CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter contains the result and discussion of the regression analysis that has been separated into five models. The methodology process mainly relies on panel data analysis, which begins with the simple Ordinary Least Square (OLS), then movesto select different panel models such as fixed-effect and random effect models. Few other tests also have been done to identify the goodness of the model obtained. Some ofthe tests are diagnostic and inferential tests. In addition, the methods that have been used also has been supported by previous literature as mentioned in Chapter 3. The testsand estimations were carried out using the statistical software STATA, and this chapterwill elaborate on the findings from the data analysis. The results of this chapter will answer the objectives and research questions as listed in Chapter 1.

4.2 Descriptive Statistics

Several statistical tests are utilized in this part to examine the distribution of data that describe the pattern of credit risk management by ten different commercial banks in Malaysia

4.2.1 Net Charge-off Ratio (NCR)

Table 4.1: Summary of Data for NCR.

	CIMB	*Alliance*	*Affin*	*BIMB*	*Hong*	*HongF*	*May*	*Pub*	*RHB*	*AMMB*
Mean	0.54	0.25	0.27	0.45	0.27	0.25	0.38	0.19	0.30	0.78
Standard Error	0.03	0.01	0.06	0.03	0.02	0.02	0.03	0.01	0.02	0.06
Median	0.53	0.25	0.16	0.42	0.26	0.26	0.36	0.18	0.27	0.75
Mode	0.43	0.28	0.14	0.53	0.21	0.28	0.28	0.18	0.24	0.35
Standard Deviation	0.17	0.08	0.34	0.16	0.10	0.14	0.16	0.05	0.12	0.35
Sample Variance	0.03	0.01	0.11	0.02	0.01	0.02	0.03	0.00	0.02	0.12
Kurtosis	2.26	0.63	7.03	0.71	0.35	8.66	0.69	-0.05	1.23	0.39
Skewness	0.68	-0.04	2.19	0.69	0.11	-1.93	0.43	0.79	0.96	0.13
Range	0.84	0.37	1.75	0.73	0.43	0.86	0.80	0.18	0.59	1.52
Minimum	0.22	0.05	-0.13	0.14	0.05	-0.33	0.04	0.13	0.04	0.06
Maximum	1.06	0.42	1.62	0.87	0.48	0.53	0.84	0.31	0.63	1.58
Sum	17.80	8.14	8.85	14.82	8.86	8.41	12.62	6.22	10.03	25.86
Count	33	33	33	33	33	33	33	33	33	33

Table 4.1 summarizes the NCR data for all banks. The sample mean is shown in the first row. Each bank's average is practically identical, with AMMB having the highest average of 0.78. The standard error, which is actually the standard error of the mean, appears in the second row. The standard error measures how far the sample means is likely to differ from the population mean. In contrast, the standard deviation is a measure of how far the observations are spread out from the mean. The NCR for Alliance and Public Bank has the lowest standard error of the mean of 0.01 and the

smallest standard deviation of 0.08 and 0.05, respectively, as shown in the table. The next item is the median that is the observation that occurs in the middle of the range as the range has an odd number. Here, the mode is the observation that occurs the most. The medians for all banks are similar, ranging between 0.15 and 0.75, and the mode is likewise similar, ranging between 0.14 and 0.43. After that, there is also kurtosis.

The kurtosis indicates whether or not the distribution is peaked. Positive kurtosis in a distribution show that there is a lot of NCR close to the mean, where the distribution is called leptokurtic. Platypurtic distributions have a negative kurtosis and are flat. Affin and Hong Leong Finance have significantly greater kurtosis values than the other banks, with values of 7.03 and 8.66, respectively. As a result, it is the furthest from a normal distribution. On the other hand, the skewness indicates whether the distribution is skewed to the right or left. The only banks with negative skewness of -0.04 and -1.93, respectively, where the distribution's tail extends to the left, are Alliance and Hong Leong Finance.

In addition, this study used a line chart to visualize the data's frequency image. The graphic is separated into two sections: the top five banks and the others to make things clearer.

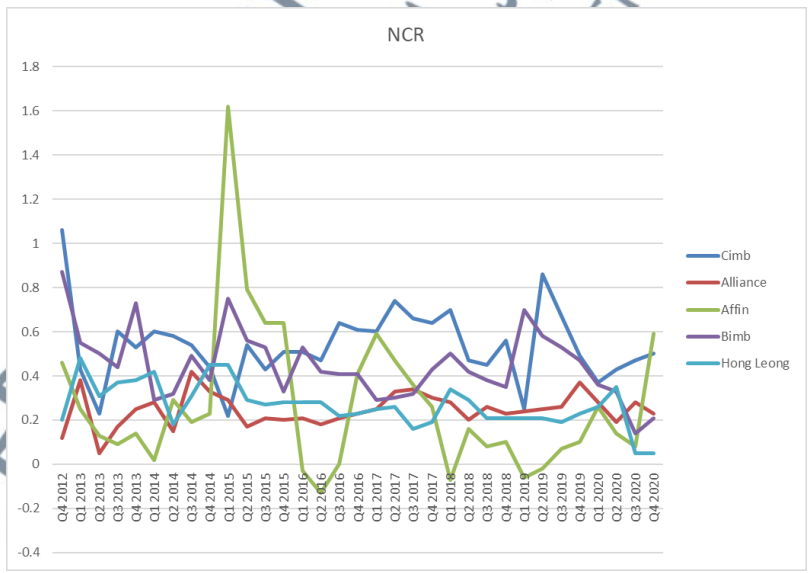

Figure 4.1: Line Chart for NCR (CIMB, Alliance, Affin, BIMB, Hong Leong).

According to Figure 4.1, Affin bank's NCR has a significant degree of variation and the highest value of NCR, especially when compared to other banks, implying that the loan portfolio is overly risky. This is because the bank's estimate of the amount of debt it will never be able to collect is likely overstated. The line, however, will become flattered by the end of 2020. This is possible because Affin bank has created its own Financial Assistance and Instalment Relief programmed, or FAIR, to entice consumers to recover the recognition of modification loss from the previous year. In contrast, throughout the study period, Hong Leong Bank displays the least up and down. This demonstrates how the bank's credit risk management contributes to a strong credit portfolio.

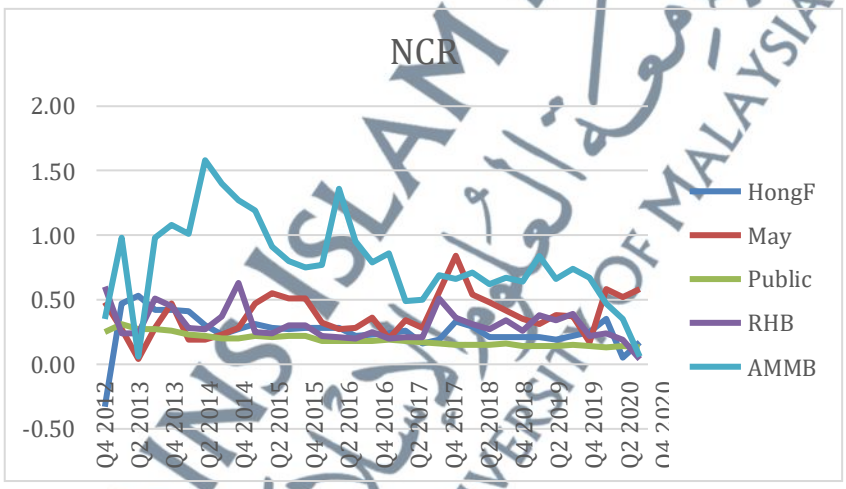

Figure 4.2: Line Chart for NCR (Hong Leong Finance, Maybank, Public, RHB, AMMB).

Overall, these five banks, particularly Public Bank, have a lower NCR trend. This is due to the conservative risk management practices and cost-cutting measures used by the Public banks, which are primarily supported by residential property finance, passenger vehicle financing, and small and medium enterprises (SME) financing (News Street Time, 11th May 2021).

Meanwhile, most AMMB's NCR values are greater than 0.50, which is unusually high compared to other banks. In addition, because AMMB is an investment holding company, it is more exposed to credit risk management, particularly through its

subsidiaries, which provide merchant and commercial banking, retail finance, stock and futures broking, and investment advisory services.

4.2.2 Loan Loss Reserve Ratio (LLR)

Table 4.2: Summary of Data for LLR.

	CIMB	*Allianc e*	*Affin*	*BIMB*	*Hong*	*HongF*	*May*	*Pub*	*RHB*	*AMMB*
Mean	4.41	4.48	3.97	5.15	4.80	4.80	4.43	4.81	4.28	4.47
Standard Error	0.01	0.02	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.04
Median	4.41	4.47	4.10	5.16	4.85	4.85	4.41	4.79	4.22	4.42
Mode	#N/A	4.53	#N/A	5.12	4.56	#N/A	#N/A	4.84	#N/A	#N/A
Standard Deviation	0.07	0.11	0.30	0.14	0.18	0.18	0.15	0.18	0.21	0.26
Sample Variance	0.00	0.01	0.09	0.02	0.03	0.03	0.02	0.03	0.04	0.07
Kurtosis	-0.16	0.45	-1.19	3.85	1.11	1.06	-1.36	5.71	-0.34	-1.24
Skewness	0.06	-0.43	-0.42	1.38	0.54	0.51	0.39	2.06	0.63	0.12
Range	0.29	0.50	0.98	0.73	0.77	0.77	0.43	0.87	0.85	0.83
Minimum	4.26	4.17	3.35	4.90	4.49	4.49	4.25	4.56	3.94	4.05
Maximum	4.54	4.67	4.33	5.63	5.26	5.26	4.68	5.43	4.78	4.88
Sum	145.43	147.75	131.17	170.00	158.32	158.26	146.28	158.78	141.08	147.67
Count	33	33	33	33	33	33	33	33	33	33

Table 4.2 summarizes the LLR data for all banks. The sample mean is shown in the first row. Each bank's average is practically identical, with BIMB having the highest average of 5.15. The standard error, which is actually the standard error of the mean, appears in the second row.

The standard error is a measure of how far the sample means is likely to differ from the population mean, whereas the standard deviation is a measure of how far the

observations are spread out from the mean. The LLR for CIMB has the lowest standard error of the mean of 0.07 and the smallest standard deviation of 0.08 and 0.05, respectively, as shown in the table. The next item is the median that is the observation that occurs in the middle of the range as the range has an odd number. Here, the mode is the observation that occurs the most. The medians for all banks are similar, ranging between 4.10 and 4.85, and the mode is likewise similar, ranging between 4.03 and 4.48. After that, there is also kurtosis. The kurtosis indicates whether or not the distribution is peaked. Positive kurtosis in a distribution show that there is a lot of LLR close to the mean, while the distribution is called leptokurtic. Platypurtic distributions have a negative kurtosis and are flat. BIMB has significantly greater kurtosis values than the other banks, with values of 3.85, respectively. As a result, it is the furthest froma normal distribution. On the other hand, the skewness indicates whether the distributionis skewed to the right or left. The only banks with negative skewness of -0.43 and -0.42, respectively, where the distribution's tail extends to the left, are Alliance and Affin bank.

In addition, this study used a line chart to visualize the data's frequency image. The graphic is separated into two sections: the top five banks and the others to make things clearer.

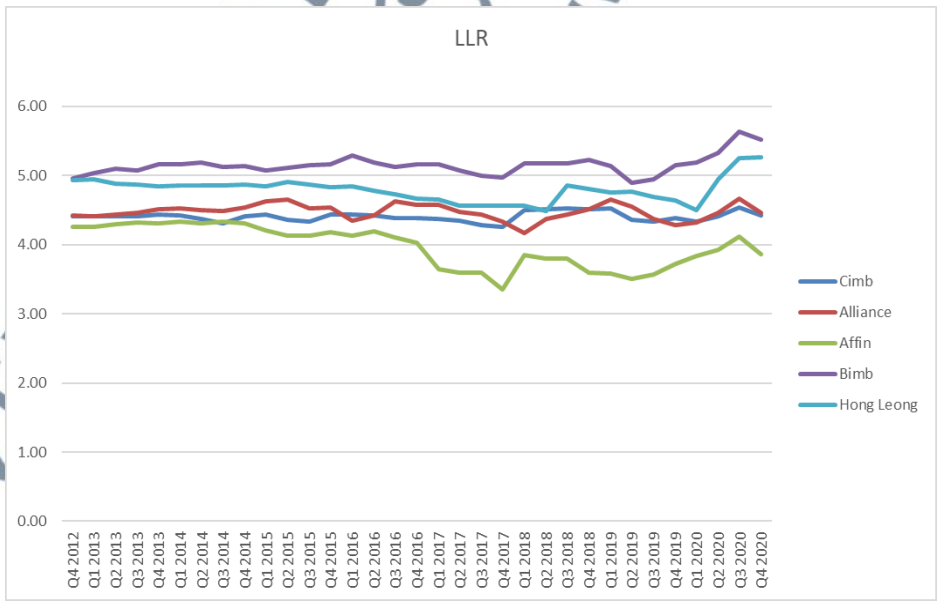

Figure 4.3: Line Chart for LLR (CIMB, Alliance, Affin, BIMB, Hong Leong).

According to Figure 4.3, Bimb bank's LLR has a significant degree of variation and the highest value of LLR, especially when compared to other banks. The Loan Loss Reserve Ratio basically shows the probability of debtors failing to settle their debts in due time. This basically reflects the company's position in terms of the collection rate. If the bank has a higher loan loss reserve ratio, it means that the organization has a higher risk profile. Therefore, it might not be a suitable investment for risk-averse investors. Meanwhile, these five banks, particularly Affin Bank, have a lower LLP trend. The Loan Loss Reserve Ratio basically shows the probability of debtors failing to settle their debts in due time. Therefore, Affin banks have demonstrated good credit risk management to bank performance.

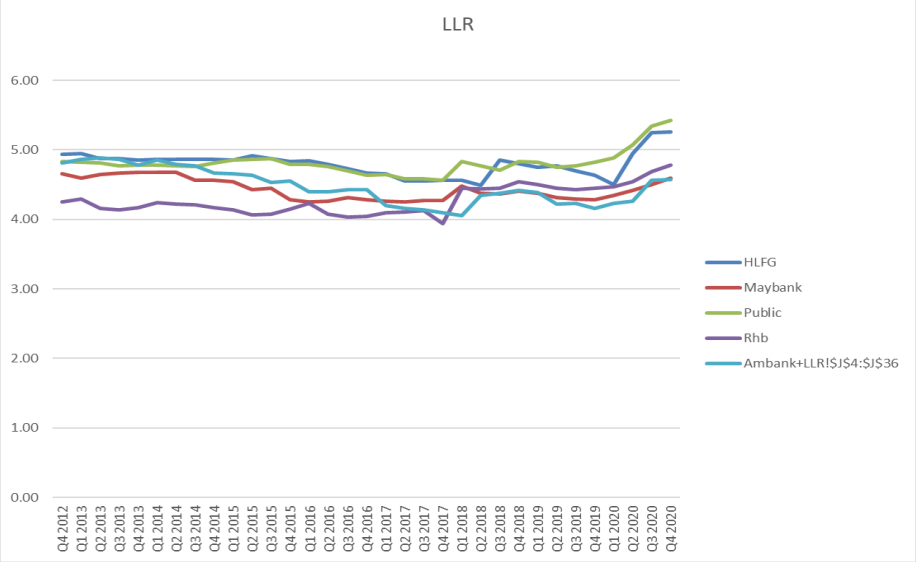

Figure 4.4: Line Chart for LLR (Hong Leong Finance, Maybank, Public, RHB, AMMB).

Overall, these five banks, particularly RHB, have a lower LLR trend. However, the line of all banks is likely similar flatter at the beginning and increases at the line's end. The main usage of this ratio is mainly from a stakeholder perspective. It shows the business's existing risk profile and its ability to manage all the due collections

successfully. When the financial statements are issued, investors and the board of directors' gauge the risk profile by directly comparing the loan loss reserve ratio of the bank with other competitors. Having a lower loan reserve ratio is favorable, but it should not come at the cost of compromising on the prudence principle in accounting.

4.2.3 Non-Performing Loan Ratio (NPL)

Table 4.3: Summary of Data for NPL.

	CIMB	*ALLIANCE*	*AFFIN*	*BIMB*	*HLBB*	*HLFG*	*PUBLIMAY*	*PUBLIC*	*RHB*	*AMMB*
Mean	1.18	0.32	0.84	0.04	-0.09	-0.09	0.72	-0.64	0.79	0.58
Standard Error	0.01	0.05	0.04	0.04	0.05	0.05	0.04	0.03	0.03	0.01
Median	1.17	0.26	0.75	0.07	-0.15	-0.16	0.82	-0.67	0.80	0.58
Mode	1.12	0.55	0.77	0.17	-0.17	-0.19	0.62	-0.71	0.81	0.63
Standard Deviation	0.07	0.26	0.24	0.21	0.26	0.26	0.25	0.18	0.15	0.07
Sample Variance	0.00	0.07	0.06	0.04	0.07	0.07	0.06	0.03	0.02	0.01
Kurtosis	-0.03	-0.77	-1.24	0.97	0.52	0.62	-0.73	0.64	-0.53	-0.63
Skewness	0.53	0.51	0.50	-0.61	-0.12	-0.17	-0.75	-0.42	0.24	-0.09
Range	0.28	0.99	0.79	0.95	1.13	1.14	0.80	0.74	0.57	0.30
Minimum	1.05	-0.06	0.47	-0.51	-0.73	-0.76	0.20	-1.11	0.52	0.43
Maximum	1.34	0.92	1.26	0.44	0.40	0.39	1.00	-0.37	1.10	0.73
Sum	38.94	10.69	27.72	1.28	-2.90	-3.12	23.76	-21.13	26.03	19.12
Count	33	33	33	33	33	33	33	33	33	33

Table 4.3 summarizes the NPL data for all banks. The sample mean is shown in the first row. Each bank's average is practically identical, with CIMB having the highest

average of 1.18. The standard error, which is actually the standard error of the mean, appears in the second row. The standard error is a measure of how far the sample means is likely to differ from the population mean, whereas the standard deviation is a measure of how far the observations are spread out from the mean. The LLR for CIMB and Ambank has the lowest standard error of the mean of 0.01 and the smallest standard deviation of 0.07, respectively, as shown in the table. The next item is the median that is the observation that occurs in the middle of the range as the range has an odd number.

Here, again, the mode is the observation that occurs the most. The medians for all banks are similar, ranging between -0.15 and 1.17, and the mode is likewise similar, ranging between -0.17 and 1.12. After that, there is also kurtosis. The kurtosis indicates whether or not the distribution is peaked. Positive kurtosis in a distribution show that there is a lot of LLR close to the mean, and the distribution is called leptokurtic. Platypurtic distributions have a negative kurtosis and are flat. BIMB has significantly greater kurtosis values than the other banks, with values of 0.97, respectively. As a result, it is the furthest from a normal distribution. On the other hand, the skewness indicates whether the distribution is skewed to the right or left. Six out of ten banks with negative skewness of -0.61, -0.12, -0.17, -0.75, -0.42 and -0.09 respectively, where the distribution's tail extends to the left, are Bimb, Hong Leong, Hong Leong Financial, Maybank, Public bank and Ambank.

In addition, this study used a line chart to visualize the data's frequency image. The graphic is separated into two sections: the top five banks and the others to make things clearer.

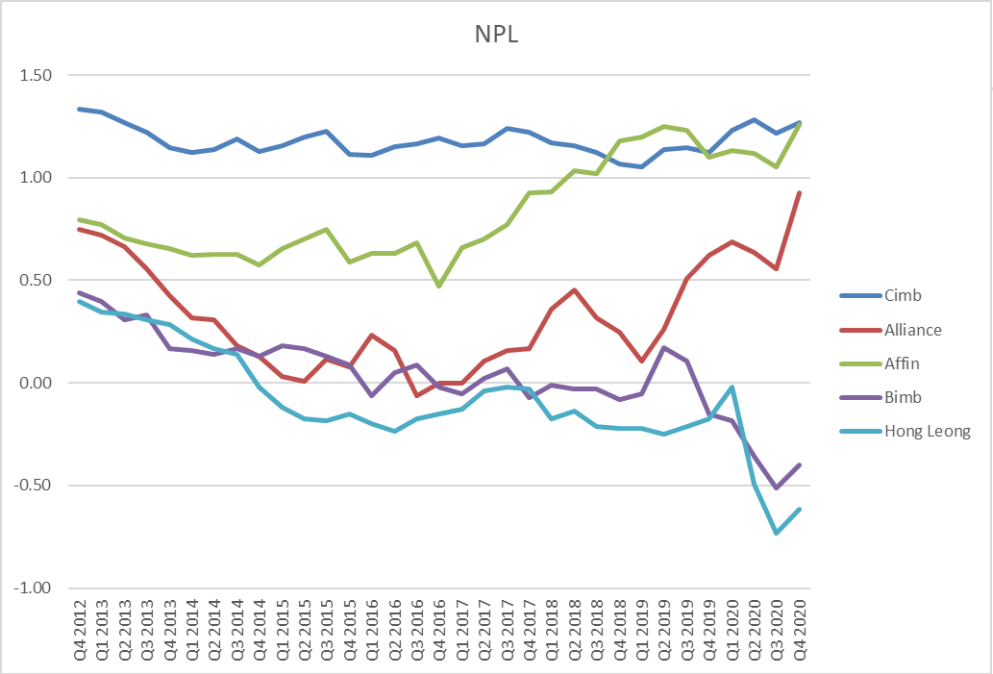

Figure 4.5: Line Chart for NPL (CIMB, Alliance, Affin, BIMB, Hong Leong).

According to Figure 4.5, Cimb bank's NPL has a significant degree of variation and the highest value of NPL, especially when compared to other banks, implying that the loan portfolio is overly risky. This is because the non-performing loans are loans with payments that are overdue by 91 days or more. In addition, some have not paid their loans for the last thirty years. Usually, a bank should not have an NPL ratio of more than five per cent. This is due to banks' weak loan appraisal process, poor credit culture amongst borrowers, and lack of accountability in various government agencies. In contrast, throughout the study period, Hong Leong Bank displays the least up and continuedly down. This demonstrates how the bank's credit risk management contributes to a strong credit portfolio. In conclusion, the findings clearly indicate that higher NPL reduces cost efficiency. Likewise, lower-cost efficiency increases NPL (Karim et al., 2010).

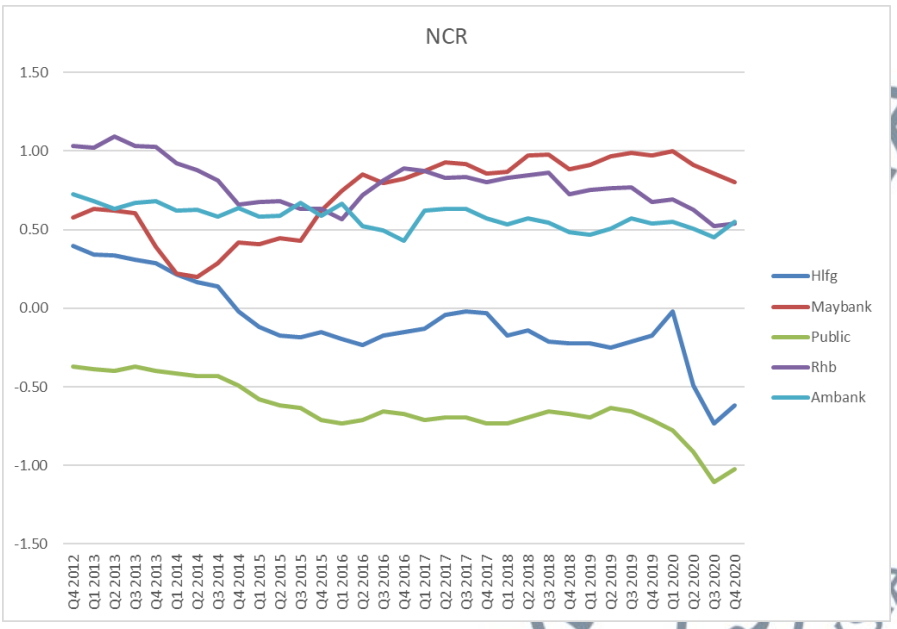

Figure 4.6: Line Chart for NPL (Hong Leong Finance, Maybank, Public, RHB, AMMB).

Overall, these five banks, particularly Maybank, have a higher NPL trend at the end of this study period. This is due to the impact of various repayment assistance programmes to borrowers affected by the Covid-19 pandemic starting to fade. The ratio is expected to remain benign for the rest of the year, given the various repayment assistance programmes that kicked in after the blanket moratorium ended on Sept 30. Bank Negara Malaysia assured borrowers last Monday that those who declined repayment assistance previously would still be able to apply for targeted assistance "throughout 2020 and into 2021" if their financial circumstances had changed. Meanwhile, the majority of AMMB's NPL values are less than 0.50, which is unusually low when compared to other banks. Because Ambank proposed a debt recovery strategy of Ambank and Ambank Islamic to strengthen their loan and financing management, resolution process, and monetise the portfolio. The proceeds from the disposal will be used for general working capital purposes within a year of completion of the exercise. AMMB told the stock exchange that its units had signed two separate sale and purchase agreements in relation to the disposal with Aiqon Amanah Sdn Bhd and Aiqon Islamic Sdn Bhd, respectively. The Aiqon SPVs are established as special purpose vehicles to

purchase and manage the portfolio. The shareholders of Aiqon Capital are Zetovest Sdn Bhd (50%) and Kurnia Quantum (50%).

4.2.4 Loan Loss Provision (LLP)

Table 4.4: Summary of Data for LLP.

	CIMB	*Alliance*	*Affin*	*BIMB*	*Hong*	*HongF*	*May*	*Public*	*RHB*	*AMMB*
Mean	0.59	0.28	0.25	0.22	0.06	0.05	0.45	0.11	0.27	0.09
Standard Error	0.06	0.05	0.07	0.02	0.02	0.02	0.04	0.01	0.02	0.04
Median	0.53	0.18	0.11	0.22	0.05	0.04	0.40	0.10	0.22	0.09
Mode	0.46	0.18	-0.07	0.17	0.04	0.01	0.32	0.11	0.19	0.16
Standard Deviation	0.35	0.31	0.41	0.14	0.11	0.12	0.24	0.06	0.13	0.25
Sample Variance	0.13	0.10	0.17	0.02	0.01	0.01	0.06	0.00	0.02	0.06
Kurtosis	0.73	2.09	1.15	0.06	3.69	3.37	-0.02	4.18	0.63	1.79
Skewness	0.93	1.41	1.41	-0.18	1.40	1.33	0.74	1.50	0.87	1.10
Range	1.36	1.36	1.49	0.61	0.59	0.59	0.95	0.33	0.58	1.11
Minimum	0.09	-0.15	-0.16	-0.07	-0.13	-0.13	0.09	0.00	0.01	-0.30
Maximum	1.45	1.21	1.33	0.54	0.46	0.46	1.04	0.33	0.59	0.81
Sum	19.37	9.20	8.38	7.13	1.91	1.80	14.72	3.56	8.75	2.85
Count	33	33	33	33	33	33	33	33	33	33

Table 4.4 summarizes the LLP data for all banks. The sample mean is shown in the first row. Each bank's average is practically identical, with CIMB having the highest average of 0.59. The standard error, which is actually the standard error of the mean, appears in the second row. The standard error is a measure of how far the sample means is likely to differ from the population mean, whereas the standard deviation is a measure of how far the observations are spread out from the mean. The LLP for Public Bank has the lowest standard error of the mean of 0.01 and the smallest standard deviation of 0.06, respectively, as shown in the table. The next item is the median that is the observation that occurs in the middle of the range as the range has an odd number.

Here the mode is the observation that occurs the most. The medians for all banks are similar, ranging between 0.04 and 0.53, and the mode is likewise similar, ranging between -0.07 and 0.46. After that, there is also kurtosis. The kurtosis indicates whether or not the distribution is peaked. Positive kurtosis in a distribution show that there is a

lot of LLP close to the mean, while the distribution is called leptokurtic. Platypurtic distributions have a negative kurtosis and are flat. Public Bank has significantly greater kurtosis values than the other banks, with values of 4.18, respectively. As a result, it is the furthest from a normal distribution. On the other hand, the skewness indicates whether the distribution is skewed to the right or left. The only bank with negative skewness of -0.18 respectively, where the distribution's tail extends to the left, is BIMB.

In addition, this study used a line chart to visualize the data's frequency image. The graphic is separated into two sections: the top five banks and the others to make things clearer.

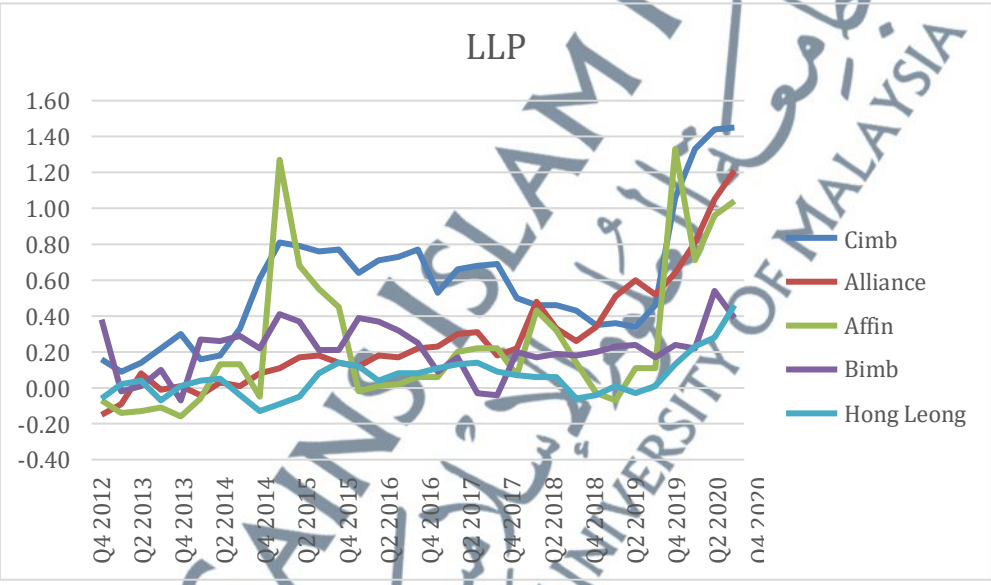

Figure 4.7: Line Chart for LLP (CIMB, Alliance, Affin, BIMB, Hong Leong).

According to Figure 4.7, Cimb bank's LLP has a significant degree of variation and the highest value of NCR, especially when compared to other banks. In the first place, a previous study examined the financial structure variables affecting banking profitability. The results reveal that higher advances-to-total assets and deposits-to-total assets ratios necessarily affect the level of banks' profit. In contrast, throughout the study period, Hong Leong Bank displays the least up and continuedly down. Therefore, banks with less loan loss provision are perceived to have more safety, and such an advantage can be translated into higher profitability.

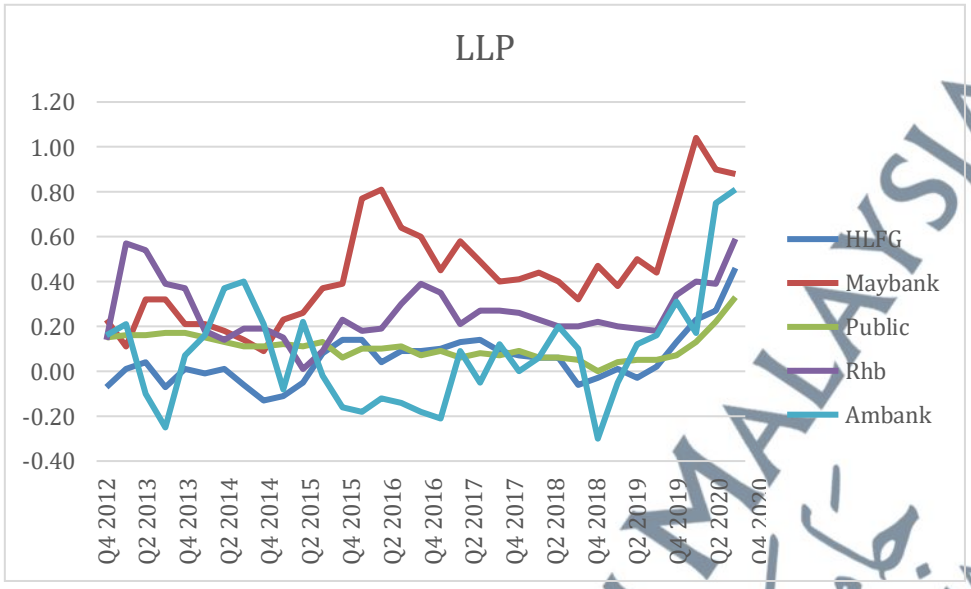

Figure 4.8: Line Chart for LLP (Hong Leong Finance, Maybank, Public, RHB, AMMB).

Overall, these five banks, particularly Public Bank, have a lower and steady LLP trend. In contrast, throughout the study period, Maybank displays the higher and increasing data line. The results show that if credit risk management is increasing, LLPs will increase. This information can be used to develop a more effective credit risk assessment, monitoring, measuring and recovery procedures by banks. Furthermore, it provides a new understanding of how CRM moderates the relationship between the determinants of LLPs, as Westernhagen (2004) earlier called for a further study to assess how CRM moderates the relationship between the determinants of LLPs. The most important practical implication is to assist investors and regulators in making informed decisions regarding loan loss provisioning of banks in Malaysia. It has gone some way towards enhancing our understanding of the efficiency of commercial banks in Malaysia and loan quality, as previously discovered by Ismail et al. (2013). Furthermore, the present study provides additional evidence with respect to the authors 'contention that loan quality, as measured by NPL, is negatively associated with efficiency. Taken together, these findings provide additional evidence with respect to

measuring the effect of NPLs on the economic crisis, an exercise undertaken by the Central Bank of Nigeria as reported by Alao and Raimi (2011).

4.3 Pearson's Correlation Analysis

The next analysis is Pearson Correlation Analysis. Pearson correlation test measures the statistical relationship between two continuous variables. The results identify the magnitude of the correlation as well as the direction of the relationship. Table 4.2 revealed the results of the Pearson's Correlation Analysis. The results shows that most of the variables are less than 56% correlated except for stock price and the total asset (TA) (+65.8%) *, LLR with NPL (+66.98%) *. This means stock price and TA has moderate to high correlation with an increase in total assets, there will 65.8% increment in the stock price. This result is aligned with the assumption on the bank size would give impact on the bank's stock performance. In addition, LLR and NPL also has moderate to high positive correlation. This result defines the increment in non-performing loan out of total loan will increase the amount of loan loss reserve out of total loan by 66.98% and vice versa. These correlated variables might be due to the nature of the banks in which projection of the loan reserve is based on the historical data of NPL.

Other than that, the dependent variables show mixed direction of correlation with the stock price. LLR and TA only shows positive correlation with the stock price while NCR, NPL, LLP and CBOE show negative correlation values with the stock price. The negative correlation is consistent with the theory in Table 3.2 in Chapter 3 that indicate lower NCR and NPL may lead to better credit risk management and hence, better bank's performance. On the other side, high or optimal LLR indicates better credit management practice, hence, better stock price performance. The contradiction of the LLP correlation values to the stock price performance can be further investigated in this analysis. Furthermore, since all of the coefficients in Table 4.5 does not show a serious correlation between independent variable, thus, all the independent variables were included in the regression. In addition, the result of variance inflation factor (VIF) also indicates the value is less than 4, in which suggests there is no multicollinearity found among the independent variables. Hence, the result of VIF further approved the inclusion of all variables into the model.

Table 4.5: Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) PRICE	1.000						
(2) NCR	-0.030	1.000					
	(0.5908)						
(3) LLR	0.319	-0.020	1.000				
	(0.0001)*	(0.7138)					
(4) NPL	-0.221	0.318	-0.670	1.000			
	(0.0001)*	(0.0000)*	(0.0000)*				
(5) LLP	-0.256	0.130	-0.184	0.432	1.000		
	(0.0000)*	(0.0177)*	(0.0008)*	(0.0000)*			
(6) TA	0.658	0.155	0.132	-0.160	-0.083	1.000	
	(0.0000)*	(0.0047)*	(0.0160)*	(0.0035)*	(0.1329)		
(7) CBOE	-0.124	-0.082	0.151	-0.038	0.359	0.056	1.000
	(0.0244)*	(0.1349)	(0.0060)*	(0.4914)	(0.0000)*	(0.3096)	

Source: STATA output

Table 4.6: Variance Inflation Factor

	VIF	1/VIF
NPL	2.689	.372
LLR	2.061	.485
LLP	1.503	.665
NCR	1.289	.776
CBOE	1.254	.798
TA	1.088	.919
Mean VIF	1.647	.

Source: STATA output

4.4 Panel Regression Analysis

4.4.1 Model 1

Model 1 is used to meet the first objective of the study which is to identify whether credit risk management practices have impact on the bank's performance. Here, the independent variables which are NCR, LLR, NPL and LLP will be regressed against the dependent variable which is bank stock price. Control variables which are TA and CBOE also will be included in Model 1 as the independent variables. Model 1 is as Equation 3.1 in Chapter 3. Firstly, the pooled OLS regression model will be obtained and the regression output as in Table 4.7.

Table 4.7: Tests for Model 1

Dependent Variable	**Stock Price**		
Independent Variable	Pooled OLS	RANDOM	FIXED
NCR	-0.5181	0.1743	0.1645
	(0.000)*	(0.000)*	(0.000)*
LLR	0.7053	0.3199	0.2739
	(0.000)*	(0.000)*	(0.000)*
NPL	0.3294	-0.02147	-0.0670
	(0.000)*	(0.655)	(0.181)
LLP	-0.3408	-0.3509	-0.3251
	(0.000)*	(0.000)*	(0.000)*
TA	0.4782	0.1657	0.0390
	(0.000)*	(0.015)*	(0.628)
CBOE	-0.3678	-0.2130	-0.1963
	(0.000)*	(0.000)*	(0.000)*
Constant	-4.5551	0.2546	1.9442
	(0.000)*	(0.784)	(0.020)*
F-test	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = 0.000* (OLS vs Random)		
Hausman test		p-value = 0.2516 (Random vs Fixed)	
R-squared	0.5862	0.4384	0.4341

Note: *significance at 5% level

Source: Author's own calculation based on STATA output

The result in Table 4.7 shows that all for the pooled OLS model, of the variables are significant at 5% significance level. F test value is significance and R^2 value shows 58.62% of the independent variables are explaining the dependent variable. Hence the model is fit for the analysis. However, since the dataset is panel data hence, further analysis needs to be done to measure the individual effect of the cross-sectional analysis. The Lagrange Multiplier (LM) test of Breusch and Pagan (1980) is employed to determine the presence of the random effect.

Both random and fixed effect models are compared to OLS to evaluate which model can increase the goodness of fit while simultaneously reducing measurement error. According to Table 4.7, the null hypothesis is rejected since the LM test probability value is 0.000, which is less than 5% significant level. This means, the individual specific event has the variance that is not equal to zero and so the pooled OLS regression is not recommended. This demonstrates the banks' distinctiveness, which is why pooling is discouraged.

Since this study is engaging with panel data containing cross-sectional, time-series, or both effects, some crucial tests must be performed to deal with heterogeneity or individual effects that are likely to occur. These effects can be either fixed or random. In order to verify the situation, Hausman test will be conducted by contrasting the random effect model to a fixed effect model. The result for Hausman test is as in Table 4.7 indicates that the random effect model is more appropriate for this dataset since the p-value is more than 5%, hence the null hypothesis cannot be rejected. Hence, it indicates that the intercepts of the individual bank are indifferent.

Through the result, the fixed-effect for Model 1 is as follows:

$$PRICE_{it} = 0.2546 + 0.1743\ NCR_{it} + 0.3199\ LLR_{it} - 0.0125\ NPL_{it} - 0.3509\ LLP_{it} + 0.1657\ TA_{it} - 0.2130\ CBOE_{it} \quad (4.2)$$

Whereby:

SP_{it} = stock price of the bank i at time t

NCR_{it} = net charge ratio of the bank *i* at the time *t*

LLR_{it} = loan loss reserve ratio of the bank *i* at the time *t*

NPL_{it} = non-performing loan ratio of the bank *i* at the time *t*

LLP_{it} = loan loss provision ratio of the bank *i* at the time *t*

TA_{it} = total asset of the bank *i* at the time *t*

$CBOE_{it}$ = CBOE of the bank *i* at the time *t*

The results for the random effect model as in Table 4.7. In the model, all variables are significant except NPL and TA. The F-value is significance and the R-squared identifies 43.84% of the independent variables could explained the dependent variable. Even though TA is not significant, however, this study would like to continue with diagnostics tests in order to test the goodness of the model. In the diagnostic tests, this study will test on cross-sectional dependency, autocorrelation problem, and heteroskedasticity problem.

Firstly, Pesaran's CD test is used to check for cross-sectional dependence in the fixed effect panel data models. The test reveals p-value less than 5% which has strongly rejected the null hypothesis of no cross-sectional independence in Model 1. The result is shown in Appendix A-7. Meanwhile, the average absolute correlation in this case is 0.331, which is moderate dependency value. Hence, there is sufficient evidence to show that cross-sectional dependence exists in this Model 1 under a fixed effect specification.

Secondly, the Wooldridge test has been used to test for serial correlation in panel-data models. Since Wooldridge's approach takes the residuals from a regression in first-differences, the result in Appendix A-12 reveals that the null hypothesis of no first-order autocorrelation is rejected with a p-value of 0.000, which is less than 5% significant. As a result, Model 1 has first-order autocorrelation. The hypothesis statement of the Wooldridge test is as follows:

Lastly, the presence of groupwise heteroskedasticity in the residuals of fixed effect regression is detected using a modified Wald test. Based on the result of the Wald test in Appendix A-11, the test p-value is 0.000. For any confidence level, this leads to a significant rejection of the null hypothesis. Hence, the variance of the error is the same for all individuals under the null hypothesis, in which confirm the heteroskedasticity problem in Model 1.

Through the diagnostics tests, the fixed effect of Model 1 experienced two serious problems which are serial correlation and heteroskedasticity problem. These two problems need to be solved in order to avoid spurious results. Therefore, in order to overcome the problems in Model 1, random GLS regression has been done with the results as in Table 4.7. The full result also can be seen in APPENDIX A-7.

Table 4.8: Random Effect Model with FGLS regression

Independent Variable	**FIXED**
NCR	-0.5181
	(0.000)*
LLR	0.7053
	(0.000)*
NPL	0.3294
	(0.000)*
LLP	-0.3408
	(0.000)*
TA	0.4782
	(0.000)*
CBOE	-0.3678
	(0.000)*
Constant	-4.5551
	(0.000)*
Wald test	0.0000*
Panels	Homokedasti
	c
Estimated autocorrelations	0

Note: *significance at 5% level

Source: Author's own calculation based on STATA output

Table 4.8 displays Model 1 after solving the serial correlation and heterokedasticity problems. After corrections have been made also, the coefficient for all variables is significant inclusive of NPL and TA which were insignificance in the previous result. The corrected Model 1 also has significance values with no autocorrelation and homokedasticy problem detected. Therefore, the model is good for further elaboration. The final results for Model 1 are as follows:

$$PRICE_{it} = -4.5551 - 0.5181\ NCR_{it} + 0.7053\ LLR_{it} + 0.3294\ NPL_{it} - 0.3408\ LLP_{it} + 0.4782\ TA_{it} - 0.3678\ CBOE_{it} \quad (4.3)$$

Whereby:

P_{it} = stock price of the bank *i* at time *t*

NCR_{it} = net charge ratio of the bank *i* at the time *t*

LLR_{it} = loan loss reserve ratio of the bank *i* at the time *t*

NPL_{it} = non-performing loan ratio of the bank *i* at the time *t*

LLP_{it} = loan loss provision ratio of the bank *i* at the time *t*

TA_{it} = total asset of the bank *i* at the time *t*

$CBOE_{it}$ = CBOE of the bank *i* at the time *t*

The final random effect Model 1 shows that coefficients have mixed magnitudes. Three of the variables have positive magnitudes (LLR, NPL, TA) while the rest has negative magnitudes (NCR, LLP, CBOE). The positive magnitudes indicate, the increment in 1% unit of LLR, NPL and TA will increase the performance of the bank by 70.53%, 32.94% and 47.82% respectively. On the other hands, 1% increments in NCR, LLP and CBOE will reduce the bank's performance by 51.81%, 34.08% and 36.78% respectively. Logically, the higher the LLR and the lower the NCR

indicates better credit risk management, hence increase the banks performance (Al-raydeh et al., 2017). This is consistent with the previous results as discussed in Chapter 3. On the other side, the increase in NPL supposedly reduce the bank's performance while the increase in LLP may increase the banks performance, however, this study found the contradictions on the results. The result will be further investigated in the next section during individual variable analysis.

In addition, the control variables, TA, shows positive magnitude with 1 % increase in the TA, will increase 47.82% in the bank's performance. This result is consistent with the correlation analysis, in which identified high correlation between the bank's performance and the TA. This means, TA may control the variation in the banks' credit risk management practice and the price variation. On the other hand, CBOE shows negative magnitude in which indicates 1% increment in market volatility may reduce the banks performance by 36.78%. This value indicates that the higher the market volatility, the lower the bank's performance. Therefore, CBOE is significance in capture the price volatility. The constant value indicates that given all other ratios are zero, the performance of the banks or the share price is at -4.56. In other words, if the bank is not practicing credit risk management (via the mentioned variables), the performance of the bank is indexed at -4.56.

4.4.2 Model 2

Model 2 is used to meet the second objective, which is to find the effect of individual credit risk management using the individual independent variables: NCR, LLR, NPL and LLP. Each of the control variables also will be used for this study. The model is as in Equation 3.2 in Chapter 3.

Based on Table 4.9, the p-value for Breusch and Pagan Lagrangian multiplier (LM test) test is less than 0.05 shows that it rejected the null hypothesis that the variance of individual specific event is equal to zero. Hence, Random effect is better estimate for the model than the Pooled OLS. Next, the Hausman test is used to choose the most appropriate model estimation between fixed and random. The result for Hausman test shows that the p-value is 0.0003 which is less than p-value 0.05. Therefore, the null hypothesis that random effect is better estimate model is rejected. Hence, fixed effect

model is more suitable for Model 2. This model is subjected to diagnostic checks such as heteroskedasticity, autocorrelation and cross-sectional dependence.

Table 4.9: Model 2 Results

Dependent Variable	**Stock Price**			
Independent Variable	Pooled OLS	RANDOM	FIXED	GLS
NCR	-0.3607 (0.000)*	0.0927 (0.065)**	0.0803 (0.105)	-0.3611 (0.000)*
TA	0.4857 (0.000)*	-0.0920 (0.175)	-0.2065 (0.005)*	0.4857 (0.000)*
CBOE	-0.3692 (0.000)*	-0.2389 (0.000)*	-0.2205 (0.000)*	-0.3682 (0.000)*
Constant	3.9397 (0.000)*	4.8683 (0.000)*	6.1859 (0.000)*	-1.4414 (0.002)*
F-test	(0.000)*	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = 0.000* (OLS vs Random)			
Hausman test	p-value = 0.0003* (Random vs Fixed)			
R-squared	0.4811	0.1661	0.3311	

Note: *significance at 5% level, **significance at 10% level

Source: Author's own calculation based on STATA output

For diagnostics test on the goodness of the model estimation, the cross-sectionaldependence is tested on Model 2 using the Pesaran's CD test. The results in Appendix B-7 find out fixed effect model for model 2 has no cross-sectional dependency with p- value 0.000. Furthermore, the F test in Appendix B-9 that is used to detect heteroskedasticity in the model show that the model suffers heteroskedasticity with p- value less than 5%. Since, Wooldridge's approach takes the residuals from a regressionin first-differences, the result in Appendix B-8 reveals that the null hypothesis of no first-order autocorrelation is rejected with a p-value of 0.000, which is less than 5% significant. As a result, Model 2 suffers with first-order autocorrelation problem. Therefore, Table 4.9 shows the corrected fixed effect model that has overcome the heteroskedasticity and autocorrelation problem.

The corrected model is as follows:

$$PRICE_{it} = -1.4415 - 0.3611\ NCR_{it} + 0.4587\ TA_{it} - 0.3692\ CBOE_{it} \quad (4.4)$$

Whereby:

$PRICE_{it}$ = stock price of the bank *i* at time *t*

NCR_{it} = net charge ratio of the bank *i* at the time *t*

TA_{it} = total asset of the bank *i* at the time *t*

$CBOE_{it}$ = CBOE of the bank *i* at the time *t*

The corrected Model 2 reveals all significance coefficient for the independent variables and the overall goodness of the model also significant. The NCR shows negative relationship with the bank's performance. This means if the Net Charge-off ratio increase by 1%, hence the bank's performance will reduce by 36.11%. As indicated

in Table 3.2 of Chapter 3, the lower the NCR the better the credit risk management practices. In other words, the higher the NCR the poorer the credit risk management practice, hence, this theory upholds the result in Model 2 in which indicates the lower the NCR, the better the credit management practice and the better performance of the banks. The result also corresponded with the overall results in Model1 when the NCR is grouped with other credit risk variables.

4.4.3 Model 3

Model 3 is also used to generate the second objective, which is to find the effect of individual credit risk management. This time the second independent variable which is LLR and its impact on the bank's performance will be tested. According to the result in Table 4.8, the p-value for Breusch and Pagan Lagrangian multiplier (LM test) test is less than 5% which indicates random effect is better estimate for the Model 3 than the pooled OLS. Testing with the fixed effect model via Hausman Test indicates the fixed effect model is better estimation model since the p-value for Hausman Test is less than 5%. Hence, fixed effect model is more suitable for Model 3. This model is subjected to diagnostic checks such as heteroskedasticity, autocorrelation and cross-sectional dependence.

Table 4.10: Tests for Model 3

Dependent Variable	**Stock Price**			
Independent Variable	Pooled OLS	RANDOM	FIXED	GLS
LLR	0.4390	0.3401	0.3185	0.4390
	(0.000)*	(0.000)*	(0.000)*	(0.000)*
TA	0.4454	-0.0088	-0.0935	0.4454
	(0.000)*	(0.894)	(0.190)	(0.000)*
CBOE	-0.4206	-0.3251	-0.3067	-0.4206
	(0.000)*	(0.000)*	(0.000)*	(0.000)*
Constant	-2.8898	2.6811	3.7321	-2.8898
	(0.000)*	(0.002)*	(0.000)*	(0.000)*
F-test	(0.000)*	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = 0.000* (OLS vs Random)			
Hausman test		p-value = 0.0151* (Random vs Fixed)		
R-squared	0.5268	0.2816	0.2848	

Note: *significance at 5% level

Source: Author's own calculation based on STATA output

Cross-sectional dependence in model 3 is tested using Pesaran's CD test. The results in Appendix C-7 find out that random effect model for model 3 has cross sectional dependency with p-value 0.00. Besides, Wald test in Appendix C-9 that is used to detect heteroskedasticity in the model show that the model suffers heteroskedasticity with p-value 0.0000. Moreover, fixed effect for model 3 has an autocorrelation with p-value 0.000 as shown in Appendix B. Therefore, the fixed effectfor model is corrected using GLS regression for heteroskedasticity and autocorrelationproblems.

The Model 3 is as follows:

$$PRICE_{it} = -2.8890 + 0.4390\ LRR_{it} + 0.4454\ TA_{it} - 0.4206\ CBOE_{it} \quad (4.5)$$

Whereby:

$PRICE_{it}$ = stock price of the bank *i* at time *t*

LLR_{it} = loan loss reserve ratio of the bank *i* at the time *t*

TA_{it} = total asset of the bank *i* at the time *t*

$CBOE_{it}$ = CBOE of the bank *i* at the time *t*

Model 3 explains that the higher the loan reserve ratio, the higher the bank's performance. This result consistent with the ideology in Chapter 3 that indicates the higher the loan loss reserve, the stable the banks will be. This means the banks have good credit risk management practice against unforeseen circumstances. The result is consistent with the findings on LLR and its impact to the banks performance when it grouped with other credit risk variables as in Model 1.

4.4.4 Model 4

Model 4 is used to meet the second objective, which is to find the effect of individual credit risk management using one independent variable. This model uses Non-performing Loan (NPL) in order to see the impact of credit risk management variable to the bank's performance. According to Table 4.11, the p-value for Breusch and Pagan Lagrangian multiplier (LM test) test is less than 5% to indicate that the random effect model is better estimation model for Model 4 than the Pooled OLS. Next, the Hausman test is used to compare which between fixed and random effects on the best estimation coefficients for Model 4. The result for Hausman test shows that the p-

value is less than 5%. Hence, the fixed effect model is more suitable for Model 4. This model is subjected to diagnostic checks such as heteroskedasticity, autocorrelation and cross-sectional dependence.

Table 4.8: Tests for Model 4

Dependent Variable	**Stock Price**			
Independent Variable	Pooled OLS	RANDOM	FIXED	GLS
NPL	-0.1324	-0.2669	-0.2896	-0.1324
	(0.003)*	(0.000)*	(0.000)*	(0.002)*
TA	0.4549	-0.2607	-0.3771	0.4549
	(0.000)*	(0.894)	(0.190)	(0.000)*
CBOE	-0.3476	-0.2371	-0.2193	-0.3476
	(0.000)*	(0.000)*	(0.000)*	(0.000)*
Constant	-1.2377	7.0334	8.3795	-1.2377
	(0.009)*	(0.000)*	(0.000)*	(0.008)*
F-test	(0.000)*	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = 0.000* (OLS vs Random)			
Hausman test	p-value = 0.000* (Random vs Fixed)			
R-squared	0.4737	0.2849	0.2902	

Note: *significance at 5% level

Source: Author's own calculation based on STATA output

Cross-sectional dependency in model 4 is tested using Pesaran's CD test. The results in Appendix D-7 find out that fixed effect estimation for model 4 suffer has cross sectional dependence with p-value 0.00. Besides, Wald test in Appendix D-9 and autocorrelation test in Appendix D-8 reveal that Model 4 suffers from heteroskedasticity and autocorrelation problem when both p-values of the test are significant at 5% significance level. Therefore, the fixed effect estimation for Model 4 is corrected using GLS regression for heteroskedasticity and autocorrelation problem.

The results as in Table 4.9 with the equation 4.6 below:

$$PRICE_{it} = -1.2377 - 0.1325\ NPL_{it} + 0.4549\ TA_{it} - 1.2377\ CBOE_{it} \quad (4.6)$$

Whereby:

$PRICE_{it}$ = stock price of the bank i at time t

NPL_{it} = non-performing loan ratio of the bank i at the time t

TA_{it} = total asset of the bank i at the time t

$CBOE_{it}$ = CBOE of the bank i at the time t

The results for Model 4 shows that the NPL has negative relationship with the bank's performance. This means, the higher the NPL, the lower the bank's performance. Based on the equation, if NPL of the bank is decreased by 1%, then the bank's performance will increase by 13.25%. This indicates better NPL management will help to manage credit risk of the banks. This result is consistent with the ideology pro founded in Chapter 3 whereby the lower the NPL, the more sustainable the bank will be. However, the result is inconsistent with the overall result in Model 1.

Model 1 explains significance NPL coefficient with positive relationship with the bank's performance. However, the individual inspections on the NPL relationship with the bank's performance is the other way around. This research suggests that the contradictions of the result might due to various factors. For example, correlation analysis that has been done at the beginning of the Chapter 4 also indicates a negative correlation between NPL and the stock price. In addition, the correlation analysis also shows that NPL has high negative correlation with LLR.

However, the VIF test does not indicates the high correlations problem between these two variables, hence, this study does not decide to drop one of the subjects. The high negative correlations occur since the losses from the NPL will be covered by LLR. Hence, low LLR might give indications high NPL has occurred and the banks need to top-up the LLR in order to stabilize the bank's credit risk management. This theoretical identification is consistent with the idea of LLR is an important part of bank's ability to sustain losses (Romero, 2012). This study might suggest future researchers to identify

the contradiction of the findings in this study with the theoretical finance on LLR and NPL.

4.4.5 Model 5

Model 5 is used to meet identify the impact of credit risk management variable, LLP to the bank's performance. Referring to Table 4.10, the p-value for Breusch and Pagan Lagrangian multiplier (LM test) test is less than 5% indicates that the variance of individual specific event is equal to zero. Hence, random effect estimation is better for model 5 than the pooled OLS. Next, the Hausman test is used to compare between fixed and random effects estimation for the model. The result for Hausman test shows that the p-value is 0.0210 which is less than the p-value, 5%. Therefore, the alternative hypothesis that fixed effect is better estimate model is accepted for Model 5. This model is subjected to diagnostic checks such as heteroskedasticity, autocorrelation and cross-sectional dependence tests.

Table 4.9: Tests for Model 5

Dependent Variable	**Stock Price**			
Independent Variable	Pooled OLS	RANDOM	FIXED	GLS
LLP	-0.3482 (0.000)*	-0.3260 (0.000)*	-0.2896 (0.000)*	-0.3482 (0.000)*
TA	0.4566 (0.000)*	-0.0165 (0.799)	-0.3771 (0.190)	0.4566 (0.000)*
CBOE	-0.2129 (0.019)*	-0.1409 (0.000)*	-0.2193 (0.000)*	-0.2125 (0.018)*
Constant	-1.7499 (0.000)*	3.6859 (0.000)*	-0.3138 (0.000)*	-1.7493 (0.000)*
F-test	(0.000)*	(0.000)*	(0.000)*	(0.000)*
BP LM test	p-value = 0.000* (OLS vs Random)			
Hausman test	p-value = 0.021* (Random vs Fixed)			
R-squared	0.4826	0.3203	0.3227	

Note: *significance at 5% level

Source: Author's own calculation based on STATA output

Cross-sectional dependence in model 5 is tested using Pesaran's CD test. The results in Appendix E-7 reveals that fixed effect model for Model 5 has cross sectional dependency with p-value less than 5%. Besides, Wald test in Appendix D-9 that is used to detect heteroskedasticity in the model show that the model suffers heteroskedasticity problem when the p-value less than 5%. Moreover, fixed effect for Model 5 also has an autocorrelation problem when the p-value is less than 5% as shown in Appendix D-8. Therefore, the fixed effect for model is corrected using GLS regression for heteroskedasticity, autocorrelation and cross-sectional dependence.

The equation for the corrected Model 5 is as below:

$$PRICE_{it} = -1.7493 - 0.3482\ LLP_{it} + 0.4566 TA_{it} - 1.7493\ CBOE_{it} \quad (4.7)$$

Whereby:

$PRICE_{it}$ = stock price of the bank *i* at time *t*

LLP_{it} = loan loss provision ratio of the bank *i* at the time *t*

TA_{it} = total asset of the bank *i* at the time *t*

$CBOE_{it}$ = CBOE of the bank *i* at the time *t*

i = entity and *t* = time.

The results indicate that the LLP has significance negative relationship with the bank's performance. In other words, 1% increase in LLP will decrease the bank's performance by 34.82%. The result of individual relationship of LLP with the bank's performance is consistent with the result from the overall variables as in Model 1. However, the relationship is contradicting with the profound theories in Chapter 3. Logically, the increase in bank's loan loss provision, may increase the sustainability of the bank during economic fluctuations. This is because loan loss provision may help the

bank to balance the income and survive during bad times via the portion of loan repayments that has been set aside by the banks to cover the portions of the loss on the defaulted loan payments (Islam, 2018).

In credit risk management perspective, higher LLP may indicate good credit risk management practice, hence, increase the bank's performance. However, the conflicting results found in this study may be due to various reasons. For example, low LLP might be due to the increase of the default payments that urged the banks to use the provisions. However, since the loss still can be covered by the provisions or LLP is not indefinite, hence the bank can be considered as successful to balance the income to cover the losses during the bad times.

In addition, the data for this study inclusive of the data for the pandemic Covid-19 year, which is 2020, hence, this research argues that, the data might give impact to the result. This is because, during the pandemic Covid 19 years, economic has sharply declined with a spike in unemployment occurrence. This situation undoubtedly rises to many loan defaulters (OECD, 2018). Moreover, the government of Malaysia has induced automatic 6 months moratorium in 2020, this point also might cause the low value of LLP. However, further analysis needs to be done to identify the cause of negative relationship between the LLP and the bank's performance.

4.5 Conclusion

The findings from this study suggests all of the credit risk management variables namely NCR, LLR, NPL and LLP are significantly giving impact to the bank's performance in various magnitude. Except NPL and LLP, the result of the rest of the variables are consistent with the theories in Chapter 3. This study is not considering to drop the variables since the variables is fit with the model and the multicollinearity problem is not exist. The contradicting of the results for NPL and LLP may be due to various reasons such as fluctuating data during pandemic Covid-19 which may cause to the increment of the defaulters. Hence, this study suggests further investigations to be done in the future