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What Determines the Capital Adequacy Ratio of Joint Venture Commercial Banks of Nepal? An Evidence from Panel Data Analysis

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ABSTRACT

The bank with the appropriate capital adequacy ratio (CAR) is considered the more substantial bank that can meet its obligations and take risks. Thus, the bank management has to identify those factors influencing CAR. This study aims to identify the factors determining the CAR of commercial banks in Nepal. For this purpose, this study has used annual panel data of 6 joint venture commercial banks of Nepal from 2007 to 2021. This paper's regression analysis revealed that bank-specific factors significantly determine the capital adequacy ratio.

Further, the study concluded that the financial performance measured by ROE and lending policy measured by the ratio of the total loan and advance to total assets (LTA) plays an inverse role. Liquidity LTD), management efficiency (ME), operational efficiency (OE), and the size of the bank (SIZE) play a positive role in determining the capital adequacy ratio. The bank's management can implement the findings of this paper to maintain a sufficient capital adequacy ratio. Further, the finding of this study can also be implemented by the regulatory bodies to develop policies relating to the capital requirements of commercial banks.

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1. INTRODUCTION

The capital adequacy ratio (CAR) is the bank's capacity to take on additional operational and credit risks and satisfy its financial commitments on time. It is a bank's available capital as a proportion of its risk-weighted credit exposures. The CAR, also known as the capital-to-risk weighted assets ratio, protects depositors. In other words, it is used to protect depositors and improve the effectiveness and stability of financial systems worldwide. To guarantee that banks have enough reserve capital to withstand an acceptable level of losses before they go insolvent, minimum CAR is crucial. Capital adequacy is one of the most crucial issues for regulatory agencies and bank management since it gives

consumers and shareholders a sense of security by lowering risk exposure. Using the minimum CAR makes the financial system more stable and effective since bankruptcy risk is reduced [1]. Thus, the bank actively manages its capital ratios [2].

The empirical evidence demonstrated that many internal and external factors influence CAR. The internal factors significantly influenced CAR [3]–[10]. The most significant variables for determining the CAR in south-eastern European countries were found to be internal factors like liquidity, ROA, size, NIM, and leverage, as well as external factors like inflation, economic growth, stock market volatility index, governance indicator, and deposit coverage insurance [11]. On the other hand, Mili et al. [12] established that the exact causes do not affect CAR in developed and undeveloped nations. Likewise, operational efficiency, return on assets, deposit structure, asset earning quality, and liquidity are the most influencing internal factors for determining CAR in Indonesian banks [13]. Alternatively, it is discovered that CAR also considerably impacts the profitability of commercial banks [14]–[16].

Additionally, from 2008 to 2013, there was a noticeable positive influence of ROA and assets quality and a noticeable negative influence of liquidity, ROE, and OE on the CAR of the Bank of Indonesia [17]. Additionally, a significant positive relation between CAR with bank efficiency was observed in Egyptian Banks [18]. The significant impact of economic and financial performance on CAR was also observed in Japan [19]. Moreover, the CAR of banks in the MENA Region was affected by operational efficiency, size of the bank, and GDP growth [20]. However, the loan-to-deposit ratio has not been found to impact Indonesia's conventional banks' CAR [21].

Similarly, it was noted that internal variables such as loan loss reserve, lending policy, NIM, bank size, and leverage significantly impacted CAR in Indonesia [22]. Similarly, commercial banks in Vietnam's CAR showed adverse effects from loans to customers, liquidity, financial leverage, and profitability. [23]. When Nepal Bank Limited was founded in 1937, the history of the Nepalese bank officially began. After the establishment of Nepal Bank Limited, the number of commercial banks increased gradually, and there were 27 commercial banks, including seven joint venture banks, till mid-July 2021.

Alajmi and Alqasem [3] examined the effects of internal variables on CAR using annual data collected from five conventional Kuwaiti banks between 2005 and 2013. For the data analysis, the authors utilized fixed-effect and random-effect models. The study discovered an adverse effect of size and ROA and no influence of dividend payout, lending policy, liquidity, assets quality, and ROE on CAR in a fixed effect model. On the other hand, the study revealed no influence of dividend payout, lending policy, ROE, and assets quality on CAR under the random effect model and a negative effect of size and ROA as well as a positive effect of liquidity. In Jordan's commercial banks, there is no relationship between risk, a sizable positive relationship between CAR with ROA and liquidity, and a negative relationship between CAR with interest rates and ROE [24].

Hafez and El-Ansary [25] have discovered the factors influencing the CAR in Egyptian commercial banks in a different study. The research was conducted based on annual data from 36 commercial banks from 2004 to 2013. The authors have divided the

study period into two sub-periods (before and after the international financial crises). While profitability, size, and asset quality were determined to be the most crucial factors before the financial crisis, the author discovered that size, managerial quality, and liquidity were the most critical factors across the entire period. On the other hand, the authors found liquidity, management quality, asset quality, and size as the most significant aspect affecting CAR after financial crises.

Additionally, Thoa and Anh [26] confirmed the influence of internal factors on the CAR of the banks of Vietnam. The examination was based on annual cross-sectional data collected from 29 commercial banks between 2011 and 2015. The research indicated that NIM, liquidity, and NPL had a substantial positive influence on CAR and that size and leverage had no effect. However, NPL and lending policy had a significant adverse effect. Similarly, Abba et al. [27] examined how bank-specific factors affected the CAR of Nigerian banks. The author discovered return on assets as the most significant influencing element for establishing the CAR based on panel data from 12 quoted banks from 2005 to 2014. The authors also discovered a strong positive effect of the risk-weighted assets ratio and liquidity and a negative influence on the quality of the assets.

Bhattarai [5] has attempted to pinpoint the macroeconomic and bank-specific factors influencing the CAR in Nepal. Using annual data from 11 commercial banks between 2013/14 and 2017/18, Bhattarai [5] examined this issue. The paper discovered a substantial impact of internal and external variables on CAR using the Pooled OLS, Fixed effect, and Random effect regression model. The research also discovered a notable beneficial impression of liquidity and a negative impact of size and inflation on CAR. Conversely, the influence of profitability, credit risk, assets quality, GDP growth rate, and management quality on CAR was not found.

To pinpoint the variables influencing CAR, Vu and Dang [28] used panel data collected from 31 Vietnamese commercial banks between 2011 and 2018. The author used a Functional General Least Square (FGLS) regression model for the data analysis. The study discovered that ROA had a significant positive impression on CAR and that leverage, loan loss reserves, and ROE had a considerable negative impression. The impact of size, deposit, loan, liquidity, non-performing loan, and NIM, on the other hand, have been noticed.

Kablay and Gumbo [29] also provided evidence of the significant influence of internal variables on CAR in Botswana's banks. The research was founded on the yearly data of nine commercial banks from 2015 to 2019. The author used regression analysis to discover substantial effects of assets to equity, the cost to income, NPL, and ROE alone.

Hewaidy and Alyousef [7] have examined the effects of external and internal factors on CAR in a different study. The research was based on annual data for all Kuwait-listed banks from 2009 to 2016. According to the author, only asset quality, management quality, liquidity, and bank size had a meaningful impact. Setiawan and Muchtar [30] examined the impression of internal factors on the CAR of Indonesian banks. The research was based on annual data from 42 listed commercial banks on the Indonesia Stock Exchange between 2015 and 2019. The author discovered that ROE and bank size had

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positive effects, whereas loan ratio had adverse effects. No effects of liquidity or loan loss reserve were detected.

Unvan [10] examined the effect of macroeconomic and internal factors on CAR in Ghana. From 2008 to 2017, the study used annual data from 11 recapitalized banks. The study found that the broad money supply had a significant positive and adverse impact on leverage and size, a weak positive impact on ROA, and a weak negative impact on the monetary policy rate. These effects were revealed using all the regression models of the study. Thus, the study concluded that the size, leverage, and overall money supply all play a crucial role in determining the CAR of banks in Ghana.

Keqa [31] has scrutinized the impression of bank-specific variables on the CAR of commercial banks operating in Western Balkan nations. The research was based on annual data from 103 banks from 2010 to 2018. The study discovered that ROA significantly impacts CAR. On the other hand, the study discovered a strong positive inspiration for size and liquidity and a considerable negative effect of leverage on CAR.

The assessment of empirical studies listed above clearly shows that various internal and external factors influence the CAR; however, the findings are not conclusive. In order to determine the elements that affect the CAR of Nepalese joint venture commercial banks, this study tries to uncover those factors. This paper's primary goal is to pinpoint the internal variables that affect joint venture commercial banks in Nepal's CAR.

2. METHOD

In this study, a descriptive and causal-comparative research design was used. With the aid of descriptive analysis, the general facts and connections between the dependent and independent variables are presented. In addition to the descriptive analysis, this study employed a causal-comparative research methodology to pinpoint the impact of variables particular to a given bank on CAR. The annual panel data of six joint venture commercial banks in Nepal that operated from 2007 to 2021 have been considered for this purpose. The regression models in this work were initially calculated using the Pooled OLS, Fixed effect, and Random Effect regression models. Following the estimation of each regression model, the best model was chosen among them based on the outcomes of the Breusch and Pagan LM test and Hausman test.

Model Specification

The capital adequacy ratio (CAR) of Nepalese joint venture commercial banks has been used in this article as a dependent variable to help achieve the study's goal. Additional explanatory factors include return on equity (ROE), lending policy (LTA), liquidity (LTD), management efficiency (ME), operational efficiency (OE), and bank size. The following is a specification of the fundamental model for multivariate regression analysis:

$$CAR_{it} = \beta_0 + \beta_1 ROE_{it} + \beta_2 LTA_{it} + \beta_3 LTD_{it} + \beta_4 ME_{it} + \beta_5 OE_{it} + \beta_6 SIZE_{it} + \varepsilon_{it} \quad 1)$$

Where CARit, the capital adequacy ratio of the bank i at year t, is the dependent variable and is determined by dividing total capital (Tier 1 capital plus Tier 2 capital) by total risk-

weighted assets. ROE_{it} is the return on equity of bank i at year t, which is used as a proxy for financial performance. It is derived by dividing net income accessible to common stockholders by total shareholders' equity. LTA_{it} is a proxy for lending policy and represents the percentage of total loans and advances to total bank assets at year t. LTD_{it} is the total loans and advances divided by total deposits made by the bank i at year t serve as a proxy for liquidity. ME_{it}, determined by dividing net profit by total revenue, is the management effectiveness of bank i at year t. The ratio of total interest revenue to total operating expenses is OE_{it}, which represents the operational efficiency of i bank at year t. $SIZE_{it}$ is the natural logarithm of the total assets, which equals the size of bank i at year t and ε_{it} is the residual error term.

3. RESULTS AND DISCUSSION

Descriptive statistics

The descriptive statistics of the variables of the study are exhibited in Table 1.

Table 1. Descriptive statistics

	Mean	Std. Deviation	Minimum	Maximum
CAR	13.67	3.43	10.43	33.96
ROE	20.52	9.38	2.29	51.97
LTA	59.81	11.28	21.73	83.42
LTD	75.32	19.05	38.70	155.32
ME	25.60	8.96	2.79	46.79
OE	4.24	1.01	1.69	7.04
SIZE	10.80	0.34	9.65	11.46

As per the result, it is observed that CAR has a minimum value of 10.43 percent and a maximum value of 33.96 percent, with an average value of 13.67 percent. These CAR values indicate that Nepal's joint venture commercial banks have maintained an adequate level of CAR. Likewise, the minimum and maximum values of ROE (2.29 percent and 51.97 percent) indicate that the return on equity of selected banks is widespread. The average value of LTA indicates that joint venture banks have a moderate lending policy. Likewise, the average value of LTD, i.e., the total loan ratio and advance to the customer to total deposit, shows that the sample banks have sufficient liquidity during the study period. Furthermore, the minimum and maximum value of ME, OE, and SIZE shows that selected banks vary extensively in terms of their management efficiency, operational efficiency, and size.

Relationship of variables

Correlation analysis has been used to identify the relationship between variables. Table 2 presents the correlation analysis's findings.

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Table 2. Correlation Results

	CAR	ROE	LTA	LTD	ME	OE	SIZE
CAR	1.0000						
ROE	-0.4600	1.0000					
LTA	-0.2801	-0.1332	1.0000				
LTD	0.4363	-0.3814	0.5561	1.0000			
ME	0.0153	0.4424	-0.1312	-0.1401	1.0000		
OE	-0.0785	0.0513	0.2419	0.0022	-0.5329	1.0000	
SIZE	-0.0262	-0.1574	0.4455	0.1282	0.0874	0.0149	1.0000

The outcome demonstrates a positive relationship between CAR with LTD and ME and a negative relationship between CAR with ROE, LTA, OE, and SIZE. Similarly, the outcome shows that ROE has a positive association with ME and OE but a negative relationship with LTA, LTD, and SIZE. LTA demonstrates a favorable relationship with LTD, OE, and SIZE, as well as a negative relationship with ME. Similarly, LTD exhibits a favorable association with OE and SIZE and a negative relationship with ME. Furthermore, ME exhibits a favorable association with SIZE and a negative relationship with OE. Finally, OE and SIZE have a favorable association.

Effect of internal factors on CAR

In order to determine the influence of internal factors on the CAR of Nepal's joint venture commercial banks, regression analysis has also been performed. Regression models with pooled OLS, fixed effects, and random effects have been computed initially for this. The results of each of these regression models are displayed in Table 3.

Table 3. Regression Results

Panel: A			
Variables	Common Effect Model (Pooled OLS Model)	Fixed Effect Model	Random Effect Model
Constant	-4.0673	-7.4391	-4.0673
	(-0.62)	(-1.01)	(-0.62)
ROE	-0.1591*	-0.1439*	-0.1591*
	(-6.16)	(-4.91)	(-6.16)
LTA	-0.2795*	--0.2619*	-0.2705*
	(-11.69)	(-10.56)	(-11.69)
LTD	0.1434*	0.1499*	0.1434*
	(11.20)	(11.48)	(11.20)
ME	0.1449*	0.1443*	0.1449*
	(4.90)	(4.08)	(4.90)
OE	1.2114*	1.4080*	2.2114*
	(5.10)	(5.56)	(5.10)
SIZE	1.6229**	1.7375**	1.6229**
	(2.56)	(2.60)	(2.56)
Wald χ^2		----	278.37*
Adjusted R^2	0.7537	----	----
R^2: within		0.7584	0.7527
R^2: between		0.7716	0.8272

R^2: overall		0.7620	0.7703
F	46.40*	41.02*	----

Panel: B

Breusch and Pagan LM test		Hausman test	
χ^2	0	χ^2	5.50
p-value	1.0000	p-value	0.3577

*Note: The symbols * and ** denote significance at one and five percent levels, respectively. The t-values are the numbers in the parenthesis.*

The result described in Table 3 (Panel A) shows the significant negative coefficient ROE and LTA. The negative ROE coefficient shows that ROE negatively impacts CAR, showing that CAR declines as Nepalese joint venture commercial banks' financial performance improve. This finding is well-matched with the results of [24], [28] and opposes the results of [30]. Similarly, the negative coefficient of LTA suggests that the joint venture commercial bank in Nepal's capital adequacy ratio would be lower as the LTA increases. This finding corroborates the findings of [26], [30]. On the other side, this opposes the findings of [3].

Additionally, the outcome in Panel A of Table 3 demonstrates the significant positive coefficients for LTD, ME, OE, and SIZE. The positive coefficient of LTD specifies that as the ratio of loans and advances to the customers to total deposit increases, capital adequacy ratios also increase. These findings corroborate the findings of [24], [26], [31] and contradict the findings of [3], [28]. Likewise, the joint venture bank of Nepal's capital adequacy ratio is also said to become strong as management and operational efficiency rise, according to the positive coefficient of ME and OE. Finally, the larger joint venture bank of Nepal has a more excellent CAR, according to the positive coefficient of SIZE, which corroborates with the findings of [30], [31]. However, it contradicts the findings of [3], [10], [26], [28].

Additionally, Panel B of Table 3 displays the outcomes of the Breusch and Pagan LM and Hausman tests. The Hausman test's p-values (1.000 > 0.05) and the Breusch and Pagan LM test's p-values (0.3577 > 0.05) demonstrate that the Pooled OLS model is suitable for the set of data used in this investigation. Additionally, the adjusted R^2 value of 0.7537 (from the Pooled OLS) shows that the independent variables in this study can explain the CAR of the joint venture commercial bank of Nepal by 75.37 percent. According to the F-value of 46.40, the estimated Pooled OLS regression model is the best-fitted model. Likewise, the study discovered that LTA had the greatest t-value, which implies that it has the most significant influence on Nepalese joint venture commercial banks' CAR.

4. CONCLUSION

This study was carried out to establish the bank-specific factors that affect the CAR of Nepal's joint venture commercial banks. We use ROE, LTA, LTD, ME, OE, and SIZE as bank-specific factors. The main finding of this study is that the factors particular to the banks chosen for the study have a substantial impact on the CAR of Nepalese joint venture commercial banks. The study concludes that the lending strategy (LTA) and financial

performance (ROE) play opposite roles in determining the CAR. The study concludes that Nepal's joint venture commercial bank must maintain a higher level of CAR while having lower ROE and LTA. Likewise, the study further concludes that liquidity (LTD), management efficiency (ME), operational efficiency (OE), and the size of the bank (SIZE) play a positive role in determining the CAR. Thus, this study concludes that the Nepalese joint venture commercial banks with better liquidity, efficiency, and the larger size can maintain a lower level of CAR.

The bank's management can use the study's findings to maintain a sufficient CAR. Furthermore, the results of this study can be used by the central bank and other regulatory bodies to develop policies relating to the capital requirements of commercial banks.

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