



Exploring Influencing Factors on Capital Adequacy in Commercial Banks

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Abstract

This study estimates the effect of macroeconomic and control factors on the capital adequacy ratio of commercial banks in Vietnam. Using the feasible generalized least squares method (FGLS), the following factors are statistically significant in affecting the capital adequacy ratio: national governance quality, economic growth, COVID-19, bank size, liquidity, and leverage. This study also highlights the role of compliance in maintaining capital adequacy during a global crisis, such as the COVID-19 outbreak, because commercial banks need more capital to absorb shocks in the financial instability period caused by the pandemic. Besides, the author emphasizes that in developing countries, especially Vietnam, the government needs to ensure national governance quality, such as political stability and regulatory quality, to increase additional capital buffers to protect them from losses or bankruptcies. Furthermore, the author conducts robustness tests to enhance the reliability and impartiality of the research findings.

Keywords:

Capital Adequacy Ratio;
Commercial Banks; COVID-19;
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1- Introduction

The adoption of the Basel Framework aids commercial banks in upholding extra capital reserves to absorb losses. Consequently, this surplus capital offers various advantages to long-term financial stability. The bank Capital Adequacy Ratio (CAR), maintained in accordance with the minimum regulatory standards, serves as a metric to evaluate the desired capital level. The Basel Accords established guidelines for determining the CAR to mitigate banking risks. It is crucial to analyze how global commercial banks handle capital and the interplay between capital management and risk dynamics.

In addition, robust levels of capital and liquidity at banks helped to act as shock absorbers of the pandemic's economic impact. The Bank for International Settlements (BIS) began to assess the effects of the COVID-19 pandemic on the banking system and evaluate the effectiveness of the Basel III regulatory framework. This shows that the Basel III regulations' overarching goal of enhancing the resilience of the banking system, which has held up exceptionally well over the last ten years and throughout the current challenged period, was accomplished by boosting banks' capital and liquidity levels. Moreover, during the global financial crisis, the BIS imposed stringent capital adequacy ratio requirements with the primary objective of safeguarding depositors' interests, as documented in [1]. According to Asteriou & Spanos [2] and Ogunode et al. [3], bolstering banks' capital adequacy protects depositors and enhances the stability of the overall financial system.

Numerous empirical studies conducted in various countries have provided compelling evidence for the effect of bank-specific and external factors on CAR [3–10]. However, their findings are inconsistent, and some factors, such as COVID-19 and national governance quality, have not been explored in their model.

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The COVID-19 pandemic has the potential to initiate a significant economic downturn, resulting in issues such as unemployment and reduced savings and investments. This situation could give rise to challenges including increased withdrawals of savings, higher default rates, a slowdown in the expansion of credit, diminished interest earnings, and an elevated risk of businesses facing insolvency. Moreover, the pandemic may pose particular difficulties to developing nations in terms of swift recovery. These challenges can be attributed to factors such as insufficient institutional governance, underdeveloped capital markets, and bureaucratic hurdles in policymaking. Collectively, these factors contributed to a decrease in available capital, intensifying the strain caused by the COVID-19 shock.

Vietnam's banking sector is currently facing challenges and potential risks that could jeopardize the overall stability of the system due to COVID-19. Although the pandemic has not impaired the operations of commercial banks, standards were implemented by the State Bank of Vietnam (SBV) under the Basel Accords framework to ensure the safety of system operations. The imperative for Vietnam to engage in international economic integration underscores the necessity of studying and adopting international standards, thus enabling its economy to deepen its integration into the global financial landscape.

Our study aims to fill this gap by examining the effects of COVID-19 and the quality of national governance on the Capital Adequacy Ratio (CAR) using the Basel framework, trade-off theory, and pecking order theory. To accomplish this objective, we formulated the research question: 'To what extent do the factors contribute to the capital adequacy ratio of Vietnamese commercial banks amidst the COVID-19 pandemic?'

2- Literature Review and Hypothesis Development

2-1-1- Literature Review

2-1-2- Basel

In 1988, the Basel I Agreement kicked off the global standardization of risk-based capital requirements. Its primary goal is to establish robust international banking systems and foster regulatory consistency among banks operating across various countries [11]. Basel I introduced essential concepts, specifying eligible asset types for banks as capital and categorizing them into Tier 1 and Tier 2 based on their capacity to absorb losses and protect creditors.

The Basel II Accord, released in June 2004, comprised three central "pillars": minimum capital requirements, regulatory oversight, and market discipline. Its aim was to enhance minimum capital adequacy standards, supervisory measures, and market discipline within the banking systems.

Basel III further reinforced these pillars by introducing additional measures for banks, such as mandating a liquidity coverage ratio and a Net Stable Funding Ratio to ensure more stable long-term equity. Banks were also required to implement a leverage ratio, in addition to the risk-based framework. In recent decades, the Basel Accords have undergone periodic reviews incorporating supplementary measures to address various forms of risk [12].

2-1-3- The Capital Structure Theory

Capital structure theory operates under the assumption of perfect markets. There are two established theories in the realm of capital structure: trade-off theory and pecking order theory [13]. The trade-off theory posits that an ideal capital structure is reached when the advantages of debt financing are in equilibrium with the drawbacks of bankruptcy [14–16]. According to this theory, as a company's size increases, it becomes more feasible to access capital markets with reduced transaction costs [17]. Furthermore, as indicated by research conducted by Dagher et al. [4], heightened market volatility motivates banks to uphold a certain minimum capital level to attract additional funds. This finding corresponds to the insights provided by Holmstrom & Tirole [18], who emphasize the importance of assuming the risks inherent in lending. This alignment also extends the idea that banks must protect themselves and the concept of risk management in lending, as discussed by Dagher et al. [4].

Conversely, based on pecking order theory, banks tend to prioritize internal financing, such as retained earnings and over-seeking external funding, and might resort to debt financing afterward. Based on this theory, banks are required to hold extra capital to absorb and mitigate losses during periods of distress or pandemic.

2-2- Empirical Studies

El-Ansary et al. [19] employed a comparative approach utilizing the Generalized Method of Moments (GMM) on panel data to identify the elements influencing the CAR in both Islamic and conventional banks. This study reveals a noteworthy correlation between the CAR and these banks. Additionally, long-term effects are observed, with bank size, operational efficiency, and GDP growth rate influencing CAR. For Islamic banks, this study demonstrates a significant link between CAR and deposits-to-assets ratio. By contrast, conventional banks exhibit connections between CAR and factors such as profitability, credit risk, and portfolio risk.

Dagher et al. [4] demonstrated that maintaining a bank capital level ranging from 15% to 23% of risk-weighted assets would have been sufficient to absorb losses during most historical banking crises in advanced economies. Additional increases in capital beyond this range would have yielded minimal benefits for preventing further crises. Appropriate capital requirements could be set below this range because banks usually hold capital exceeding regulatory thresholds and other instruments that could be bailed contribute to a bank's capacity to absorb losses.

The study by Obeid [8] reveals that credit risk, bank size, and GDP growth rate have a favorable impact on CAR within the Arab banking sector. Conversely, the study shows that bank profitability has a detrimental influence on the CAR. The author emphasizes the critical role of CAR as a significant indicator of absorbing losses and enhancing the banking system's overall stability. Naoaj [10] investigated factors influencing the capital adequacy of commercial banks in Bangladesh. This reveals that capital adequacy is significantly affected by leverage, liquidity risk, real GDP, net profit, and inflation. On the other hand, it explores the determinants of CAR in both the short and long term [7]. According to the study by Gharaibeh [7], in the short run, factors such as the credit-to-deposits ratio, banks' leverage ratio, banks' liquidity ratio, one-year-lagged return on equity (ROE), capital-to-assets ratio, one-year-lagged capital asset ratio, liquid-assets-to-deposits ratio, and coverage ratio significantly affect CAR. However, in the long run, only the leverage, liquidity, capital-to-assets, and liquid-assets-to-deposits ratios significantly affect CAR.

In Vietnam, the study conducted by Thoa et al. [5] explored the determinants of CAR in Vietnamese banks, focusing on internal factors. This study employs secondary data sourced from the banks' annual reports from 2009 to 2015. Their findings demonstrate that both bank size and liquidity have a negative and statistically significant impact on the CAR. Conversely, loan loss reserves and loans also exhibit a negative influence on the CAR; however, these effects are statistically insignificant. Consistent with these authors, Le et al. [6] investigated the factors affecting CAR. This study employs FGLS to explore the effects of financial leverage, client deposits, loans, liquidity, and profitability on the CAR.

2-3- Hypothesis Development

2-3-1- COVID-19

The emergence of the COVID-19 pandemic has led to shifts in the business landscape. As a result, the recovery process of developing nations from the impact of COVID-19 has become challenging because of factors such as weak institutional governance and government policy-making issues. Consequently, to mitigate systemic risks and the potential bankruptcy of numerous global banks, banking regulations such as Basel II and Basel III have played a crucial role in ensuring stability within the global financial system. An integral aspect of these regulations is CAR, which measures a bank's capital in relation to its risk-weighted assets. This ratio serves as an indicator of a bank's ability to support high-risk assets such as loans.

Despite the COVID-19 crisis causing a decline in the average capital ratio, it generally remained above the regulatory minimum capital requirement, as highlighted by the IMF [20]. Consequently, the ability of banks to effectively meet these minimum capital requirements can help mitigate asset risks and bolster financial stability during the pandemic, as suggested by previous studies [21–24]. Furthermore, some research indicates that banks maintaining a high capital adequacy ratio are poised to achieve robust performance and fortify their financial well-being in the face of the COVID-19 challenges [25].

Hypothesis 1: COVID-19 positively affects CAR at commercial banks in Vietnam.

2-3-2- National Governance Quality

National governance is one of three levels of governance: global, national, and local [26]. Kumar et al. [27] investigated the effect of governance components, such as corruption and political stability, on banking performance, which is measured by capital adequacy and other CAMEL factors. According to Lee and Lee [28] and Park [29], a lack of political stability can negatively impact the capital adequacy ratio. This result is supported by Belkhir et al. [30] and Charumilind et al. [31].

Hypothesis 2: National governance quality negatively affects CAR at commercial banks in Vietnam.

2-3-3- Economic Growth

Economic growth plays a pivotal role in influencing the banking system, as indicated by various metrics examined in previous research [28, 32, 33]. Mili et al. [34] and Yüksel and Özşarı [35] investigate the impact of economic growth on capital adequacy ratios within the banking system. In particular, there are some research revealing a negative relationship between economic growth and the CAR [8, 19, 36].

Hypothesis 3: Economic growth negatively affects CAR at commercial banks in Vietnam.

2-3-4- Inflation

Inflation is another significant economic factor that affects commercial banks' CAR. Numerous studies have delved into the connection between inflation and CAR [17, 36, 37]. Specifically, some studies illustrate that a heightened inflationary environment erodes bank capital, resulting in a negative correlation between inflation and CAR [17, 37, 38]. Abba et al. [39] identified a positive relationship between inflation and the CAR.

Hypothesis 4: *inflation affects CAR at commercial banks in Vietnam.*

2-3-5- Control Factors

Furthermore, some findings show that bank-specific factors, such as bank size, liquidity, leverage ratio, deposits, non-performing loans, and profitability, significantly influence CAR. These control factors were incorporated into the model to bolster the internal validity of the study and minimize the impact of potentially confounding or unrelated factors. Additionally, this inclusion serves to establish a strong correlation or causal connection between the variables of interest and helps to prevent research bias.

Bank size: The size of a bank is determined by the natural logarithm of its total assets [40]. A negative relationship between bank size and CAR has been demonstrated [36, 41–44]. Thus, we propose hypothesis 5 that bank size negatively affects CAR in commercial banks in Vietnam. Liquidity is a bank's capability to turn its financial assets quickly and efficiently into cash or the availability of ready funds to meet all of its financial obligations [45, 46]. Banks with greater liquid assets have an increased capacity to acquire debt, potentially leading to a reduction in their capital reserves. Therefore, some researchers [6, 47–50] have explored the negative influence of liquidity on the CAR. Based on this argument, we propose hypothesis 6, which states that liquidity negatively affects CAR in commercial banks in Vietnam.

Leverage: The financial leverage ratio pertains to the blend of borrowed funds and shareholder equity utilized in a bank's financial strategy [46, 51]. Empirical studies show that leverage has an inverse relationship with CAR [6, 52], while Usman et al. [44] show that leverage is positively correlated with CAR. Hence, we propose hypothesis 7, which states that leverage affects CAR in commercial banks in Vietnam.

Deposits: Deposits are taken from customers and represent a significant proportion of capital in commercial banks. Increased deposits necessitate stricter banking regulations and oversight to safeguard depositors' rights and mitigate the risks of insolvency. Therefore, we anticipate a positive correlation between the deposit levels and capital ratios. The study conducted by Masood and Ansari [53] showed a positive correlation between customer deposits and CAR, whereas Le et al. [6] and Mili et al. [34] concluded that CAR is negatively affected by customer deposits. Based on these arguments, Hypothesis 8 proposes that deposits affect the CAR at commercial banks in Vietnam.

Non-performing loans: non-performing loans are considered one of the bank risks that involve the risk that the borrower fails to pay the principal and interest on time [54]. Smaoui et al. [36] and Rime [42] indicate a notable and meaningful positive correlation between fluctuations in bank risk and capital adequacy. As a result, Hypothesis 9 is that non-performing loans have a negative effect on CAR at commercial banks in Vietnam.

Profitability: The prevalent metrics employed to assess an entity's income and profitability are Return on Assets (ROA) and Return on Equity (ROE). These ratios also signify the efficiency and effectiveness of banks, showcasing how they deployed their capital judiciously [46]. Some studies confirm the positive effect of profitability on CAR [17, 55], while Le et al. [6] explore the inverse relationship between profitability and CAR. Based on these arguments, we propose hypothesis 10 that profitability affects CAR in commercial banks in Vietnam.

3- Methodology and Research Model

3-1- Sample

This study focused on the evaluation of commercial banks in Vietnam. The dataset includes 34 commercial banks over 13 years, resulting in 442 observations. However, after removing unavailable data, the final sample used for the analysis consisted of 432 observations, reflecting the available and transparent information sources. The data employed in this study were drawn from financial statements, annual reports, bank websites, and the FiinPro database. Additionally, macroeconomic factors are sourced from the World Bank website to enhance the comprehensive nature of the analysis.

3-2- Research Model

Here, the research model is presented based on the following form:

$$car_{i,t} = \alpha_0 + \sum_1^n \alpha_j macro_variables_{i,t} + \sum_{n+1}^m \alpha_k control_variables_{i,t} + \varepsilon \quad (1)$$

Model (1) is modified into model (2) as follows:

$$car_{it} = \alpha_0 + \alpha_1 covid_t + \alpha_2 gdp_t + \alpha_3 inf_t + \alpha_4 ngov_t + \alpha_5 size_{i,t} + \alpha_6 ldr_{i,t} + \alpha_7 lev_{i,t} + \alpha_8 deposit_{i,t} + \alpha_9 nplr_{i,t} + \alpha_{10} roe_{i,t} + \varepsilon \tag{2}$$

where $car_{i,t}$ is capital adequacy ratio of bank i at time t , $covid_t$ is COVID-19 occurred at time t , gdp_t is gross domestic products at time t , inf_t is inflation rate at time t , $ngov_t$ is national governance quality at time t , $size_{i,t}$ is the size of bank i at time t , $ldr_{i,t}$ is liquidity of bank i at time t , $lev_{i,t}$ is leverage ratio of bank i at time t , $deposit_{i,t}$ is deposit ratio of bank i at time t , $nplr_{i,t}$ is non-performing loan ratio of bank i at time t , $roe_{i,t}$ is profitability of bank i at time t . (The details of each variable are presented in Table 1).

Table 1. Variables in model

Variables	Index	Formula
Dependent Variable		
<i>Capital Adequacy ratio_{i,t}</i>	<i>car_{i,t}</i>	Annual Reports
Independent Variables and Control Variables		
Independent Variables	COVID-19	<i>covid_t</i> <i>covid_t</i> = 1 if year t has COVID-19, otherwise its value is 0.
	Economic growth	<i>gdp_t</i>
	Inflation rate	<i>inf_t</i>
	National governance quality	<i>ngov_t</i>
Control Variables	Bank size	<i>size_{i,t}</i>
	Liquidity ratio	<i>ldr_{i,t}</i>
	Leverage ratio	<i>lev_{i,t}</i>
	Deposit	<i>deposit_{i,t}</i>
	Non-performing loan ratio	<i>nplr_{i,t}</i>
	Profitability	<i>roe_{i,t}</i>

3-3- Research Process and Methodology

The research process to determine the determinants of capital adequacy ratio by applying the FGLS method. The process of this study is illustrated in Figure 1.

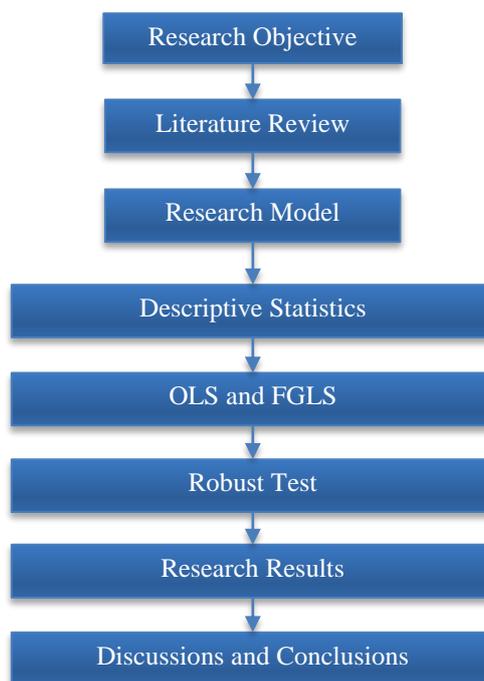


Figure 1. Research process

Based on the research objective, the author conducted a literature review and empirical studies to suggest a research model. The study then employs the ordinary least squares (OLS) method to present descriptive statistics. In addition, the model's defects were tested, such as multicollinearity, autocorrelation, and heteroscedasticity. As the relationship between bank risk (non-performing loans) and bank capital may yield a biased model and misleading conclusions due to heteroskedasticity [56, 57], FGLS was conducted to solve the problem. Finally, robustness testing was performed to improve the reliability of the findings.

4- Model Analysis and Discussions

4-1- Model Analysis

Table 2 presents the results of the descriptive statistics that describe the numeric set of data using Stata 20.0. The minimum, maximum, and mean values of the variables were briefly discussed.

Table 2. Descriptive statistics

Variable	Obs	Mean	Min	Max
car	432	0.126	0.050	0.259
ngov	432	53.626	44.080	63.460
inf	432	0.055	0.010	0.190
gdp	432	0.061	0.030	0.080
covid	432	0.306	0.000	1.000
roe	432	0.113	-0.560	7.360
nplr	432	0.027	0.010	0.820
dep	432	31.690	17.860	35.030
lev	432	11.596	2.050	30.200
ldr	432	0.907	0.410	10.380
size	432	32.401	29.740	35.290

The basic characteristics of the collected data, including the mean, minimum, and maximum values of the dependent and independent variables, are listed in Table 2. The mean value of the capital adequacy ratio was 0.126, and the minimum and maximum values were 0.050 and 0.259, respectively. The lowest number belonged to the Vietnam - Asia Commercial Joint Stock Bank in 2016 and the Ho Chi Minh City Development Joint Stock Commercial Bank in 2015. The Vietnam Joint Stock Commercial Bank for Industry and Trade has the highest capital adequacy ratio (25.91% in 2021).

Regarding macroeconomic factors, the minimum values of GDP, inflation, and national governance quality are 0.026, 0.006, and 44.080, respectively. The maximum values of these factors were 0.072, 0.187, and 63.460, respectively. Finally, the COVID-19 factor is a dummy variable with a minimum value of 0 and a maximum value of 1. This signifies that the years when COVID-19 had an impact were assigned a value of 1, specifically in 2019 and 2021, whereas all other unaffected years held a value of 0.

Bank size has a minimum value of 29.738, representing the Viet Capital Commercial Joint Stock Bank in 2010, whereas the Joint Stock Commercial Bank for Investment and Development of Vietnam in 2021 has the largest size. Liquidity is represented by the loan-to-deposit ratio of the commercial banks. The minimum and maximum values are 0.363 and 1.789, respectively. In addition, the leverage ratio and deposit ratio have minimum and maximum values of 2.900 and 30.202, and 18.000 and 35.000, respectively. The deposit ratio is the Natural Log of customer deposits in commercial banks. In addition, the non-performing loan ratio has a minimum value of 0.010, and its maximum value is 0.825. The maximum value was obtained from a Construction Bank (VNCB) in 2012.

Return on equity has the lowest value of -0.560, which belongs to the Tien Phong Commercial Joint Stock Bank in 2011. Construction banks had the highest return on equity in 2012 (7.360). This means that the Construction Bank earned the highest net income in 2012 compared to the other banks. The next section presents an examination of multicollinearity, autocorrelation, and heteroskedasticity after conducting Ordinary Least Squares (OLS) regression. Considering the OLS findings, the presence of multicollinearity was assessed using both the Variance Inflation Factor (VIF) and the correlation coefficient matrix (Table 3).

Table 3. Test of the multi-collinear phenomenon

	car	size	ldr	lev	deposit	loan	nplr	roe	covid	gdp	inf	ngov	VIF
car	1.00												
size	0.36	1.00											7.72
ldr	-0.69	-0.42	1.00										2.74
lev	0.35	0.16	-0.44	1.00									1.70
deposit	-0.31	0.54	0.04	-0.12	1.00								5.99
nplr	-0.67	-0.38	0.53	-0.41	0.38	0.02	1.00						3.30
roe	0.03	0.32	-0.41	-0.13	0.38	-0.03	-0.01	1.00					1.77
covid	0.14	-0.23	0.01	0.04	-0.41	0.14	-0.17	-0.15	1.00				1.24
gdp	-0.06	-0.24	-0.06	0.30	-0.28	0.02	0.05	-0.23	0.12	1.00			1.40
inf	-0.23	-0.61	0.17	-0.07	0.07	0.01	0.49	-0.03	-0.07	0.02	1.00		3.31
ngov	-0.13	0.23	0.06	-0.05	0.45	-0.01	0.18	0.18	-0.05	-0.13	-0.07	1.00	1.35

Based on Table 3, the rule of thumb is satisfied; hence, the model is free of multicollinearity [58]. The next section shows the results of the Wooldridge and Breusch-Pagan tests for autocorrelation and heteroskedasticity, respectively. All p-values of these tests are less than 5%, confirming that the model contains autocorrelations and residuals with variance changes. As stated above, FGLS is used in the estimation to deal with defective problems in the model.

4-2-Discussions

Table 4 confirms that the model has six statistically significant factors at the 5% level affecting CAR: bank size, liquidity, leverage, national governance quality, gross domestic product, and COVID-19.

Table 4. Results of FGLS and OLS methods

car	FGLS	OLS
	Coef. P>z (p-values)	Coef. P>z (p-values)
ngov	-0.769 0.000***	-0.551 0.000***
inf	0.286 0.377	0.199 0.702
gdp	-0.166 0.000***	-0.118 0.000***
covid	0.279 0.000***	0.105 0.041*
roe	0.027 0.753	0.127 0.550
nplr	0.435 0.091	0.243 0.068
dep	0.017 0.120	0.009 0.188
lev	0.008 0.026*	0.011 0.032*
ldr	-0.030 0.045*	-0.027 0.038*
size	-0.071 0.001***	-0.085 0.000***

legend: * p<0.05; ** p<0.01; *** p<0.001

where car_{it} : capital adequacy ratio of bank i at time t ; $ngov_t$: national governance quality at time t ; inf_t : inflation rate at time t ; gdp_t : gross domestic product at time t ; $covid_t$: covid incurred at time t ; roe_{it} : return on equity of bank i at time t ; $nplr_{it}$: non-performing loan ratio of bank i at time t ; dep_{it} : customer deposits of bank i at time t ; lev_{it} : leverage ratio of bank i at time t ; ldr_{it} : the loan-to-deposit ratio of bank i at time t ; $size_{it}$: the size of bank i at time t .

National governance quality has a negative effect on the capital adequacy ratio of commercial banks in Vietnam because its coefficient is -0.769. The negative coefficient implies that a one standard deviation increase in national governance quality leads to a 0.769 decrease in the capital adequacy ratio of Vietnamese commercial banks, other things being equal. These findings are consistent with those of previous studies [27, 30, 31]. They agree that in developing

countries that lack transparency and political instability, firms, especially financial institutions, need more capital adequacy as their capital buffer to protect them from losses or bankruptcies. Capital adequacy requirements are rules and regulations set up by Basel and the Central Banks of each country in the world that help bank supervisors determine whether commercial banks always hold sufficient capital to meet unexpected operational risks.

Gross domestic product, an economic growth factor, is also a macroeconomic factor that significantly and negatively affects the capital adequacy ratio of commercial banks in Vietnam. The negative coefficient of GDP implies that, other things being equal, a one standard deviation increase in GDP will lead to a 0.166 decrease in the capital adequacy ratio of Vietnamese commercial banks. These findings are consistent with those of previous studies [8, 19, 36]. These authors claim that the higher the economic growth, the lower is the capital buffer needed by commercial banks. This means that during economic growth and development, commercial banks maintain the CAR at a lower rate than in the recession phases.

COVID-19 has a coefficient of 0.050, implying that a one standard deviation increase in COVID-19 will lead to a 0.050 increase in the capital adequacy ratio of Vietnamese commercial banks. These findings are consistent with those reported by Karim et al. [1] and Dagher et al. [4]. They demonstrate that during the crisis, banks had sufficient capital buffers to absorb losses. Rubi et al. [59] concluded that a decrease in CAR signifies diminished financial health and resilience of banks in coping with potential risks. Studies by [60–63] examine the influence of the pandemic on bank performance via the responses of capital to the risk-taking aptitude of banks. They claim that the financial stability of the banking industry during a crisis is not comparable to that during normal economic activity, because the consequences of each economic condition are different. Additionally, these authors concluded that during the COVID-19 global crisis, banks needed more capital to absorb shocks, and the pandemic also significantly negatively impacted their ability to survive [63].

The control variables also have significant effects on CAR in commercial banks. First, the leverage ratio has a positive coefficient (0.008); hence, it has a direct and significant effect on the CAR. A coefficient value of 0.008 indicates that an increase in leverage of 1 percent is matched by an increase of 0.008 percent in the capital adequacy ratio, other things being equal. These findings are supported by previous studies [44, 47, 49, 64–66]. They argue that competition leads to the specialization of commercial banks in lending, mobilization, and other activities. By specializing, banks can guarantee the efficiency of financial leverage, amplify the profit increase when financial leverage is higher, and improve the chance of building capital from internal resources, thereby increasing the capital adequacy ratio. Therefore, the leverage ratio positively affects commercial banks' CAR in Vietnam.

Second, liquidity, measured by the loan-to-deposit ratio, has a significant negative effect on CAR because its coefficient is -0.030, which is lower than 0. With the coefficient above implying that other things are equal, a one-standard deviation increase in liquidity will lead to a 0.030 decrease in the capital adequacy ratio of Vietnamese commercial banks. This study finds a statistically significant relationship between liquidity and CAR, which is in line with the research results in [6, 47–50]. Bank liquidity relates to liquid assets and short-term funding. Commercial banks that maintain excessive holdings of highly liquid assets may miss opportunities to generate returns on their assets and hinder capital accumulation, leading to a decline in their capital adequacy ratio. Commercial banks with more liquid assets have greater capacity to raise debt, which might result in a decline in bank capital holdings [48–50].

Finally, bank size has a significant negative effect on the capital adequacy ratio because its coefficient is -0.071. This means that, other things being equal, a one standard deviation increase in bank size will lead to a 0.071 decrease in the capital adequacy ratio of Vietnamese commercial banks. The research results are in line with those in [36, 41–44]. They argue that larger banks are more experienced and have a reputation for brands; hence, they have easier access to capital markets than smaller banks [67].

5- Conclusion

Our findings reveal that leverage, liquidity, and bank size are statistically significant factors affecting the CAR in commercial banks. In particular, this study highlights that the global health crisis (COVID-19) has had a significant and positive effect on the capital adequacy ratio. In addition, national governance quality and economic growth negatively affect the CAR of commercial banks in Vietnam. In developing countries such as Vietnam, under the conditions of political and regulatory quality stability and a favorable economic environment, commercial banks only maintain a minimum level of capital adequacy ratio for their activities, as required by the Central Bank and Basel. Based on the research findings, the author recommends that commercial banks maintain their bank size at an appropriate level by expanding and controlling their credit activities. Second, commercial banks should effectively use the financial leverage ratio and the balance between liabilities and equity. In addition, it is imperative for banks to maintain their capital adequacy ratio judiciously by adjusting profits according to prevailing economic circumstances. Bank executives should demonstrate flexibility in their approach by weighing the pursuit of higher returns through investments in riskier asset portfolios against the imperative of ensuring bank safety. However, the implementation of these management policies should be contingent on the current market conditions. Commercial banks may choose to embrace a greater risk appetite in pursuit of profit and accept a lower level of capital adequacy, particularly if the market is in the growth and development phase.

Although this study obtained specific findings, it has some limitations. First, future research may address other factors affecting CAR at commercial banks in Vietnam, such as interest rates, unemployment rates, and other indicators of the WGI. Second, a subsequent study should consider endogeneity by using instrumental variables to obtain unbiased and reliable results.

6- Declarations

6-1-Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6-2-Funding

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6-4-Institutional Review Board Statement

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6-5-Informed Consent Statement

Not applicable.

6-6-Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the author.

7- References

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