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Assessing the Impact of Macroeconomic Variables And Macroprudential Policy Elements on the Capital Adequacy Ratio

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Abstract

Macroprudential policy is the approach that is specifically aimed at containing systemic risks and maintaining financial stability in a country. One of the key elements of an effective macroprudential policy framework is a system of early warning indicators that signal increased vulnerabilities to financial stability. The most important macroprudential policy indicators that are used to monitor systemic risk are asset quality and liquidity indicators. The key indicator is capital adequacy ratio. It is also the main prudential and structural Islamic Finance indicators (PSIFIs) on the financial soundness and growth of the Islamic banking systems. This study investigates the relationship between the Capital adequacy ratio and different macroeconomic variables and macroprudential policy elements for twenty (20) selected countries from 2008 until 2017. It is documented that there is statistically significant relationship between the capital adequacy ratio and macroeconomic variables such as gross domestic product, balance of payment, money supply and unemployment rate. For the effect of macroprudential policy instruments and institutional factors it shows that these elements are effective in stabilising the banking system fragility.

Keywords: Macroprudential Policy, Systemic Risk, Financial Stability, Capital Adequacy Ratio and Banking System Fragility

Introduction

The Global Financial Crisis (GFC) of 2008 to 2009 has brought a huge impact on the world economy. It began with US Subprime mortgage crisis, explode to housing crisis and quickly grew into a global banking crisis with the investment and merchant banks first absorbing the impact before it spreads to the commercial banks and Islamic banks as well (Krugman, 2009; Hasan &

Dridi, 2010). According to Arvai, Prasad and Katayama (2014), the global financial crisis not only triggered major changes in the approach countries take in financial regulation, but it also led to the recognition of the financial stability in order to achieve macroeconomic stability. The main lesson of this crisis is the importance of mitigating systemic financial risks and the need to strengthen the macroprudential approach to supervision and regulation that can identify risks throughout the system and take appropriate actions to maintain financial stability (Kawai & Morgan, 2012).

Macroprudential policy can be defined as a policy that uses primarily prudential tools to limit systemic or system-wide financial risk, thereby limiting the incidence of disruptions in the provision of key financial services that can have serious consequences for the real economy. According to Kawai and Morgan (2012), there are two main objectives of macroprudential supervision and regulation that are to reduce systemic risk and preserve systemic financial stability. Systemic risk is the risk of collapse in the entire financial system stemming from the breakdown of a single firm. It is a result of undercapitalisation by financial institutions in a market that is increasingly interdependent (Calmes & Theoret, 2014). Understanding and quantifying this systemic risk is important in ensuring that our financial institutions are adequately capitalised to withstand another financial crisis. Borio (2010) stated that there are two classification of the systemic risks that addressed by macroprudential policy that are time dimension and cross-sectional dimension. The time dimension deal with how aggregate risk in the financial system evolves over time.

Systemic risk was a major contributor to the global financial crisis (GFC) 2008 to 2009 and companies that are facing with this systemic risk problem are called “too big to fail.” In order to monitor systemic risk, a wide range of macroprudential indicators is used in the previous studies such indicators of bank capital, bank’s performance, indicators of liquidity and indebtedness. Other than that the indicators also cover both the domestic and international aspects of the financial system, and include macro, micro and sectoral variables (Lim et al., 2011). The most important macroprudential policy indicators that are used to monitor systemic risk are asset quality and liquidity indicators. The key indicator is capital adequacy ratio. It is also the main prudential and structural Islamic Finance indicators (PSIFIs) on the financial soundness and growth of the Islamic banking systems.

The aim of this research is to examine the relationship between the Capital adequacy ratio with different macroeconomic variables and macroprudential policy elements for twenty (20) selected countries from 2008 until 2017. These selected countries are Bahrain, Bangladesh, Brunei, Egypt, Indonesia, Iran, Jordan, Kuwait, Lebanon, Malaysia, Nigeria, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Tunisia, Turkey and United Arab Emirates (UAE).

Literature Review

One of the factors that would determine the banking system’s resiliency to shocks is the availability of banking capital. According to Ioan, Balogh and Simona (2013), the main indicator use to assess the banking fragility is capital adequacy ratio (CAR). It is used in the banking system to protect depositor and to promote the stability and efficiency of the global financial system. It is also assists to prevent the banks from taking any excess leverage and becoming insolvent in the process (Mili, Sahut & Trimeche, 2014). Bank Capital to risk weighted assets measures is used as a macroprudential indicator for capital adequacy ratio (CAR) (Hewaify & Alyousef, 2018). This

macroprudential indicator is calculated using total regulatory capital as the numerator and risk-weighted assets as the denominator (ADB, 2015). There are two type of capital that are measure in the formula that are tier one capital which can absorb losses without a bank being required to cease trading and another one is tier two capital which can absorb losses in the event of liquidation and so provides a lesser degree of protection to depositors (Irawan & Anggono, 2015). The risk weighted assets that take into account are credit risk, market risk and operational risk. The Basel III norms prescribed capital to risk-weighted assets of 8%.

In Turkey, Asarkaya and Ozcan (2007) have studies on the determinants of capital structure in the banking sector from 2002 to 2006. By using the generalized method of moments (GMM) estimators, the finding suggested that economic growth has a positive correlation with capital adequacy ratio. By using GLS regression model, Aktas et al (2015) study on the Determinants of Banks' Capital Adequacy Ratio in South Eastern European Countries from 2007 to 2012. The empirical finding showed that from a sample of 71 commercial banks, the economic growth rate has statistically significant effect in determining CAR for the bank in the SEE region. Other than that, Yahaya et al (2016) investigated the impact of Financial and Economic performance on Capital Adequacy Ratio in Japan. The data were evaluated from 64 regional banks over a period of 10 years from 2005 to 2014. By using panel regression model in their study, GDP growth showed a negative sign with CAR.

Past studies have revealed that inflation rate is one of the determinants that affect capital adequacy ratio and liquidity ratio. In Nigeria, by using Co-Integration analysis technique, Williams (2011) had studied the relationship between capital base and some macroeconomic variables, financial structure, and banking variables during 1980 to 2008 in Nigeria. The study revealed that there is a negative relationship between inflation and banks capital base because inflation erodes banks capital in the most developing economy. Therefore to ensure the inflation rate at a minimum level, the Nigerian government and bank regulators should regulate and strengthen their investment policy. Similarly, Aktas, et al (2015) had studied on the Determinants of Banks' Capital Adequacy Ratio in South Eastern European Countries over a period 2007 to 2012. By using feasible GLS regression model, the result showed that inflation rate has a negative relationship with CAR for the bank in the SEE region. Other than that Yahaya, et al.(2016) have investigated about the impact of Financial and Economic performance on Capital Adequacy Ratio in Japan. The data were evaluated from 64 regional banks over a period of 10 years from 2005 to 2014. By using panel regression model in their study, the result revealed that inflation rate has a significant relationship with CAR.

Barrell, Karim and Ventouri (2013) investigated the effect of some of the macroeconomic variables on capital adequacy from 1980 to 2012. In this study, current account deficit has significantly affect Capital Adequacy. Other than that, Balogh (2012) studied on macroprudential supervision tools in 27 countries of European banking System from 2001 to 2010. By applying fixed effect model, the result indicated that government deficit/surplus has no significant impact on bank capital to asset ratio. According to Caggiano and Calice (2011), who conducted a study on the macroeconomic determinants of Higher Capital Ratios on African Economies found that current account deficit has statistically no impact on capital Adequacy ratio (CAR). They used fixed effect model to analyze the data.

Past studies have also revealed money supply as one of the important determinants that affect banks capital adequacy ratio. Shaddady and Moore (2015) has analyzed the bank

regulation, bank specific indicators, country indicators and market contestability indicators determinants of bank capital adequacy ratio in GCC countries by using panel data for 89 banks during the year 1998 to 2013. They employed A GMM estimator in the study and the results revealed that money supply has negative and significant impacts on the capital adequacy ratio in large banks. This means that an increase in supply of money will cause large banks to hold low capital adequacy. Moreover, Williams (2011) had studied on the relationship between capital base and macroeconomic, financial structure and banking variables in Nigeria from 1980 to 2008. In the study he is using capital adequacy base as a dependent variable while total loans, money supply, interest rate, inflation rate, demand deposit, political instability, exchange rate, liquidity risk, openness of the economy and investments are used as independent variables. By using an error correction model, the empirical finding concluded that the money supply is very important to determine capital adequacy base and having a very strong significant impact on capital adequacy base.

By applying the ordinary least square (OLS) method, Shingjergji and Hyseni (2015) studied the influence of macroeconomic and banking factors on credit growth in the Albanian banking system. The empirical result showed that credit growth is positively related to capital adequacy ratio. Igan and Tan (2015) studied about capital Inflows, credit growth and financial system. This study covered granular panel dataset for 33 countries from 1980 to 2011. The empirical result showed that credit growth has negative relationship with capital adequacy ratio. The stronger the credit growth, the lower the capital adequacy ratio. This was supported by Trenca et al. (2013) who studied about a macroprudential supervision model in the central and eastern European banking system. One of their research objectives is to identify the macroeconomic variables that have a significant influence on the bank capital to asset ratio among 10 banks during 2000 to 2011. By using fixed effect model, the result showed that domestic credit to private sector in GDP has negative effect on bank capital to asset ratio.

Teglio, Raberto and Cincotti (2011) studied the impact of bank's capital adequacy regulation on the economic system based on a set of 40 years simulation. They examined the data base on short run (first 5 years), medium run (the following 15 years) and long run (the last 20 years). The result pointed that the unemployment rate has a significant impact on bank's capital adequacy ratio. Williams (2011) had studied the relationship between capital base and some macroeconomic variables, financial structure and banking variables over the period of 1980 to 2008 in Nigeria.

Table 1. the theoretical research on an institutional framework of macroprudential policy

Name of Authors	Findings
Borio (2010), Vinal (2011), Lim et al. (2011)	Certain aspects that are more important to ensure effective institutional framework of macroprudential policy in a country that are a clear definition of macroprudential authorities and mandates, outlined principle for their work and different configuration of the mandates distribution between organizations need to be considered with or without interagency financial stability board
Claessens et al. (2014), Akinci and Olmstead-Rumsey (2015)	It contains some recommendations on possible sets of macroprudential instruments, condition and objectives for application of each of instruments. Many of researchers from IMF tend to view the macroprudential policy mandate as a right for macroprudential policy for ensuring financial stability
Kama, Adigun and Adegbe (2013)	The success of the implementation macroprudential policy need a good governance arrangement, essential analytical tools, good coordinating structure as well as accountability. They are also stated that A centralised authority should fully control the policy instruments under a clear mandate, central banks should play a leading role.
Lim, Ramchand, Wang and Wu (2013)	The ownership of a mandate for macroprudential policy or financial stability, existence of a financial stability committee that facilitates policy coordination and exchange of views among multiple agencies and the roles a central bank and a government play in the financial stability committee are the three characteristics of institutional arrangement that need to have a special attention by a central bank and a government in implementing macroprudential policy framework.

Egawa et al. (2015)	Their empirical analyses suggested that, there are the differences in terms of the roles the central bank and the government play in macroprudential policy in each country. Factors that influence these differences included economic and financial characteristics for an example the exchange rate regime and the degree of democracy.
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Table 2. Empirical Research on The Effectiveness Of Macroprudential Policy Tools.

Name of Authors	Findings
Ahuja and Nabar (2011)	Loan to value ratio caps were decelerate the property price growth and lending growth. Loan to value ratio (LTV) also strengthen the bank capital buffers, bank performance and have a significant effect on financial stability indicators in economies.
Igan and Kang (2011)	There is an evidence of beneficial effects of LTV and DTI limits associated with a decline in house price appreciation and transaction activity in Korea. Both tools also play a key role in bubble dynamics
Lim et al. (2011)	Macroprudential policy tools, mainly based on credit-related measures (e.g. LTV caps) or liquidity-related measures (e.g. reserve requirements) may reduce procyclicality.
Dell'Ariccia, Igan, Laeven and Tong (2012)	Some macro-prudential policies tools being effective in reducing the pro-cyclicality of credit and leverage in their study
Claessens et al. (2014)	Macroprudential policies tools caps on borrower such as LTV and caps on bank's asset and liabilities effectively or significantly reduce the total leverage growth and total asset growth while buffer-based policies seems to have little impact on asset growth.
Aiyar, Calomiris and Wieladek (2014)	Bank-specific higher capital adequacy requirements diminished lending by individual banks (whereas tighter monetary policy did not affect the supply of lending)
Aysan et al. (2016)	Macroprudential measures have a positive effect on financial stability after the 2008 crisis. Moreover, depositor discipline varies across bank types. While state-owned banks

	appear to have similar discipline with private counterbanks, Islamic banks have looser discipline
Olszak, Kowalska, and Roszkowska (2018)	This paper shows that borrower restrictions (such as loan-to-value ratios – LTV, and debt-to-income ratios – DTI) are definitely more effective in reducing the procyclicality of loan-loss provisions.

Data and Methodology

In this study several macroeconomic variables and macroprudential policy elements are used to explain capital adequacy ratio. These macroeconomic variables are GDP growth rate, inflation rate, balance of payment, money supply, domestic credit growth, unemployment rate and real exchange rate. Next is the macroprudential policy elements which consist of macroprudential policy tools that are loan to value ratio (LTV) where it is the ratio of loan amount to total asset, debt to income ratio (DTI) is the ratio of total recurring monthly debt to gross monthly income and reserve requirement (RR) is the fraction of deposits that regulators require a bank to hold in reserves. For mandate, it is the powers of the agency (or agencies) or authority to decide involved in macroprudential policy. There are two indices that are used to represent mandate that are the CB index and the Gov index where below assign a score of 1 to 3, with the higher value indicating the more important role. Table 3 shows the indices and score.

Table 3. The CBINDEX, The GOVINDEX and its score

THE CB INDEX	SCORE
The macroprudential policy/financial stability mandate is shared by multiple agencies including the central bank, and the central bank is a member of the financial stability committee	1
The mandate is shared by multiple agencies including the central bank, and the central bank chairs the financial stability committee	2
The central bank, or a committee of the central bank, is the sole owner of the mandate.	3
THE GOV INDEX	SCORE
There is no financial stability committee, or no governmental agency is a member	1
A governmental agency is a member/observer of the financial stability committee	2
A governmental agency chairs the financial stability committee	3

Source: Egawa et al (2015)

For transparency it represented by regulation and transparency index. According to Mendonca, Galvao and Loures (2010), economic and political transparencies are more relevant concerning the analysis of the financial system stability. Regulation and transparency index”, the economic transparency was divided into two subgroups. The first group is focused on the risks of the financial firms while the second one concentrates on the account information. Table 3.5 shows the method for calculating the degree of transparency and regulation of the financial institutions.

- The responses to the questions in Table 4. were classified based on the following criteria:
- i. degree “1” is attributed to the institutions when the activity under consideration (from A.1.1 to B4) is an exigency determined by the regulatory agencies.
 - ii. degree “0.5” is attributed to the institutions when, although the activity is not an exigency of regulatory agencies, the banking institution performs it in a regular manner
 - iii. degree “0” is attributed to the institutions when neither the institution performs the activity nor it is an exigency of the regulatory agencies.

Table 4. Regulation and transparency Index

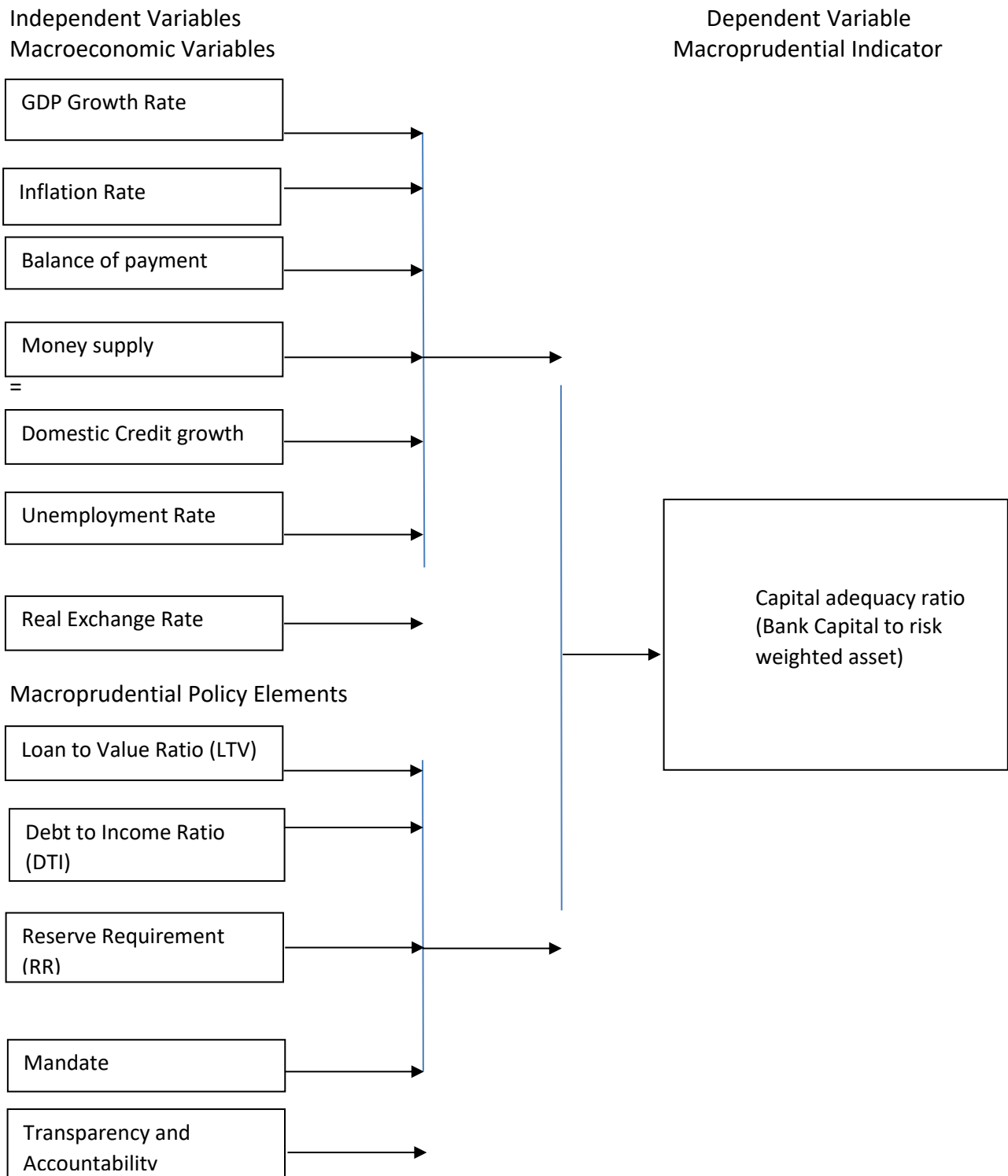
Code	Questions	Degree
A	Economic transparency	
A.1	Regarding the institutional risks and principles of Basel II	
A.1.1	If the institution calculates the credit risk	0, 0.5 or 1.0
A.1.2	If the credit risk is disclosed in periodic reports	0, 0.5 or 1.0
A.1.3	If the institution calculates the market risk	0, 0.5 or 1.0
A.1.4	If the market risk is disclosed in periodic reports	0, 0.5 or 1.0
A.1.5	If the institution calculates the operational risk	0, 0.5 or 1.0
A.1.6	If the operational risk is disclosed in periodic reports	0, 0.5 or 1.0
A.2	Regarding the account information and policy of transparency	
A.2.1	If the reports are available quarterly	0, 0.5 or 1.0
A.2.2	If the reports are available yearly	0, 0.5 or 1.0
A.2.3	If the Basel index is calculated and disclosed in the reports	0, 0.5 or 1.0
B	Political transparency	
B.1	If the capital structure of the institution is disclosed in the account reports	0, 0.5 or 1.0
B.2	If the structure and risk management policies are disclosed	0, 0.5 or 1.0
B.3	If the policies for mitigating risk (hedge) are disclosed	0, 0.5 or 1.0
B.4	If market environments and forecasts are disclosed	0, 0.5 or 1.0

The research period is from 2008 to 2017. Islamic banking data have been collected from Islamic banks in Bahrain, Bangladesh, Brunei, Egypt, Indonesia, Iran, Jordan, Kuwait, Lebanon, Malaysia, Nigeria, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Tunisia, Turkey and United Arab Emirates (UAE).

Research Framework

The theoretical framework in this study is based on Babihuga (2007), Trenca et al. (2013) and Ismail and Che Pa (2015).

Figure 1. Relationships between Macroeconomic Variables, Macroprudential policy elements and Capital Adequacy Ratio



Result and Discussion

Panel Data analysis was employed in verifying the relationship exists between macroeconomic variables, macroprudential policy elements with capital adequacy ratio in Islamic bank. The unbalanced panel data analysis was used for the estimation. To do this analysis two Stages Least Square Model had be done in order to get a good result that are supported by the previous studies. In general, if there are more time- varying exogenous variables than time-invariant endogenous variables, two stage least square estimator is consistent and more effiecient than the within estimator. Two stage least squares method is used fit models that include instrumental variables. 2SLS includes four types of variable(s): dependent, exogenous, endogenous, and instrument. In this study, instrumented variable is CG, included instruments variables are GDP, BOP, MS, UNR and TRANS and excluded instruments are INF AND RER. Since the data collected consist of time variant variables and time invariant variable (LTV, DTI, CBINDEX and GOVINDEXT), the data had divided into four (4) models.

Model A

$$CAR_{i,t} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 BOP_{i,t} + \beta_4 MS_{i,t} + \beta_5 CG_{i,t} + \beta_6 UNR_{i,t} + \beta_7 RER_{i,t} + \beta_8 LTV_{i,t} + \beta_9 RRI_{i,t} + \beta_{10} CBINDEX_{i,t} + \beta_{11} TRANS_{i,t} + \epsilon_{i,t}$$

Model B

$$CAR_{i,t} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 BOP_{i,t} + \beta_4 MS_{i,t} + \beta_5 CG_{i,t} + \beta_6 UNR_{i,t} + \beta_7 RER_{i,t} + \beta_8 DTI_{i,t} + \beta_9 RRI_{i,t} + \beta_{10} CBINDEX_{i,t} + \beta_{11} TRANS_{i,t}$$

Model C

$$CAR_{i,t} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 BOP_{i,t} + \beta_4 MS_{i,t} + \beta_5 CG_{i,t} + \beta_6 UNR_{i,t} + \beta_7 RER_{i,t} + \beta_8 LTV_{i,t} + \beta_9 RRI_{i,t} + \beta_{10} GOVINDEXT_{i,t} + \beta_{11} TRANS_{i,t} + \epsilon_{i,t}$$

Model D

$$CAR_{i,t} = \beta_0 + \beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 BOP_{i,t} + \beta_4 MS_{i,t} + \beta_5 CG_{i,t} + \beta_6 UNR_{i,t} + \beta_7 RER_{i,t} + \beta_8 DTI_{i,t} + \beta_9 RRI_{i,t} + \beta_{10} GOVINDEXT_{i,t} + \beta_{11} TRANS_{i,t}$$

Descriptive Statistic Analysis

Table 5.Descriptive Statistic Analysis

VARIABLES	Mean	Median	Standard Deviation	Skewness	Kurtosis	Jarque-Bera
CAR	18.27613	16.50000	9.783380	3.932527	23.12471	3773.811 (0.000000)
GDP	3.977145	4.120500	3.507753	0.312210	6.217899	89.53978 (0.000000)
INF	6.677755	4.456000	7.227234	2.075975	8.392552	385.9859 (0.000000)
BOP	3.436111	-0.050500	16.22399	1.829550	10.52151	577.1881 (0.000000)
MS	15.75658	12.41900	15.51736	2.509713	10.06239	622.4722 (0.000000)
CG	52.57373	46.54850	28.49519	0.526255	2.720509	9.783627 (0.007508)
UNR	7.347885	5.600000	5.474515	0.976482	3.462395	33.56566 (0.000000)
RER	103.9251	102.4500	12.11416	0.274564	4.594354	19.31214 (0.000064)
CBINDEX	2.600000	3.000000	0.584558	-1.150049	3.314879	44.91336 (0.000000)
GOVINDEK	2.150000	2.000000	0.357967	1.960392	4.813137	156.4142 (0.000000)
TRANS	8.735000	8.500000	1.676703	0.338508	1.622356	19.63543 (0.000054)
LTV	77.36842	80.00000	10.46137	-0.571049	4.245173	22.60086 (0.000012)
DTI	49.53333	50.00000	10.47763	0.168520	2.063105	6.196044 (0.045138)
RR	0.090625	0.070000	0.056487	1.388485	4.386249	80.27709 (0.000000)

Mean shows the average value of the series and median is the middle value (or average of the two middle value) of the series when the value are ordered from the smallest to the largest amount. Positive skewness was represented by CAR, GDP, INF, BOP, MS, CG, UNR, RER, GOVINDEK, TRANS, DTI and RR variables, and implied that the distribution had a long right tail. Meanwhile, CBINDEX and LTV variables showed a negative value of skewness, which indicated that the distribution had a long left tail. The result showed that kurtosis value of CAR, GDP, INF, BOP, MS, UNR, RER, CBINDEX, GOVINDEK, LTV and RR exceeded three. The kurtosis indicated Leptokurtic or the distribution is peaked as compared to normal distribution. The kurtosis value of CG, TRANS and DTI was less than three, implied Platykurtic which defines the distribution is

flat relative to the normal. Finally p value of Jarque – Bera stated that all variables are equal to 0.000000 except RER (0.000064), TRANS (0.000054), LTV (0.000012) and DTI (0.045138) which is less than 0.05 and it indicates a significant result. Thus, it is not showing normal distribution.

Table 6. Pearson Correlation Analysis

	CAR	GDP	INF	BOP	MS	CG	UNR	RER	CBIND EX	GOVIN DEX	TRAN S	LTV	DTI	RR
CAR	1	0.138 767	- 0.027 72	0.360 336	0.125 863	- 0.295 81	- 0.052 31	0.236 655	0.261 628	- 0.1220 1	0.455 517	0.055 416	0.324 089	- 0.030 54
GDP	0.138 767	1	- 0.105 7	0.065 755	0.260 671	- 0.168 64	- 0.056 29	0.001 798	0.027 15	- 0.0741 6	0.051 163	0.111 55	0.040 71	- 0.069 41
INF	- 0.027 72	- 0.105 7	1	- 0.064 79	0.265 118	- 0.460 2	- 0.225 978	0.241 15	0.014 502	- 0.1621 31	0.220 96	0.126 547	0.149 147	0.203 146
BOP	0.360 336	0.065 755	- 0.064 79	1	- 0.160 29	- 0.156 11	- 0.523 4	0.115 852	0.284 293	- 0.1756 9	0.624 897	0.040 53	0.223 567	0.332 79
MS	0.125 863	0.260 671	0.265 118	- 0.160 29	1	- -0.495	- 0.547 675	0.186 675	0.097 413	0.0091 82	0.286 95	0.317 503	0.164 504	0.122 586
CG	- 0.295 81	- 0.168 64	- 0.460 2	- 0.156 11	- -0.495	1	- 0.239 65	- 0.327 01	- 0.191 14	- 0.0123 3	0.101 812	0.091 24	0.042 68	0.077 08
UNR	- 0.052 31	- 0.056 29	- 0.225 978	- 0.523 4	- 0.547 675	- 0.239 65	- 0.000 79	- 0.000 79	- 0.127 89	- 0.1458 56	0.654 8	0.424 251	0.065 79	0.081 129
RER	0.236 655	0.001 798	0.241 15	0.115 852	0.186 675	- 0.327 01	0.000 79	1	0.322 167	- 0.4328 8	0.127 684	0.211 98	0.142 957	0.236 497
CBIND EX	0.261 628	0.027 15	- 0.014 502	0.284 293	0.097 413	- 0.191 14	- 0.127 89	0.322 167	1	- 0.7395 1	0.323 625	0.283 266	0.266 622	- 0.236 32

GOVIN DEX	- 0.122 01	- 0.074 16	- 0.162 131	- 0.175 69	- 0.009 182	- 0.012 33	- 0.145 856	- 0.432 88	- 0.739 51	- 1	- 0.229 08	- 0.007 26	- 0.070 77	- 0.164 818
TRANS	0.455 517	0.051 163	- 0.220 96	- 0.624 897	- 0.286 95	- 0.101 812	- 0.654 8	- 0.127 684	- 0.323 625	- 0.2290 8	- 1	- 0.060 77	- 0.455 646	- 0.346 46
LTV	0.055 416	- 0.111 55	- 0.126 547	- 0.040 53	- 0.317 503	- 0.091 24	- 0.424 251	- 0.211 98	- 0.283 266	- 0.0072 6	- 0.060 77	- 1	- 0.556 599	- 0.556 27
DTI	0.324 089	- 0.040 71	- 0.149 147	- 0.223 567	- 0.164 504	- 0.042 68	- 0.065 79	- 0.142 957	- 0.266 622	- 0.0707 7	- 0.455 646	- 0.556 599	- 1	- 0.247 83
RR	- 0.030 54	- 0.069 41	- 0.203 146	- 0.332 79	- 0.122 586	- 0.077 08	- 0.081 129	- 0.236 497	- 0.236 32	- 0.1648 18	- 0.346 46	- 0.556 27	- 0.247 83	- 1

Table 6. shows the relationship between macroeconomic variables, macroprudential policy elements and Islamic bank's capital adequacy ratio. GDP, BOP, MS, RER, CINDEX, TRANS, LTV and DTI are positively correlated with the Islamic bank's capital adequacy ratio. Other than that the result of this pearson correlation analysis for model 1 showed that, there was a negative association between INF, CG, UNR, GOVINDEIX and RR with Islamic bank's capital adequacy ratio.

Table 7. Regression Analysis Result Of Pooled Two (2) Stage Least Squares Estimator Model for Dependent Variable – Capital Adequacy Ratio – (Model A, Model B, Model C and Model D)

	2SLS (ROBUST)	2SLS (ROBUST)	2SLS (ROBUST)	2SLS (ROBUST)
	MODEL A	MODEL B	MODEL C	MODEL D
	(TI – LTV & CBINDEX)	(TI – LTV & GOVINDEK)	(TI – DTI & CBINDEX)	(TI – DTI & GOVINDEK)
Intercept	-2.81997 (0.013)	-3.278215 (0.017)	-.0100681 (0.993)	-0.5749955 (0.647)
LGDP	-0.0003201 (0.994)	0.0037715 (0.926)	0.0580568 (0.116)*	0.0700771 (0.048)**
LINF				
LBOP	0.084852 (0.004)***	0.0640654 (0.042)**	0.0154364 (0.641)	0.0023669 (0.942)
LMS	0.0290876 (0.562)	0.0517317 (0.379)	0.1136994 (0.047)**	0.1092886 (0.056)**
LCG	0.0857829 (0.407)	0.1134989 (0.325)	0.1071735 (0.366)	0.1021782 (0.395)
LUNR	-0.0349929 (0.164)	-0.0034028 (0.907)	0.0428616 (0.202)	0.0752243 (0.022)**
LRER				
LLTV	0.9471822 (0.000)***	0.9357908 (0.000)***		
LDTI			-0.083906 (0.597)	-0.022951 (0.895)
LRR	0.1457192 (0.001)***	0.168205 (0.000)***	0.1050007 (0.034)**	0.1236697 (0.019)**
CBINDEX	0.1463334 (0.047)**		0.1270952 (0.117)*	
GOVINDEK		-0.1890141 (0.041)**		-0.1035235 (0.170)
TRANS	0.616677 (0.003)***	0.8522597 (0.001)***	1.161904 (0.000)***	1.377728 (0.000)***
Adjusted R ²	0.9878	0.9872	0.9879	0.9878
F Statistic	6.22 (0.0000)	6.15 (0.0000)	5.89 (0.0000)	5.58 (0.0000)
Observation	145	145	115	115

This table provides the regression results of macroeconomic variables, macroprudential policy elements with the Islamic bank's Capital Adequacy Ratio(model A, model B, model C and model D) using Pooled Regression model and two stage least square estimator model. ***, **, * significant at the 1%, 5% and 10% respectively. Standard errors are given in parentheses.

The result in Table 7 for this estimation showed the adjusted R2 for model A, B, C and D are 0.9878, 0.9872, 0.9879 and 0.9878 and the p- value of F – statistic is at 0.00000. This result indicated that the independent variables as a group are significant in determining the dependent variable at 1% level of significance. For the first macroeconomic variable, the coefficient value of the natural logarithm of GDP growth rate was significantly and uniformly positive for capital adequacy ratio (CAR) at 5 % level. This result showed that GDP growth rate could boost the bank capital. The empirical results of a study conducted by Mili et al. (2014); Schaeck et al (2006); Bohachova (2008) provided the CAR depends significantly on GDP growth of the country where the result indicated that banks in economically advanced countries on average behave more prudently, apparently boosting their capital base during economically good times when it is easiest to do so. The regression result of a study executed by Asarkaya and Ozcan (2007) that studied on the determinants of capital structure in the banking sector from 2002 to 2006 found that economic growth has a positive correlation with capital adequacy ratio where banks seem to hold more capital when economic growth is stronger and banks usually suffer in terms of capital during periods of economic slowdown in Turkey.

Second is BOP where it correlation value was significantly and uniformly positive for capital adequacy ratio (CAR) at 1% level. This result was consistent with Barrell, Karim and Ventouri (2013) that investigated on the effect of some of the macroeconomic variables on capital adequacy from 1980 to 2012. In this study, current account deficit has significantly affect Capital Adequacy.

Next is Money Supply (MS). The coefficient value of the natural logarithm of money supply (MS) was significantly and uniformly positive for capital adequacy ratio (CAR) at 5% level. The result was supported by Williams (2011) that studied on the relationship between capital base and macroeconomic, financial structure and banking variables in Nigeria from 1980 to 2008. In the study he is using capital adequacy base as a dependent variable while total loans, money supply, interest rate, inflation rate, demand deposit, political instability, exchange rate, liquidity risk, openness of the economy and investments are used as independent variables. By using an error correction model, the empirical finding concluded that the money supply is very important to determine capital adequacy base and having a very strong significant impact on capital adequacy base. The coefficient and very strong level of significance even at one percent in their result suggested that an increase in Money leads to an increase in Bank capital base. The increase in CAR could also have a feedback effect on economic growth. Another studied by Unvan (2020), showed large supplies of money (BM) have a positive and significant effect on the adequacy of bank assets where the supply of money speeding up economic activity, resulting in more bank deposits for businesses and households. It provides "life support" to banks and allows them to retain enough money to comply with the regulatory requirement. Similar with Jacques and Nigro (1997), where the regulators play a key role in establishing a positive association between capital adequacy ratio and bank efficiency through their activities. Banks could react to administrative activities constraining them, to expand their capital adequacy by expanding resources that was a prevalent thought process in changes in money related frameworks in creating economies.

The coefficient value the natural logarithm of unemployment rate was significantly and uniformly positive at 5% level. This result in line with Farooq Akram (2012) that studied about the macro effects of bank capital requirements on Norwegian economy and their use as a macroprudential policy instrument. He found that the unemployment rate has a significant effect on bank capital requirement. Supported by Teglio, Raberto and Cincotti (2011) that studied the impact of bank's capital adequacy regulation on the economic system based on a set of 40 years simulation. They examined the data base on short run (first 5 years), medium run (the following 15 years) and long run (the last 20 years). The result pointed that the unemployment rate has a significant impact on bank's capital adequacy ratio.

In term of macroprudential policy elements, table 7 showed that for the first macroprudential policy tool, the coefficient value of the natural logarithm of loan to value ratio (LTV) was significantly and uniformly positive for the CAR at 1% level. Second tool is Debt to income ratio (DTI) where the result showed DTI had no relationship with CAR, meanwhile the coefficient value of the natural logarithm reserve requirement (RR) had positive impact on the capital adequacy ratio (CAR) at 1% significance level This result is in line with some previous studies that are showed Some macro-prudential policies tools being effective in stabilising the banking system fragility. Other than that, for mandate there are two index used CBINDEX and GOVINDEK where the coefficient value of CBINDEX was significantly and uniformly positive for capital adequacy ratio (CAR) at 5% level, Meanwhile, the coefficient value of the GOVINDEK had a negative impact on capital adequacy ratio (CAR) at 5% significance level. For second macroprudential policy institutional factor, the coefficient value of the natural logarithm of transparency (TRANS) was significantly and uniformly positive for capital adequacy ratio (CAR). This result showed the institutional factors in macroprudential policy framework are effective for ensuring the financial stability.

Conclusion

The main lesson of Global financial crisis is the importance of mitigating systemic financial risks and the need to strengthen the macroprudential approach to supervision and regulation that can identify risks throughout the system and take appropriate actions to maintain stability. Key elements of an effective macroprudential policy framework consist of a system of early warning indicators that signal increased vulnerabilities to financial stability, a set of policy instruments that can help to contain risks and institutional factors that can be used to ensure the effective identification of systemic risks. Capital Adequacy Ratio is one of the important macroprudential policy indicators on the financial soundness and growth of the Islamic banking systems. The empirical evidences clearly documented that there is statistically significant relationship between the CAR and macroeconomic variables such as Gross Domestic Product, Balance of payment, money supply and unemployment rate. For the effect of macroprudential policy instruments and institutional factors it shows that these elements are effective in stabilising the banking system fragility.

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