

Impact of Loan Portfolio Diversification on Performance of Licensed Commercial Banks in Sri Lanka

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Abstract

Introduction: The empirical studies provide mixed evidence on the relationship between loan portfolio diversification and loan portfolio concentration with the bank performance. This research study is one of the research that has been carried out in the Sri Lankan context with the objective of, determine the impact of loan portfolio diversification on performance of licensed commercial banks in Sri Lanka.

Design/ Methodology/ Approach: Nonprobability sampling technique is used to select 10 banks out of 26 licensed commercial banks in Sri Lanka for the period of 2010 to 2019. Data were analyzed by using correlation and fixed effect panel regression model. The independent variables of product wise diversification and sector wise diversification calculated from the measurement of Hirschman Herfindahl Index. Return on asset has taken to measure the bank performance and Interest Rate Spread, Capital Adequacy, Liquidity and Bank Size are used as control variables for identifying the model.

Findings: There is a significant negative impact on product wise loan diversification on bank performance and significant positive impact on sector wise loan diversification on bank performance. Further, control variables of interest rate spread, and bank size have a significant negative relationship with bank performance while Capital Adequacy has a significant positive relationship with bank performances.

Conclusion: According to the product wise loan diversification bank can earn more profit from concentration strategy while under the sector wise loan diversification bank performance can be improved by following diversify strategy.

Key Words: *Bank Performance, Hirschman Herfindahl Index, Loan Portfolio Diversification, Loan Portfolio Concentration*

Cite this paper as:

Rathnamalala, R.I.B.A.M.I. and Perera, L.A.S. (2021). Impact of Loan Portfolio Diversification on Performance of Licensed Commercial Banks in Sri Lanka. *9th Students' Research Symposium, Department of Finance, University of Kelaniya, Sri Lanka*. 1. 178-200

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1. Introduction

Banks play an important role by mobilizing savings, reducing cost of financial transaction, and diminishing credit risk in the economy. There are two portfolio Diversification strategies in the real world, and they are Loan Portfolio Diversification (LPD) and Loan Portfolio Concentration (LPC). Loan Portfolio Diversification (LPD) aims to provide loans into different sections while Loan Portfolio Concentration (LPC) focus to provide specialized areas.

This study identifies the LPD in Sri Lankan banking industry. In other words, how banks manage their lending to obtain more profit. This study diversifies loans under both product and sector wise diversification. Return on Asset take as the performance measurement which is more effective and accurate to catchup the profits and evaluate interest rate spread those previous studies rarely used. Finally, to contribute to the policy makers and managers how diversification is used in making portfolio decisions.

1.1. Research Problem

LPD decisions impact to the bank performance through the changes of interest rates and credit risk. Performance is affected by loan portfolio decisions in different ways as higher the accumulation of unpaid loans and the lower the performance. Therefore, every commercial bank in Sri Lanka aims to reduce credit risk. A key issue to ensure advancement must be how to make sure banks successfully balance their LPD and to be stable and still supply the economy with adequate performance. Based on the available literature straight forward assessment of the impact

of LPD on performance of licensed commercial banks cannot be made. And also, there are few researches available relating to this area and those studies also provide different argument within their scope.

1.2. Research Question & Objectives

1.2.1. Research Question

- Does LPD affect performance of licensed commercial banks in Sri Lanka?

1.2.2. Objectives

- Assess the impact of Loan Portfolio Diversification on performance of Licensed Commercial Banks in Sri Lanka under the Product wise loan diversification.
- Assess the impact of Loan Portfolio Diversification on performance of Licensed Commercial Banks in Sri Lanka under the Sector wise loan diversification.

2. Literature Review

Loan Portfolio Diversification is a mechanism used by commercial banks to mitigate credit risk. Some banks diversify their loans portfolio while some other banks tend to concentration their loan portfolios. This is treated as a major strategy of loan portfolio management which captures the risk of the interrelationship of individual loans as a portfolio. The key principle in banking business is to diversify risk exposures as defined by the Basel Committee on Bank Supervision, 1991. Portfolio theory called traditional banking theory states diversified banks can reduce

risk by minimizing the cost of monitoring. Monitoring cost can be reduced by mitigating the agency problem between bank owners and bank creditors. According to Portfolio theory LPD increases bank performance by reducing credit risk through improving monitoring incentives (Kumanayake et al., 2019). (Winton, 1999; Tabak et al., 2011) explain banks that are not diversified properly may be more susceptible to the economic volatility of the sectors in which they concentrate their activities than banks that are well diversified.

LPC focus only on a few selected sectors which bank can enjoy a competitive advantage (Kurincheedaran, 2015). This is supported by Corporate Finance theory. As per most of the research results they highlighted that concentration helps to mitigate agency problem and reduction of firm value. And also (Kurincheedaran, 2015) mention increasing LPD lead towards allocating resources to inefficient divisions. Therefore, this becomes poor investment decisions that affect firm value negatively. The findings of (Atahau & Cronje, 2019) show that concentration increase bank returns and the positive effect of concentration on return tends to be more significant for domestic owned banks. Banks, by being specialized in a few sectors, develop the ability to better screen their borrowers, which reduces the problem of adverse selection and allows for a better assessment of collateral value.

Performance can be defined as the way in which a bank utilizes resources to achieve the objectives. There is a strong relationship between bank performance and credit risk of a bank (Githaiga, 2013). Better bank performance can be expected from mitigating credit risk. Banks need to get possible steps to mitigate credit risk to safeguard the assets of the bank and protect the investor's interest. Bank performance can be measured through bank specific

factors and macroeconomic factors. Bank specific factors refer to individual bank characteristics which affect the bank performance. Those factors affect to the internal management decisions. Macroeconomic factors are the variables which are beyond the control of the bank, however, affect to the profitability (Kumanayake et al., 2019).

3. Methodology

3.1 Research Design

3.1.1 Dependent Variable

LPD measured by using the Hirschman Herfindahl Index (HHI) which was used by (Shim, 2018). HHI is calculated as the sum of squares of exposures as a fraction of total exposures of product diversification and sector diversification. According to the product diversification Overdraft, Term loan, Pawning, Trading, Leasing, and other loans have been taken to calculate HHI. Under the sector wise diversification Agriculture, Manufacture, Construction, Trading, Infrastructure, and other loans have been carried out to calculate HHI.

$$\text{HHI Product} = \left(\left(\frac{\text{OVR}}{\text{TOL}} \right)^2 + \left(\frac{\text{TER}}{\text{TOL}} \right)^2 + \left(\frac{\text{PAW}}{\text{TOL}} \right)^2 + \left(\frac{\text{TRA}}{\text{TOL}} \right)^2 + \left(\frac{\text{LEA}}{\text{TOL}} \right)^2 + \left(\frac{\text{OTH}}{\text{TOL}} \right)^2 \right) \quad (1)$$

$$\text{HHI Sector} = \left(\left(\frac{\text{AGR}}{\text{TOL}} \right)^2 + \left(\frac{\text{MAN}}{\text{TOL}} \right)^2 + \left(\frac{\text{CON}}{\text{TOL}} \right)^2 + \left(\frac{\text{TRA}}{\text{TOL}} \right)^2 + \left(\frac{\text{INF}}{\text{TOL}} \right)^2 + \left(\frac{\text{OTH}}{\text{TOL}} \right)^2 \right) \quad (2)$$

Where TOL denotes total loans of each bank. The loan portfolio diversification is then calculated by one minus Loan HHI. According to (Stiroh, 2002) HHI diversification value of 1 indicates absolute concentration where only one loan is granted while value 0 represents a perfectly diversified portfolio.

3.1.2 Dependent Variable

This study measures the performance of the bank by using return on asset (ROA). Authors (Chen et al., 2013) have used ROA to measure firm performance by taking the ratio of net income to total assets. Hence, researcher measured the ROA by dividing net income from total asset.

3.1.3 Control Variables

Interest Rate Spread: IRS identified as the differences between Lending Rate and Deposit Rate. Hence, study gets the IRS from the difference between average weighted lending rate and average weighted deposit rate.

Capital adequacy: The relationship between bank capitalization and bank credit risk could either be positive or negative. Therefore, to measure the capital adequacy researcher used the ratio of total equity to total assets.

Liquidity: In this study the ratio of net loans to total assets is used to measure the liquidity of the banks performance which (Francis, 2013) also used in the previous study.

Bank Size: BSIZE is another determinant of performance which is measured from the logarithm of total assets.

3.2. Conceptual Framework

Independent Variables

Dependent Variable

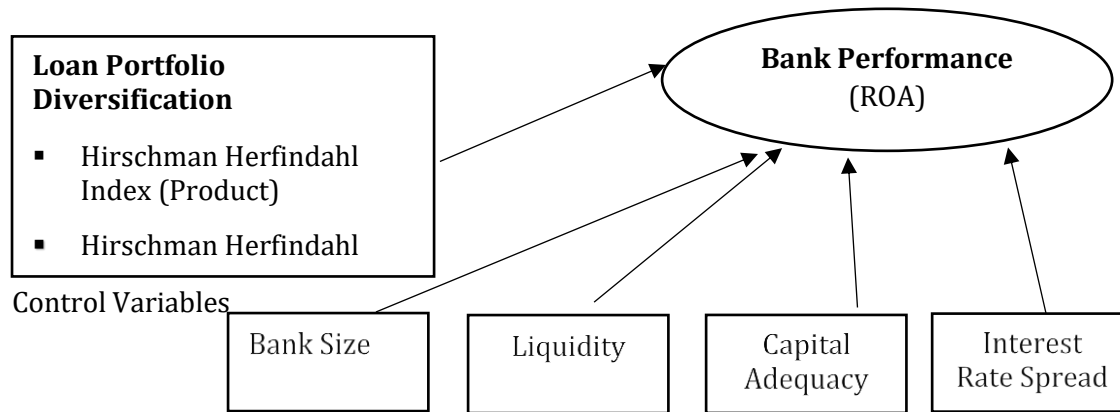


Figure: 3.1 Conceptual Framework

Source: Author Compiled

This study focuses on all the licensed commercial banks in Sri Lanka from 2010 to 2019. The researcher has used non probabilistic sampling technique for selecting the sample. Hence, ten systemically important banks are selected as the sample out of 26 licensed commercial banks. This study uses the data available in the annual reports of the selected banks and other secondary data are collected from the CSE website and the Central Bank of Sri Lanka (CBSL) website.

3.3 Data Analysis

The study used quantitative method to determine the impact from the data obtained. Data analyzed using multiple linear regression technique which specified in equations 3 and study follows the HHI to measure the extent of LPD which most of the past studies used.

$$ROA = \alpha + \beta_1 HHIPRODUCT + \beta_2 HHISECTOR + \beta_3 IRS + \beta_4 CAP + \beta_5 LIQUIDITY + \beta_6 BSIZE + \varepsilon \quad (3)$$

Where, ROA is Bank performance, HHIPRODUCT is Product wise diversification, HHISECTOR is Sector wise diversification. IRS is Spread of interest landings and Deposits, CAP is Total Equity to Total Asset, LIQUIDITY is Total Loans to Total Assets and BSIZE is Logarithm of Total Asset.

Based on all the evidence of empirical studies, this study aims to test the following hypothesis for the study.

H1 - There is a significant impact of Product LPD on commercial banks performance.

H2 - There is a significant impact of Sector LPD on commercial banks performance.

H3 - There is a significant impact of IRS on commercial banks performance.

H4 - There is a significant impact of CAP on commercial banks performance.

H5 - There is a significant impact of Liquidity on commercial banks performance.

H6 - There is a significant impact of BSIZE on commercial banks performance.

4. Findings and Discussion

4.1 Descriptive statistics

Table 4.1: Descriptive Statistics

Description	ROA	HHI	HHI	IRS	CAP	Liquidity	BSIZE
		Product	Sector				
Mean	1.29	0.64	0.67	5.78	14.83	65.71	26.66
Median	1.27	0.68	0.71	5.65	14.51	67.47	26.67
Maximum	2.27	0.79	0.80	8.57	26.90	87.65	28.51
Minimum	0.18	0.06	0.38	4.80	10.90	20.20	24.16
Std. Dev.	0.41	0.13	0.10	1.04	2.51	10.14	0.99
Skewness	0.32	-1.50	-0.98	1.78	1.66	-1.75	-0.23
Kurtosis	3.68	6.09	3.13	5.56	7.92	9.08	2.30
Observations	100	100	100	100	100	100	100

Source – Author Compiled

Descriptive statistics have included measure of central tendency, dispersion, and normality. Skewness measures the “degree of asymmetry” of the data series. According to the results of this study HHI Product, HHI Sector, Liquidity and BSIZE are negatively skewed while ROA, IRS and Capital Adequacy are positively skewed. Kurtosis

measures the “degree of sharpness” or in other words, measures the Preakness or flatness of the distribution of the data series. According to the results of this study ROA, HHI Product, HHI Sector, IRS, CAP and Liquidity have Leptokurtic while BSIZE has a Platykurtic distribution since that variable Kurtosis value is less than 03.

4.2. Test for Normality

Normality should prove from the data set to rely on the model output. In this study the researcher has used Jarque-Bera statistic to identify the overall normality in the model. The hypothesis of the test is as follows.

H_0 : Data normally distributed

H_1 : Data not normally distributed

Rule of Thumb: Reject null hypothesis when $p < 0.05$

The probability value of this study 31% is above the 5% significant level which leads to the acceptance of the null hypothesis. That indicate data normally distributed in the analysis.

4.3 Test for Unit Root

For testing the Unit Root of the variables can develop hypothesis as below.

H_0 : Variable is not stationery (Unit root)

H_1 : Variable is stationery (No unit root)

Rule of Thumb: Reject null hypothesis when $p < 0.05$

Table 4.2: Unit Root Tests

Variable	P value	t-statistics
ROA	0.0008	-3.1543
HHI Product	0.0000	-0.7335
HHI Sector	0.0000	-8.2328
IRS	0.0000	-18.5557
CAP	0.0000	-3.9694
Liquidity	0.0000	-9.4550
BSIZE	0.0000	-4.5588

Source – Author Compiled

According to the results of LLC test, all the variables are significant at 5% level. Therefore, null hypothesis can be rejected, and it will emphasize that there is no unit root in the whole data set. All variables are stationary.

4.4 Correlation Analysis

The correlation matrix for the variables in this analysis is provided in the below table thus each of the variable coefficient was carried out with the intention of defining essential relations between the variables under consideration in terms of distribution.

Table 4.3: Correlation Analysis

	ROA	HHI Product	HHI Sector	IRS	CAP	Liquidity	BSIZE
ROA	1	-0.2172	0.1321	0.1361	0.4516	-0.1347	-0.1823
HHI Product	-0.2172	1	-0.2760	-0.2710	-0.2910	0.4398	-0.0026
HHI Sector	0.1321	-0.2760	1	-0.0473	-0.0457	0.0513	0.1480
IRS	0.1361	-0.2710	-0.0473	1	0.0453	-0.3893	-0.3601
CAP	0.4516	-0.2910	-0.0457	0.0453	1	-0.1650	-0.2534
Liquidity	-0.1347	0.4398	0.0513	-0.3893	-0.1650	1	-0.1006
BSIZE	-0.1823	-0.0026	0.1480	-0.3601	-0.2534	-0.1006	1

Source – Author Compiled

According to the result, all other variables show values between 0 to 0.8 that means there are no strong relationship among variables and there are no strong multicollinearity.

4.5 Interpretation on Final Output

Table 4.4: Hausman Test Output

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f	Prob.
Cross sections Random	67.403551	6	0.0000

Source – Author Compiled

Hausman Test is used to select appropriate model between the Fixed Effect Model and Random Effect Model.

According to the results of the Hausman Test, Chi square probability value of 0.0000 is less than 5% significant level. Therefore, researcher has rejected the null hypothesis and accepted the alternative hypothesis which indicate Fixed Effect Model is the most appropriate for the case of ROA.

Table 4.5: Fixed Effect Model Output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.67217	2.405063	7.347902	0.0000
HHI PRODUCT	-1.007197	0.331013	-3.042768	0.0031
HHI SECTOR	1.731901	0.574128	3.016576	0.0034
IRS	-0.199910	0.041461	-4.82161	0.0000
CAP	0.058508	0.015109	3.872395	0.0002
LIQUIDITY	-0.002327	0.004557	-0.510551	0.6110
BSIZE	-0.617063	0.084162	-7.331845	0.0000
Root MSE	0.243205	R-squared		0.641101
Mean dependent var	1.287711	Adjusted R-squared		0.577011
S.D. dependent var	0.408008	S.E. of regression		0.265358
Akaike info criterion	0.330176	Sum squared resid		5.914869
Schwarz criterion	0.747003	Log likelihood		-0.508811
Hannan-Quinn criter.	0.498874	F-statistic		10.00326
Durbin-Watson stat	1.979771	Prob (F-statistic)		0.000000

Source – Author Compiled

The independent variable HHI Product obtains a -1.007197 coefficient with a P value of 0.0031 that less than 0.05 which indicates it has a significant negative impact on bank performance. The independent variable HHI Sector obtains a probability value of 0.0034 which is less than 0.05 and the coefficient value is 1.731901. Therefore, it indicates it has a significant positive impact on bank performance. The results of the control variable IRS exhibit 0.0000 P value which less than significant level of 5% with the coefficient of -0.199910 that define IRS has a significant negative impact to the commercial bank performance. CAP has a positive statistically significant impact to the ROA since it consists with a 0.058508 of coefficient and 0.0002 of p value which is less than 5% level. Liquidity has a negative statistically insignificant impact on ROA, its coefficient includes -0.002327 and p value of 0.6110 is exceed the 5% critical level. BSIZE variable has a negative significant impact over ROA hence, its coefficient indicates -0.617063 and 0.0000 of p value which is less than 5% confidence level.

The R-squared of this model was 0.641101 which means that the independent variables explained around 64% of the variations in the performance of the licensed commercial banks in Sri Lanka. The Adjusted R² value obtains 0.577011 which indicates, there is 57.70% chance that the model can be enhanced with the addition of new factor. Durbin-Watson value of 1.979771 indicate model is silent from serial correlation. The probability value of F-statistic shows as 0.0000 which is less than 5% critical level. Therefore, it can be concluded as the overall model is significant at 95% confidence level.

4.6 Test for Multicollinearity

If independent variables are highly or perfectly correlated that is called multicollinearity. Hence, examine whether multicollinearity exists in the study or not the researcher used Variance Inflation Factor [$1 / (1 - R \text{ squared})$] and Tolerance ($1/\text{VIF}$). If the VIF is less than 5 or Tolerance is more than 0.2 it indicates no multicollinearity exist among independent variables. According to the collinearity diagnostic, the VIF value of 2.786299 is less than 5. This indicates that the assumption of multicollinearity is fulfilled in this study. Model is silent.

4.7 Residual Analysis

According to the LR test if the P value is higher than 0.05 researcher accept the null hypothesis which explain residuals are homoscedastic. Based on the study LR test P value of 0.1977 is higher than the critical level which define residuals are homoscedastic.

4.8 Hypothesis Testing

Models	Probability	At 5% significance level	Acceptance
H1	0.0031	Significant	Accepted
H2	0.0034	Significant	Accepted
H3	0.0000	Significant	Accepted
H4	0.0002	Significant	Accepted
H5	0.6110	Insignificant	Rejected
H6	0.0000	Significant	Accepted

Source – Author Compiled

Based on the results, all the developed hypothesis (H1, H2, H3, H4, and H6) can be accepted except H5. Because it shows an insignificant impact on bank performance. Therefore, rejected the fifth hypothesis.

Most of the past studies have used HHI for measure the diversification of the banking sector. If the HHI exceeds 0.5 that denotes market is highly concentrated. According to this study descriptive statistics, HHI values of all commercial banks exceeds 0.5. Therefore, it seems all banks are concentrated.

According to fixed effect panel regression model the final equation form can be given as bellow.

$$\text{ROA} = 17.67217 - 1.007197 \text{ HHI Product} + 1.731901 \text{ HHI Sector} - 0.199910 \text{ IRS} + 0.058508 \text{ CAP} - 0.002327 \text{ Liquidity} - 0.617063 \text{ BSIZE} \quad (4)$$

When compared to product wise diversification, there is a negative significant impact on bank performance. If bank increase the loan portfolio that would lead to decrees the bank performance. But when considering the sector wise diversification there is a positive significant impact on bank performance. If banks increase their loan portfolio that would lead to increase the bank performance. As per the IRS there is a significant negative impact on bank performance which indicate that bank can increase the performance by decreasing the IRS. According to the analysis Capital Adequacy of the bank has a positive significant impact on bank performance. Hence, if banks increase their Capital Adequacy that would lead to increase the bank performance. This study used liquidity as a

control variable and that indicate a negative insignificant impact on bank performance. Banks could be at a higher risk of bankruptcy if they increase the loan to asset ratio. Bank size has a negative significant impact on bank performance. The negative economies of scale and higher exposure of risky activities could be the reason for this negative impact. If bank increase the BSIZE that would lead to decrease the bank performance.

5. Conclusion

There are a smaller number of literature available in Sri Lanka relating to the link between loan portfolio diversification and commercial banks performance. Therefore, researcher undertake an empirical investigation to find out the impact of loan portfolio diversification on the performance of licensed commercial banks in Sri Lanka. This study analyzed the diversification and performance impact for 10 licensed commercial banks over the sample period of 2010 to 2019 by using different economic analysis and methodological approaches. In this study ANOVA model is analyzed by using the cross-sectional data series. Descriptive statistics and linear regression model are the statistical techniques conducted in this study. Main objectives of the study are to identify whether LPD impact performance of licensed commercial banks in Sri Lanka under product wise diversification and sector wise diversification. From the finding above, that is achieved, as the overall model is significant at 5% significant level.

A main finding of this study is that the product wise loan diversification, lead to poor performance on licensed commercial banks in Sri Lanka. According to the product wise loan diversification this study agrees with the

Corporate Finance Theory. In Sri Lankan context under sector wise diversification high diversified loan portfolio base lead to increase the performance of licensed commercial banks. According to the sector wise loan diversification this study agrees with the Traditional Banking Theory. The result of control variable IRS show a negative significant impact on the commercial bank performance and the Capital Adequacy show a positive significant impact on the bank performance. Liquidity shows a negative impact on the commercial bank performance with an insignificant impact. That exhibit the impact is not conclusive. Considering the results of the control variable BSIZE, there is a significant negative impact on the commercial bank performance. It means when the bank size is changing, the commercial bank performance also changes. Findings of this study provide a guidance to managers about the LPD and bank performance. When preparing regulatory frameworks for encouraging banks performances policymakers should carefully focus about to specialize or diversify their credit portfolios. Increased knowledge regarding this topic will enable bank managers and regulators to make more informed decisions and as a result contribute to financial stability and sound economic development. According to the results when bank focusing more about the product wise diversification, commercial banks need to limit their loan portfolio diversification into appropriate level to enhance their performance. On the other hand, when banks focusing more on sector wise diversification they should need to be increase the loan portfolio up to a specific level to enhance their performance. Therefore, from a policy point of view, bank loan portfolio should be carefully evaluated.

Further research can be done incorporating other determinants of commercial bank's profitability like return on equity (ROE) and return on capital employed (ROCE) etc. In Sri Lanka there is no any previous research had found conducted when considering all area of loan portfolio diversification such as product wise diversification, sector wise diversification, geographical wise diversification and currency wise diversification. Hence, further, researchers can be focus about all the diversification areas. The study recommends to do further studies in the banking industry by using macroeconomic variables like GDP growth. Finally, study suggest for focusing impact of loan portfolio decision on bank cost efficiencies which has not been addressed in this study.

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