Scholars Journal of Economics, Business and Management OPEN ACCESS
Abbreviated Key Title: Sch J Econ Bus Manag
ISSN 2348-8875 (Print) | ISSN 2348-5302 (Online)
Journal homepage: https://saspublishers.com

Factors Affecting Commercial Banks' Capital Adequacy Ratios in Gulf Cooperation Council (GCC) Countries

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DOI: 10.36347/sjebm.2022.v09i02.002 | **Received:** 11.01.2022 | **Accepted:** 15.02.2022 | **Published:** 24.02.2022

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Abstract **Review Article**

This study seeks to identify factors that influence bank capital adequacy ratios for a sample of consists of 62 commercial banks listed on the stock markets operating in GCC countries over the time between 2011 and 2018 was used. To deal with the problems of the data set, we utilize the PCSE method. The empirical results suggested that among the CAMELS model variables, capital ratio, management efficiency, earning capacity, liquidity management, and sensitivity have a positive statistical significant influence on bank capital adequacy ratios. In contrast, Asset quality, market concentration, and bank size have a negative effect on commercial banks' capital adequacy ratios. Concerning macro-economic variables, the empirical results suggested that economic growth and inflation rate influence bank capital adequacy ratios.

Keywords: Capital adequacy, CAMELS framework, Commercial Banks, PCSE Method.
JEL Classification: G21, C23.

I. INTRODUCTION

The financial system is a pivotal part of the economic activity of many countries, given its importance for promoting stability and sustainable economic development. As a pivotal part of this system, Commercial banks play an increasingly important role in countries' payment systems, financing economic activity, mobilisation and distribution of financial resources, recycling of investment capital, stability and welfare. Due to the importance of ensuring stability, they have gained significant importance worldwide. Consequently, it is essential to evaluate and monitor the performance of commercial banks and to impose the necessary international laws and regulations related to maintaining stability. Most notably, publications by the Basel Committee on Banking Supervision, which are known as Basel I, Basel II and, more recently, Basel III, have outlined the requirements of improving capital ratio (CR) and have added three new ratios: the leverage ratio (LR), the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). Their aim is to enhance the operations of the banking industry.

Capital adequacy in the context of the banking industry may be explained as the capacity of a bank to avoid risk. In other words, it indicates the ability to tolerate shocks and absorb threats and unpredicted losses. These ratios ensure the stability of a nation's banking sector by lowering and the risk-averse in the future. Therefore, capital adequacy ratios are some of the most important indicators used to check the soundness of local and international banking regulations.

Central banks are among the essential competent supervisory authorities in the regulation and supervision of commercial banks. Through their supervisory function, they strive to ensure safety, maintain monetary and financial stability and maintain the soundness of their respective financial systems to enhance confidence therein and support the balanced and sustainable economic growth of their countries (Afzal & Mirza, 2012). Towards this end, the CAMELS framework, which is used to identify the strengths and weaknesses associated with the bank's overall condition, is one of the most important off-site monitoring tools and an early warning system to ensure

safe and sound banking practices. The acronym CAMELS derives from the six primary components of the banking industry: capital ratios (C), asset quality of the bank (A), management efficiency of the bank (M), earning capacity of the bank (E), liquidity management (L) and sensitivity to market risk (S).

As Roman and Sargu (2013) point out, this framework has become the most common measure for the estimation of a bank' s performance and a very fruitful and widely used monitoring technique worldwide. For these reasons, understanding commercial banks' activities and the regulatory and legal environments in which they work is vital throughout financial and economic studies. Therefore, these studies remain a significant yet relatively rare topic in GCC countries, and this paper attempts to close this research gap in the empirical literature. Consequently, according to the authors' information, this paper is the first to attempt to investigate the impact of the six elements of the CAMELS framework indicators on commercial bank capital adequacy in relation to the countries under study. Additionally, this paper increases and deepens the awareness of the possible effects of industry-specific and macroeconomic indicators on commercial banks' capital adequacy ratios. The remainder of the research is organised as follows: Section II presents a literature Review summary, Section III presents the data description and sample, Section IV presents the methodology and model specification, Section V presents the results of the regression models and Section VI presents the study's conclusion.

II. LITERATURE REVIEW

The financial crisis and fluctuations and instability in the banking industry have attracted the attention of many researchers, financial analysts, regulatory agencies and policymakers in recent decades. This is largely because of its importance to overall economic development. This makes studies regarding the performance of commercial banks crucial in our current time.

Although there are studies about the CAMELS framework in the literature, most researchers have focused on measuring and comparing bank performance using only the first five elements: the CAMEL framework, which excludes sensitivity to market risk (S) (Sangmi & Nazir, 2010; Kishore *et al*., 2015; Zedan & Daas, 2017). Others have focused on the comparative analysis between conventional and Islamic banks (Jaffar and Manarvi 2011; Rozzani & Rahman 2013; Hadriche, M. 2015), and others still have focused on different ownership between public sector banks, private banks, domestic banks and foreign-owned banks (Jha & Hui, 2012; Aspal & Malhotra, 2013). Some researchers have focused on showing the differences or similarities between the CAMEL rating and other ratings (Derviz & Podpiera, 2008; Babar & Zeb, 2011; Yuksel *et al*., 2015). In addition, several studies have concentrated on individual countries' specific banking systems, whereas others have focused on panels of countries. Far less attention has been given to the impact of CAMEL framework variables on commercial bank performance, although Ongore and Kusa (2013) and Rauf (2016) have attempted to contribute to the field in this aspect. Abusharba *et al*., (2013) studied the relationship between CAMEL framework variables and Islamic banks' capital adequacy in Indonesia. Williams (2011) studied the relationship between macroeconomic indicators and banks' capital adequacy in Nigeria, revealing that macro-economic indicators are the most robust determinants of capital adequacy. Abad-González *et al*., (2018) considered both the CAMEL model and macro-economic indicators as factors affecting banking solvency.

III. Data Collection and Sample

This study is based on balanced panel data for a sample of 62 banks in GCC countries between 2011 and 2018. Of these 62 banks, 12 were in Saudi Arabia, 6 were in the Kingdom of Bahrain, 10 were in the State of Kuwait, 6 were in the Sultanate of Oman, 8 were in the State of Qatar and 20 were in the United Arab Emirates. These banks were selected because they are listed on the stock markets in their respective countries. To achieve the objectives of this study, we included twelve variables, two of which were dependent and ten of which were independent. The independent variables were divided into three sub-categories: CAMELS model indicators, industry-specific indicators and macro-economic indicators. Table 1 provides a summary of the selected variables.

Table 1: Summary of selected variables

Notation	Variable name	Proxy of Variable	Previous Authors
Dependent variables: Ratios of capital adequacy			
CAR1	Total bank's regulatory capital as a percentage of Risk-Weighted Assets		Kalifa & Bektaş (2018)
CAR2	Shareholders' Equity as percentage of bank assets.		
Independent Variables: CAMELS model indicators			
C	Capital (bank leverage)	Shareholders' Equity as a percentage of bank Liabilities	Ahmad & Albaity (2019)
A	Assets Quality	Impaired loans calculated as a percentage of gross loans	Thoa *et al*., (2020)
M	Management Efficiency	Operating expense as a percentage of net revenue	Abbas *et al*., (2020)
E	Earning Capacity	Net interest margin	Thoa & Anh (2017);

			Mili *et al*., (2017)
L	Liquidity Management	Liquid Assets as a percentage of bank Assets	Aspal & Nazneen (2014)
S	Sensitivity to market risk	Total securities as a percentage of bank assets	El-Ansary & Hafez (2015)
Industry-specific indicators			
HHI	Market Concentration	Herfindahl–Hirschman Index The sum of the squared each bank's market shares in total assets of the individual banks.	Chi-Chuan Lee (2018); Moudud-Ul-Huq (2019); Sarwar *et al*., (2020)
BS	Bank size	Size natural logarithm of total assets (log)	Moussa (2018); Ahmad & Albaity (2019)
Data source: ORBIS			
Macro-Economic indicators			
INF	Inflation Rate	The rate of annual inflation based on consumer price indexes	Kalifa & Bektaş (2018); Smaoui *et al*., (2020); Moussa (2018)
GDP	Economic Growth	GDP per capita growth (annual %)	
Data source: World Bank			

IV. Methodology and model specification

This study utilized two models to empirically investigate the influence of CAMELS model variables and macro-economic variables on commercial banks' capital adequacy ratios. Given the characteristics of the data under study, a panel-corrected standard error (PCSE) estimator (Beck & Katz, 1995), which is appropriate and bias-free, was applied. The PCSE estimator controls cross-section dependence, autocorrelation and heteroskedasticity problems. This methodology is appropriate for conditions when N is greater than T. Consequently, the proposed model for examining the fundamental links among the variables is as follows:

$$\mathbf{CAR}_{it} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1} C_{i,t} + \boldsymbol{\beta_2} \mathbf{A}_{i,t} + \boldsymbol{\beta_3} M_{i,t} + \boldsymbol{\beta_4} E_{i,t} + \boldsymbol{\beta_5} L_{i,t} + \boldsymbol{\beta_6} S_{i,t} + \boldsymbol{\beta_7} \mathbf{HHI}_{i,t} + \boldsymbol{\beta_8} \mathbf{BS}_{i,t} + \boldsymbol{\beta_9} \mathbf{In}_{i,t} + \boldsymbol{\beta_{10}} \mathbf{GDP}_{i,t} + \boldsymbol{\varepsilon_{it}}.$$

Where:

$\mathbf{CAR}_{it}$: is the capital adequacy variable of the bank (i =1, ..., 62) at the time (t =1, …., 8) as represented by the CAR1 and CAR2.

$\boldsymbol{\beta_0}$: is the constant parameter.

$\boldsymbol{\beta_{1-}\beta_{10}}$: are the coefficient parameters.

$\boldsymbol{\varepsilon_{it}}$: is the residual term.

V. Empirical Results and Discussion

Descriptive statistics

Table 2 shows the descriptive statistics data regarding the variables of this study; these are the mean, minimum, maximum and standard deviation values. From the descriptive statistics table, we can see that data are normality and the absence of outliers in the variables.

Table 2: Descriptive statistics

stats	mean	min	max	sd
CAR1	18.993	6.230	47.54	4.6420
CAR2	14.576	5.327	79.93	5.3074
C	17.169	5.627	76.09	6.4485
A	4.027	0.068	27.09	2.6769
M	40.492	16.000	186.54	16.3712
E	2.979	-1.902	9.99	1.3065
L	20.028	3.452	74.70	9.5639
S	15.370	0.949	93.62	12.2019
HHI	2458.788	1134.072	12596.50	1929.6750
BS	16.936	11.707	20.58	1.8541
INF	2.245	-0.401	5.83	1.3082
GDP	3.646	-2.866	13.38	2.8101

Correlation matrix

Table 3 shows the correlations between the explanatory variables of this study. From the correlation matrix table, we can see that the explanatory variables have small coefficients. This explains why there is no multicollinearity problem in the models.

Table 3 Correlation matrix

Obs=496	C	A	M	E	L	S	HHI	BS	INF	GDP
C	1									
A	-0.058	1								
M	0.026	0.094	1							
E	0.211	0.152	-0.248	1						
L	0.015	0.162	0.276	-0.046	1					
S	-0.043	-0.120	0.025	-0.322	-0.011	1				
HHI	-0.078	-0.105	0.106	-0.236	0.181	0.189	1			
BS	-0.019	-0.196	-0.503	0.156	-0.327	0.029	-0.277	1		
INF	-0.011	-0.017	0.088	-0.070	0.056	0.010	-0.119	0.027	1	
GDP	0.142	-0.028	-0.027	0.090	0.030	0.060	-0.034	0.0387	0.230	1

Experiential examination

Table 4 summarizes the empirical framework of the valuation models, using the total capital ratio (CAR1) and equity to total assets (CAR2) as proxies for capital adequacy.

The results of the estimate between the CAMELS model variables and the capital adequacy ratios show that the effect of bank leverage (C) on capital adequacy ratios is positive and statistically significant for both models at the 1%*** level. This positive sign is consistent with previous empirical research (Kalifa & Bektaş, 2018; Ahmad & Albaity, 2019). A high this ratio value indicates low leverage, and vice versa (Ahmad & Albaity 2019). In other words, the higher the ratio of total equity to total liabilities, the more ability the bank is in remains solvent and the better its performance and it implies that the degree to which a bank lessens its leverage increases its capital adequacy ratios. Asset quality (A) was found to be negative and statistically significant for both models at the 1%*** level. This negative sign is consistent with almost all previous empirical research. The lower this ratio, the better off a bank is in terms of capitalized and asset quality. Management efficiency (M) has a positive and statistically significant effect at the 1%*** level on the capital adequacy ratio measured using CAR2. However, it was insignificant when measured using CAR1. These results are inconsistent with those of Abbas *et al.*, (2020). The results show that the earning capacity of the bank (E) has a positive and statistically significant effect at the 1%*** level on the capital adequacy ratio measured using CAR1. This positive sign is consistent with previous empirical research (Thoa & Anh, 2017; Ahmad & Albaity, 2019; Mili *et al*., 2017; Moussa, 2018). Bank liquidity (L) has a significant and positive effect at the 1%*** level on the capital adequacy ratio measured using CAR2. This result contrasts with Moussa's (2018) and Thoa *et al*.,'s (2020) findings. Finally, the results show that sensitivity to market risk (S) positively and significantly affects the bank capital adequacy ratio measured using CAR1 at the 1%*** level. These results are inconsistent with El-Ansary & Hafez (2015).

Table 4: Regression Results for (CAR1, CAR2) as measures of capital adequacy.

	CAR1		CAR2	
Variable	**Coefficients**	**z-stat**	**Coefficients**	**z-stat**
C	.4038205***	(5.64)	.4505686***	(3.35)
A	-.1674863**	(-2.18)	-.315635***	(-3.47)
M	.0102797	(0.53)	.1392046***	(4.29)
E	.3864311***	(4.04)	.1061648	(0.60)
L	.0168498	(0.74)	.1290133***	(4.05)
S	.0409143***	(2.41)	.0187217	(1.25)
HHI	-.0001796***	(-3.81)	-.0001522*	(-1.69)
BS	-.4643093***	(-3.60)	.2005981	(1.24)
INF	-.2286316**	(-2.46)	-.1347472	(-1.57)
GDP	.0186658	(0.47)	.117953**	(2.49)
Constant	19.13602***	(6.57)	-3.82828	(-1.11)
Wald-test	*χ2 (10) = 668.78***		*χ2 (10)* = 664.59***	
R-squared	0.8994		0.8245	
T. periods	8			
N. groups	62			
N. Observations	434			

Denotes significance at the 1%***, 5%** and 10%* levels

Regarding the estimated results between industry-specific indicators and capital adequacy ratios, evidence showed that the impact of market concentration rate measured by Herfindahl–Hirschman Index (HHI) on capital adequacy measures is negative and significant at the 1%*** level for both models. This

negative finding is explained by less competitiveness or higher concentration (HHI) in the banking industry keeping capital adequacy ratios to a minimum. This negative sign is consistent with Moudud-Ul-Huq (2019) who found that concentration index have a negative impact on the capital buffers.

Evidence showed that bank size (BS) has a negative and statistically significant effect at the 1%*** level on the capital adequacy ratio measured using CAR1. This negative result suggests that larger banks have riskier assets. Regarding the estimated results between macroeconomic characteristics and capital adequacy ratios, evidence showed that the impact of the inflation rate (INF) on capital adequacy measured using CAR1 is negative and significant at the 5%** level but insignificant when measured using CAR2. In contrast, the impact of economic growth in terms of gross domestic product (GDP) on capital adequacy measured using CAR2 is positive and significant at the 5%** level but not significant when measured using CAR1.

VI. CONCLUSION

This study aimed to inspect the factors affecting capital adequacy ratios in commercial banks by examining the six components of the CAMELS framework in relation to commercial bank capital adequacy in GCC countries. Additionally, this study aimed to increase and deepen awareness of the possible effects of industry-specific and macro-economic indicators. The study found that the major CAMELS model components that had a positive, statistically and significant effect on commercial banks' capital adequacy ratios in the GCC countries between 2011 and 2018 were capital (C), management efficiency (M), earning (E), liquidity (L) and sensitivity (S), excepting asset quality (A), which has a correct negative and is statistically significant on commercial banks' capital adequacy for both models. The effect of the industry-specific indicators of commercial banks' capital adequacy in the countries under study was found to be negative and statistically significant on the ratio measured using CAR1. Similarly, regarding the estimated results between macroeconomic characteristics and capital adequacy ratios, evidence showed that the impact of the inflation rate (INF) on capital adequacy measured using CAR1 was negative and significant at the 5%** level but not significant when measured using CAR2. In contrast, the impact of economic growth in terms of GDP on capital adequacy measured using CAR2 was positive and significant at the 5%** level but not significant when measured using CAR1. It is quite clear from this study that there are many factors affecting the capital adequacy ratios of the banking industry, including internal factors specific to the bank and such external factors as industry indicators and macroeconomic indicators.

Therefore, the study recommends bank managers and policy makers to exercise caution in implementing their policies related to capital and security requirements due to its importance in strengthening and improving the banking sector and paving the way for an exceptional increase in granting confidence to depositors and its repercussions on the stability and sustainability of the bank. Likewise, central banks must carry out financial evaluations and analyses from time to time to keep pace with innovations and regulatory and supervisory strategies and to take into account the precise variables that affect the ability of banks to make the right decisions regarding those variables. We recommend that future researchers conduct more empirical research to explain the role that internal and external factors play as possible explanatory determinants of capital adequacy ratios in the banking industry, which could include more variables other than those used in this study.

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