

IMPACT OF CAPITAL ADEQUACY RATIO (CAR), LOAN-TO-DEPOSIT RATIO (LDR) AND BANK SIZE ON PROFITABILITY OF COMMERCIAL BANKS LISTED ON THE PAKISTAN STOCK EXCHANGE (2011–2020)

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Abstract

This study investigates the influence of the (CAR) Capital Adequacy Ratio, (LDR) Loan-to-Deposit ratio, and Bank Size on the profitability measured by (ROA) Return on Assets of commercial banks listed on the Pakistan Stock Exchange (PSX) for the period 2011–2020. By utilizing a quantitative research design and a stratified panel data approach, this study categorizes banks into three distinct groups on their total asset size: Small, Medium, and Large. The main purpose of this division is to examine how the size of a bank changes the effect of financial ratios on its performance. This study explores that profitability of banks can not be measured by the same factors. Different banks have different reason for achieving higher profitability. For medium- sized banks, CAR emerged as a highly significant driver of profitability. Which indicates that strong capital buffers are essential for banks having high CAR to maintain depositor trust and operational stability. However, this study also found that large banks although having assets but profitability ratio is low. In contrast, small banks indicate that profitability remains relatively independent of traditional LDR and CAR fluctuation. Infact it prioritize niche efficiency and lean operations. For large banks, traditional financial ratios were found to be less significant. Profitability is driven by complex variables like digital transformation, market share, and non- interest income in large banks. The findings of this study suggest that same model of regulatory or management approach for all size banks is ineffective. The study concludes that medium size banks should focus on maintaining capital solvency. While Larger banks to achieving higher financial performance should observe beyond traditional ratios toward revenue diversification.

Keywords: *Capital Adequacy Ratio (CAR), Loan-to-Deposit Ratio (LDR), Bank Size, Profitability, Pakistan Stock Exchange, Stratified Analysis.*

INTRODUCTION

Commercial banks are pivotal to Pakistan's financial stability and economic growth. The Main function of commercial banks is the intermediaries between depositors and borrowers. Profitability, measured by metrics like Return on Assets (ROA). Key regulatory ratios i.e. CAR, LDR. These ratios are directly related to financial stability. CAR safeguards against insolvency (Malik et al., 2021; Rafique et al., 2020). The main function of LDR is the balance between liquidity risk and credit deployment (Gita & Mei, 2023; Ramadhanti et al., 2019). State Bank of Pakistan (SBP) governs banking sector of Pakistan for regulations and Basel frameworks. It faces unique challenges, including macroeconomic volatility and evolving credit landscapes (Burr & Collins, 2018). Despite extensive Global research, still banking profitability factor is yet to be explored like (Gita & Mei, 2023; Putranto et al., 2017). Empirical

evidence from Pakistan remains unexamined aspect. Many studies focus on CAR and LDR effects. After 2015, we have observed that new banking rules like Basel III changed the situation. COVID-19 also affected banking performance (Mahmood et al., 2023). Critically, inconsistent findings such as the positive effect of CAR (Rafique et al., 2020) versus neutrality in (Burr & Collins, 2018) creates vagueness an ambiguity for policymakers and bank managers in developing strategies of achieving higher profit. It carries both practical and theoretical value. Empirically quantifying CAR, LDR are essential factors for profitability can help the SBP adjust capital and liquidity regulations. (Rafique et al., 2020). In addition, it examines and resolves fallacies in prior results like (Ali et al., 2024) vs (Burr & Collins, 2018). This study extends asset-based theories of scale economies in emerging trends of Pakistan economy. It examines all Commercial banks listed on the Pakistan except non- listed banks & Islamic banks.

LITERATURE REVIEW

The financial performance of commercial banks is a multidimensional. It is influenced by several economical social and political factors e.g. regulatory requirements, operational efficiency, and institutional scale. According to Signaling Theory, explain that a bank having high CAR indicates that it has strong capital. A high CAR shows that a bank has strong capital. This is the sign of stability that bank can bear unexpected financial losses. Money protection always be the first demand of depositors. Financially healthy and reliability are the important factors that should be present according to investor s point of view. Overall, in Pakistani banking sector system, a high CAR strengthens trust and stability.

In Pakistan, banks with strong capital are seen as safer and more stable. People trust these banks more because they believe their money is secure. When public trust increases, more customers deposit their money in these banks. Banks use this money for business and investments. Lower funding cost is the main issue. Well-capitalized banks also face lower funding costs. They do not need to borrow at high interest rates because lenders see them as low-risk. Financial performance of banks increases due to Lower costs and greater trust by depositors and investors. .As a result, their profits improve & directly increases their ROA. Increasing ROA is the sign of profitability (Ali & Puah, 2018). Furthermore, another research explored that The State Bank of Pakistan strictly follows Basel III rules. These rules require banks to hold higher capital levels. This is necessary rule for all banks to maintain strong capital buffers for safety & security of public trust and money. Firstly, it was observed and felt that it is an extra pressure, which is putting on banks. However, it proves later that it actually helps them. Banks become more careful in how they use their assets. They manage risky assets more efficiently. They avoid unnecessary risky lending. This leads to better financial discipline. Banks improve their risk management practices regularly. They focus more on quality lending instead of risky growth. Because from risky growth they can get sustainability. Because of this, banks become more stable and reliable. Their performance improves. In the end, stronger capital and better risk control help increase profitability (Shahid & Abbas, 2019). Too much capital is not always good. If a bank keeps very high capital, it may not use its money efficiently. Large unused capital means missed opportunities. This creates opportunity costs. The bank may avoid investing in profitable projects. It may also avoid lending where returns are higher. As a result, profits can be decreased. ROA may become weaker. This shows that balance is important. So this can be a crucial point where more

capital stops being helpful. Extra capital becomes restrictive & limits growth instead of supporting it. Financial Intermediation Theory explains another dimension of getting profit in Pakistani banks is that, banks generate profit by mobilizing deposits into productive loans. LDR is the primary proxy for this activity (Ahmad, Mir, & Ali, 2017). Another Research About significant positive relationship between LDR and profitability in Pakistani banks. This means that when banks give more loans, their profits increase. Profit also depends on giving loans is one of the main dimensions. A higher LDR shows that banks are using their deposits actively. Lending more money instead of keeping it idle is better activity for Pakistani banks. Hen More loans will be generated it would indicate the sign of more interest income. This interest income directly improves bank profitability. Therefore, a higher LDR can be beneficial. Because by achieving higher LDR better financial efficiency can be gained. It helps banks improve their financial performance (Abbas, Iqbal, & Aziz, 2020). Conversely, during periods of economic volatility in Pakistan, a high LDR can be detrimental. Because it elevates liquidity risk and the probability of default (Khan & Khan, 2017). Pakistani banks are no taking more interest in private sector loans but showing attraction towards (PIBs and T-Bills. This shift suggests that the traditional LDR may show an insignificant impact in empirical model. However, a necessary condition is when banks are deriving substantial income from risk-free government debt instead of traditional intermediation. The Scale Efficiency Theory suggests that larger banks should achieve higher profitability .Big banks can earn more profit by reducing cost on a large scale. Their fixed costs are spread over many assets.so it can be concluded that large banks are more priftable as compare to small and mmedium banks (Noman, Pervin, Chowdhury, & Banna, 2015). Advanced digital infrastructure diversified revenue system are also main factors for large Pakistani banks to gain profit. (Iqbal & Molyneux, 2016). However, the large banks in Pakistan also suffer from operational inefficiencies because of many reasons like excessive bureaucracy, and management entrenchment. These factors often lead to diseconomies of scale in Pakistan (Ayyub, Aman, & Ahmed, 2019).mid-sized banks in Pakistan often outperform the largest tier in terms of ROA due to leaner management structures and higher agility in a shifting regulatory landscape, corroborate this. Empirical studies covering the 2011–2020 period highlight that bank-specific variables do not act in isolation (Zamir, Razzaq, & Gillani, 2020). Macroeconomic stability, such as GDP growth and inflation, moderates the impact of internal factors like CAR and Bank Size. For instance, during high-inflation periods in Pakistan, we observed that large banks were better positioned to hedge risks than smaller ones. However, this situation prolonged despite of having their inherent operational inefficiencies (Abbas, Iqbal, & Aziz, 2020). The impact of bank size depends on who owns the bank. Due to the difference in public banks and private banks difference in LDR & CAR also occurs. Private Banks show stronger reactions to LDR and CAR as compare to public banks. This means their profitability changes more when loans or capital levels change. Private Banks are more profit-focused. They actively use loans and capital to improve earnings. Public banks may not respond in different way not like private banks. Their profitability is less sensitive to these factors. They often have different goals, set by Government; similarly, their objectives are different too. . Because of these differences, size alone is not enough. We must also look at ownership type. (Raza, Jawaid, & Shafiq, 2019) This is why stratified analysis is important.in this study by using size as grouping variable helps us to understand some patterns better. By doing critical thinking on this research study, different profitability drivers can be seen. This

approach gives a visible and more accurate picture of the Pakistani banking sector.

Research Gap

In Pakistan, commercial banks often prefer investing in “risk-free” government securities (T-Bills and PIBs) instead of private sector lending. This challenges the traditional assumption that a high Loan-to-Deposit Ratio (LDR) is the primary driver of profitability. Banks may earn high margins from government borrowing. Between 2011 and 2020, the lagged effect of Non-Performing Loans (NPLR) on profitability remains underexplored. This is especially relevant during interest rate hikes in 2018–2019 and the 2020 COVID-19 shock. The role of bank size is also ambiguous in Pakistan. Some studies suggest larger banks benefit from economies of scale. Others indicate X-inefficiencies increase bureaucratic costs. This study examines whether size acted as a buffer or a burden during crises. Existing literature has not fully addressed the integrated impact of Basel III capital requirements and the “government crowding out” effect on profitability. Nor has it explored how bank size affected resilience during overlapping shocks. This research fills these gaps through a comprehensive panel data analysis of PSX-listed commercial banks from 2011 to 2020.

Research Objectives

1. To evaluate the impact of CAR on the ROA of commercial banks in Pakistan over the period of 2011–2020.
2. To analyze the influence of LDR on the financial performance of listed commercial banks.
3. To investigate whether bank profitability varies across different bank sizes (Small, Medium, and Large) based on total assets.

Research Questions

4. To what extent does the Capital Adequacy Ratio (CAR) influence the Return on Assets (ROA) of commercial banks listed on the PSX?
5. What is the relationship between the Loan-to-Deposit Ratio (LDR) and the profitability of these banks?
6. Does Bank Size (categorized as Small, Medium, and Large) lead to significant differences in bank profitability?

Table 1: *variable category*

<i>Variable Category</i>	<i>Variable Name</i>	<i>Symbol</i>	<i>Measurement / Proxy</i>
Dependent Variable	Profitability	ROA	(Net Income / Total Assets) × 100
Independent Variable	Capital Adequacy Ratio	CAR	(Tier 1 + Tier 2 Capital) / Risk-Weighted Assets
Independent Variable	Loan-to-Deposit Ratio	LDR	Total Loans / Total Deposits

This is stratified panel data analysis. Bank size is grouping variable & divided into Small, Medium, and large based on Total Assets.

Table 2. *Bank size Categorization*

<i>Bank Name</i>	<i>Total Assets (PKR Million)</i>	<i>Category</i>
HL	3,828,510	Large
UB	2,201,700	Large
MB	1,757,462	Large
AB	1,590,458	Large
BA	1,387,700	Large
FB	711,159	Medium
JS	532,168	Medium
SL	485,397	Medium
AL	192,800	Small
SB	158,842	Small

Variables are selected based on their direct relevance because this study focuses on capital and liquidity management.

Research Hypotheses

The following hypotheses are formulated based on standard banking theories (such as the Risk- Return Trade-off).

- H₁: There is a significant positive relationship between Capital Adequacy Ratio (CAR) and Return on Assets (ROA).
- H₂: There is a significant relationship (positive or negative) between Loan-to-Deposit Ratio (LDR) and ROA.
- H₃:: There is a significant difference in profitability (ROA) based on Bank Size (Small, Medium, and Large).

3.7-Theoretical framework.

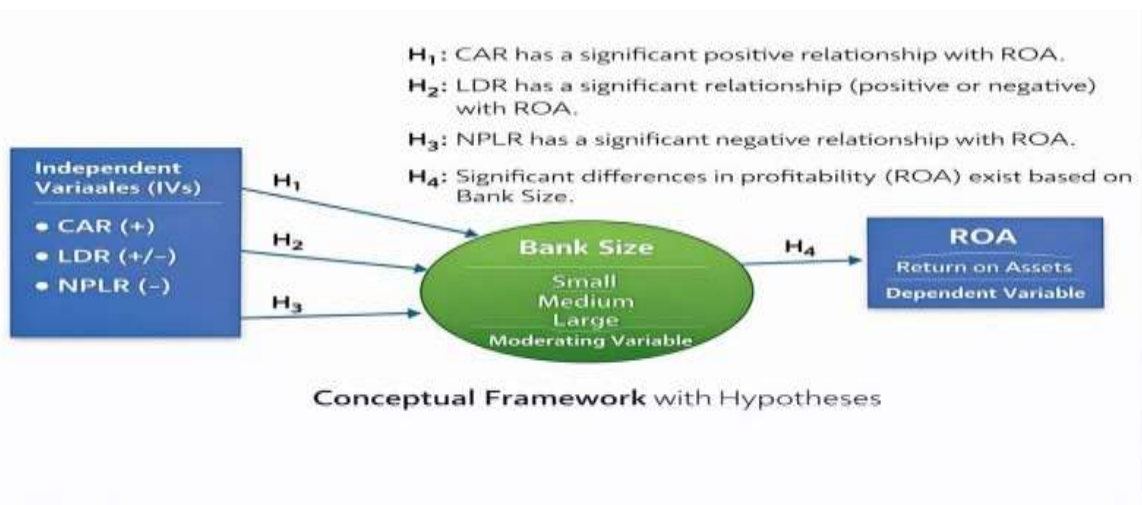
To build a robust framework, three theories are applied in this study. Signaling Theory, which suggests that a high CAR signals a bank's financial strength and ability to absorb unexpected losses to the market and depositors. A strong capital base often leads to lower funding costs and higher profitability. In this study, stratified regression shows that CAR has a highly significant positive impact on Large Banks (coeff: 0.1521, $p < 0.001$) and Small Banks ($p = 0.002$)³.

Secondly, Financial Intermediation Theory, which explains that LDR reflects how effectively banks convert deposits into loans. Because with higher LDR, interest income if lending risks are properly managed. . In this study, my results show that

LDR was not significant across any bank size category. Thirdly, the Scale Efficiency theory suggests that Bank Size influences profitability. Larger banks can achieve higher ROA by spreading fixed costs over a bigger asset base through economies of scale. My results align with this theory because Large Banks Showed a significant negative coefficient (-0.0109, $p = 0.004$) for size1010. This indicates "Diseconomies of Scale," where being too large leads to inefficiencies. Small Banks showed a marginal positive effect (0.0047, $p = 0.061$).

(This theoretical framework is also influenced by Basel III Accords, which mandate the minimum CAR for Pakistani banks as regulated by the State Bank of Pakistan SBP)

Conceptual Framework



Research Design

This study uses a Quantitative Research Design with a Panel Data (Longitudinal) approach. Panel data is used because of cross-sectional (different banks) and time-series (2011–2020) data. This data check how profitability changes over time and across different institutions. Asset quality (often measured via NPLR) is a significant factor in banking. However, NPLR is missing in my study. However, this study specifically prioritizes the impact of regulatory solvency (CAR) & (LDR). By using LDR & CAR it as examined that how capital buffers and lending aggressiveness Influence profitability across different bank strata in Pakistan without the confounding effects of credit-specific shocks.

Table 3: Techniques & level of application.

Technique	Level of Application	Expected Output
Descriptive Stats	Full & 3 Groups	Comparison of means (e.g., Avg ROA).
One-Way ANOVA	Comparison	Statistical justification for stratification.
Correlation/VIF	Each Group	Check for variable overlap (Multicollinearity).
Hausman Test	Each Group	Selection of FE vs. RE model.

Diagnostic Tests	Each Group	Validity of p-values (Heteroscedasticity).
Group Regression	Individual Strata	Significance of CAR, LDR, NPLR per bank size.

Descriptive Statistical Analysis

Table: 4 Master Descriptive Statistics Table (2011–2020)

<i>Group</i>	<i>Variable</i>	<i>Mean</i>	<i>Median</i>	<i>Std. Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>
Full Sample	ROA (%)	0.91%	0.80%	0.74%	0.941	1.433
	CAR (%)	16.62%	14.50%	5.29%	2.004	5.414
	LDR (%)	53.68%	52.80%	10.17%	0.834	0.993
	Total Assets	539,841	444,453	451,386	0.898	-0.177
Large Banks	ROA (%)	1.60%	1.45%	0.68%	0.939	0.050
	CAR (%)	17.86%	17.63%	3.33%	0.109	-0.804
	LDR (%)	47.90%	46.99%	6.48%	1.035	0.849
	Total Assets	1,013,990	990,298	349,483	0.365	-0.811

Group	Variable	Mean	Median	Std. Deviation	Skewness	Kurtosis
Medium Banks	ROA (%)	0.61%	0.61%	0.27%	-0.339	-0.654
	CAR (%)	14.02%	13.50%	1.96%	1.541	2.075
	LDR (%)	56.12%	55.40%	9.82%	-0.091	0.255
	Total Assets	349,292	322,467	161,374	0.321	-0.620
Small Banks	ROA (%)	0.32%	0.45%	0.46%	-0.863	0.359
	CAR (%)	18.52%	15.20%	8.70%	1.171	0.393
	LDR (%)	58.81%	56.50%	11.36%	1.055	0.754
	Total Assets	104,914	105,426	46,217	0.034	-0.943

In this study, I have found that large banks are the most profitable, with the highest average ROA of 1.60% and much larger assets. Small banks lend more aggressively, as shown by their higher average Loan-to-Deposit Ratio (58.81%) compared to large banks. As far as CAR is concerned, Capital Adequacy remains strong for all banks. However, capital levels can be seen in small banks. . Overall, capital ratios are mostly concentrated around required targets, although a few banks show very high or very low values.

ANOVA Test

Table 5: Comparison across Bank Sizes (2011–2020)

Variables	F-Statistic	p-value	Significance	Results
ROA (%)	46.752	< 0.001	Significant	Differences in profitability are highly significant.
CAR (%)	6.396	0.0027	Significant	Capital adequacy ratios differ significantly across groups.
LDR (%)	10.162	< 0.001	Significant	Lending strategies vary significantly by bank size.
Total Assets	102.061	< 0.001	Significant	Asset sizes are significantly different between categories.

The results show clear differences across banks of different sizes. Which indicates that means bank size matters for performance and structure. We cannot ignore bank size. For ROA, the F-statistic is very high at 46.75. The p-value is very low. This shows

that bank size strongly affects profitability. Capital Adequacy (CAR) is also significant. However, in these results the F-statistic is lower at 6.39. It means differences in capital levels are smaller across bank sizes. The Loan-to- Deposit Ratio (LDR) shows strong variation. Small, medium, and large banks manage lending and deposits differently. Total Assets have a very high F statistic of 102.06. Therefore, all these findings indicate that confirms that dividing banks into small, medium, and large groups is correct and meaningful.

4.3-Multicollinearity Testing (VIF Results)

Variance Inflation Factor (VIF) test was conducted. Multicollinearity occurs when independent variables are highly correlated, which can distort the results of a regression model

Table 6: VIF values & status

Variable	VIF Value	Status
Capital Adequacy Ratio (CAR %)	1.14	No Multicollinearity
Loan-to-Deposit Ratio (LDR %)	1.08	No Multicollinearity
Bank Size (Log of Assets)	1.19	No Multicollinearity
Mean VIF	1.14	Pass

In this study, All VIF values are well below 5. This shows there is low correlation among the variables. CAR, LDR, and bank size are not highly related. Because multicollinearity is low, the model is stable. The regression results are reliable. The effects of CAR and LDR on ROA can be clearly understood. Including bank size does not create any problem. VIF values stay low. So overall, we can conclude that bank size does not strongly overlap with CAR or LDR management.

4.4-Association Testing (Correlation Matrix)

This table shows the strength and direction of the relationship between variables.

Table 7: Association testing

Variable	ROA	CAR	LDR	Bank Size
ROA	1.000			
CAR	0.321	1.000		

<i>Variable</i>	<i>ROA</i>	<i>CAR</i>	<i>LDR</i>	<i>Bank Size</i>
LDR	-0.354	0.064	1.000	
Bank Size	0.586	-0.095	-0.336	1.000

In this study, the results show that Bank size and ROA have a positive link (0.586). Big banks usually earn more profit. ROA and LDR have a weak negative link (-0.354). Too much lending can reduce profit. ROA and CAR have a weak positive link (0.321). Well-capitalized banks perform better. CAR and bank size have almost no link (-0.095). Capital level does not depend on bank size.

Table 8: Stratified Association (Correlation r) Table

<i>Variable Pair</i>	<i>Small Banks (r)</i>	<i>Medium Banks (r)</i>	<i>Large Banks (r)</i>
ROA & CAR	0.549	0.309	0.402
ROA & LDR	0.063	-0.332	0.081
ROA & Bank Size	-0.160	-0.046	-0.212
CAR & LDR	0.394	-0.150	-0.302
CAR & Bank Size	-0.721	0.249	0.539
LDR & Bank Size	-0.189	0.604	-0.337

ROA and CAR are positively related in this result. This link of ROA & CAR is strongest in small banks ($r = 0.549$). Strong capital is important factor for small banks to get maximum profitability. CAR and bank size show opposite patterns. In this study, Small banks have a strong negative link (-0.721). Their capital falls as they grow. Large banks have a strong positive link (0.539 because their capital increases as they grow. As far as the LDR is concerned, LDR and bank size are strongly linked in medium banks. The correlation is positive (0.604). About medium banks, it can also be concluded that Medium banks lend more as they get bigger.

4.5-Panel Unit Root Test

In this study, the Panel Unit Root Test (ADF-Fisher Chi-square) shows the unbalanced panel is stationary. This is the reason that the regression results are not spurious.

Table 9: ADF-Fisher Chi-square

<i>Group</i>	<i>Variable</i>	<i>Fisher χ^2 Stat</i>	<i>p-value</i>	<i>Result</i>
Large Banks	ROA	15.268	0.018	Stationary
	CAR	152.193	0.000	Stationary
	LDR	14.056	0.029	Stationary

	Bank Size	25.302	0.000	Stationary
Medium Banks	ROA	21.136	0.002	Stationary
	CAR	15.065	0.020	Stationary
	LDR	3.487	0.746	Non-Stationary
Small Banks	Bank Size	2.820	0.831	Non-Stationary
	ROA	24.022	0.000	Stationary
	CAR	∞	0.000	Stationary
	LDR	21.539	0.000	Stationary
	Bank Size	0.920	0.922	Non-Stationary

In these results, ROA and CAR are positively related. This relationship is strongest in small banks ($r = 0.549$). Small banks depend more on capital to earn profit. As size is grouping variable in this study, I have found that CAR and bank size behave differently across groups. Small banks show a strong negative link (-0.721). Their capital falls as they grow. Large banks show a strong positive link (0.539). Their capital improves as they grow. These Results clearly indicate that LDR and bank size are strongly linked in medium banks (0.604). So, larger medium banks lend more compared to deposits.

4.6-Model Selection Tests

The Hausman Test is used to decide between Fixed Effects (FE) and Random Effects (RE) models.

Table 10: Hausman test.

<i>Group</i>	<i>F-statistic</i>	<i>p-value</i>	<i>Preferred Model</i>
Large Banks	38.447	0.0000	Fixed Effects (FE)
Medium Banks	8.119	0.0007	Fixed Effects (FE)
<i>Group</i>	<i>F-statistic</i>	<i>p-value</i>	<i>Preferred Model</i>
Small Banks	2.831	0.0906	Random Effects (RE)

I used Hausman test to choose the right model either I should use fixed effects. H0 means no correlation. Therefore, the Random Effects model is appropriate. It means there is correlation. Therefore, I preferred the Fixed Effects for my research work.

4.7-Diagnostic Assumption Tests. Random Effects (RE) Model Results

Table 11: random effect model

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>z-statistic</i>	<i>P-value</i>	<i>95% Conf. Interval</i>
Intercept	0.001	0.006	0.263	0.792	[-0.009, 0.012]
CAR (Capital Adequacy Ratio)	0.032	0.014	2.272	0.023*	[0.004, 0.059]
LDR (Loan-to-Deposit Ratio)	-0.005	0.006	-0.852	0.394	[-0.017, 0.007]
Bank Size (Log Assets)	0.000	0.000	0.976	0.329	[-0.000, 0.001]

(*) Significant at the 5% level.*

In this study, results indicate that, The CAR has a significant positive effect on ROA. For every 1% increase in CAR, ROA rises by about 0.032% ($p = 0.023$). it means to earn profit banks should me more capitalized. The LDR does not significantly affect ROA ($p = 0.394$). Its slight negative effect is not enough to show a clear impact. So it can be concluded that Bank size within Small, Medium, or Large groups also does not significantly affect ROA ($p = 0.329$). This means the overall category matters more than exact asset size.

4.8-Diagnostic Assumption Tests

Results of the tests for Normality, Heteroscedasticity, and Autocorrelation ae given below.

Table: 12 Diagnostic assumption tests.

<i>Diagnostic Test</i>	<i>Statistic</i>	<i>P-value</i>	<i>Result</i>
Jarque-Bera (Normality)	1342.34	0.0000	Failed (Non-Normal)
<i>Diagnostic Test</i>	<i>Statistic</i>	<i>P-value</i>	<i>Result</i>
Shapiro-Wilk (Normality)	0.6710	0.0000	Failed (Non-Normal)
Breusch-Pagan (Heteroscedasticity)	14.0722	0.0028	Failed (Heteroscedasticity Present)
Durbin-Watson (Autocorrelation)	0.7491	N/A	Failed (Positive Autocorrelation)

This tests show that the residuals are not normal ($p = 0.000$), there is heteroscedasticity in the data ($p = 0.0028$). positive autocorrelation exists in this study because of Durbin-Watson = 0.7491. So it can be concluded that the model less reliable.

4.9-Stratified Regression Estimation.

I conducted Stratified Regression Estimation by running separate OLS regression models for all categories i.e. Large, Medium, and Small. This allows us to see how the impact of Capital CAR and Loan-to-Deposit Ratio LDR varies depending on the size of the bank.

Table 13: stratifies regression estimation.

<i>Bank Category</i>	<i>Variable</i>	<i>Coefficient</i>	<i>P-value</i>	<i>Significance</i>
LARGE BANKS	CAR	0.1521	0.000	*** (Highly Sig)
	LDR	0.0117	0.488	Not Sig
	Bank Size	-0.0109	0.004	** (Significant)
	<i>R-squared</i>	<i>0.431</i>		
MEDIUM BANKS	CAR	0.0302	0.284	Not Sig
	LDR	-0.0102	0.140	Not Sig
	Bank Size	0.0006	0.621	Not Sig
	<i>R-squared</i>	<i>0.187</i>		
SMALL BANKS	CAR	0.0544	0.002	** (Significant)
	LDR	-0.0098	0.247	Not Sig
	Bank Size	0.0047	0.061	* (Marginal)
	<i>R-squared</i>	<i>0.465</i>		

In this study, for large banks, CAR has a very strong positive effect on ROA, which indicate profitability. Results show that Small banks also benefit from CAR, but the effect (0.054) is much smaller than in large banks (0.152). For medium banks, CAR does not significantly affect ROA. LDR is not significant in any bank group. This means the loan-to-deposit ratio does not consistently affect profitability in these banks. Bank size has different effects. We can conclude that in large banks, bigger size slightly lowers ROA ($p = 0.004$), means there are possible inefficiencies. In small banks, growth has a small positive effect ($p = 0.061$), means there are some efficiency gains.

Limitations and Future Research

I did not include the Non-Performing Loan Ratio (NPLR) due to lack of data. This research is focused on solvency (CAR) and liquidity (LDR) to see how capital and lending affect profitability. By doing this, the study avoided complications from credit-specific shocks. However, leaving out asset quality may hide how credit risk affects the results. Future studies should include NPLR to examine the credit risk and liquidity, how both together impact profitability. Researchers should also consider macroeconomic factors like inflation and interest rate changes to better understand the banking environment.

Suggestions for Future Research:

Future studies should include NPLR to see how credit risk and liquidity together impact profitability. They should also consider inflation and interest rate changes to better understand the banking environment of Pakistan.

Recommendations for Managers

To get maximum profitability, Medium banks managers should maintain strong capital buffers. Moreover, try to focus on avoid diseconomies of scale. They should maintain depositor trust, and focus on operational efficiency. Because we know that size negatively impacts ROA. For Small banks, profitability depends less on ratios like LDR and CAR. Therefore, managers should prioritize niche efficiency, quality service, and lean operations. For Large banks, capital and liquidity ratios are not significant. Therefore, managers should adopt other ways for revenue revenue through non-interest income, digital transformation, and cross-selling.

Conclusions

This study examined the impact of CAR, LDR, and bank size (as grouping variable categorized by their asset size) on the profitability (ROA) of banks. The results reveal that the drivers of profitability are not uniform across the banking sector in Pakistan. The Stratified Analysis provided deep critical results. As we have seen in this study, that Medium-sized banks are the most sensitive to this financial lever for them. Higher CAR is a significant driver of profitability, instead of having diseconomies of scale. Where increasing size alone can negatively affect ROA. But Small banks maintain a steady baseline profitability independent of these specific ratios. In large banks, there are other complex variables like advance digital transformation and market share that fall outside the scope of traditional ratio analysis.

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