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

M.S.Kumanayake[1*], Y.M.C.Gunarathne[2], Ravindra Deyshappriya[2]

1Department of Management Sciences, Uva Wellassa University, Badulla, Sri Lanka, mskumanayake@gmail.com
2Department of Management Sciences, Uva Wellassa University, Badulla, Sri Lanka, gunaratneymc@gmail.com
3Department of Management Sciences, Uva Wellassa University, Badulla, Sri Lanka, ravindra@uwu.ac.lk

Article Information

Abstract

Credit risk pertaining to commercial bank loans can be considered as one of the main risks which commercial banks face. Thus, commercial banks diversify their loan portfolio to enhance performance mitigating the credit risk. Loan portfolio diversification refers to providing loans into different sectors without concentrating on a particular sector. However, there is no consensus in the literature about the link between loan portfolio diversification and performance of commercial banks. Therefore, this study examines the impact of loan portfolio diversification on the performance of commercial banks in Sri Lanka. Hirschman Herfindahl Index was used to measure the loan portfolio diversification while performance measured by the CAMEL model. The variables such as Interest Rate Spread and Bank size are considered as the control variables. Data were collected from audited annual financial statements of commercial banks between 2008 and 2017. The sample consists of ten licensed commercial banks including six systemically important commercial banks in Sri Lanka out of 25 licensed commercial banks in Sri Lanka. Data were analyzed by using Pearson correlation and fixed effect panel regression model. The results reveal that there is a significant negative impact of loan portfolio diversification on commercial bank performance. Further, control variables-bank size positively links with commercial bank performance while interest rate spread has a positive insignificant impact on bank performance. In conclusion, it is confirmed that commercial banks should reduce their loan portfolio diversification as much as possible to increase performance. Because results revealed that a diversified loan portfolio position leads to the poor performance of commercial banks. The management should follow specific strategies about LPD and improve commercial bank

Introduction

In banking system lending is a significant part that needs to be highly concerned to maximize organizational performance. The loan portfolio is treated as a major asset to the banks. Therefore banks' decision-makers need to properly manage loan portfolios through various strategies such as diversification and concentration. Loan portfolio diversification (LPD) refers to providing loans into different sectors without concentrating on one particular sector. LPD can be based on product, industry, and currency. Product-wise categorization can be identified as a term loan, overdraft, housing loans, credit cards, and leasing. Industry-wise categorization can be shown as agriculture, manufacturing, banking & finance, tourism, and construction. On the other hand currency, wise categorization refers to a loan given by using various currencies. Loan portfolio concentration (LPC) means concern only specialization area when providing loans. Aarflot and Arnegård (2017) state diversification versus concentration important to banks to ensure financial stability. Some believe LPD helps to enhance the performance of banks while others believe LPC helps to enhance the firm performance. Further mix evidence can be seen in between these two extremes.

Corporate Finance Theory supports for the LPC strategy. According to Acharya, Hasan, and Saunders (2006) industrial and sector-wise loan diversification reduce bank return. Chen, Wei, Zhang, and Shi (2013),Behr, Kamp, Memmel, and Pfingsten (2007) and Adzobu, Adzobu, et al. (2017) also agree with this. Hayden, Porath, and Westernhagen (2007) suggest banks should focus to obtain benefits from management expertise and to reduce agency problems. Further Winton (1999a) suggests LPD harm to the loan monitoring effectiveness because of having a lack of knowledge about new markets.

However, some arguments prescribe LPD as a strategy for reducing credit risk as mentioned in the Portfolio Theory. Tah, Tah, Martinez, and Martinez (2016) state diversification is a better way to mitigate bankruptcy. Maina (2013) and Kashian and Tao (2014) found that LPD increases bank return. Hayden et al.

(2007) state banks should be diversified as possible to reduce the risk of bank failure. Theory of Financial Intermediation also highlights diversification makes it cheaper for financial institutions to achieve credibility through better screening of the borrowers.

The diversification of the loan portfolio directly affects bank performance. Raei, Farhangzadeh, Safizadeh, and Raei (2016) state that the U-S global financial crisis in 2008 is partly due to the concentration of bank lending on the real estate sector. Further Raei et al. (2016) state that many previous bank crises have occurred as a result of the concentration of loan portfolios. According to Freitakas (2013) loan portfolio accounts for 70-80% of assets of commercial banks. Therefore bank managers need to take better loan portfolio decisions to gain more profits. This emerges need for managing loan portfolio decisions to enhance bank performance.

Lending exposes the bank to different kinds of risks such as credit risk, market risk, liquidity risk, operational risk. Among these credit risk is one of the most significant risks. Credit risk refers to the default in the payments. Increased defaults require an increase in the amount of loan loss provision and nonperforming loans. Then profitability reduces as a result (Freitakas, 2013). Apătăchioae (2015) also states that risk and performance highly interrelated. Therefore, credit risk should be reduced as possible to increase performance. The essence of LPD versus LPC strategies again arises relating to loan portfolio decisions.

Kurincheedaran (2015) is the only literature article found in Sri Lankan context which relating to the LPD. According to Kurincheedaran (2015) sector, wise loan diversification lead to the poor performance of domestic licensed commercial banks in Sri Lanka. Therefore the purpose of this research is to identify the impact of loan portfolio diversification on the performance of the commercial bank in Sri Lanka. This would be helpful to understand bank performance based on the loan portfolio of a bank.

Literature Review

Asset Management

Lending is a major business activity in the banking sector since it generates the largest revenue to the banks. Therefore loan portfolio is treated as the main source of the asset of a bank (Winton, 1999b). Lending activities should be performed effectively to have a well-managed asset portfolio. There is a greater source of risk associated with a loan portfolio of a bank. It is known as credit risk which is referred to as default the payments. It negatively impacts the asset management of a bank. According to Ávila, Flores, López-Gallo, and Márquez (2013) most of the financial losses due to poor management of the loan portfolio. Thereby banks implement different strategies to reduce loan loss provisions and non-performing loans. Loan diversification and loan concentration are strategies to cope up with credit risk.

Most of the banks try to increase customer deposits through new motivational programs. Banks give rewards, gifts and gift vouchers to customers during special milestones of their lives. Those programs enhance competition between commercial banks. Therefore it helps to enhance loan providing capacity by collecting more funds. It is easy to recover interest payable on deposit to customers by interest income receivable from lending because lending rates are higher than the deposit rates.

Sometimes banks obtain loans from other banks during fund shortage situations. It is called interbank loans. Therefore if a bank has sufficient funds to lend there is no need to grant additional loans from other banks. All these efforts of a bank are to lend as much as they are possible to earn higher profits. Therefore management needs to take correct decisions regarding lending activities. Kurincheedaran (2015) has proven this idea by mentioning as lending is the largest asset that significantly contributes to revenue.

Loan Portfolio Diversification

LPD is a mechanism used by commercial banks to mitigate credit risk. Some banks diversify their loan portfolio while some other banks tend to concentrate 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 the banking business is to diversify risk exposures as defined by the Basel Committee on Bank Supervision, 1991. A portfolio theory called traditional banking theory states diversified banks can reduce risk by minimizing the cost of monitoring. Monitoring costs 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.

Tah et al. (2016) suggest that LPD reduces the likelihood of bankruptcy and increase the financial performance of a firm. According to Maina (2013), LPD helps to enhance the financial performance and it uses as a strategy to catch up with the higher performance level. According to Dionne and David (2005) diversifying the loan, portfolio helps to reduce portfolio risk. Kashian and Tao (2014) state a more concentrated loan portfolio may lower the return simultaneously higher the credit risk. Meanwhile Lefcaditis, Tsamis, and Leventides (2014) state that concentration risk increase bank credit loss because of the probability of default the payments in specialized sectors. Aarflot and Arnegård (2017) also mentioned increased diversification improves performance. Moreover, Freitakas (2013) states Lithuanian banks provision for bad loans has increased due to concentrated loans.

According to Hayden et al. (2007), LPD improves banks performance only under moderate risk levels. Banks should evaluate the riskiness of the decisions when increasing the industrial, sector-wise or geographical LPD. Banks with diversified loan portfolios can pool their internally generated funds and allocate them properly according to the analysis based on the financial sector.

Basel Committee on Banking Supervision (2006) mentioned LPC is the main reason for having large losses on bank portfolio. Ávila et al. (2013) state concentrated loans generate losses in credit portfolio because a single portfolio impact to arise concentration risk even though LPC helps to assess capital adequacy to some extent. Those provide LPD as a better way of reducing the credit risk. Beck and De Jonghe (2013) state loan concentration highly related to systematic risk. Therefore the benefit of LPD gains through the least correlated asset because the goal is to minimize the correlation between assets in the portfolio.

Loan Portfolio Concentration

LPC is concentrating only on a few selected sectors which bank can enjoy a competitive advantage (Kurincheedaran, 2015). This is supported by Corporate Finance theory. Most of the researchers highlighted that concentration helps to mitigate agency problem and reduction of firm value. According to

Kurincheedaran (2015) increasing LPD lead to allocating resources to inefficient divisions. Therefore it becomes poor investment decisions that affect firm value negatively. Banks need to gather sufficient information regarding borrowers to perform lending activities transparently. LPD contradicts this fact because it is critical to collect reliable information about prospective borrowers. Therefore LPC parallels with this fact because it is possible to screen the borrowers. Information theory highlighted the needs of knowledge about customers. Basel Committee on Banking Supervision also introduced a principle call "know your customer". All these facts are supported to LPC.

Corporate Finance theory suggests firm should relate with concentration to enhance profitability and to reduce credit risk. Corporate Financial Theory advises specializing in a specific sector. Specialized banks can obtain a competitive advantage by collecting information on that sector to become more knowledgeable. This would result to reduce the cost of information asymmetry through better screening the credit risk of a specialized sector. According to Acharya et al. (2006) industrial and sector wise LPD affects to reduce the firm return simultaneously increase the firm risk. LPC leads to enhance the performance of a bank. Chen et al. (2013) have selected mining, manufacturing, production, construction, and transport as sector-wise categorization. According to Chen et al. (2013) sector, wise LPD may affect to reduce return and risk simultaneously. However, this is contradicted by the findings for the countries like Italy, German, Brazil, and Argentina (Chen et al., 2013). Moreover, Freitakas (2013) states that LPD adversely affects the yield on assets. Similarly, it does not help to reduce the bank risk.

Bank Performance

Performance can be defined as how a bank utilizes its resources to achieve its 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 that affect bank performance. Those factors affect internal management decisions. Macroeconomic factors are the variables that are beyond the control of the bank, however, affect the profitability.

According to Athanasoglou, Brissimis, and Delis (2008), Market Power theory explains bank-specific factors and Efficient Structure theory discusses macroeconomic factors. Market power theory states that external market forces lead to earning a profit. Moreover, Efficient Structure theory suggests managerial and scale efficiency supported to higher financial performance. It is possible to conclude that both banks specific and macroeconomic factors are influenced by performance. Bank specific factors are capital size, size of deposit liabilities, size, and composition of credit portfolio, interest rate policy and labor productivity. Macroeconomic policy stability, Gross Domestic Product, Inflation, Interest Rate, and Political instability treated as macroeconomic factors.

Most of the financial institutions face financial losses due to unconsciousness on credit risk. Therefore not only commercial banks but also any financial institution needs to check the performance. According to Baral (2007), financial system of the country can be protected through regular check on performance indicators. International monetary authorities such as the World Bank, the international monetary fund highlighted the needs of a healthy financial sector to build the confidence of the private sector. Financial health consists of political stability and sustainable real sector growth (Rostami, 2015). Mere a financial performance does not portrait the whole performance of the financial institution. Therefore it needs to focus on the quality of the asset, liquidity position, capital base, management quality and earnings. All these factors affect the different types of risks such as credit risk, interest rate risk, liquidity risk, insolvency risk, etc.

There are strategies to reduce the risk of significant losses which is called "safety nets". Government and other regulatory bodies introduced different kinds of safety nets to promote financial and economic stability. Those safety nets include minimum capital requirements and other capital restrictions. Therefore performance can increase by reducing the probability of uncertain losses.

Loan Portfolio Diversification Decisions on Bank Performance

According to Raei et al. (2016), LPD is less attractive because it leads to an increase in the competition. Italy German and Brazilian banking sectors provide empirical evidence to prove it. Moreover, Raei et al. (2016) state credit risk can reduce through specialization because banks can concentrate on sectors in which banks are expertise. Laeven and Levine (2007) state diversified financial

institutions have less market value compared to the financial institutions which specialized the financial activities.

According to Kurincheedaran (2015), sector-wise LPD lead to the poor performance of domestic Licensed Commercial Banks in Sri Lanka. Since LPD reduce return and increase risk simultaneously it should enhance the return through LPC. Behr et al. (2007) findings are more parallel with this conclusion. According to Kamp, Pfingsten, Memmel, and Behr (2007) banks which concentrate on special expertise area have a higher return than diversified banks. As well as specialized banks have lower loan loss provisions and lower nonperforming loan rates than diversified banks. Similarly, Tah et al. (2016) mention concentration increase return while reducing default risk.

Fazio, Tabak, and Cajueiro (2003) prescribe that LPC increases the performance and it is advisory to restrict the lending to a few sectors. This fact undermines the LPD (Fazio et al., 2003). Adzobu, Agbloyor, and Aboagye (2017) state that LPD adversely affects profitability and it enhances the credit risk. Further Belguith and Bellouma (2017) show LPD reduces the return of a bank.

LPC could be able to attain more favorable outcomes due to the reasons highlighted by Beck and De Jonghe (2013). Banks have the problem of information asymmetry when providing loans to customers. This is a major vulnerable to adverse selection and moral hazard. Adverse selection can arise when banks are unable to distinguish between solvent and insolvent borrowers. Banks give higher incentives for the less solvent borrowers while discouraging to provide loans to more solvent borrowers. Moral Hazard is the risk of misleading information. Moreover higher loan concentration can be screen and monitor effectively. Therefore LPC enhances performance by mitigating information asymmetry which is the main source of all these problems.

Lending to more sectors raises the information overload because it lowers the bankability to oversee the total loans effectively. Therefore benefits can be obtained through LPC because there is no information overload. Further learning effect also a benefit of lower-level diversification of the portfolio. It is easier to face the upcoming problems as quickly as possible to take immediate reaction because banks become familiar with specialized sectors. This is a better chance for banks to run business activities very smoothly.

LPD leads to increase in the monitoring cost because a bank needs to have experts to govern whole sectors. Therefore limited attention can be a reason to default the payment. Ultimately banks result in accumulated huge losses (Bonti, Kalkbrener, Lotz, & Stahl, 2006). Further, some studies emphasize that LPD has both merits and drawbacks. According to Turkmen and Yigit (2012), geographical LPD produces a negative effect on performance as well as sector-wise LPD cause a mix of evidence for risk and return preferences. It is advisory for banks to concern about compliance with regulatory requirements when providing loans to different industries. Further, if banks provide loans to sectors that have competitive advantage it can mitigate the risk of default the payments. LPD gains less through monitory benefits. When putting overall effect, credit risk can be minimized through lowering the LPD (Beck & De Jonghe, 2013)

Conceptual Framework

The following conceptual framework has been constructed based on "How the loan portfolio diversification impacts on commercial bank performance".
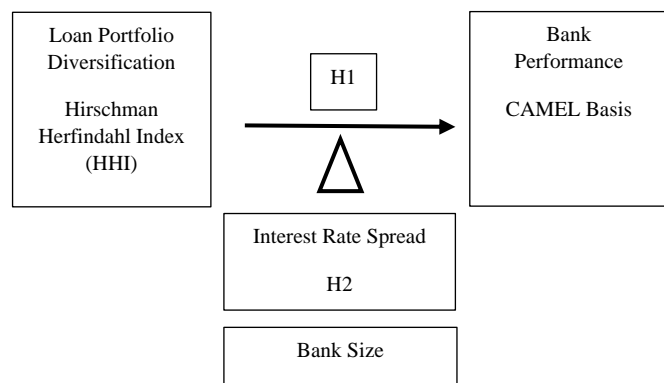

Figure 1: Conceptual Framework

Source: Developed by researcher

Hypothesis Development

The following hypothesis formulated for the study to test the impact of loan portfolio diversification on commercial bank performance.

H_0 - There is no significant impact of loan portfolio diversification on commercial banks performance.

H_1 - There is a significant impact of loan portfolio diversification on commercial banks performance.

H_0 - There is no significant impact of Interest Rate Spread on commercial banks performance.

H_2 - There is a significant impact of Interest Rate Spread on commercial banks performance.

H_0 - There is no significant impact of Bank Size on commercial banks performance.

H_3 - There is a significant impact of Bank Size on commercial banks performance.

Methodology

Population

This study was carried out on commercial banks in Sri Lanka. There are twenty-five (25) licensed commercial banks. In the banking system, there are government banks and private banks based on the ownership structure. Commercial banks in Sri Lanka provide a wide array of financial services including payments and settlement services. So, the considering population in this study was twenty-five licensed commercial banks in Sri Lanka.

Sample

This study focuses on 10 licensed commercial banks including 6 systemically important licensed commercial banks selected out of 25 licensed commercial banks in Sri Lanka. This consists of eight private banks and two state-owned banks. Basel Committee on Banking Supervision has identified factors such as size, complexity, interconnectedness, and expertise to assess systemically important financial institutions.

Data and Data collection method

The researcher gathered information from secondary data. It is data that has already been collected and is readily available for use. The data sources were annual reports of the commercial banks and the central bank of Sri Lanka and referring to the CSE websites. Data collected from annual reports of each commercial bank from 2008 to 2017. However, this data only denotes individual banks position and does not cover subsidiaries or group. The sector classifications are slightly varied between a few banks which were analyzed in detailed and incorporated in the relevant loan products.

Results and Discussion

Descriptive Analysis

Table 1: Descriptive Analysis

	N	Mean	Maximum	Minimum	Std. Deviation
HHI	100	2972.232	5419.961	2032.514	741.5500
IRS	100	3.013600	7.540000	0.150000	2.006117
BSIZE	100	8.347004	9.290436	6.299264	0.597802
CRAR	100	14.96660	40.90000	8.060000	4.218043
NPLR	100	4.889100	33.61000	1.350000	4.636515
OCIR	100	54.95818	95.08595	17.63069	15.45105
ROA	100	1.447600	4.240000	0.100000	0.567470

Source: Author's Calculations based on the annual report data

Table1 indicates the mean, median, maximum, minimum and standard deviation values of the descriptive analysis. The descriptive statistics is based on 10 commercial banks and 10 year data that include 100 observations. The first column of the table shows the mean values for each variable. According to the

results, the highest mean value for dependent variables is shown in OCIR while ROA shows the lowest mean value. It shows 54.95% and 1.44% respectively. In the 10 years' time period other dependent variables such as CRAR, NPLR and LIQR shows mean value 14.96%, 4.88% and 25.05% respectively. During the period all dependent variables (CAMEL model) have positive mean value and it denotes that the banking sector runs with high performance level. Moreover the independent variable HHI shows 2972.232 mean value in the study denoting that there are high diversified loans in product wise categorization. The highest variance within the dependent variables is shown in OCIR. The value of standard deviation is 15.45. The 0.56 which is the lowest variance within dependent variables, shows in ROA. The other dependent variable CRAR, NPLR and LIQR shows 4.21, 4.63 and 3.96 standard deviation within the time period of 2008 to 2017.

The mean value of CRAR (capital adequacy) is 14.96% which is slightly higher than the regulatory requirement of 10% which is the evidence of the compliance of banks regarding Basel II requirements. And also maximum value and the minimum value standing at 40.90% and 8.06% respectively and accordingly, the standard deviation of CRAR is 4.218043. The NPLR (non-performing loan ratio) among commercial bank in Sri Lanka is varied from 4.88% to 22.30% with the mean and standard deviation 6.47% and 33.61% respectively which indicates that there is volatility among the banks' ability in credit risk management and the need for a loan portfolio diversification. OCIR (operating cost to income ratio) is varied from 17.63% to 95.08% with a standard deviation of 15.45 which indicates that performance indicator management quality highly differs among the bank. The minimum and maximum value of return on assets 0.10% and 4.24% show that low volatility in performance indicator earnings of Sri Lankan commercial banks. The standard deviation value shows that the dependent variable ROA is 0.56. There is also a low variation in LIQR (liquidity ratio) with a stand deviation of 3.96. And also it's standing maximum and minimum value 42% and 20% respectively and it denoting that the banking sector runs with effective liquidity level. The control variable called BSIZE (bank size) calculated by using the logarithm of the total assets and it shows a mean value of 8.34 with a standard deviation of 0.59 and these valued indicates that very small as well as very large commercial banks are included in the sample. And also the maximum and minimum values were 9.29 and 6.29 respectively. Finally, the mean value of real IRS (interest rate spread) was 3.01% indicating the average interest rate spread of the country's economy over the past 10 years with 2.00 standard deviation. The maximum interest rate spread of the economy was recorded as 7.54 and the minimum was 0.15.

Correlation Analysis

Table 2: Correlation Analysis

Probability	HHI	IRS	BSIZE	CRAR	NPLR	OCIR	ROA	Probability
10								10
HHI	1.0000							HHI

IRS	0.2460	1.0000						IRS
	0.0136	-----						
BSIZE	0.1728	-0.0746	1.0000					BSIZE
	0.0855	0.4603	-----					
CRAR	-0.0707	-0.1860	-0.3724	1.0000				CRAR
	0.4845	0.0638	0.0001	-----				
NPLR	0.0376	0.0688	-0.1271	-0.0719	1.0000			NPLR
	0.7098	0.4959	0.2074	0.4767	-----			
OCIR	-0.0014	-0.0013	-0.3345	0.1285	0.4998	1.0000		OCIR
	0.9889	0.9895	0.0007	0.2025	0.0000	-----		
ROA	-0.1715	-0.0015	0.3004	-0.1748	-0.4350	-0.5268	1.0000	ROA
	0.0879	0.9880	0.0024	0.0819	0.0000	0.0000	-----	
LIQR	0.0768	-0.1813	0.0828	-0.0194	0.0354	-0.0365	0.2315	LIQR
	0.4474	0.0710	0.4123	0.8476	0.7265	0.7180	0.0204	

Source: Author's Calculations based on the Annual Report Data

Correlation analysis is used to measure the association or strength of the relationship between two variables. It analyzes the relationship between independent variable and dependent variable to check whether there is a positive relationship or negative relationship. Table 2 represents the correlation analysis between the dependent variables (CRAR, NPLR, OCIR, ROA and LIQR) and independent variable (HHI) and control variables (IRS, BSIZE). According to that HHI is negatively correlated with performance, measured based on CRAR, OCIR and ROA methodology. This indicates that an increase in the Loan portfolio diversification of the commercial bank will decrease the performance. The results show the highly insignificant relationship between HHI and CRAR, based on the results of the analysis. The correlation value is -0.0707 where the value in between -0.5 to 0. Therefore, there is a weak negative linear relationship among the HHI ratio and CRAR. And also the coefficient of correlation between HHI and OCIR is shown as -0.0014. It represents that the weak negative association between the variables and at the same time HHI is statistically insignificant with OCIR since its P value is 0.9889. According to the results of the study, there is another insignificant relationship between the HHI and ROA. The correlation value shows as -0.1715 in the study. So there is a weak negative

linear relationship between the HHI and ROA. There is an insignificant weak positive relationship between the HHI and NPLR because the correlation value which is 0.0376 in between the 0 and 0.5. LIQR also positively correlated with the HHI having a 0.0768 correlation value. It also represents the weak positive linear relationship.

The control variable interest rate spread has a weak negative linear relationship with CRAR with a correlation value of -0.1860. There is a weak positive relationship between the IRS and NPLR with a correlation value of 0.0688. Moreover the correlation coefficient value of the IRS with OCIR is -0.0013 where the value in between -0.5 and 0. That indicates there is a weak negative relationship between IRS and OCIR. The correlation value of the IRS with ROA is 0.3004 where the value in between 0.0 and 0.5 and it statistically significant because of the rule of P value less than 0.05. That indicates there is significant weak positive relationship between IRS and ROA.

Further CRAR as well as NPLR and OCIR shows the weak negative correlation between BSIZE according to the coefficient value of -0.3724 and -0.1271 and -0.3345 respectively. There is a statistically significant correlation in CRAR and OCIR with the BSIZE because of the rule of P value less than 0.05. Moreover ROA as well as LIQR shows the weak positive correlation between BSIZE according to the coefficient value of 0.3004 and 0.0828 respectively and ROA a statistically significant with the P value of 0.0024. Among the independent and control variable variables, the highest correlation was between HHI and IRS and the correlation is positive with the statistically significant correlation value 0.2460. The correlation between HHI and BSIZE is the lowest correlation among the explanatory variables with the correlation value of 0.1728

Panel Data Analysis

Regression analysis is a statistical process used to estimate the relationships among variables. This study is based on balanced longitudinal panel data for altogether 10 commercial banks covering the period from 2008 to 2018. In the regression model, there are some assumptions, these assumptions can be tested as a diagnostic test. To improve the validity of the regression results the researcher used these test. There are main assumptions regarding the regression analysis and they are stated in order as follows.

Panel Unit Root Test

Table 3: Unit Root Test

	Levin, Lin & Chu	Im, Pesaran and Shin W-stat	ADF - Fisher Chi-square	PP - Fisher Chi-square
HHI	0.0000**	0.0139**	0.0096**	0.0000**
IRS	0.0000**	0.0000**	0.0000**	0.0000**
BSIZE	0.0000**	0.0277**	0.0019**	0.5650**
CRAR	0.0000**	0.0029**	0.0024**	0.0007**
NPLR	0.0000**	0.0108**	0.0089**	0.0007**
OCIR	0.0005**	0.0995**	0.0455**	0.0407**
ROA	0.0000**	0.0002**	0.0002**	0.0010**
LIQR	0.0000**	0.0000**	0.0000**	0.0007**

Source: Author's Calculations based on the annual report data

** indicates the 95% significant level

According to the results of Unit roots test Summary for HHI majority tests arrived with a corresponding P value which is greater than 5% at Level. Meaning that according to majority results researcher can't reject the Null hypothesis at level. But after estimate HHI into 1st difference, it shows that majority of tests arrived with a corresponding P value which is less than 5%. Therefore according to majority results researcher can reject the Null hypothesis and accept the alternative hypothesis after 1st difference. Therefore, it proves that after converting into 1st difference of HHI it does not have a unit root. It is meaning that HHI is stationary data after 1st difference.

Unit root test results for IRS majority tests arrived with a corresponding P value which is less than 5% at Level. It meaning that according to the majority results researcher can reject the Null hypothesis at level and accept the alternative hypothesis. Therefore IRS does not have unit root and hence IRS is stationary data at the Level.

Through level unit root test of BSIZE arrived with balance result. But after estimate BSIZE into 1st difference it shows that the majority tests arrived with a corresponding P value which is less than 5%. Therefore BSIZE does not have a unit root and hence BSIZE is stationary data at 1st difference.

Unit root test results for CRAR majority tests arrived with a corresponding P value which is less than 5% at Level. Therefore according to majority results researcher can reject the Null hypothesis at the level and accept the alternative hypothesis and it meaning that CRAR does not have a unit root and hence CRAR is stationary data at Level.

When considering the stationary of NPLR the majority tests arrived P value less than 5% in level. Therefore the results indicate to reject null hypothesis by demonstrating NPLR is stationary in the level.

As per panel unit root test the OCIR majority tests arrived with a corresponding P value which is less than 5% at the Level. Therefore according to majority results researcher can reject the Null hypothesis at the level and accept the alternative hypothesis. Therefore OCIR does not have a unit root and hence OCIR is stationary data at Level.

Unit root test results for ROA majority tests arrived with a corresponding P value which is less than 5% at Level. It meaning that according to majority results researcher can reject the Null hypothesis at level and accept the alternative hypothesis. Therefore ROA does not have a unit root and hence ROA is stationary data at Level.

When analyzing the LIQR variable the results majority tests arrived with a corresponding P value which is less than 5% at Level The null hypothesis can be rejected in this case. Therefore data in LIQR can be considered stationary at the level according to the findings.

Hausman Test

Table 4: Hausman Test

	CRAR	NPLR	OCIR	ROA	LIQR
Probability	0.1747**	0.0008**	0.5803**	0.0438**	0.2023**

Source: Author's Calculations based on the annual report data

** indicates 95% significant level

Based on the analyzed results to select appropriate model within the fixed effect and random effect model the researcher used the Hausman test. Essentially, the test looks to see if there is no correlation between the unique errors and the regression in the model. In the Hausman test to identify which model is appropriate for the study the researcher developed hypothesis. If the P-value < 0.05, fixed effect model is appropriate, otherwise Random effect model is appropriate.

H0: Random effect model is appropriate for the analysis

H1: Fixed effect model is appropriate for the analysis

Table 4 shows the probability values of Hausman Test. According to the results of the table, it shows the probability values of CRAR, OCIR and LIQR are higher than the significant level as 0.1747, 0.5803 and 0.2023 respectively. Therefore, the null hypothesis cannot be rejected. The null hypothesis is random effect model is appropriate. So to identify the impact of loan portfolio diversification on commercial bank performance the researcher can use the random effect model for panel data. In the case of NPLR and ROA probability values are lower than the significant level 0.05 as 0.0008 and 0.0438 respectively. Therefore it can reject the null hypothesis and H1 is appropriate to the study. It means that fixed effect model is appropriate for the case of NPLR and ROA.

Fixed Effect Model

Table 5: Result of Fixed Effect Model under ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.215156	0.759204	2.654390	0.0103
HHI	-0.000262	8.08E-05	-3.247381	0.0017
IRS	0.025989	0.025008	1.039245	0.3016
BSIZE	0.260120	0.160165	2.450142	0.0161
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.386571	Mean dependent var		1.447600
Adjusted R-squared	0.301961	S.D. dependent var		0.567470
S.E. of regression	0.474114	Akaike info criterion		1.466001
Sum squared resid	19.55624	Schwarz criterion		1.804674
Log likelihood	-60.30007	Hannan-Quinn criter.		1.603068
F-statistic	4.568816	Durbin-Watson stat		1.724979
Prob(F-statistic)	0.000000			

Source: Author's Calculations based on the annual report data

This part reviews the results based on the Fixed effects model. According to the above tables, 5 shows the probability F statistics under ROA as 0.0000. But the other four models such as CRAR, NPLR, OCIR, and LIQR show probability F statistics 0.051214, 0.000011, 0.012126 and 0.217375 respectively (Appendix 6.3.3). The rule is that if the P (F-statistic) value is less than 0.05 the model is

highly significant and ROA is the appropriate model with 0.386571 R-squared value. There is only a 38.65% variation in ROA can be explained by HHI. The remaining 61.35 of variation in HHI (LPD) explained by other variables that are not considered in the study. The result of the fixed effect model under ROA is discussed as follows.

When considering the loan portfolio diversification of commercial banks the HHI (Hirschman Herfindahl Index) is identified as a negative coefficient of -0.000262 under the ROA. Further, it is statistically significant and which is having 0.0017 probability value. The negative and statistically significant result shows that the negative impact of loan portfolio diversification on commercial banks performance in Sri Lanka. And also it shows that commercial banks with relatively high diversified loan portfolio base lead to reduce the performance of domestic Licensed Commercial Banks in Sri Lanka. Therefore the Null hypothesis developed in this study can be rejected.

The results of the control variable IRS exhibit a positive coefficient of 0.025989 at 0.3016 significant level under the ROA. It indicates that interest rate spread positively impact to the commercial bank performance. But it is an insignificant relationship and that shows the effect is not conclusive. The second hypothesis developed to identify the impact of interest rate spread on bank performance. Therefore the Null hypothesis cannot be rejected since the results do not appear as significant.

The second control variable BSIZE, the result of bank size shows that a positive coefficient of 0.260120 and it was statistically significant because the P-value is lower than the significant level as 0.0161. Further, it shows that commercial banks with relatively high assets base are more profitable than the small banks which are having a low asset base. The positive coefficient and significant effect indicate that larger banks succeed better than smaller ones in achieving a higher ROA. The third hypothesis was developed relating to identifying the impact of bank size on commercial bank performance. Therefore since the result is significant Null hypothesis can be rejected.

Auto Correlation

According to this fixed effect model of ROA the value of Durbin-Watson stat is provided as 1.724979. This value lies between 1.5 to 2.5. In this case the researcher can summarize that the residuals become independent and those are not serially correlated. So there is no serial correlation problem and model is highly valid and appropriate.

Multi-collinearity

If independent variables are highly or perfectly correlated that is called multi-collinearity. This is a problem in the regression model. Therefore regression results should be free from multi-collinearity problem. Using VIP (Variance Inflation Factor) or Tolerance multi-collinearity can be tested. If VIF is less than 10 or Tolerance is more than 0.1 there is no multi-collinearity problem.

VIF	$= 1/(1- R \text{ squared})$
VIF (ROA)	$= 1/(1-0.386571)$
	$=1.630181$

According to the collinearity diagnostic, the VIF value is less than 10. All the tolerance values are more than 0.1. As a result there is no multi-collinearity problem in regression results. Model is silent.

The Relationship between Independent Variables and Residuals

Table 6: Correlation Analysis between Independent Variables and Residuals

Correlation Probability	RESID	HHI	IRS	BSIZE
RESID	1.000000			

HHI	0.047781	1.000000		
	0.6369	-----		
IRS	-4.60E-05	0.246048	1.000000	
	0.9996	0.0136	-----	
BSIZE	0.107279	0.172831	-0.074678	1.000000
	0.2881	0.0855	0.4603	-----

Source: Author's Calculations based on the annual report data

The result of the correlation analysis between independent variables and residuals all the P values are more than 0.05. So the association between residuals and independent variables are insignificant. Therefore, they are not correlated and the model is appropriate.

Conclusions and Recommendations

Conclusion

This study was conducted to find out the impact of loan portfolio diversification on the performance of commercial banks in Sri Lanka. For the study, the researcher used 10 commercial banks from 2008 to 2017 and the researcher used 100 observations for the study. In this research, LPD was considered as the independent variable and it has used the Hirschman Herfindahl Index (HHI) to measure the diversification. The dependent variables bank performance is measured in accordance with the CAMEL approach. It is a more effective measurement since it covers various aspects of the performance of a bank such as capital adequacy, asset quality, management efficiency, earnings, and liquidity. Product-wise loan categorization such as term loan, overdraft, leasing, pawning, credit card loan, housing loan and other loan has been taken to calculate Hirschman Herfindahl Index (HHI). In this study bank size and interest rate spread rate has selected as control variables. The researcher runs a balanced panel data analysis to achieve the objectives in the study. To get an idea about the data the researcher conducted a descriptive analysis for the study. The study used correlation analysis and regression analysis for achieving the objectives. The main finding of the study shows that LPD significantly reduces commercial bank performance. Moreover, it shows bank size (BSIZE) the control variable of the study significantly impact on enhance the commercial bank performance. The detailed summary of the study can be shown as follows.

In a banking system, lending represents the heart of the commercial banking industry and loans are leading assets as they generate the largest share of operating income. To maximize company performance, it is important for commercial banks to concern productivity in managing the loan portfolio. Portfolio diversification unable to eliminate the default risk, but it can reduce credit risk into the appropriate level.

According to the correlation analysis of the study, there is a negative relationship between loan portfolio diversification and return on asset. That means when the LPD is increasing within the banks the earnings based on assets decrease. This situation arises when the banks are providing more different categories of loan to their customers. Therefore this relationship is not healthy enough for banks when they perform loan-related various activities.

According to the regression analysis of the study, the researcher got the results of ROA is the most appropriate model. Because the rule is that if the P (F-statistic) value is less than 0.05 the model is highly significant and ROA is recorded lowest P(F-statistic) value among the CAMEL model variables. Firstly the researcher checked whether there is a significant negative impact of HHI (LPD) on earning (ROA). According to the results, 38.65% fluctuation of return on assets only can explain from the HHI. The impact is little much high, according to the results. Moreover, there is a negative and statistically significant result, shows that the negative impact of loan portfolio diversification on commercial banks performance in Sri Lanka. Therefore it shows that commercial banks with relatively high diversified loan portfolio base lead to reduce the performance of domestic Licensed Commercial Banks in Sri Lanka.

The results of the control variable IRS show a positive impact on the commercial bank performance and there is an insignificant relationship and that shows the effect is not conclusive. According to the study, the third objective of the study is to check whether there is an impact of IRS on bank performance. Therefore, it shows a positive impact when IRS within the country is changing, the bank performance (ROA) also changes. But this effect is not conclusive.

Considering the results of the second control variable Bank size, there is a significant positive impact of Bank size (BSIZE) on the commercial bank performance (ROA). It means when the bank size is changing, the commercial bank performance (ROA) also change.

Recommendations

These results provide a significant platform for managers to identify the impact of LPD on the performance of commercial banks. According to these results, the following recommendation can be beneficial to the commercial bank's management, policymakers and their other financial authorities to take an important decision regarding LPD. The management should follow specific strategic planning about LPD and improve commercial bank performance. Moreover, they need to make high attention to the loan portfolio position of the bank.

According to the result, commercial banks need to limit their loan portfolio diversification into appropriate level to enhance their performance. Therefore the management of a commercial bank should need to use appropriate strategies to reduce loan portfolio positions while retaining their client base. Furthermore,

they should focus on only limited areas to serve loan to their customers. Moreover, the commercial bank should need to focus on reducing the level of non-performing loans because when diversifying the loan portfolio there is a high credit risk. Therefore commercial bank management needs more attention on those non-performing loans and should get immediate action to reduce the level of credit risk. The large commercial banks have more opportunities to expand their bank size through diversified branch networks and it ensures higher performance generation to the bank. Therefore, commercial banks should need to expand their branch network into an effective position.

Future Research Directions

This study has mainly focused on to identify the impact of loan portfolio diversification on the performance of commercial banks in Sri Lanka. Therefore, based on the researcher experience in the research, there is an ability to provide suggestions for future researchers to conduct their research effective manner. Moreover, it will be important for commercial banks to make an effective decision regarding loan portfolio diversification.

In Sri Lanka, Researcher had not found any one of the previous research conducted when considering all area of loan portfolio diversification such as product wise diversification, industry-wise diversification, and currency wise diversification. There are some domestic and international scholars' researches focused only on one area of loan portfolio diversification. The researcher could able to conduct this research in those areas of the banking industry. If this research were carried out in all private and government sector banks, then research findings could be generalized to the whole island. Moreover, every bank has to do this kind of research to understand the market potential and to reduce the non-performing loans. In addition to that, it is suggested analyze the macroeconomic variables such as GDP growth rate on loan portfolio diversification decision. And also, for further research like how the credit risk and non-performing loan affect the net interest margin of the commercial bank as well. Moreover, the researcher can propose that research can be done in focusing effect of loan portfolio decision on bank cost efficiencies which have not been addressed in this study. Furthermore, the researcher can focus on the effect of the cost of loan portfolio diversification on commercial bank performance.

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