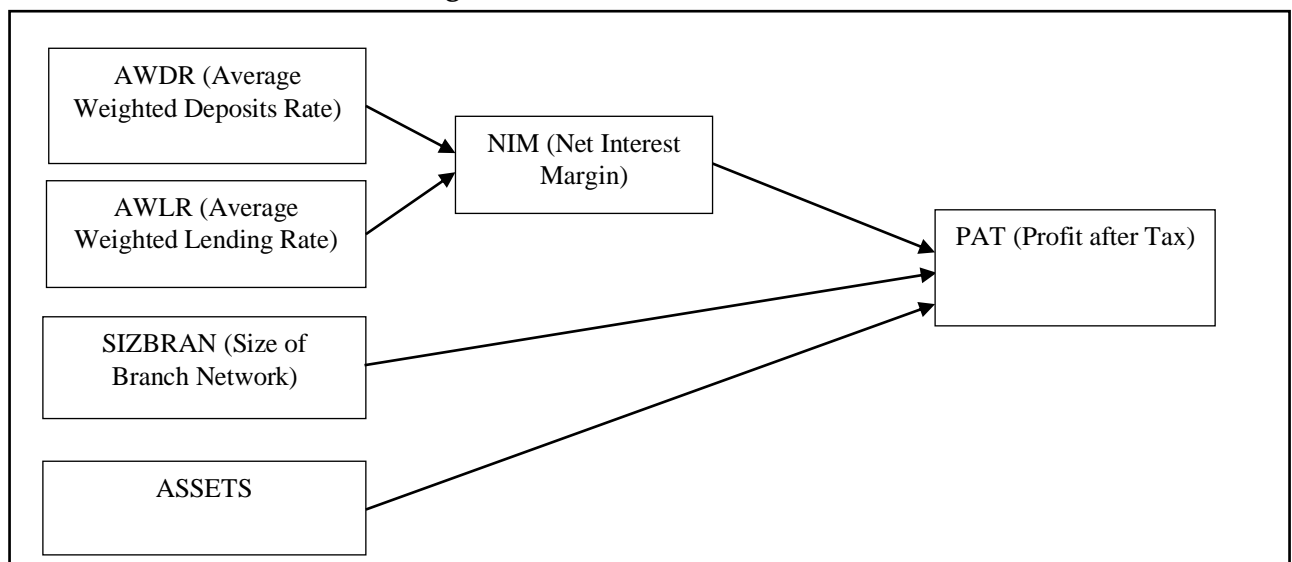
The main objective of the study was to determine the impact of AWDR, AWLR, NIM, SIZBRAN and ASSETS over the PAT. According to the variables depicted in Figure 1, the following research questions were formulated;

1) What are the most impactful variables on Profitability of Sri Lankan local commercial banks?
2) What are the least impactful variables on Profitability of Sri Lankan local commercial banks?

3) What is the nature of interdependencies between observed variables?

7. Findings and Analysis

This section emphasizes the SPSS output of variables based on actual data of 11 banks from 2006 to 2017 modelled on the above research framework. In addition, it deals with presenting the results of summary statistics of each variable in the research, showing the effect of bank specific variables on banks' profitability. Descriptive analysis had been performed as the preliminary step of the research findings.

7.1 Descriptive Analysis
Table 1 shows the summary statistics for 12 years covering correlations of the variables used in the research model. The rule of thumb is high correlations are better in factor analysis.

Table 1: Correlations Matrix

		Av.W.Deposits%	Av.W.Lending%	Net.Int.Margin%	Size of Branch Network	Total Asset
Correlation Sig. (1-tailed)	Av.W.Deposits%	1.000				
	Av.W.Lending%	.585	1.000			
	Net.Int.Margin%	.249	.561	1.000		
	No of Branches	-.193	-.771	-.746	1.000	
	Assets Value	-.206	-.640	-.868	.932	1.000

In the above Correlation matrix, the variables are standardized, which means that each variable has a variance of 1, and the total variance is equal to the number of variables used in the analysis. Under this study when commanding SPSS output, 'Profit after Tax' was selected as the selection variable and data screening was done with the rule of thumb as to identify that correlations to be at least 0.30 or above. Accordingly, two correlations were identified as results above 0.30; AWDR to AWLR as 0.585 and AWLR to NIM as 0.561. Correlations of all other variables were below 0.30 and in sometimes negative or totally unrelated. Hence, descriptive statistics has given a primary indication that AWDR, AWLR and NIM are the most correlated variables over PAT (Profit after Tax) of Sri Lankan banks.

7.2 Factor Analysis
The Exploratory Factor Analysis (FEA) is used in this study to perform data reduction procedure by combining all five independent variables on the dependent variable of profit after tax. Before proceeding to data interpretation, factor loading is to be verified. Factor loading is basically the correlation coefficient for the variable and factor. Factor loading shows the variance explained by the variable on that particular factor. As a rule of thumb, 0.6 or higher factor loading represents that the factor extracts sufficient variance from that variable. Accordingly, data screening was proceeded with two tests namely sampling adequacy through KMO Test and Bartlett's Test of Sphericity. KMO

measure varies between 0 and 1, and values closer to 1 are better as depicted under Table 2 below;

Table 2: Normality and Adequacy of Research Data

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.613
Bartlett's Test of Sphericity	Approx. Chi-Square	48.132
	df	10
	Sig.	0.000

Table 2 depicts the value of KMO as 0.613 which is considered adequate. Bartlett's Test of Sphercity test indicates that the correlation matrix is an identity matrix in which all of the diagonal elements are 1 and all off-diagonal elements are 0. Under current study, Bartlett's Test's Chi-Square of 48.132 at df=10 is confirmed at significance level of 0.000 can be considered positive that final factor analysis will yield useful information.

7.3 Communalities

A communality is the extent to which an item correlates with all other items. The higher the communalities are, the better is the correlation. Communalities indicate the common variance shared by factors with given variables. Higher communality indicated that larger amount of the variance in the variable has been extracted by the factor solution. For better measurement of factor analysis, communalities should be 0.4 or greater.

Table 3: Communalities

Communalities	Initial	Extraction
Av.W. Deposits%	1.000	.943
Av.W. Lending%	1.000	.845
Net.Int. Margin%	1.000	.804
Size of Branch Network	1.000	.922
Assets Value	1.000	.954
Note: Extraction Method: Principal Component Analysis		

Communalities in the table 3 indicate that all extraction values vary between 0.804 to 0.954 which are well above acceptable value of 0.4 or greater. Hence, communalities of the current study are well acceptable to proceed final results of factor analysis. Communality value 0.943 under factor 1 represent that AWDR denotes 94.3% (0.943 x 100) out of 05 variables and AWLR value denotes 84.5% out of 05 variables.

Extraction values of factor analysis indicate that the proportion of each variable's variance that can be explained by the retained factors. Variables with high values are well represented in the common factor space, while variables with low values are not well represented. They are the reproduced variances from the factors that have been extracted under Table 4 below;

Table 4: Extraction Values

		Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings	
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.421	68.427	68.427	3.421	68.427	68.427	3.015	60.294	60.294
2	1.047	20.935	89.362	1.047	20.935	89.362	1.453	29.068	89.362
3	.376	7.524	96.886						
4	.137	2.737	99.623						
5	.019	.377	100.000						
Extraction Method: Principal Component Analysis.									

Total Variance Explained

Accordingly, Table 4 indicates extraction values and next step is to interpret Eigenvalues through the scree plot as explained under figure 2 below. Rule of thumb is 'if eigenvalue of a selected component falls below 1 which component is not important'.

7.4 Eigenvalues and the Scree Plot

Eigenvalues, also called characteristic roots are the variances of the factors. Eigenvalues under figure 2 shows variance explained by that particular factor out of the total variance. From the commonality column under Table 3 above, it is indicated how much variance is explained by the first factor out of the total variance. For example, the first factor AWDR explains 68.4% variance out of the total; this means that 31.6% variance will be explained by all the other factors.
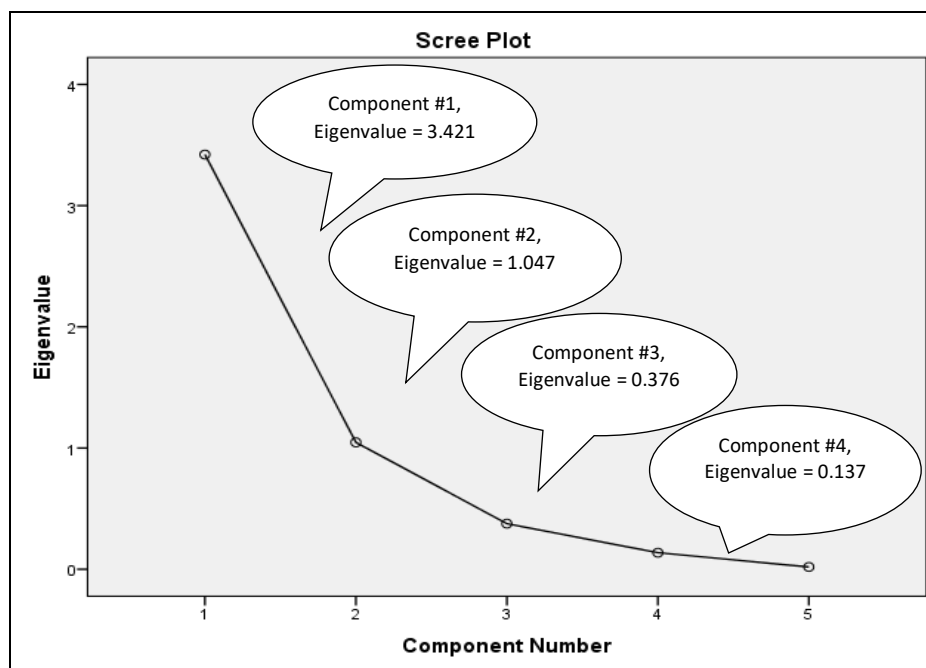

Figure 2: Scree Plot

The scree plot graphs the eigenvalue against the factor number. These values are in the first two columns of the table 4 above. From the third component (factor), the line is almost flat, meaning each successive factor is accounting for smaller and smaller amounts of the total variance.

Table 5: Component Matrix

Component Matrix[a]	Component	
	1	**2**
Av.W.Deposits%	.449	.861
Av.W.Lending%	.853	.344
Net.Int.Margin%	.866	-.232
Size of Branch Net.	-.933	.225
Assets Value	-.933	.288

Note: Extraction Method: Principal Component Analysis.
a. 2 components extracted.

Finally, component matrix in the table 5 confirms Size of Branch network and Assets are the most impactful variables to profitability among Sri Lankan commercial banks, followed by NIM (as the output variable of AWDR and AWLR).

8. Summary and Conclusion

In pursuant to the results of exploratory factor analysis above, the impact of bank-specific variables of Sri Lankan local commercial banks against profitability covering 05 variables such as size of branch network, total assets, average loan interest ratio, average deposit interest ratio and net interest margin were statistically performed. It was proved that except average deposits ratio, all other variables can be identified as major determinants of banks' profitability in Sri Lanka during the period of 2006 to 2017. Accordingly, results of factor analysis have signified that three major determinants; size of branch network, total assets and net interest margin have greatly impacted on bank profitability of Sri Lankan local commercial banks.

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