CHAPTER SEVEN : RESEARCH FINDINGS II

7.1 Introduction

This chapter discusses the findings with regard to the Islamic and conventional banks before and after the 2008 financial crisis. It started with an overview of extended hypotheses followed by the descriptive statistics for both Islamic and conventional banks before and after the crisis. The next section discusses the model explanatory power as well as the collinearity of the variables in the research. This is followed by an explanation of multiple regressions using PLS-SEM on the factors that determine profitability and insolvency risks (X on Y) and liquidity factors (X on M). Second, the last section discusses the analysis of the comparison between profitability and insolvency risks (z score) before and after the crisis. The final section analyzed the mediating roles and effects between the factors that determine liquidity, profitability, and insolvency risks (z score) before and after the 2008 financial crisis.

7.2 Summary of Descriptive Statistics (Before and After the Crisis Period)

This study has 10 latent variables (LVs) for the 21 indicators whose proxies have been calculated. The model and step for the data analysis are similar as in Chapter 6 above. Tables 7.1 and 7.2 show the summary descriptive statistics of mean and standard deviations. Based on the average liquidity, the conventional banks surpassed Islamic banks. In particular, after the crisis period conventional has high liquidity (118%) compared to the before crisis period which is around 114%. This indicates that conventional banks after the 2008 financial crisis have surpassed all other periods in

maintaining adequate liquidity. Profitability indicators, such as the return on average assets (1.63%) and return on average equity (18.32%) in the conventional banks before the crisis period are higher than in the Islamic banks after the crisis as well as conventional banks after the crisis periods. The net interest margin (2.44%), in the Islamic banks after the crisis category is greater than in the all other periods.

The above results might be because from the data, this research noted that conventional banks before the crisis period had contributed to high ROAA and ROAE, while Islamic banks before the crisis period contributed more in the interest (profit) income. This is consistent with the observation in table 7.2 that shows that the conventional banks before the crisis period has high-inefficiency ratios (measured by PE/NI), and high earning quality ratios (measured by NII/GR), which would generate a better ROAA and ROAE. The Islamic banks after the crisis has a better interest-earning ratio. Besides, the mean and standard deviation for all factors in each period are almost equal. The only difference is for growth on gross loans, efficiency ratios measured by (TE/TR) and concentration which is significantly different in each period. Therefore, differences in the liquidity level are not only confined to the bank specific factors and macroeconomic factors but also exist before and after the crisis periods.

Table 7. 1: Descriptive statistics for the exogenous indicators (bank specific factors and macroeconomic factors) for each bank's category.

Variables	Items	Islamic banks, before and after crisis				Conventional banks, before and after crisis			
		Before crisis		After Crisis		Before crisis		After crisis	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
	EQNL	45.16	195.41	12.98	5.50	52.16	111.62	149.20	658.13
Capital Adequacy Ratio	EQTA	10.32	14.32	7.96	3.00	11.73	8.64	15.33	14.67
	CRISK	31.76	31.20	75.94	29.83	43.17	28.91	152.51	185.58
	GGL	3122.38	13965.85	19.76	27.04	11.55	36.87	182.58	2244.80
Assets Quality	RILIL	168.50	399.94	128.06	67.00	136.44	289.00	374.15	1439.53
	TE/TR	290.78	792.95	139.60	40.14	106.55	103.51	110.87	30.44
	PE/NI	129.89	282.27	103.22	284.52	85.16	210.07	105.22	419.05
Management Efficiency	OH/TA	1.48	3.64	0.88	0.37	0.72	0.34	0.71	0.55
	IER	66.85	44.93	335.56	2520.16	61.39	67.39	93.84	90.05
	OI/AS	4.32	2.52	2.82	1.60	4.69	2.58	2.83	1.77
Earning Quality	NII/GR	19.36	17.07	12.55	8.82	33.43	20.67	33.07	16.11
Inflation	INF	3.28	1.57	2.06	0.79	2.39	1.34	2.10	0.76
	GDPG	5.49	1.36	4.55	2.54	5.46	2.03	4.65	2.36
GDP	GDPC	1.46	3.25	3.74	0.88	2.39	2.63	3.70	0.86
Concentration	HHI	2302.49	1771.20	1218.22	174.25	1081.99	72.47	1150.16	64.39

Table 7. 2: Descriptive arithmetic mean statistics for the endogenous variable (i.e.,, liquidity, profitability and insolvency risks) for each bank before and after 2008 financial crisis.

Descriptive Statistics (Liquidity)				
	Islamic banks		Conventional banks	
Variable	Before	After	Before	After
LCR	98.18	75.84	126.17	133.81
NSFR	119.99	98.76	102.07	102.27
Average	109.09	87.30	114.12	118.04

Descriptive Statistics (Banks profitability and Z Score)				
	Islamic Banks		Conventional Banks	
Variable	Before	After	Before	After
ROAA	0.20	0.94	1.63	1.25
ROAE	-6.61	13.94	18.32	13.14
NIM	2.40	2.44	2.26	1.98
Z Score	-4.59	19.04	20.56	21.79

7.3 Result and Discussion: Islamic and Conventional Banks Before and After the Crisis Period

All the R^2 reported in table 7.5 and 7.6 below indicates that the model 's explanatory power provides a moderate predictive ability for the dependent variable in each period. However, the R^2 for z score of the Islamic banks before the crisis period is quite low, approximately 0.29% (see table 7.5) because it excludes some important

measures of the insolvency risks variable. The significant value and structural coefficient estimate among the latent variables (LVs) for each model are presented in Table 7.5 (Islamic banks before and after crisis period) and Table 7.6 (Conventional banks before and after crisis period).

Table 7.5 presents the Model A and B of the PLS-SEM statistically significant estimates for the factors that determine liquidity and the bank's profitability and insolvency risks (z score) for Islamic banks. On the other hand table 7.6 presents the Model A of the PLS-SEM statistically significant estimates for the factors that determine liquidity and bank profitability and insolvency risks for conventional banks. Table 7.3 and 7.4 shows that no multicollinearity issue was detected for all the periods. All Variance Inflation Factor (VIF) values were within the acceptable threshold of less than five.

Table 7. 3: Assessment of Collinearity (Islamic banks before and after the crisis)

	Islamic banks after the crisis			Islamic banks before the crisis		
Variables	**Liquidity**	**Profitability**	**Z Score**	**Liquidity**	**Profitability**	**Z Score**
CAR	1.657	1.808	1.805	1.77	2.683	2.632
Assets Quality	1.891	2.000	1.949	3.844	3.951	3.923
Efficiency	1.651	1.769	1.684	4.134	4.675	4.648
Earning Quality	1.343	1.357	1.352	1.323	1.439	1.419
Inflation	2.093	2.13	2.13	4.453	4.469	4.455
GDP	1.869	1.926	1.917	2.892	2.918	2.904
Concentration	2.966	3.566	3.387	2.163	3.63	2.982
Liquidity	-	1.972	1.921	-	3.464	3.462
Profitability	-	-	-	-	-	-
Z Score	-	1.831	-	-	1.694	-

Table 7. 4: Assessment of Collinearity (Conventional banks before and after the crisis)

	Conventional banks after the crisis			Conventional banks before the crisis		
Variables	**Liquidity**	**Profitability**	**Z Score**	**Liquidity**	**Profitability**	**Z Score**
CAR	1.353	1.928	1.927	1.224	2.444	2.369
Assets Quality	1.175	1.211	1.211	1.213	1.268	1.23
Efficiency	1.541	1.556	1.543	1.123	1.158	1.134
Earnings Quality	1.074	1.078	1.078	1.053	1.055	1.053
Inflation	2.171	2.485	2.172	2.748	3.075	2.752
GDP	1.658	1.659	1.659	3.094	3.144	3.111
Concentration	1.563	2.024	1.615	2.176	2.2	2.199
Liquidity	-	1.592	1.576	-	2.33	2.243
Profitability	-	-	-	-	-	-
Z Score	-	2.096	-	-	1.712	-

Table 7. 5: Significant Results of the Factors that Determine Liquidity, Profitability and Insolvency Risks (Islamic Banks Before and After Crisis)

	Islamic bank after crisis (2009-2016)			Islamic bank before crisis (2000-2007		
Panel A	coef. (β)	Std.error	Critical ratio	coef. (β)	Std.error	Critical ratio
CAR -> Liquidity (C1)	0.278	0.141	1.967*	0.499	0.283	1.761*
Asset Quality -> Liquidity (C2)	0.174	0.297	0.585	0.151	0.487	0.309
Efficiency -> Liquidity (C3)	0.132	0.133	0.991	-0.385	0.486	0.793
Earning Quality -> Liquidity (C4)	-0.067	0.1	0.671	0.166	0.158	1.049
Inflation -> Liquidity (C5)	0.138	0.104	1.324	0.018	0.265	0.066
GDP -> Liquidity (C6)	-0.158	0.143	1.109	0.06	0.246	0.242
Concentration -> Liquidity (C7)	-0.468	0.155	3.023***	-0.486	0.331	1.469
Panel B						
CAR -> Profitability (F1)	-0.351	0.255	1.376	-0.288	0.348	0.828
Assets Quality -> Profitability (F2)	-0.393	0.37	1.062	-0.252	0.392	0.643
Efficiency -> Profitability (F3)	-0.617	0.18	3.421***	-0.693	0.431	1.607
Earning Quality -> Profitability (F4)	-0.034	0.159	0.212	-0.022	0.247	0.091
Inflation -> Profitability (F5)	-0.179	0.108	1.657*	-0.366	0.317	1.153
GDP -> Profitability (F6)	0.096	0.145	0.662	-0.207	0.266	0.779
Concentration -> Profitability (F7)	0.187	0.206	0.907	-0.262	0.297	0.882
CAR -> Z Score (F8)	0.035	0.093	0.379	0.174	0.197	0.882
Assets Quality -> Z Score (F9)	-0.168	0.201	0.834	-0.129	0.303	0.425
Efficiency -> Z Score (F10)	0.215	0.125	1.721*	0.126	0.346	0.364
Earning Quality -> Z Score (11)	0.055	0.112	0.486	0.109	0.199	0.548
Inflation -> Z Score (F12)	0.011	0.1	0.111	0.092	0.384	0.238
GDP -> Z Score (F13)	0.069	0.101	0.677	0.088	0.396	0.223
Concentration -> Z Score (F14)	0.313	0.133	2.352**	0.619	0.204	3.028***
Panel C						
Liquidity -> Profitability (F15)	0.201	0.146	1.38	-0.035	0.238	0.148
Liquidity -> Z Score (F16)	-0.168	0.099	1.706*	-0.034	0.189	0.179
R Square(R2) – Liquidity	0.448			0.661		
R Square (R2) – Profitability	0.527			0.701		
R Square (R2)- Z Score	0.415			0.289		

Table 7. 6: Significant Results of the Factors that Determine Liquidity, Profitability and Insolvency Risks (Conventional Banks Before and After Crisis)

	Conventional after crisis (2009-2016)			Conventional before crisis (2000-2007)		
Panel A	coef. (β)	Std.error	Critical ratio	coef. (β)	Std.error	Critical ratio
CAR -> Liquidity (C1)	0.603	0.123	4.905***	0.714	0.11	6.5***
Asset Quality -> Liquidity (C2)	-0.149	0.161	0.928	0.086	0.126	0.68
Efficiency -> Liquidity (C3)	-0.036	0.09	0.402	0.071	0.093	0.764
Earning Quality -> Liquidity (C4)	0.048	0.138	0.349	0.012	0.089	0.132
Inflation -> Liquidity (C5)	-0.03	0.105	0.285	0.041	0.078	0.527
GDP -> Liquidity (C6)	0.015	0.076	0.197	-0.086	0.107	0.805
Concentration -> Liquidity (C7)	-0.181	0.085	2.137**	-0.1	0.069	1.438
Panel B						
CAR -> Profitability (F1)	-0.018	0.111	0.162	-0.585	0.454	1.289
Assets Quality -> Profitability (F2)	-0.194	0.105	1.85*	0	0.146	0.002
Efficiency -> Profitability (F3)	-0.612	0.094	6.496***	0.112	0.224	0.502
Earnings Quality -> Profitability (F4)	0.137	0.12	1.135	-0.094	0.196	0.482
Inflation -> Profitability (F5)	0.077	0.07	1.107	0.103	0.131	0.792
GDP -> Profitability (F6)	-0.017	0.055	0.304	0.09	0.121	0.744
Concentration -> Profitability (F7)	-0.189	0.078	2.409**	0.094	0.116	0.81
CAR -> Z Score (F8)	-0.029	0.078	0.367	0.209	0.113	1.843*
Assets Quality -> Z Score (F9)	0.008	0.057	0.137	0.149	0.194	0.769
Efficiency -> Z Score (F10)	0.076	0.065	1.174	0.119	0.129	0.918
Earnings Quality -> Z Score (F11)	0.015	0.068	0.221	0.036	0.093	0.389
Inflation -> Z Score (F12)	0.386	0.089	4.359***	-0.435	0.066	6.604*
GDP -> Z Score (F13)	-0.014	0.059	0.237	0.139	0.057	2.444**
Concentration -> Z Score (F14)	0.442	0.067	6.613***	-0.023	0.046	0.502
Panel C						
Liquidity -> Profitability (F15)	-0.255	0.113	2.257**	0.043	0.181	0.238
Liquidity -> Z Score (F16)	0.087	0.065	1.345	-0.225	0.117	1.922*
R Square(R2) – Liquidity	0.342			0.537		
R Square (R2) – Profitability	0.643			0.336		
R Square (R2)- Z Score	0.503			0.39		

7.3.1 Result of Research Question 1: Factors that Determine Bank's Profitability and Insolvency Risks Before and After the Crisis Period (RQ 1)

Hypothesis 1 predicts that bank specific factors and macroeconomic factors have a statistically significant relationship with the profitability and insolvency risks (z score) for Islamic and conventional banks before and after the crisis period. The discussion of results will start with the first research question. "*What is the effect of bank specific factors and macroeconomic factors on the profitability and insolvency risks (z score) before and after the crisis period for Islamic and conventional banks?"*

- **Islamic bank after and before the crisis period.** For the Islamic bank's profitability sample, panel B of table 7.5 shows that only efficiency and inflation have significant

negative relationships with profitability after the crisis period. This is in line with the research hypothesis (i.e. F2 and F5 respectively). For efficiency, the findings is in line with ES concept while for inflation the findings is in line with uncertainty concept. Accordingly, F3 and F5 hypotheses are accepted for Islamic banks profitability model after the crisis period. For z score model, the results revealed that only concentration, and efficiency has a significant positive relationship with insolvency risks (z score) after the crisis period. For concentration, the findings is in line with this research hypothesis (F14), while for efficiency, the findings is contrary to this research hypothesis (F10). Thus, F14 hypotheis is accepted for Islamic banks after the crisis study while, F10 hypothesis is rejected. However, before the crisis period panel B of table 7.5, the only variable that has a significant relationship with the insolvency risks (z score) is concentration (positive) and the findings reflects the F14 hypotheis. Accordingly, hypothesis F1-F13 is rejected for Islamic banks before the crisis period studies, but only F14 hypothesis is accepted.

- **Conventional bank before and after the crisis.** For the conventional banks after the crisis sample, panel B, table 7.6 shows that only concentration (contrary to this research hypothesis) and efficiency (consistent with this research hypothesis) have a negative relationship on profitability. In the insolvency risks (z score) model, a positive effect was found between concentration (consistent with this research hypothesis) and inflation (contrary to this research hypothesis). Thus, hypotheses F5 and F7 is rejected for conventional banks after the crisis period profitability model. On the other hand, F12 hypotheis is rejected and F14 hypotheis is accepted for insolvency risks (z score) model.

As for before the crisis sample, table 7.6, shows no significant effects for profitability model were found. Thus, all hypotheses F1-F7 are rejected. However, for

the insolvency risks (z score) model before the crisis period, panel B of table 7.6, shows CAR and GDP have a positive significant effect with Z insolvency riks (z score) both of which are consistent to this research hypothesis (i.e. hypothesis F8 and F13. However, negative relationship of inflation with insolvency risks (z score) is consistent with this research hypothesis (F12).

In sum, the results highlight some specific factors disparities in terms of the sign and significance level before and after the crisis period. This is probably because of the difference strategies of operations adopted by both Islamic and conventional banks before and after the crisis period.

As shown by descriptive statistics explained above, Malaysian Islamic banks before the crisis period, large banks (i.e., bank Islam and bank Muamalat) indicate more significant market power (i.e. concentration). On the other hand; Islamic banks after the crisis period have lower expenses which enables them to increase their profitability. In addition, high inflation affects the banks negatively by decreasing their overall returns on assets, return on equity and NIM. This leads to lower bank profitability because of the increase in the general price of goods and services leads to consumers decreased their saving possibly affecting liquidity and subsequently lower profitability. For the conventional banks after the crisis period, the increase in bank concentration lowers profitability but increases the solvency. On the other hand, an decrease in inefficiency through cost reductions tends to increase overall profitability and at the same time, reduces insolvency. The less liquid bank is, the higher profitability and more vulnerable the banks will be to insolvency risks. An increase in bank solvency through a higher z score increases the overall bank's profitability. The different outcomes of how banks and macroeconomic factors affect profitability and insolvency (z score) before and after

the crisis for Islamic and conventional banks also reflects how the bank manages its assets and liabilities mismatches (liquidity).

7.3.2 Results of Research Question 2: Factors that Determine Bank's Liquidity Before and After the Crisis Period (RQ 2)

Group hypothesis 2 predicts that bank specific factors and macroeconomic factors have a significant relationship with liquidity before and after the crisis period. The discussion of results will start with the second research question: "*What is the effect of the bank specific factors and macroeconomic factors on the liquidity of Islamic and conventional banks in Malaysia before and after the crisis period?"*

- **Islamic banks after and before the crisis period:** Panel A of tables 7.5 show for the after-crisis period samples of Islamic banks, only CAR (Positive) and concentration (Negative) have significant relationships with banks liquidity. The positive relationship of CAR with liquidity is in line with this research hypothesis (i.e hypothesis C1) and risk absorption concept. However, a negative relationship of concentration risk with liquidity is contrary to this research hypothesis (i.e. hypothesis C7). On the other hand, before the crisis sample, panel A of table 7.5, also only CAR have a significant positive relationship with the bank's liquidity which is also in line with this research hypothesis and risk absorption concept. Accordingly, hypothesis C1 is accepted both before and after the crisis period of this study. On the other hand, hypothesis C2-C7 are rejected both before and after the crisis period for Islamic banks study. The implications for this findings will be explained after.
- **Conventional bank after and before the crisis.** For after the crisis sample of conventional banks, panel A of table 7.6 shows that only CAR (positive) and concentration risk (Negative) variables have a significant relationship with the bank's

liquidity. A positive relationship of CAR with liquidity is in line with this research hypothesis (i.e. hypothesis C1) and risk absorption concept. However, a negative relationship of concentration risk with liquidity is contrary to this research hypothesis (i.e. hypothesis C7). On the other hand, for the conventional banks before the crisis sample, panel A of table 7.6 shows that only CAR has a significant positive relationship with the bank's liquidity which is also in line with this research hypothesis and risk absorption concept. Accordingly, hypothesis C1 is accepted both before and after the crisis period of this study, while hypothesis C2-C7 are rejected both before and after the crisis period for conventional banks study. The implications for this findings will be explained after.

7.3.3 Results of the Research Question 3: The Effect of Liquidity on Banks Profitability and Insolvency risks (z score) Before and After the Crisis Period?

Group hypothesis 3 predicts a relationship between the bank's liquidity and profitability and insolvency risks (z score). The discussion of results will start with the third research question: *"Does the liquidity effect the profitability and insolvency risks of Islamic and conventional banks in Malaysia before and after the crisis period?"*

According to the Islamic bank's samples (table 7.5), only after the crisis period show a significant but negative relationship of liquidity with insolvency risks (z score) but not before the crisis period. Though the findings is significant but a negative relationship makes it contrary to this research hypothesis (i.e. hypothesis F16). On the other hand, no significant relationship was found between liquidity and profitability both before and after the crisis period. Thus, both F15 and F16 hypotheses are rejected for Islamic banks study before and after the crisis period.

For conventional banks samples (table 7.6), there is a significant negative relationship between liquidity and bank profitability for conventional banks after the crisis period (i.e. F15, table 26). However no relationship was found after the crisis between liquidity and insolvency risks (i.e. F16 hypothesis). Thus, both hypothesis F15 anf F16 are rejected for conventional banks after the crisis period study. On the other hand, a significant negative relationship between liquidity and insolvency risks (z score) was found before the crisis period, but no any significant relationship was detected for the relationship between liquidity and profitability. Both findings are contrary to this research hypothesis. Thus hypothesis F15 and F16 are rejected also for conventional banks study before the crisis period.

In summary, the hypotheses that there is a positive relationship between the bank's liquidity and profitability and insolvency risks (z score) can be rejected for both Islamic and conventional banks after and before the crisis period. The negative relationship of liquidity and profitability for conventional banks after the crisis indicates that high liquidity is not necessarily to increase the bank's profitability, while the negative relationship of liquidity and insolvency risks (z score) in conventional banks before the crisis period means an increase in liquidity reduces the bank's solvency. With these relationships, this study will further investigate whether the bank's liquidity might indirectly affect or mediate the relationship between the bank specific factors and macroeconomic factors and profitability and insolvency risks (z score). This will be discussed later in this chapter.

In sum, most of the liquidity factors show an inconsistent sign coefficient within the Islamic and conventional banks after and before the crisis period. On the other hand, contrary to the research hypothesis, no positive relationship was observed between bank's liquidity and profitability and insolvency risks (z score) for both Islamic and

conventional bank's profitability and insolvency risks (z score) models in both before and after the crisis period studies.

7.3.4 Results of the Research Question 4: Comparison Between Liquidity, Profitability and Insolvency Risks (Z Score) Before and After the Crisis Period (RQ 3).

The research will start with the discussions on research questions four: *"Does the profitability, insolvency risks and liquidity of Islamic and conventional banks in Malaysia differ before and after the crisis period?"*

In chapter 6 above, this research performed the multi-group analysis to examine significant differences for each parameter (path coefficients) between Islamic and conventional banks. This section extends this to examine whether the path coefficient estimates before and after the crisis period differ between Islamic and conventional banks. The Smith- Satterthwaite test (SST) is used to compute its significant value (Chin, 2000).

In Table 7.7 and 7.8, the results are presented in two stages: (i) the comparison between the Islamic banks before and after the crisis period, and (ii) the comparison between the conventional banks before and after the crisis period. In the first SST analysis, the null hypothesis cannot be rejected because all of the path coefficients to the bank's liquidity, profitability and insolvency risks (z score) are equal for Islamic banks before and after the crisis period. However, the second SST analysis shows that some of the path coefficients in the conventional bank's samples significantly differ before and after the financial crisis period. This reveals that only the relationships between bank's liquidity, profitability and insolvency risks (z score) in the conventional bank's study differ before and after the crisis period but not for the Islamic banks.

However, during the analysis both studies are analyzed in order to know the overall effects on Malaysian banking sector.

The research model for Islamic banks shows Model A for the coefficient difference before and after the crisis period, the same standard errors assumed, and unequal standard errors assumed. The research model for conventional banks shows Model A for the coefficient difference before and after the crisis period, equal standard errors assumed, and unequal standard errors assumed.

Table 7. 7: Multi-group analysis for Islamic banks before and after the crisis period

MGA Islamic Banks Before/After	(diff)	Equal standard errors assumed	Unequal standard errors assumed
Panel A			
CAR -> Liquidity	0.221	0.141	0.499
Assets Quality -> Liquidity	-0.023	0.297	0.041
Efficiency -> Liquidity	-0.517	0.133	-0.385
Earning Quality -> Liquidity	0.233	0.1	0.166
Inflation -> Liquidity	-0.12	0.104	0.018
GDP -> Liquidity	0.218	0.143	0.06
Concentration -> Liquidity	-0.018	0.155	-0.486
Panel B			
CAR -> Profitability	0.089	0.255	-0.262
Assets Quality -> Profitability	0.141	0.37	-0.252
Efficiency -> Profitability	-0.076	0.18	-0.693
Earning Quality -> Profitability	0.012	0.159	-0.022
Inflation -> Profitability	-0.187	0.108	-0.366
GDP -> Profitability	-0.303	0.145	-0.207
Concentration -> Profitability	-0.449	0.206	-0.262
CAR -> Z Score	0.139	0.093	0.174
Assets Quality -> Z Score	0.039	0.201	-0.129
Efficiency -> Z Score	-0.089	0.125	0.126
Earning Quality -> Z Score	0.054	0.112	0.109
Inflation -> Z Score	0.081	0.100	0.092
GDP -> Z Score	0.019	0.101	0.088
Concentration -> Z Score	0.306	0.133	0.619
Panel C			
Liquidity -> Profitability	-0.166	0.146	0.035
Liquidity -> Z Score	-0.172	0.099	-0.340

Table 7. 8: Multi-group analysis for conventional banks before and after crisis period

MGA conventional Before/After	(diff)	Equal standard errors assumed	Unequal standard errors assumed
Panel A			
CAR -> Liquidity	0.111	0.674	0.674
Assets Quality -> Liquidity	0.235	1.149	1.152
Efficiency -> Liquidity	0.107	0.829	0.829
Earning Quality -> Liquidity	-0.036	0.219	0.220
Inflation -> Liquidity	0.071	0.543	0.544
GDP -> Liquidity	-0.05	0.359	0.359
Concentration -> Liquidity	0.081	0.74	0.742
Panel B			
CAR -> Profitability	-0.547	1.184	1.173
Assets Quality -> Profitability	0.194	1.085	1.082
Efficiency -> Profitability	0.724	3.009***	2.988***
Earning Quality -> Profitability	0.231	1.012	1.008
Inflation -> Profitability	0.026	0.176	0.176
GDP -> Profitability	0.107	0.813	0.807
Concentration -> Profitability	0.283	2.037**	2.03
CAR -> Z Score	0.238	1.744*	1.738*
Assets Quality -> Z Score	0.141	0.705	0.699
Efficiency -> Z Score	0.043	0.3	0.298
Earning Quality -> Z Score	0.021	0.183	0.183
Inflation -> Z Score	-0.821	7.406***	7.429***
GDP -> Z Score	0.153	1.869*	1.87*
Concentration -> Z Score	-0.465	5.715***	5.736***
Liquidity -> Profitability	0.298	1.406	1.4
Liquidity -> Z Score	-0.312	2.35**	2.337**

7.3.5 Mediating Roles Between the Factors that Determine Liquidity and Profitability and Z Score Before and After the Crisis Period (RQ 4)

This study examine the mediation effects for Islamic and conventional banks before and after the crisis period. Previously, Chapter 6 specified that there are potential mediation effects between the factors that determine liquidity and the bank's profitability only for pooled and Islamic bank's study. It is expected that there is a mediation effect before and after the crisis period for both Islamic and conventional banks. The comprehensive test for the mediation effects in PLS-SEM is by following the precondition that ought to be met (Iacobucci & Duhachek, 2003; Mackinnon et al., 1995; and Zhao et al. 2010) claim that the requirement for mediation to exist is that the indirect effect (*path: a x b*) should be significant.

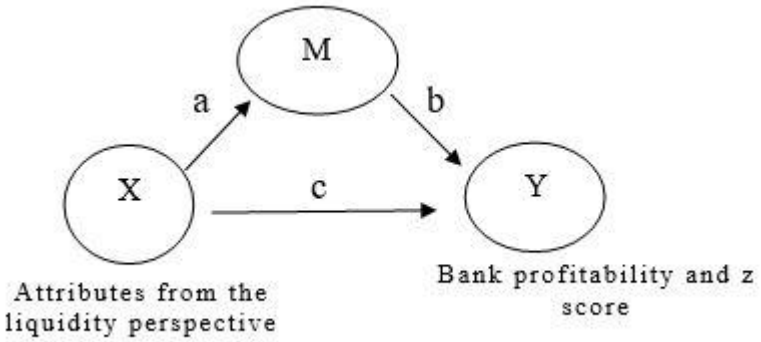
Mediation Effect of Banks Liquidity Before and After the Crisis Period

A. The total effect or direct effect $X \rightarrow Y$ relationships in mediation analysis

At first glance, the relationship in hypothesis 3 between banks liquidity and profitability and z score (path *"b"*) shows that, no any significant positive relationship was found between liquidity and profitability in either before or after the crisis period for Islamic banks. However, a significant negative relationship was found between liquidity and insolvency risks (z score) in Islamic banks after the crisis. In addition, a significant negative relationship was found between liquidity and profitability in conventional banks after the crisis. At the same time, a significant negative relationship was detected between liquidity and insolvency risks (z score) in conventional banks before the crisis period.

Since some significant relationships were detected, an important question then arises: Are the relationships between the bank specific factors and macroeconomic factors and profitability and insolvency risks (z score) mediated by liquidity in those

periods? In table 7.9 and 7.10, a bootstrap T-statistics is computed to examine mediation following Hair et al., (2013); and Preacher & Hayes, (2008) recommendations. The following explanation is the summary of the mediation test analysis results. All explanations are based on the path diagram coefficients:



Note: a, b, c, are the path coefficients between the construct

Figure 7. 1: Path diagram coefficients for mediation effects

Table 7.9 and 7.10 summarizes the significant mediation analysis results between 2 sub-samples, i.e., Islamic and conventional banks after the crisis period. Based on the typology of mediation explained in methodology chapter (i.e. chapter 5), the framework for mediation analysis results of table 7.9 and 7.10 show that only 3 cases for mediation were found during all the periods. (i.e., 1 cases for Islamic banks after the crisis period and 2 cases for conventional banks after the crisis period). The type of mediation for Islamic banks after the crisis period can be considered as "complementary" (i.e., concentration-liquidity-z score). On the other hand, the mediation for conventional banks after the crisis is considered as "indirect-only mediation" (i.e. CAR-Liquidity- Profitability) and "competitive mediation" i.e. (Concentration – Liquidity – Profitability). The following paraghraphs provide the

possible evidence behind these types of mediation and discusses the practical implications, and the implications for concept building.

A. **Complementary mediation:** this type of mediation was shown in table 7.9, of the Islamic banks after the crisis period, for the relationships of concentration - liquidity – insolvency risks (z score). The indirect effect *a x b* as shown in table 7.5 is significant and positive ab=- 0.0786 (a=-0.468, b=-0.168). The direct effect as also shown in table 7.5 is significant and positive c=0.313. Multiplying the coefficients of the indirect and direct effects (a x b x c = 0.0246) is positive with a significance level of 95% CI by bootstrap analysis (t=1.757, table 7.9). This condition is considered complementary mediation (multiplying a x b x c results in a significant and positive value).

Implication: The positive sign of the direct and indirect effect in the relationship of concentration – liquidity – insolvency risks (z score) as shown in table 7.9 (Islamic banks post crisis period) is possible and it can give information for concept building. The direct path c "positive" sign for the X→Y relationship means, the higher concentrations by banks makes them more strong in terms of capitalization to withstand losses for a long time and be solvent. This is good reason to expect a positive relationship (Rucker et al., 2011; Zhao et al., 2010). Normally, the relationship of the direct effect should be clear based on the findings by previous studies. For example previous studies, particularly Horvath, et al. (2016), suggests that low concentration (X) lead to high liquidity (M) and high liquidity will lead to low banks solvency (z score) because holding excessive funds without invisting in a profitable ventures (Y). This is consistent with the risk return trade off concept explained in chapter 4. The banks with low concentration tend to have a positive view in the interbank money market at the time when it needs funding to improve its liquidity position due to the low risk (however, such high liquidity without avenues to invest it will undemine the bank's

solvency) since the high concentration act as an adverse effect that tends to threaten the bank's existence when there is corporate hazards among the top management officials or defaults by the concentracted sector. Low concentration can led to the improve in liquidity but can result in decrease of bank's insolvency.

Thus, the results show that the liquidity level acts as a bridge between the concentration risk and banks insolvency risks for the positive indirect effect. However, a low concentration leads to low insolvency (low z score), creating a positive direct effect c. Concentration ↓ Z Score ↓. Based on the previous studies, banks with high concentration to a particular sector are considered vulnerable as it may lead to bankruptcy at the time of defaults because the concentrated sector will adversely effects the bank stability, thereby increasing the bank insolvency risks. So, the relationship between low concentration and insolvency risks (z score) is expected to be a positive direct effect "c" in line with this research findings. Also, the mediated paths a x b is positive (consistent with the literature).

It would undermine the literature if the liquidity level did not mediate the effect of concentration on insolvency risks (z score) - because the direct effect is significantly positive. So, it can be claimed that such a "direct path" is often in line with the existing literature without any hidden mediators from the model (Rucker et al., 2011; Shrout & Bolger, 2002; and Zhao et al., 2010).

B. *Competitive Mediation:* Table 7.10 Concentration – Liquidity – Profitability for conventional banks after the crisis period study shows a competitive mediation. The indirect effects (i.e. path a x b) are significant and positive, while the direct effects (i..e path c) is significant and negative. Thus, multiplying path a x b x c resulted in a negative number. The findings shows for conventional banks after the crisis, the low concentration reduced the banks liquidity, at the same time, the banks with low

liquidity experienced an increased in their profitability (risk returns tradeoff concept). However, according to the SCP concept, banks with high concentrations is expected to have high profitability. However, this research findings shows that the banks with high concentration has a low profitability in contrary to the concept buildings. The implications will be explained below:

Implications: The negative sign of the direct and indirect effect in the relationship of concentration – liquidity - profitability as shown in table 7.10 (conventional banks post crisis period) is contrary to the concept building. (i.e. SCP concept). As hypothesized and explained in chapter 4 (conceptual framework). The relationships between concentration and banks profitability should be positive in order to be consistent with SCP concept. However, the negative relationships found in this study for this direct effects while indirect effects is in line with the conceptual expections, mean, there are other hidden mediator variables that influence this relationships. For example, had it been the research found that the indirect effect (i.e. the relationship between concentration and liquidity and liquidity and profitability is significant and positive) as in Islamic banks mediation discussed above and then the relationship between concentration and profitability is significant and positive also, then it means the banks low liquidity which resulted in low profitability is due to the low concentration that reduced the profitability. (This is in line with the concept). However, the negative opposite findings means there are other mediators that intervene the relationships between concentration – liquidity – profitability. Further studies should concentrate in findings these factors.

C. **Indirect-only mediation:** The conventional banks after the crisis period for the relationships of CAR – liquidity - profitability (table 7.10) shows an indirect- only mediation. The total effect of capital adequacy (X) did not significantly affect the

bank's profitability Y (c=-0.018, t=0.162 (table 7.6), while the relationship of X to M remained positive and significant (a=0.603, t=4.905) and relationship of M to Y remained also significicant but negative (b=.-0.255, t=2.57). A bootstrap 95% CI indicated that the indirect effect through M is significant, a x b = -0.154, 95% CI: t=1.883 (table 7.10).

Implications: This means that when the banks' capital is increased after the crisis, Malaysian conventional banks use excess capital to improve their liquidity position. However, increasing their liquidity position results in decrease in their profitability. This can be attributed to high expenses incurred by the banks during the period under study which eroded the profits or high idle liquid funds kept. The results of X on M is consistent with the high capital ratios reported in the descriptive statistics for conventional banks after the crisis and it is in line with risk absorption concept. For this reason, banks that have a high capital adequacy ratio can have high access to funding from the other sources and this will increased their liquidity position. However, if the expenses increased (as in the case of this studies), it will eroded their profitability and, as a result, their profitability will be low. On the other hand, if the banks have high CAR and use it to improve their liquidity position, this would cause an improvement in its profitability if expenses, loan loss provisions and NPLs were kept low. This is because enough liquid assets for the banks create high financing assets which means higher profitability.

Finally, in this study, the implication of mediation effects can be summarized as follows: (i) " complementary" mediation this is consistent with the conceptual framework and there is no need to further test for an indirect effect because the process of X→Y has been assumed to be completely explained (Hair et al., 2013; and Zhao et al., 2010) (ii) "competitive", mediation is likely to involve the omission of a mediator

(i.e., one or more hidden mediators from the model that match the revealed sign of direct effect). The inconsistent sign between direct effect (*c*) and indirect effect (*ab*) or unexplained direct effect (c) is a guide for future research and a silver lining for concept building in seeking alternative mediators; (ii) "indirect-only" mediation identification is consistent with the conceptual framework and there is no need to further test for an indirect effect because the process of X→Y has been assumed to be completely explained (Hair et al., 2013; Zhao et al., 2010).

Table 7. 9: Mediation test analysis results (Islamic banks after the crisis)

Islamic banks after the crisis	**Bootstrapping**
CAR -> Liquidity -> Profitability	1.100
Asset Quality -> Liquidity -> Profitability	0.753
Efficiency -> Liquidity -> Profitability	1.126
Earning Quality -> Liquidity -> Profitability	0.737
Inflation -> Liquidity -> Profitability	1.119
GDP -> Liquidity -> Profitability	1.232
Concentration -> Liquidity -> Profitability	-1.683
CAR -> Liquidity -> Z Score	1.130
Asset Quality -> Liquidity -> Z Score	0.525
Efficiency -> Liquidity -> Z Score	0.848
Earning Quality -> Liquidity -> Z Score	0.553
Inflation -> Liquidity -> Z Score	0.971
GDP -> Liquidity -> Z Score	0.933
Concentration -> Liquidity -> Z Score	1.757*

Table 7. 10: Mediation test analysis results (Conventional banks after-crisis)

Conventional After Crisis	**Bootstrapping**
CAR -> Liquidity -> Profitability	-1.883*
Asset Quality -> Liquidity -> Profitability	0.833
Efficiency -> Liquidity -> Profitability	0.722
Earning Quality -> Liquidity -> Profitability	0.313
Inflation -> Liquidity -> Profitability	0.344
GDP -> Liquidity -> Profitability	0.386
Concentration -> Liquidity -> Profitability	2.231**
CAR -> Liquidity -> Z Score	1.260
Asset Quality -> Liquidity -> Z Score	0.676
Efficiency -> Liquidity -> Z Score	0.596
Earning Quality -> Liquidity -> Z Score	0.257

Conventional After Crisis	Bootstrapping
Inflation -> Liquidity -> Z Score	0.325
GDP -> Liquidity -> Z Score	0.377
Concentration -> Liquidity -> Z Score	1.078

7.4 Summary of the Chapter

The key objective of this study was to empirically test the comprehensive simultaneous relationships between Islamic and conventional banks before and after the crisis period of liquidity and profitability and insolvency risk (z score). To date, this is the first study to examine the relationships between these factors using the PLS-SEM approach in Malaysia, especially involving mediation and the equality of coefficient effects in different bank categories at different periods. Normally, the extensive bank's liquidity literature looks at the concept of direct effect relationships X→Y (i.e., liquidity and profitability factors). However, in respect to banks before and after the 2008 financial crisis, it is often unclear how the factors that determine liquidity (X) affect profitability and insolvency risks (Y) directly and how the concept of direct effect X→Y can be labeled the "effect to be mediated". Traditional cause and effect relationships let us say X and Y, but do not normally consider the effect of the mediation variable. The research specifically allows for this "mediation" to define the causal relationship between X and Y. The study finds that some liquidity factors do not only directly enhance bank's profitability and insolvency risks.

This study found different effects of liquidity, profitability and insolvency risks (z score) in before and after the crisis period. That is, no significant positive relationship between liquidity and profitability in both Islamic banks before and after the crisis period. However, significant negative relationship between Islamic banks liquidity and insolvency risks (z score) after the crisis period is found. In addition, a significant negative relationship is observed between conventional banks liquidity and profitability

after the crisis period, but no significant effect is found with z score (insolvency risks) before the crisis period. At the same time, a significant negative relationship is observed between liquidity and (insolvency risks (z score) for conventional banks after the crisis period. It should be well understood by bank management within the sample in the conventional banks after the crisis period that increases in liquidity contribute to low profitability as stated in the previous studies by Hasanov et. al. (2018).

The study finds that liquidity in the Islamic bank after the crisis period and conventional banks after the crisis period plays an important role in the mediation effect between the 2 factors (i.e., Capital adequacy ratio and concentration) and banks profitability and z score (for Islamic and conventional banks after the crisis). Conversely, no significant effects was found for both the Islamic and conventional banks before the crisis periods. The study finds a complementary mediation effects for concentration →liquidity → z score (Islamic banks after the crisis). The positive indirect effect indicates that the banks will not necessarily increase solvency even though they have high liquidity due to the low concentration. For example, for the banks that have a low concentration, the tendency to have a high liquid asset will be high, and consequently, excessive accumulation of idle liquidity leads to low solvency (indirect effect ab is positive). This suggests that the Islamic banks after the crisis period might have high liquidity beyond the regulatory requirements which cause low profitability. The implication indicates that the Malaysian government should introduce policies that will enhance profitability and liquidity for the Islamic banks. The Malaysian government should also strengthen the already developed newly Basel III liquidity rules in order to have a better liquidity buffer by banks and to minimize the insolvency risk.

The positive indirect effect for conventional banks after the crisis indicates that the profitability is not enhanced by having a high liquidity and a low concentration. For

example, as the study observed in conventional banks after the crisis period, when the bank's concentration decrease, the bank tends to have a high liquidity and consequently lead to low profitability as they tight their assets in liquid form without financing the profitable projects. The banks can maximize their profitability through managing their assets-liabilities by holding an appropriate amount of liquidity.

A closer examination of the data showed that before and after the crisis period, the study finds that there are not just positive and negative direct effects, but also positive and negative indirect effects. To be specific, the different bank and macroeconomic factors (X) can be either a positive or a negative direct effect on profitability and insolvency risks (Y). Likewise the indirect effect of bank specific factors and macroeconomic factors (X) on profitability and insolvency risks (Y) through liquidity (M) can also be either positive or negative. In addition, including the mediation variable (M) in the analysis can change the direction of the direct effect between bank specific factors and macroeconomic factors (X) and the bank's profitability and insolvency risks (Y). The concept of direct effect would be misleading if we conclude the direct effect results when it is other variables (i.e., mediators) that have intervened in the direct relationship and consequently changed the magnitude, sign and significance level. Moreover, consideration of the unexpected direct effect "c" is pursued for the possibility of an omitted second, or more, mediator variables. The result provided in this study gives an essential guide for future research in speculating about the meaning of unexpected direct effects "c".

Furthermore, an analysis using Partial Least Square-Multi-Group Analysis (PLS-MGA) for the two banking sectors' equality in their parameter estimates was completed. The study finds that most of the Islamic banks before and after the crisis period show consistent, equal effects in their liquidity, profitability and z score. However, the

conventional banks before and after the crisis period tend to reveal differences in some of their profitability and z score. This study reports novel evidence that each period has different relationships between factors that determine bank's profitability and insolvency risks (z score) for conventional banks study only. However, in order to know the overall effects on the banking sector both studies were analyzed in this research.