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DOES BASEL III CAPITAL HELP OR HURT BANK PROFITABILITY? QUANTILE EVIDENCE FROM PAKISTAN

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KEYWORDS	ABSTRACT
Basel III, regulatory capital, capital adequacy, bank profitability, MMQR, Pakistan	Capital is the buffer that protects depositors when a bank makes losses, and Basel III asked banks around the world to hold more of it. Bankers often argue that extra capital lowers their returns, while regulators argue that it makes banks safer and cheaper to fund. The present study tests these claims for Pakistan, where the State Bank of Pakistan phased in Basel III capital rules between 2013 and 2019. It asks whether the Basel regulatory capital ratio raises or lowers bank profitability, and whether its effect is the same for weak and strong banks. Annual data on 29 listed banks (24 private and 5 public) for 2011–2023 were used, giving 377 bank-year observations, and profit was measured by ROA (return on assets) and ROE (return on equity). The effect of capital across the profit distribution was traced with the Method of Moments Quantile Regression (MMQR), and the two-way link between capital and profit was handled with an instrumental variables version of the quantile estimator (IVQR). Regulatory capital raised profitability in all four models and at almost every quantile. In three models its effect grew from the least to the most profitable banks, and for ROE it was not significant among the least profitable banks. The IVQR estimates were very close to the MMQR estimates. These findings imply that the State Bank of Pakistan has no profit-based reason to relax Basel III capital rules, but that capital alone will not restore weak banks, which also need plans to cut bad loans and costs.
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Introduction

Capital is what stands between a bank's losses and the money of its depositors. When loans go bad, the loss is first absorbed by the bank's own capital, and only when that is used up do depositors and the state bear the cost. The global financial crisis of 2007–2009 showed that many banks held too little capital of too poor a quality. In response, the Basel Committee on Banking Supervision (BCBS, 2010) raised both the amount and the quality of capital that banks must hold against their risk-weighted assets. Pakistan followed. The State Bank of Pakistan (SBP) issued its Basel III

instructions in August 2013, made them effective from December 2013 and set December 2019 as the date for full implementation (State Bank of Pakistan [SBP], 2013). By the end of 2024, the capital adequacy ratio of the banking sector stood at 20.6 percent, up from 19.7 percent a year earlier, while non-performing loans fell to 6.3 percent of total loans from 7.6 percent (SBP, 2025).

Higher capital comes at a price, or so bankers argue. Equity is usually more expensive than deposits, so a bank that must fund more of its assets with equity earns a lower return for its shareholders. Supervisors see the matter differently. A bank with more capital is less likely to fail, so depositors and lenders ask for a lower return, and part of the cost of equity is offset by cheaper funding (Berger, 1995). In Pakistan this debate has practical weight. The Basel III phase-in took place during years of political instability, high inflation, pressure on the rupee and large fiscal deficits (Ministry of Finance [MoF], 2023). If the new rules squeezed bank profits in such a setting, the case for adding further buffers would be weak. If they did not, the SBP could tighten capital rules without fear of harming bank earnings.

Pakistani banks also differ widely in both capital and profit. Most private banks kept their regulatory capital ratios within a narrow positive band during 2011–2023. Several public banks saw their ratios drift down from around 11 to 15 percent in the early years toward about 5 percent by the early 2020s, and a few specialised lenders reported deeply negative ratios after years of losses. Profits show the same split. In our data the median ROE is 0.122, but the minimum is -49.8 , and the kurtosis of ROE exceeds 250. A sector made up of a well-capitalised and steadily profitable core plus a small group of weak banks is unlikely to respond to capital in a single, uniform way.

Theory does not give a clear answer either. Under the expected bankruptcy cost and signalling views, capital should raise profit, because it lowers the risk premium on bank funding and signals confidence about future earnings (Berger, 1995). Under the risk and return view, capital should lower ROE, because it reduces leverage and pushes banks toward safer, lower-yielding assets. Risk-weighted rules add a further twist, since banks can lower their measured risk by shifting into assets with low risk weights rather than by raising capital (Jones, 2000). The evidence is just as mixed. Bitar, Pukthuanthong, and Walker (2018) find that capital ratios raise the profitability of OECD banks, but de Bandt, Camara, Maitre, and Pessarossi (2018) find that regulatory capital has no effect on the profitability of French banks, and Le, Nasir, and Huynh (2023) find that tighter capital raises operating earnings without raising overall profitability in Australia and the United Kingdom. Tran, Lin, and Nguyen (2016) show that the sign itself can depend on how well capitalised a bank already is. This lack of agreement gives a reason to test the question again for an emerging market that has just completed the Basel III transition.

Most studies also estimate one average effect of capital for all banks. Yet capital may play two different roles. For a strong bank with good lending opportunities, extra capital is room to grow. For a weak bank close to a loss, it is mostly a cushion. An average estimate would blend these two roles

and could easily show no effect at all. A further problem is that causation may run both ways. Profitable banks retain more earnings and so build capital faster, which can make capital look more useful than it is.

These points raise several questions. Does Basel regulatory capital raise or lower the profitability of Pakistani banks? Is its effect the same at the bottom and the top of the profit distribution? Does the answer change between ROA and ROE, or when macroeconomic conditions are taken into account? And does the result hold once we allow for the fact that profit may also drive capital?

This paper takes up these questions with annual data on 29 listed banks, 24 private and 5 public, for 2011–2023. Two profit measures are used, ROA (return on assets) and ROE (return on equity), and capital is measured by the Basel regulatory capital ratio (RCA), that is, eligible capital over risk-weighted assets. Estimation relies on the Method of Moments Quantile Regression (MMQR) proposed by Machado and Santos Silva (2019), an estimator that accommodates bank-specific intercepts and reports the capital coefficient at five points of the profit distribution, from the 10th to the 90th percentile. Since capital and profit may be decided jointly, we check for endogeneity and repeat the estimation with the instrumental variables quantile estimator (IVQR) of Chernozhukov and Hansen (2008). The models control for credit risk, liquidity, income mix, costs, size, funding structure, ownership and the macroeconomic setting.

Two contributions follow from this design. One is fresh evidence on the profit effect of Basel III capital rules in an emerging market whose banks completed the transition only in 2019. The other is a demonstration that the payoff from capital depends on how profitable a bank already is, a pattern that survives the instrumental-variables check. The remainder of the paper is arranged as follows. Section 2 reviews earlier work, Section 3 presents the data, Section 4 explains the empirical approach, Section 5 reports the estimates, Section 6 interprets them, and Section 7 closes the paper.

Literature review

Two arguments run through the debate on bank capital and profit. One holds that capital is costly. Because equity costs more than deposits and debt, a bank that is made to hold more equity must accept a lower return, and it may also cut lending or move into safer assets. The other holds that capital pays for itself. A better-capitalised bank faces lower expected costs of distress and can borrow more cheaply, so the higher cost of equity is partly or fully offset. Berger (1995) tested these ideas on US banks in the 1980s and found that higher capital was followed by higher earnings, which he linked to lower funding costs and to signalling. Athanasoglou, Brissimis, and Delis (2008) found the same positive effect on both ROA and ROE for Greek banks. Goddard, Molyneux, and Wilson (2004), who used ROE for European banks, found a weaker link.

Studies of this question differ in how they measure profit. Some use ROA only, as Ramadhanti and Hidayati (2019) did for Indonesia, while Chandrasegaran (2020) used ROA together with the net interest margin and non-interest income for Sri Lanka, and Spaseska, Hristoski, and Odzaklieska

(2022) used return on average assets for North Macedonia. Others use both ROA and ROE, including Almazari and Alamri (2017) for Saudi Arabia, Nguyen (2020) for Vietnam, Goet (2022) and Balami and Chalise (2023) for Nepal, and Abbas, Iqbal, and Aziz (2019), who used average-balance versions of the two ratios for Asian and US banks.

The arrival of Basel III produced a second wave of studies. Bitar et al. (2018) studied 1,992 banks in 39 OECD countries over 1999–2013 and found that both risk-based and simple capital ratios raised profitability and efficiency, although risk-based ratios did little to reduce risk. de Bandt et al. (2018) used supervisory data for France and split capital into the part required by regulation and the part held voluntarily. Only voluntary capital raised performance, and regulatory capital had no significant effect on profitability. Le et al. (2023) studied the largest banks in Australia and the United Kingdom over 2000–2019 and found that stricter capital raised operating earnings but not overall profitability. They also found an optimal capital ratio close to the Basel III minimum for common equity. Tran et al. (2016) found for US banks that more regulatory capital was linked to lower profits among highly capitalised banks and to higher profits among weakly capitalised ones, so the effect of a change in capital depends on where a bank starts. Ayadi, Naceur, Casu, and Quinn (2016) found that compliance with the Basel Core Principles had no link with bank efficiency. Bikker and Hu (2002) and Liu and Seeiso (2012) add a warning about the cycle, since risk-sensitive capital requirements may make bank lending more procyclical.

Evidence from emerging and South Asian markets is mixed. In Nigeria, Olalekan and Adeyinka (2013) found a positive link between capital adequacy and profit in published accounts, though not in survey responses, and Agbeja, Adelakun, and Olufemi (2015) also found a positive effect. Ozili (2015) studied Basel capital and profitability in Nigeria. Datta and Al Mahmud (2018) found a positive and significant effect of the capital adequacy ratio for 29 Bangladeshi banks under Basel II over 2007–2014. Nguyen (2020) found that capital raised ROA and ROE in Vietnam, but only for small banks. Other studies find little or no effect. Chandrasegaran (2020) found that the capital adequacy ratio had no significant effect on ROA in Sri Lanka after Basel III was adopted in 2017, though it raised non-interest income. Spaseska et al. (2022) found a positive but insignificant effect in North Macedonia, Balami and Chalise (2023) a negative but insignificant one in Nepal, and Kunjeda (2024) only weak correlations between capital and ROA or ROE for two Nepalese banks. Abbas et al. (2019) found that capital raised the profits of Asian banks after the global crisis. For Pakistan, Sultan, Ahmed, Ameen, and Singh (2020) found that the capital adequacy ratio lowered bank profits.

Three points emerge from this work. The sign of the capital effect differs across countries, periods and measures. Nearly all studies estimate a single average effect, although Nguyen (2020) and Tran et al. (2016) both show that the effect differs between groups of banks. And the one cross-country quantile study, by Bortoluzzo, Ciganda, and Bortoluzzo (2024), finds that capital adequacy lowers profitability for 1,200 banks in 101 countries. Quantile methods (Koenker & Bassett, 1978)

are well suited to this question, but they have not been used to study Basel III capital in Pakistan, and the Pakistani evidence has not been brought up to the end of the phase-in period. We therefore test two hypotheses. H1: The Basel regulatory capital ratio has a positive effect on bank profitability. H2: The effect of regulatory capital differs across the profitability distribution. We do not fix the direction of H2 in advance, because the funding cost and signalling channels point to a larger effect among strong banks, while the buffer role of capital points to a larger effect among weak ones.

Data and variables

Sample and sources

The data cover 29 scheduled banks listed in Pakistan, of which 24 are privately owned and 5 are owned by the state. Both conventional and Islamic banks are included. Each bank is observed every year from 2011 to 2023, so the panel is balanced and contains 377 bank-year observations. The window opens in 2011 because the capital and risk items needed for this study are reported on a consistent basis for all banks only from that year. Bank figures come from audited annual reports and the capital disclosures that banks file with the SBP, and every ratio is computed by the authors from the underlying accounts. Macroeconomic series come from the World Development Indicators and the SBP.

Measurement

Table 1 lists the variables. The two profit measures are ROA, net income over total assets, and ROE, net income over shareholders' equity. ROA shows how much a bank earns on its asset base, while ROE shows what its owners earn, so ROE is the more direct test of the banker's claim that capital lowers shareholder returns. The variable of interest is RCA, eligible regulatory capital over risk-weighted assets. This is the ratio for which Basel rules set a minimum. Unlike a plain equity-to-assets ratio, its denominator gives a larger weight to riskier assets. Negative values of RCA belong to a few banks whose capital had been wiped out by accumulated losses.

Six bank-level controls are used: loan-loss reserves relative to total loans (credit risk, CR); loans relative to deposits (LR); the share of non-interest income in operating income (revenue diversification, RD); operating cost relative to operating income (OE); the natural logarithm of total assets (bank size, BS); and customer deposits as a share of total liabilities (funding structure, FS). Four macroeconomic controls describe the setting: real GDP growth (EG), inflation on the GDP deflator (INF), the deposit rate (IR) and growth of broad money (MSG). Private ownership is marked by a dummy (DUM) equal to one.

Table 1. Definitions of the variables

Variable	Definition	Role
ROA	Net income / total assets	Dependent
ROE	Net income / shareholders' equity	Dependent
RCA	Eligible regulatory capital / risk-weighted assets (Basel ratio)	Variable of interest
CR	Loan-loss reserves / total loans	Control
LR	Total loans / total deposits	Control
RD	Non-interest income / total operating income	Control
OE	Operating cost / operating income	Control
BS	Natural log of total assets	Control
FS	Customer deposits / total liabilities	Control
EG, INF, IR, MSG	Real GDP growth, GDP deflator inflation, deposit rate, M2 growth	Macroeconomic controls
DUM	1 = private bank, 0 = public bank	Control

Note. Bank data are from audited annual reports and SBP disclosures; macroeconomic data are from the WDI and the SBP. (See Rehman and Sheikh, 2026 as well)

Empirical approach

Specification

The baseline relationship links profit to regulatory capital and a set of controls:

$$\text{PROF}_{it} = \beta_0 + \delta \text{RCA}_{it} + \sum_k \beta_k \text{CTRL}_{k,it} + \theta \text{DUM}_i + \mu_i + \varepsilon_{it} \quad (1)$$

where PROF_{it} is ROA or ROE of bank i in year t , $\text{CTRL}_{k,it}$ are the bank-level controls, μ_i is a bank effect and ε_{it} is the error term. A second version adds the macroeconomic controls $\text{MACRO}_{m,t}$:

$$\text{PROF}_{it} = \beta_0 + \delta \text{RCA}_{it} + \sum_k \beta_k \text{CTRL}_{k,it} + \sum_m \gamma_m \text{MACRO}_{m,t} + \theta \text{DUM}_i + \mu_i + \varepsilon_{it} \quad (2)$$

Model A (ROA) and Model B (ROE) are based on Equation (1). Model C (ROA) and Model D (ROE) are based on Equation (2). The parameter of interest is δ . The leverage-based ratio of equity to total assets is left out because it moves almost one for one with RCA ($r = 0.995$), and including both would make δ impossible to estimate precisely.

Pre-estimation tests

Before estimation we check four properties of the data. Since all banks face the same policy rate, regulation and business cycle, their errors may be correlated, so we apply the cross-sectional dependence test of Pesaran (2021). Stationarity is then checked with the CIPS test of Pesaran (2007), which is valid when such dependence is present, and with ADF tests for the national macroeconomic series. The Pesaran and Yamagata (2008) delta test tells us whether a common slope is a reasonable assumption across banks. Finally, Westerlund's (2007) error-correction based statistics, together with the residual-based procedures of Kao (1999) and Pedroni (1999, 2004), indicate whether the series move together in the long run.

Quantile estimation

The main estimator is MMQR (Machado & Santos Silva, 2019), which extends quantile regression (Koenker & Bassett, 1978) to panels with fixed effects. It starts from a location-scale model:

$$Y_{it} = \alpha_i + X_{it}'\beta + (\delta_i + Z_{it}'\gamma)U_{it} \quad (3)$$

Here X_{it} collects the explanatory variables, Z_{it} is a known transformation of X_{it} , α_i and δ_i capture bank heterogeneity in location and in scale, and the disturbance U_{it} is drawn independently of X_{it} . It follows that the τ -th conditional quantile is

$$Q_Y(\tau|X_{it}) = (\alpha_i + \delta_i q(\tau)) + X_{it}'\beta + Z_{it}'\gamma q(\tau) \quad (4)$$

The coefficient of RCA at quantile τ equals its location coefficient plus its scale coefficient multiplied by $q(\tau)$. A zero scale coefficient would mean that capital has the same effect at every quantile, so the scale estimate gives a direct test of H2. We report estimates at $\tau = 0.10, 0.25, 0.50, 0.75$ and 0.90 .

Dealing with endogeneity

Profitable banks can add retained earnings to capital, and loan quality and liquidity may also respond to profit. The exogeneity of RCA, CR and LR is examined with Durbin's χ^2 and the Wu-Hausman F statistic (Durbin, 1954; Wu, 1973; Hausman, 1978), after which all four models are estimated again by IVQR (Chernozhukov & Hansen, 2008). Its structural quantile function is

$$Q_Y(\tau|D,X) = D'\alpha(\tau) + X'\beta(\tau) \quad (5)$$

with D denoting the regressors treated as endogenous and X those treated as exogenous. The second lags of RCA, CR and LR serve as instruments.

Estimates

Summary statistics

Table 2 summarises the bank-level data. The median bank has an RCA of 0.072, but the mean is -0.182 because of the few banks with negative capital, and the series has a skewness of -5.140 and a kurtosis of 27.819. ROA has a median of 0.008 and ranges from -0.109 to 0.183. ROE has a median of 0.122 and a minimum of -49.785 . These heavy tails mean that the mean of each series is a poor guide to the typical bank.

Table 2. Summary statistics of the bank-level variables

Variable	Mean	Median	Max	Min	SD	Skewness	Kurtosis	Jarque-Bera
ROA	0.006	0.008	0.183	-0.109	0.023	-0.525	20.147	4635.658
ROE	-0.101	0.122	3.360	-49.785	2.865	-15.415	253.915	1003902.000
RCA	-0.182	0.072	0.787	-8.344	1.464	-5.140	27.819	11335.940
CA	-0.133	0.065	0.741	-7.210	1.149	-5.073	27.093	10735.060
CR	0.169	0.096	0.999	0.000	0.219	2.532	8.927	954.614
LR	1.929	0.582	41.489	-0.185	6.483	5.568	32.970	16057.200
RD	0.135	0.117	0.863	-0.058	0.113	3.402	17.640	4094.043
OE	0.341	0.293	1.448	-0.371	0.210	2.299	11.610	1496.592
BS	8.419	8.496	9.823	6.579	0.717	-0.670	3.027	28.204
FS	0.742	0.801	0.959	0.005	0.199	-2.203	8.059	707.123

Note. 29 banks, 2011–2023, $N = 377$. Every series rejects normality on the Jarque-Bera test at the 1% level. (See Rehman and Sheikh, 2026)

Table 3 shows how RCA relates to the other variables. Its simple correlation with ROA is negative (-0.395) and with ROE close to zero (0.002). These raw correlations are driven by the extreme observations and do not hold other factors constant, so they say little about the effect of capital on its own. RCA is almost identical to the equity-to-assets ratio (0.995) and is strongly and negatively correlated with LR (-0.940), RD (-0.848) and CR (-0.724), so better-capitalised banks in Pakistan tend to lend out less of their deposits, rely less on fee income and carry fewer bad loans.

Table 3. Pairwise correlations of RCA, ROA and ROE with the other variables

Variable	with RCA	with ROA	with ROE
ROA	-0.395	1.000	0.326
ROE	0.002	0.326	1.000
CA	0.995	-0.379	0.004
CR	-0.724	-0.134	-0.189
LR	-0.940	0.443	0.006

Variable	with RCA	with ROA	with ROE
RD	-0.848	0.490	0.004
OE	-0.030	-0.569	-0.259
BS	0.455	0.170	0.139
FS	0.676	-0.219	0.044
EG	0.001	0.005	-0.094
INF	-0.003	-0.021	0.062
IR	-0.007	-0.033	0.075
MSG	0.013	0.036	0.049

Note. Pearson coefficients, $N = 377$.

Pre-estimation tests

Table 4 shows that every variable is strongly dependent across banks, with CD statistics significant at 1%, including 30.560 for RCA. RCA and FS are stationary in levels, while the other bank-level series contain a unit root. The hypothesis of common slopes is rejected for each of the four models in Table 5, with adjusted delta statistics of 4.054 (Model A), -12.321 (B), -10.921 (C) and -12.752 (D). In Table 6, the Westerlund Pt statistic and every Kao statistic reject the absence of cointegration in each model, and the modified Phillips-Perron statistic of Pedroni does the same. Banks therefore respond differently to the same factors, and the series share long-run relationships, which supports the use of MMQR.

Table 4. Cross-sectional dependence (Pesaran CD) and unit root tests

Variable	Pesaran CD	CIPS (levels)	Decision
ROA	8.825***	-1.842	Unit root
ROE	9.138***	-1.558	Unit root
RCA	30.560***	-2.625	I(0) at 1%
CR	7.980***	-1.893	Unit root
LR	12.762***	-1.937	Unit root
RD	27.839***	-2.087	Unit root
OE	32.949***	-1.120	Unit root
BS	56.223***	-1.724	Unit root
FS	15.122***	-2.939	I(0) at 1%
EG	72.650***	ADF: I(1)	

Variable	Pesaran CD	CIPS (levels)	Decision
INF	72.650***	ADF: above I(1)	
IR	72.650***	ADF: I(1)	
MSG	72.650***	ADF: I(1)	

Note. *** $p < .01$. CIPS statistics are for the bank-level series; the four macroeconomic series are national and were tested with ADF tests (EG, IR and MSG are I(1); INF is integrated of a higher order). (See Rehman and Sheikh, 2026 as well)

Table 5. Pesaran–Yamagata slope homogeneity tests, Models A–D

Model	Dependent	Regressors	Delta	p	Adj. Delta	p
A	ROA	7	2.249	.025	4.054	.000
B	ROE	7	-6.834	.000	-12.321	.000
C	ROA	11	-9.965	.000	-10.921	.000
D	ROE	11	-10.512	.000	-12.752	.000

Note. H_0 : slopes are equal across banks. Adj. Delta is the small-sample adjusted statistic.

Table 6. Westerlund, Kao and Pedroni cointegration tests, Models A–D

Model	W:Gt	W:Ga	W:Pt	W:Pa	Kao: MDF	Kao: ADF	P:MPP	P:PP	P:ADF
A	-0.893 (.666)	-2.063 (.980)	-10.009 (.000)	-4.902 (.000)	-2.096 (.018)	-3.115 (.000)	9.255 (.000)	-8.955 (.000)	-5.201 (.000)
B	-1.239 (.768)	-3.379 (.000)	-7.901 (.016)	-3.324 (.000)	-7.752 (.000)	-8.121 (.000)	9.339 (.000)	-12.068 (.000)	-8.168 (.000)
C	-2.178 (.000)	-3.264 (.994)	-11.144 (.000)	-3.920 (.059)	-2.653 (.004)	-3.538 (.000)	8.877 (.000)	1.381 (.083)	0.235 (.407)
D	-0.696 (.926)	-2.076 (.980)	-7.457 (.000)	-7.187 (.000)	-7.940 (.000)	-8.091 (.000)	9.077 (.000)	1.333 (.091)	0.697 (.242)

Note. W = Westerlund (2007); Kao = Kao (1999); P = Pedroni (1999, 2004). MDF = modified Dickey–Fuller; MPP = modified Phillips–Perron; PP = Phillips–Perron. p-values in parentheses. H_0 : no cointegration.

Models with bank-level controls

Table 7 and Figure 1 report Model A. RCA enters with a positive and significant coefficient at all five quantiles of ROA, and the coefficient climbs steadily: 0.106 at Q0.10, 0.177 at Q0.25, 0.236 at the median, 0.299 at Q0.75 and 0.334 at Q0.90. The scale coefficient (0.072) is significant at 1%, so the rise is not due to chance. Capital adds roughly three times as much to ROA in the top decile as in the bottom decile.

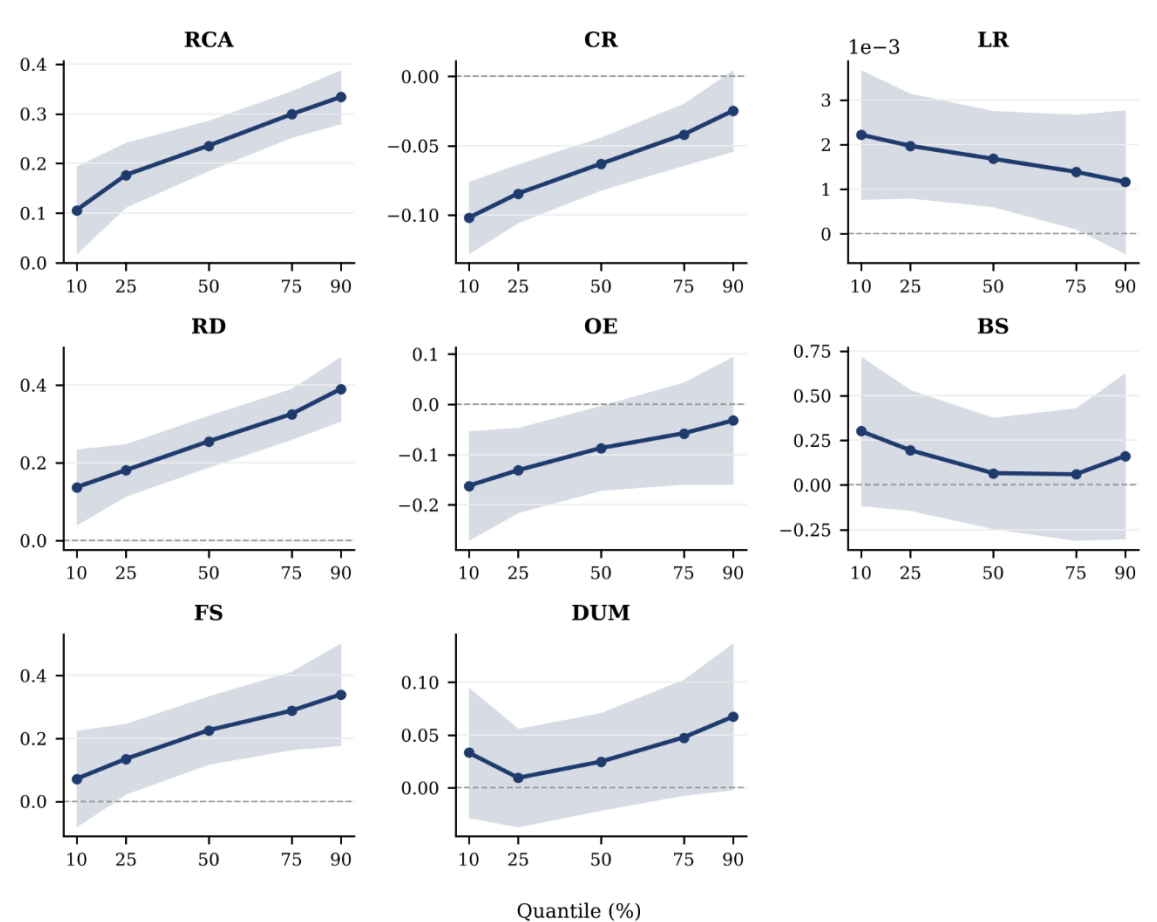
Table 7. MMQR estimates, Model A (ROA, RCA and bank-level controls)

Variable	Location	Scale	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.229*** (0.0256)	0.0723*** (0.0169)	0.106** (0.0450)	0.177*** (0.0333)	0.236*** (0.0258)	0.299*** (0.0239)	0.334*** (0.0277)
CR	-0.0609*** (0.00976)	-0.0253*** (0.00638)	-0.102*** (0.0133)	-0.0844*** (0.0108)	-0.0630*** (0.00974)	-0.0419*** (0.0114)	-0.0247 (0.0150)
LR	0.00165*** (0.000553)	0.000346 (0.000361)	0.00222*** (0.000740)	0.00197*** (0.000598)	0.00168*** (0.000549)	0.00139** (0.000655)	0.00116 (0.000821)
RD	0.246*** (0.0316)	0.0879*** (0.0182)	0.137*** (0.0497)	0.181*** (0.0344)	0.255*** (0.0339)	0.325*** (0.0333)	0.390*** (0.0424)
OE	-0.0961** (0.0415)	-0.0426 (0.0278)	-0.162*** (0.0556)	-0.131*** (0.0432)	-0.0870** (0.0431)	-0.0576 (0.0518)	-0.0322 (0.0650)
BS	0.0536 (0.159)	0.151 (0.104)	0.301 (0.213)	0.194 (0.172)	0.0661 (0.159)	0.0598 (0.189)	0.163 (0.237)
FS	0.207*** (0.0535)	0.0886** (0.0359)	0.0712 (0.0782)	0.135** (0.0573)	0.226*** (0.0554)	0.288*** (0.0636)	0.340*** (0.0832)
DUM	0.0177 (0.0226)	0.0331** (0.0151)	0.0333 (0.0315)	0.00945 (0.0238)	0.0248 (0.0236)	0.0477* (0.0280)	0.0675* (0.0355)
Constant	-3.079*** (0.900)	0.301 (0.588)	-3.572*** (1.202)	-3.360*** (0.972)	-3.104*** (0.893)	-2.853*** (1.066)	-2.648** (1.333)
Observations	377	377	377	377	377	377	377

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. DUM = 1 for private banks.

Turning to ROE in Model B (Table 8 and Figure 2), capital has no significant effect at Q0.10 (0.052) or Q0.25 (0.058). It becomes significant at the median (0.068) and reaches 0.084 at Q0.90. The scale coefficient is positive but not significant. Among the controls, credit risk is insignificant in the lower quarter of the ROE distribution and becomes more harmful toward the top, from -0.045 at the median to -0.088 at Q0.90, while size and the private-bank dummy rise across quantiles.

Figure 1. MMQR coefficients by quantile, Model A (ROA)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

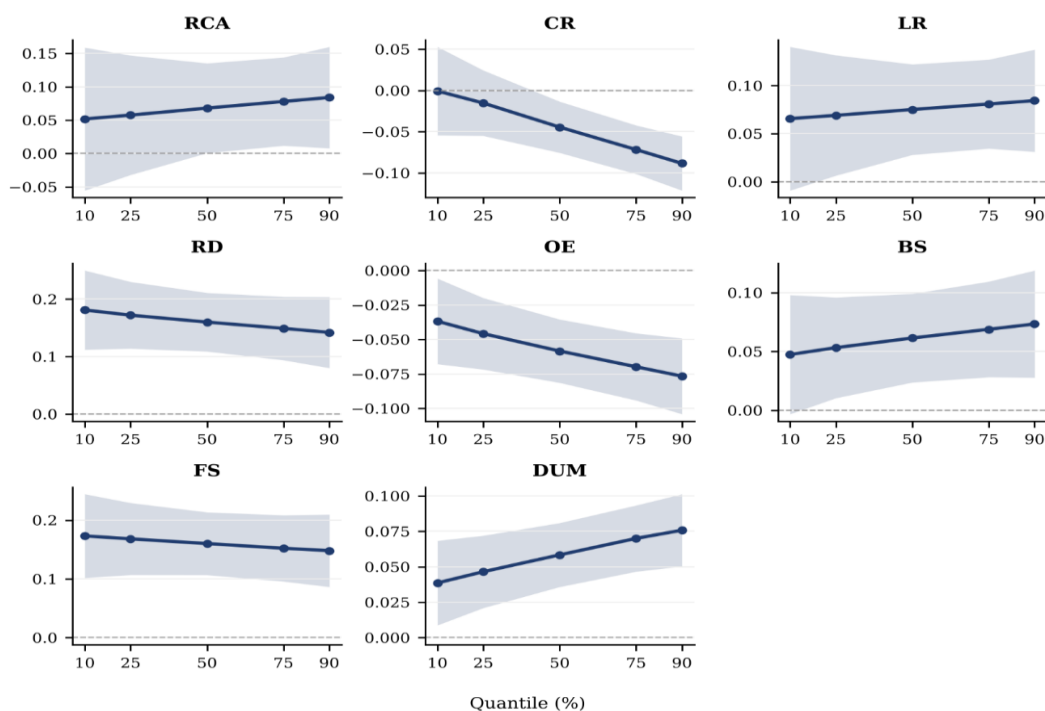
Table 8. MMQR estimates, Model B (ROE, RCA and bank-level controls)

Variable	Location	Scale	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.0677** (0.0345)	0.0109 (0.0219)	0.0517 (0.0546)	0.0575 (0.0456)	0.0680** (0.0343)	0.0779** (0.0337)	0.0839** (0.0387)
CR	-0.0436*** (0.0153)	-0.0301*** (0.00970)	-0.000716 (0.0273)	-0.0153 (0.0202)	-0.0445*** (0.0158)	-0.0717*** (0.0150)	-0.0884*** (0.0167)
LR	0.0749*** (0.0241)	0.00631 (0.0153)	0.0656* (0.0381)	0.0690** (0.0319)	0.0751*** (0.0240)	0.0808*** (0.0236)	0.0843*** (0.0271)
RD	0.161***	0.0128	0.181***	0.172***	0.160***	0.149***	0.142***

Variable	Location	Scale	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
	(0.0260)	(0.0135)	(0.0351)	(0.0296)	(0.0260)	(0.0281)	(0.0315)
OE	-0.0575***	-0.0130**	-0.0368**	-0.0458***	-0.0584***	-0.0698***	-0.0766***
	(0.0115)	(0.00596)	(0.0158)	(0.0132)	(0.0117)	(0.0124)	(0.0140)
BS	0.0608***	0.00843	0.0474*	0.0532**	0.0614***	0.0688***	0.0733***
	(0.0191)	(0.00993)	(0.0258)	(0.0218)	(0.0192)	(0.0207)	(0.0232)
FS	0.160***	0.00852	0.173***	0.168***	0.160***	0.152***	0.148***
	(0.0272)	(0.0138)	(0.0363)	(0.0312)	(0.0272)	(0.0287)	(0.0314)
DUM	0.0575***	0.0128**	0.0386**	0.0465***	0.0584***	0.0700***	0.0758***
	(0.0113)	(0.00574)	(0.0152)	(0.0130)	(0.0115)	(0.0119)	(0.0130)
Constant	5.143***	0.447	4.382***	4.825***	5.189***	5.577***	5.790***
	(0.572)	(0.378)	(1.034)	(0.730)	(0.556)	(0.531)	(0.600)
Observations	377	377	377	377	377	377	377

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. DUM = 1 for private banks.

Figure 2. MMQR coefficients by quantile, Model B (ROE)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

Models with macroeconomic controls

Once growth, inflation, the deposit rate and money supply growth enter the ROA equation (Model C, Table 9 and Figure 3), RCA stays positive and significant at every quantile, but its effect becomes flat. It moves only from 0.060 to 0.063, and the scale coefficient (0.001) is close to zero. With the business cycle held constant, a higher capital ratio lifts ROA by roughly the same amount for every bank.

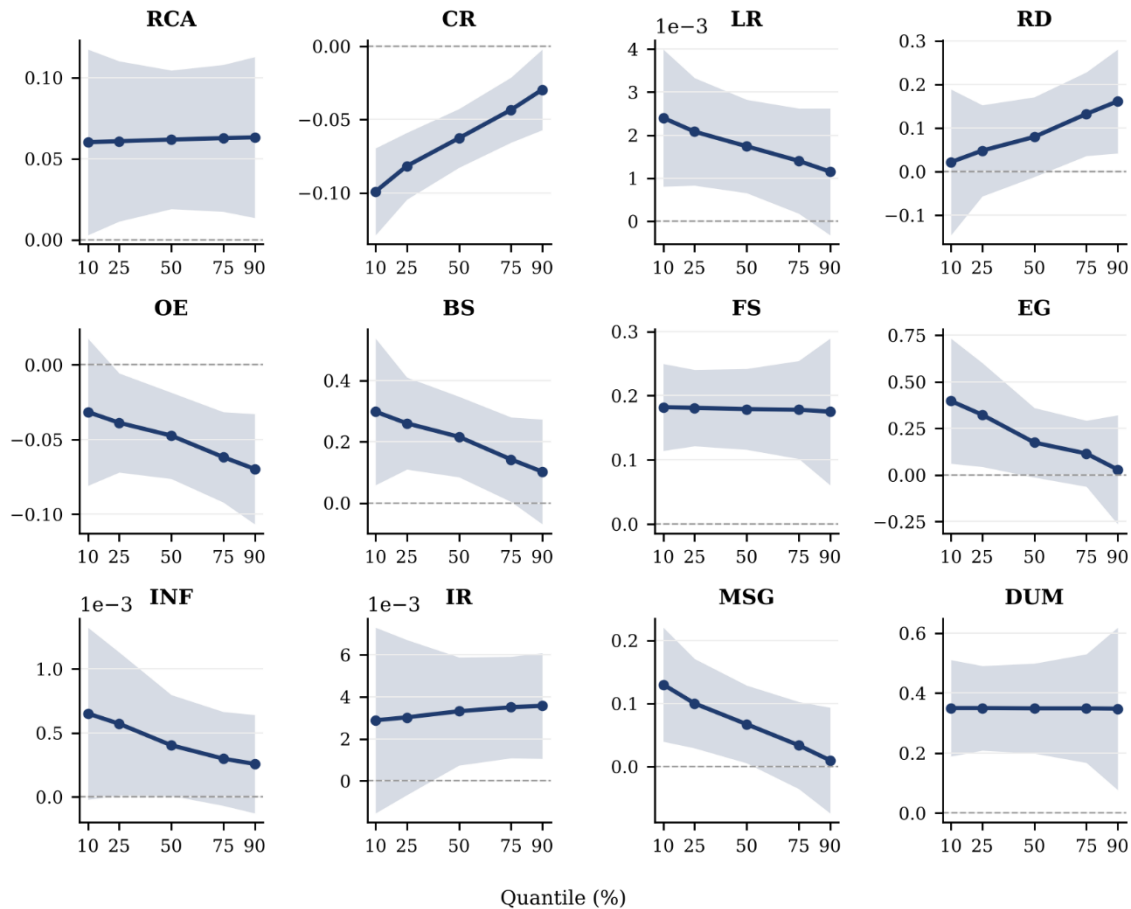
Table 9. MMQR estimates, Model C (ROA, RCA, bank-level and macroeconomic controls)

Variable	Location	Scale	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.0616*** (0.0219)	0.00103 (0.0111)	0.0601** (0.0292)	0.0607** (0.0252)	0.0617*** (0.0218)	0.0626*** (0.0231)	0.0631** (0.0253)
CR	-0.0610*** (0.0101)	-0.0218*** (0.00629)	-0.0992*** (0.0151)	-0.0818*** (0.0116)	-0.0628*** (0.0102)	-0.0435*** (0.0113)	-0.0297** (0.0140)
LR	0.00171*** (0.000552)	0.000392 (0.000345)	0.00240*** (0.000812)	0.00208*** (0.000637)	0.00174*** (0.000553)	0.00140** (0.000623)	0.00115 (0.000751)
RD	0.0930** (0.0454)	0.0502* (0.0286)	0.0215 (0.0852)	0.0479 (0.0533)	0.0793* (0.0466)	0.132*** (0.0489)	0.161*** (0.0607)
OE	-0.0512*** (0.0143)	-0.0138 (0.00900)	-0.0316 (0.0251)	-0.0388** (0.0169)	-0.0474*** (0.0147)	-0.0618*** (0.0154)	-0.0697*** (0.0188)
BS	0.197*** (0.0653)	0.0708* (0.0411)	0.298** (0.122)	0.260*** (0.0766)	0.216*** (0.0670)	0.142** (0.0703)	0.102 (0.0872)
FS	0.179*** (0.0322)	-0.00222 (0.0217)	0.182*** (0.0345)	0.181*** (0.0303)	0.179*** (0.0321)	0.178*** (0.0389)	0.175*** (0.0582)
EG	0.201** (0.0967)	0.120* (0.0640)	0.397** (0.171)	0.323** (0.142)	0.174* (0.0949)	0.115 (0.0902)	0.0291 (0.149)
INF	0.000432** (0.000208)	0.000137 (0.000119)	0.000651* (0.000343)	0.000571** (0.000285)	0.000403** (0.000201)	0.000298 (0.000187)	0.000257 (0.000196)
IR	0.00326** (0.00138)	0.000238 (0.000784)	0.00288 (0.00225)	0.00302 (0.00188)	0.00331** (0.00131)	0.00350*** (0.00123)	0.00357*** (0.00128)
MSG	0.0640** (0.0312)	0.0378* (0.0195)	0.130*** (0.0461)	0.1000*** (0.0361)	0.0670** (0.0314)	0.0336 (0.0352)	0.00974 (0.0427)
DUM	0.349*** (0.0765)	0.000639 (0.0516)	0.350*** (0.0819)	0.350*** (0.0719)	0.349*** (0.0764)	0.349*** (0.0923)	0.348** (0.138)

Variable	Location	Scale	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
Constant	3.794*** (1.283)	0.307 (0.838)	3.291* (1.714)	3.507** (1.385)	3.768*** (1.274)	4.024*** (1.523)	4.233** (1.899)
Observations	377	377	377	377	377	377	377

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. DUM = 1 for private banks.

Figure 3. MMQR coefficients by quantile, Model C (ROA)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

For ROE (Model D, Table 10 and Figure 4), the rising pattern returns. RCA is not significant at Q0.10 (0.004) but is significant from Q0.25 onward, increasing to 0.014, 0.025, 0.035 and 0.045 across the remaining quantiles. Its scale coefficient (0.012) is significant at 1%. In the same model the harm

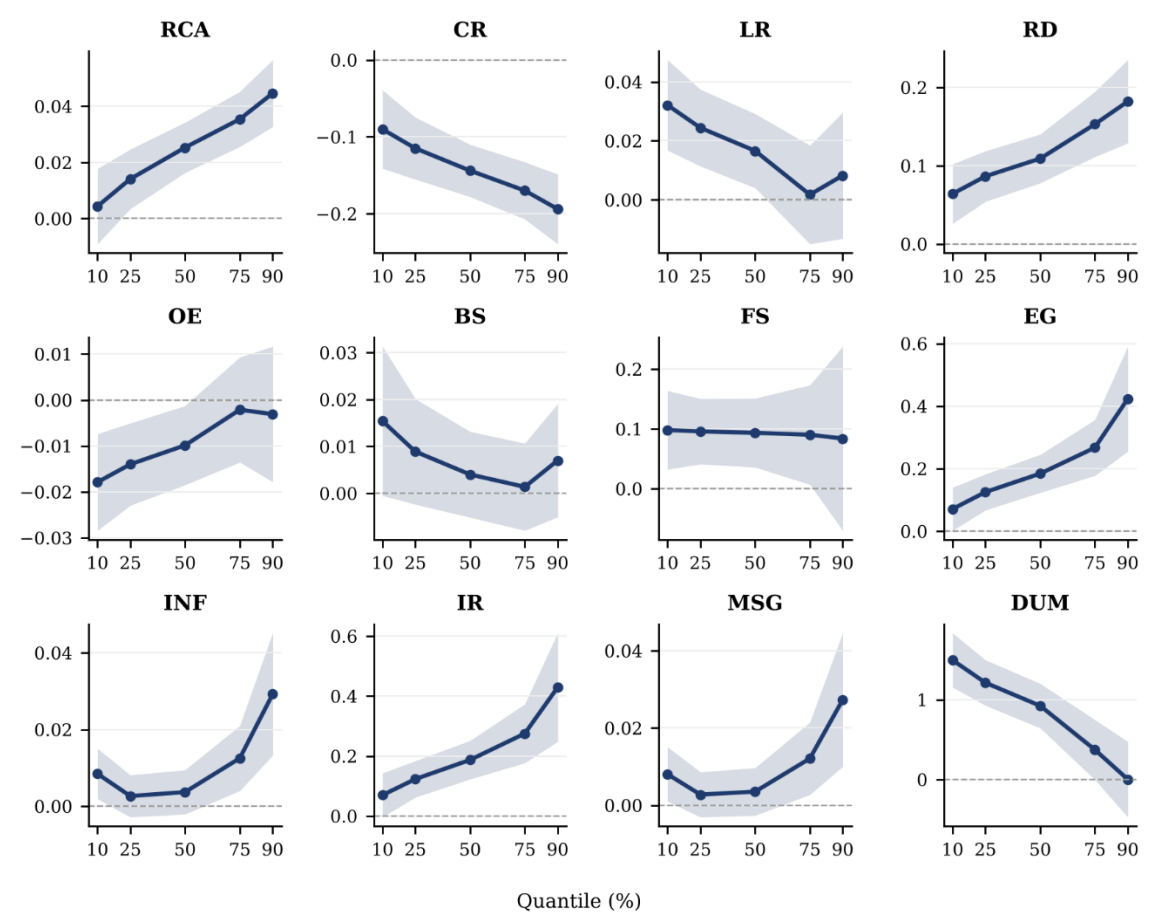
from credit risk deepens from -0.090 at Q0.10 to -0.194 at Q0.90, and growth and the deposit rate both have much larger effects at the top of the ROE distribution than at the bottom.

Table 10. MMQR estimates, Model D (ROE, RCA, bank-level and macroeconomic controls)

Variable	Location	Scale	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.0248*** (0.00456)	0.0121*** (0.00273)	0.00437 (0.00683)	0.0141*** (0.00540)	0.0253*** (0.00456)	0.0354*** (0.00499)	0.0446*** (0.00607)
CR	-0.143*** (0.0174)	-0.0310*** (0.0104)	-0.0902*** (0.0260)	-0.115*** (0.0205)	-0.144*** (0.0173)	-0.170*** (0.0189)	-0.194*** (0.0231)
LR	0.0138** (0.00655)	-0.0128*** (0.00427)	0.0321*** (0.00781)	0.0244*** (0.00662)	0.0166*** (0.00640)	0.00175 (0.00851)	0.00825 (0.0109)
RD	0.118*** (0.0163)	0.0375*** (0.0106)	0.0640*** (0.0194)	0.0864*** (0.0164)	0.109*** (0.0159)	0.153*** (0.0212)	0.182*** (0.0271)
OE	-0.00839* (0.00450)	~ 0.00669** (0.00293)	-0.0179*** (0.00536)	-0.0140*** (0.00456)	~ 0.00988** (0.00439)	-0.00213 (0.00583)	-0.00309 (0.00751)
BS	0.00441 (0.00473)	0.00746** (0.00359)	0.0154* (0.00811)	0.00889 (0.00573)	0.00401 (0.00466)	0.00137 (0.00474)	0.00701 (0.00615)
FS	0.0922*** (0.0333)	0.00451 (0.0298)	0.0980*** (0.0335)	0.0958*** (0.0279)	0.0934*** (0.0294)	0.0901** (0.0424)	0.0839 (0.0785)
EG	0.216*** (0.0358)	0.113*** (0.0319)	0.0709** (0.0350)	0.125*** (0.0293)	0.184*** (0.0309)	0.267*** (0.0454)	0.423*** (0.0854)
INF	0.00706** (0.00339)	0.0121*** (0.00303)	0.00845** (0.00334)	0.00263 (0.00279)	0.00367 (0.00294)	0.0125*** (0.00432)	0.0292*** (0.00813)
IR	0.219*** (0.0385)	0.117*** (0.0355)	0.0695* (0.0373)	0.123*** (0.0309)	0.187*** (0.0327)	0.275*** (0.0499)	0.429*** (0.0923)
MSG	0.00665* (0.00366)	0.0115*** (0.00338)	0.00804** (0.00359)	0.00277 (0.00297)	0.00352 (0.00314)	0.0121** (0.00477)	0.0273*** (0.00881)
DUM	0.816*** (0.145)	0.475*** (0.0945)	1.495*** (0.173)	1.212*** (0.145)	0.923*** (0.142)	0.372* (0.191)	0.00138 (0.241)
Constant	1.163* (0.643)	1.599*** (0.594)	-0.888 (0.647)	-0.153 (0.533)	0.727 (0.566)	1.925** (0.848)	4.049*** (1.553)
Observations	377	377	377	377	377	377	377

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. DUM = 1 for private banks.

Figure 4. MMQR coefficients by quantile, Model D (ROE)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

Endogeneity and IVQR estimates

The Durbin and Wu–Hausman tests in Table 11 reject the exogeneity of RCA, CR and LR in all four models. The Durbin χ^2 values lie between 15.88 and 18.26, and the Wu–Hausman F values between 19.52 and 22.45. Tables 12 to 15 and Figures 5 to 8 therefore report the IVQR estimates.

Table 11. Durbin–Wu–Hausman tests for endogeneity

Model	Endogenous regressors	Durbin χ^2	p	Wu–Hausman F	p
A	RCA, CR, LR	15.88	.000	19.52	.000

Model	Endogenous regressors	Durbin χ^2	p	Wu-Hausman F	p
B	RCA, CR, LR	16.41	.000	20.37	.000
C	RCA, CR, LR	18.26	.000	22.45	.000
D	RCA, CR, LR	17.12	.000	20.98	.000

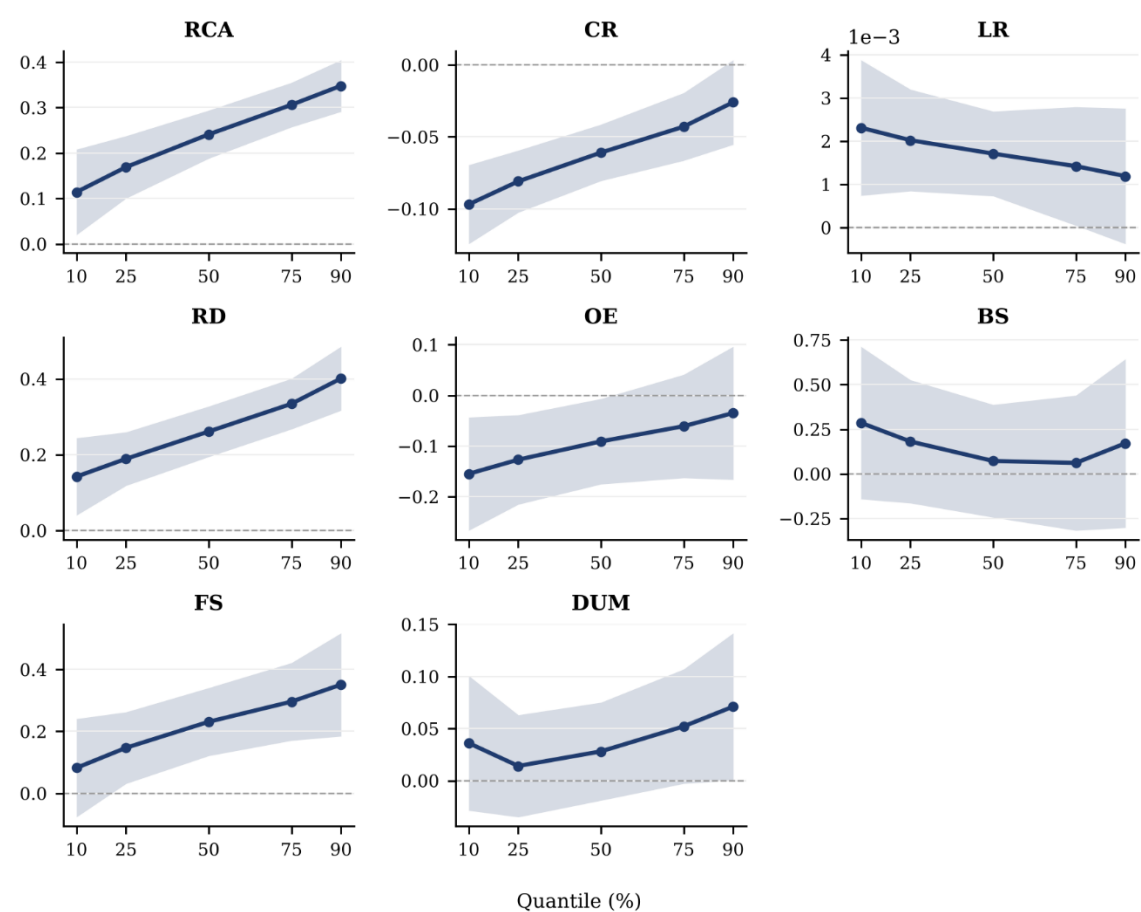
Note. Suspected endogenous regressors: RCA, CR and LR, instrumented by their second lags. H0: the regressors are exogenous.

Table 12. IVQR estimates, Model A (ROA, RCA and bank-level controls)

Variable	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.114** (0.048)	0.169*** (0.035)	0.241*** (0.027)	0.306*** (0.025)	0.348*** (0.029)
CR	-0.097*** (0.014)	-0.081*** (0.011)	-0.061*** (0.010)	-0.043*** (0.012)	-0.026 (0.015)
LR	0.00231*** (0.0008)	0.00202*** (0.0006)	0.00171*** (0.0005)	0.00142** (0.0007)	0.00119 (0.0008)
RD	0.142*** (0.052)	0.189*** (0.036)	0.261*** (0.034)	0.334*** (0.034)	0.401*** (0.043)
OE	-0.155*** (0.057)	-0.127*** (0.045)	-0.091** (0.043)	-0.061 (0.052)	-0.035 (0.067)
BS	0.286 (0.218)	0.181 (0.176)	0.072 (0.161)	0.061 (0.193)	0.171 (0.241)
FS	0.082 (0.081)	0.147** (0.059)	0.231*** (0.056)	0.296*** (0.064)	0.351*** (0.085)
DUM	0.036 (0.033)	0.014 (0.025)	0.028 (0.024)	0.052* (0.028)	0.071* (0.036)
Constant	-3.487*** (1.236)	-3.281*** (1.011)	-3.019*** (0.927)	-2.761*** (1.084)	-2.532** (1.361)

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. RCA, CR and LR are instrumented with their second lags.

Figure 5. IVQR coefficients by quantile, Model A (ROA)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

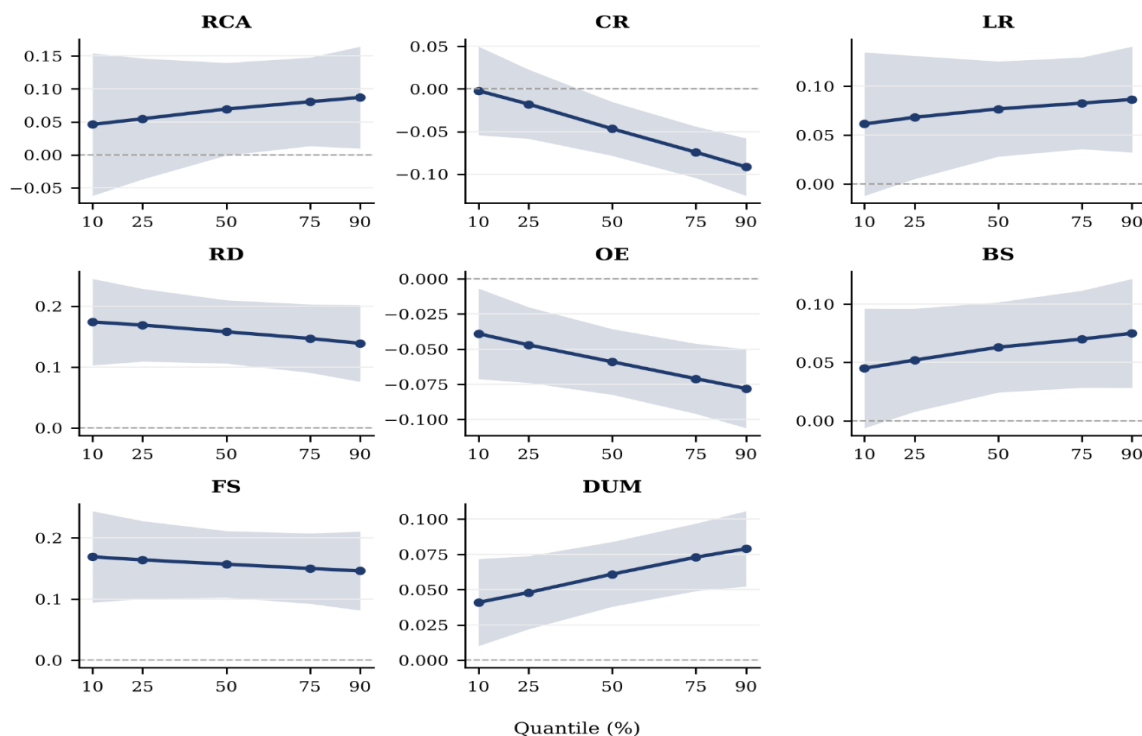
Table 13. IVQR estimates, Model B (ROE, RCA and bank-level controls)

Variable	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.0462 (0.0551)	0.0548 (0.0467)	0.0695** (0.0358)	0.0806** (0.0342)	0.0871** (0.0394)
CR	-0.0021 (0.0265)	-0.0178 (0.0207)	-0.0468*** (0.0161)	-0.0743*** (0.0154)	-0.0916*** (0.0172)
LR	0.0614* (0.0374)	0.0682** (0.0321)	0.0768*** (0.0248)	0.0827*** (0.0239)	0.0865*** (0.0276)
RD	0.174***	0.169***	0.158***	0.147***	0.139***

Variable	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
	(0.0362)	(0.0304)	(0.0265)	(0.0286)	(0.0321)
OE	-0.039**	-0.047***	-0.059***	-0.071***	-0.078***
	(0.0164)	(0.0137)	(0.0119)	(0.0127)	(0.0143)
BS	0.045*	0.052**	0.063***	0.070***	0.075***
	(0.0261)	(0.0225)	(0.0197)	(0.0212)	(0.0238)
FS	0.169***	0.164***	0.157***	0.150***	0.146***
	(0.0381)	(0.0324)	(0.0277)	(0.0293)	(0.0328)
DUM	0.041**	0.048***	0.061***	0.073***	0.079***
	(0.0157)	(0.0132)	(0.0117)	(0.0122)	(0.0136)
Constant	4.621***	4.914***	5.236***	5.682***	5.934***
	(1.112)	(0.781)	(0.594)	(0.548)	(0.617)

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. RCA, CR and LR are instrumented with their second lags.

Figure 6. IVQR coefficients by quantile, Model B (ROE)



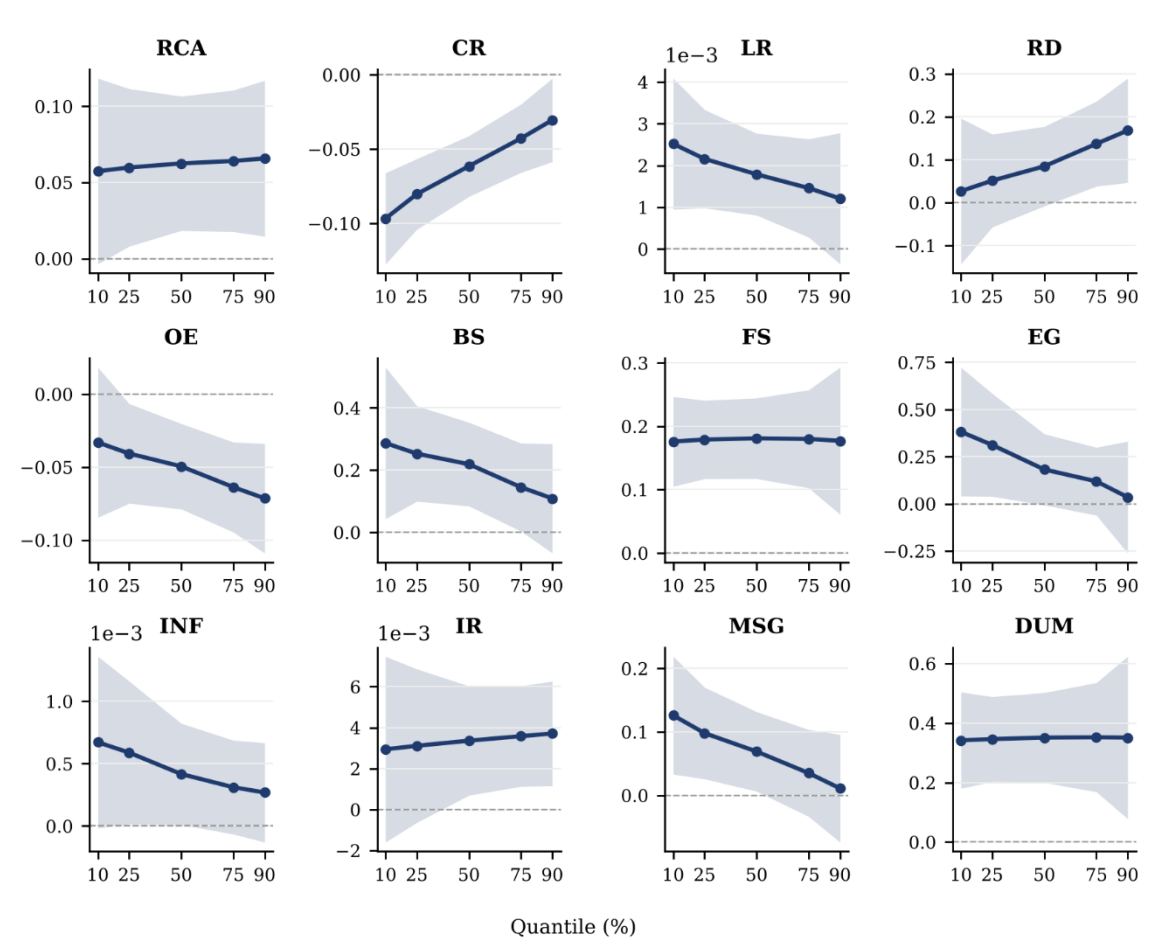
Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

Table 14. IVQR estimates, Model C (ROA, RCA, bank-level and macroeconomic controls)

Variable	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.0574** (0.0311)	0.0598** (0.0264)	0.0625*** (0.0225)	0.0641*** (0.0237)	0.0658** (0.0261)
CR	-0.0967*** (0.0156)	-0.0803*** (0.0121)	-0.0615*** (0.0104)	-0.0428*** (0.0117)	-0.0305** (0.0143)
LR	0.00252*** (0.0008)	0.00216*** (0.0006)	0.00179*** (0.0005)	0.00146** (0.0006)	0.00121 (0.0008)
RD	0.0267 (0.0865)	0.0512 (0.0551)	0.0846* (0.0472)	0.137*** (0.0504)	0.168*** (0.0619)
OE	-0.0331 (0.0262)	-0.0407** (0.0174)	-0.0495*** (0.0149)	-0.0637*** (0.0157)	-0.0714*** (0.0191)
BS	0.287** (0.124)	0.253*** (0.0781)	0.219*** (0.0685)	0.145** (0.0721)	0.109 (0.0895)
FS	0.176*** (0.0361)	0.179*** (0.0315)	0.181*** (0.0324)	0.180*** (0.0394)	0.177*** (0.0591)
EG	0.382** (0.174)	0.312** (0.139)	0.182* (0.0961)	0.119 (0.0917)	0.035 (0.151)
INF	0.000672* (0.000351)	0.000589** (0.000292)	0.000417** (0.000207)	0.000311 (0.000192)	0.000269 (0.000203)
IR	0.00294 (0.00231)	0.00311 (0.00191)	0.00336** (0.00136)	0.00358*** (0.00125)	0.00371*** (0.00130)
MSG	0.126*** (0.0473)	0.098*** (0.0368)	0.069** (0.0319)	0.035 (0.0349)	0.011 (0.0432)
DUM	0.342*** (0.0825)	0.346*** (0.0726)	0.351*** (0.0769)	0.352*** (0.0935)	0.351** (0.139)
Constant	3.214* (1.721)	3.489** (1.391)	3.802*** (1.283)	4.116*** (1.548)	4.361** (1.924)

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. RCA, CR and LR are instrumented with their second lags.

Figure 7.IVQR coefficients by quantile, Model C (ROA)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

Table 15.IVQR estimates, Model D (ROE, RCA, bank-level and macroeconomic controls)

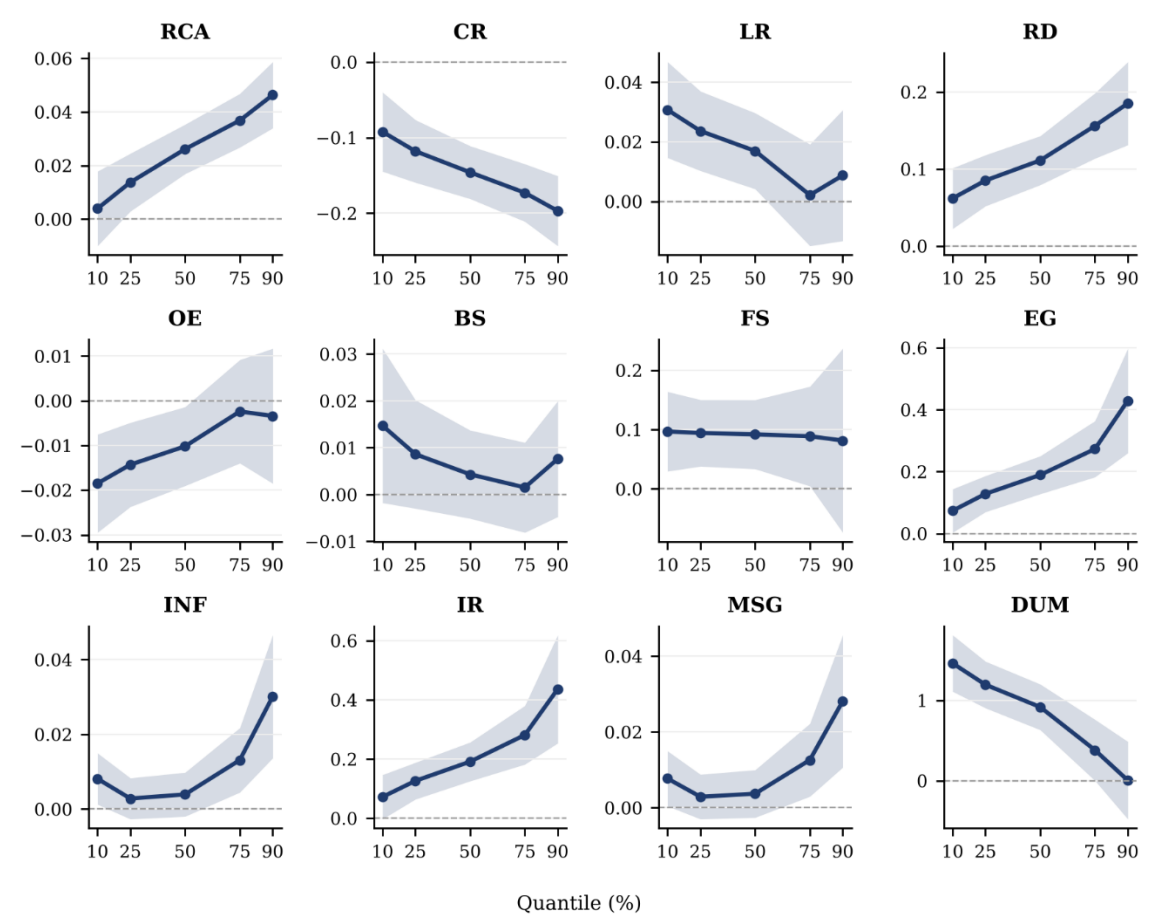
Variable	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RCA	0.0039 (0.0071)	0.0137** (0.0055)	0.0261** (0.0047)	0.0368** (0.0051)	0.0463** (0.0063)
CR	-0.0924** (0.0267)	-0.118** (0.0211)	-0.146** (0.0178)	-0.173** (0.0194)	-0.197** (0.0236)
LR	0.0307** (0.0082)	0.0236** (0.0068)	0.0169** (0.0065)	0.0021 (0.0087)	0.0087 (0.0112)

Variable	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
RD	0.0617*** (0.0201)	0.0849*** (0.0169)	0.111*** (0.0162)	0.156*** (0.0216)	0.185*** (0.0275)
OE	-0.0185*** (0.0056)	-0.0143*** (0.0048)	-0.0102** (0.0045)	-0.0024 (0.0059)	-0.0034 (0.0077)
BS	0.0147* (0.0084)	0.0086 (0.0059)	0.0043 (0.0048)	0.0015 (0.0049)	0.0076 (0.0063)
FS	0.0967*** (0.0342)	0.0941*** (0.0286)	0.0918*** (0.0297)	0.0886** (0.0428)	0.0815 (0.0791)
EG	0.0734** (0.0358)	0.128*** (0.0297)	0.189*** (0.0312)	0.273*** (0.0462)	0.429*** (0.0861)
INF	0.0081** (0.0035)	0.0028 (0.0028)	0.0039 (0.0030)	0.0131*** (0.0044)	0.0301*** (0.0084)
IR	0.0718* (0.0381)	0.126*** (0.0316)	0.191*** (0.0334)	0.281*** (0.0505)	0.436*** (0.0931)
MSG	0.0077** (0.0037)	0.0029 (0.0030)	0.0037 (0.0032)	0.0126** (0.0049)	0.0281*** (0.0089)
DUM	1.462*** (0.179)	1.195*** (0.148)	0.917*** (0.145)	0.381* (0.194)	0.0041 (0.246)
Constant	-0.821 (0.659)	-0.118 (0.548)	0.751 (0.571)	1.984** (0.861)	4.182*** (1.571)

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$. RCA, CR and LR are instrumented with their second lags.

Table 16 and Figure 9 put the two sets of RCA estimates side by side. They are very close. In Model A the IVQR coefficient rises from 0.114 to 0.348, against 0.106 to 0.334 under MMQR. In Model B it is insignificant at the two lowest quantiles and rises from 0.070 at the median to 0.087 at Q0.90. In Model C it is flat at 0.057–0.066, and in Model D it is insignificant at Q0.10 and then rises from 0.014 to 0.046. The controls keep their signs under IVQR. Correcting for the two-way link between capital and profit therefore leaves the main result in place.

Figure 8. IVQR coefficients by quantile, Model D (ROE)



Note. The line shows the quantile coefficient and the shaded band its 95% confidence interval.

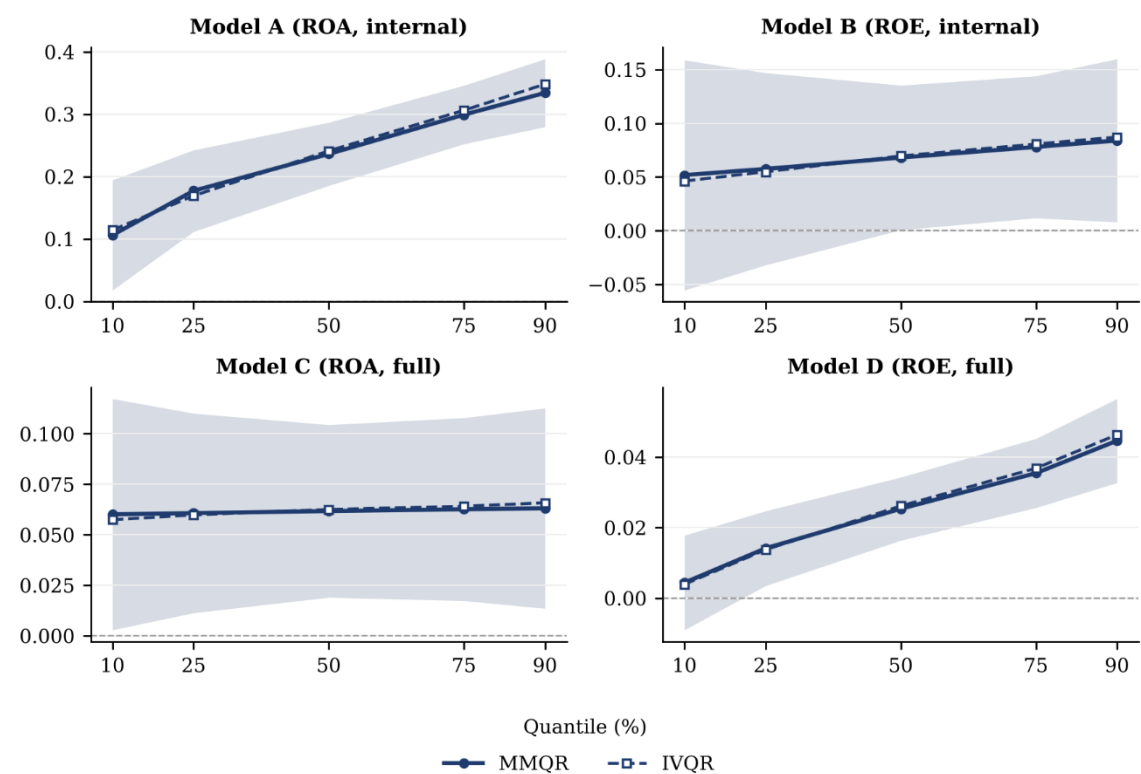
Table 16. RCA coefficients by quantile under MMQR and IVQR

Model	Estimator	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
A (ROA)	MMQR	0.106** (0.0450)	0.177*** (0.0333)	0.236*** (0.0258)	0.299*** (0.0239)	0.334*** (0.0277)
	IVQR	0.114** (0.048)	0.169*** (0.035)	0.241*** (0.027)	0.306*** (0.025)	0.348*** (0.029)
B (ROE)	MMQR	0.0517 (0.0546)	0.0575 (0.0456)	0.0680** (0.0343)	0.0779** (0.0337)	0.0839** (0.0387)
	IVQR					

Model	Estimator	Q0.10	Q0.25	Q0.50	Q0.75	Q0.90
C (ROA)	IVQR	0.0462	0.0548	0.0695**	0.0806**	0.0871**
		(0.0551)	(0.0467)	(0.0358)	(0.0342)	(0.0394)
	MMQR	0.0601**	0.0607**	0.0617***	0.0626***	0.0631**
		(0.0292)	(0.0252)	(0.0218)	(0.0231)	(0.0253)
D (ROE)	IVQR	0.0574**	0.0598**	0.0625***	0.0641***	0.0658**
		(0.0311)	(0.0264)	(0.0225)	(0.0237)	(0.0261)
	MMQR	0.00437	0.0141***	0.0253***	0.0354***	0.0446***
		(0.00683)	(0.00540)	(0.00456)	(0.00499)	(0.00607)
	IVQR	0.0039	0.0137***	0.0261***	0.0368***	0.0463***
		(0.0071)	(0.0055)	(0.0047)	(0.0051)	(0.0063)

Note. Standard errors in parentheses. *** $p < .01$, ** $p < .05$, * $p < .10$.

Figure 9. Coefficient on RCA by quantile: MMQR and IVQR



Note. Solid line: MMQR estimate with 95% confidence band. Dashed line: IVQR estimate.

Discussion

The answer to the main question of this paper is that capital did not cost Pakistani banks their profits. The Basel capital ratio has a positive effect in every model and under both estimators wherever it is significant, and at no quantile is it negative, so H1 is supported. This agrees with Berger (1995), Athanasoglou et al. (2008) and Bitar et al. (2018), and with Datta and Al Mahmud (2018) for Bangladesh. It differs from de Bandt et al. (2018), who found no effect of regulatory capital in France, from Sultan et al. (2020), who found a negative effect for Pakistan in an earlier sample, and from the negative cross-country quantile estimates of Bortoluzzo et al. (2024). Three features of the Pakistani setting help explain why capital paid off. Depositors and lenders faced high inflation, currency pressure and political uncertainty over 2011–2023, so the safety of a bank mattered more to them than it would in a calm market, and a strong capital ratio lowered the premium they asked for. A well-capitalised bank could also keep lending through bad years, whereas banks close to the minimum had to shrink their loan books to protect their ratios. And with several public and specialised lenders visibly weak, a high capital ratio worked as a signal of soundness that helped a bank hold on to cheap retail deposits.

H2 is supported as well. In Models A, B and D the effect of capital grows from the bottom to the top of the profit distribution, and the scale coefficient is significant in Models A and D, while for ROE capital has no significant effect on the least profitable banks. Capital seems to do different work at each end of the distribution. For a profitable bank with good borrowers and controlled costs, extra capital is room to expand lending and to take business that thinly capitalised rivals must refuse. For a bank near the bottom it is mainly a cushion that keeps the bank solvent without producing earnings, because the bank's problems lie in its loan book and its costs. Nguyen (2020) also found that capital helps some banks and not others, although in Vietnam the gains went to small banks, and Tran et al. (2016) showed that the effect depends on a bank's starting capital. Our results add that it also depends on a bank's starting profitability. The flat effect in Model C suggests that part of the gap in Model A reflects the business cycle, since strong banks may have been both better capitalised and more profitable in good years. For ROE, the measure bankers have in mind when they say capital lowers returns, the rising pattern survives the macroeconomic controls.

Credit risk lowers profitability in all four models, but its pattern depends on the profit measure. For ROA the damage is largest at the bottom of the distribution, while for ROE it grows toward the top and reaches -0.194 at Q0.90 in Model D. Provisions for bad loans are charged directly against income, and loans that stop paying interest still tie up funding and capital (Berger & DeYoung, 1997; Saleh & Abu Afifa, 2020). A weak bank has little income to absorb these charges, which explains the ROA pattern. A highly profitable bank, on the other hand, earns a large share of its ROE from a thin equity base, so a rise in bad loans cuts deeply into the return to its owners.

The loans-to-deposits ratio has a positive effect in most specifications. A higher ratio means more of each deposit rupee is out on loan, so the sign shows that lending pays better than holding liquid

assets and government securities. The effect fades toward the top in the ROA models and in Model D, as the most profitable banks already lend out enough and gain little from lending more, whereas in Model B it rises across quantiles. The positive sign is in line with Abbas et al. (2019) for Asian banks.

Revenue diversification raises profitability in every model. Fee and commission income adds a source of earnings that does not depend on the interest margin and needs little capital (Chiorazzo, Milani, & Salvini, 2008; Sanya & Wolfe, 2011). In the ROA models and in Model D the effect grows toward the top, from 0.137 to 0.390 in Model A, which suggests that banks with established systems and client networks earn most from fee business. Model B is the exception, with a slightly larger effect at the bottom.

The cost-to-income ratio lowers profitability, as expected, because every extra rupee of operating cost comes straight out of profit and high costs usually go with weak management (Berger & DeYoung, 1997; Dietrich & Wanzenried, 2011). Its quantile pattern again differs by measure. In Models A and D the penalty is largest for low-profit banks and loses significance at the top, while in Models B and C it grows toward the top. Among the strongest banks, cost overruns appear to eat into the high returns that shareholders have come to expect.

Bank size matters only in some models. It raises ROE across the distribution in Model B, from 0.047 to 0.073, and raises ROA at the lower and middle quantiles in Model C before fading at Q0.90. Scale lets a large bank share the fixed outlay on systems, regulatory reporting and its branch network across more business, and large banks often borrow more cheaply, but these gains seem to matter less for banks that are already very profitable.

Funding structure has a positive and fairly stable effect in most models. Customer deposits are a cheaper and steadier source of funds than market borrowing, which widens the interest margin and lowers the risk of funding stress (Demirgüç-Kunt & Huizinga, 1999). In Model A the coefficient is insignificant at Q0.10 (0.071) and reaches 0.340 at Q0.90, so cheap deposits are worth most to banks that can also put them to profitable use.

The macroeconomic variables behave differently for ROA and ROE. In Model C, growth and money supply growth help low-profit banks most and lose significance toward the top, while the deposit rate is insignificant at the bottom and significant from the median upward. In good years loan demand rises and defaults fall (Athanasoglou et al., 2008), and faster money growth eases funding, which matters most to weaker banks that cannot easily raise funds on their own. When the rates paid on deposits lag behind lending rates, a rise in the policy rate widens the spread (Saunders & Schumacher, 2000), and banks with large deposit bases capture more of that gain. In Model D, growth, the deposit rate, inflation and money supply growth all have their largest effects at the top, with the coefficients on growth and the deposit rate rising to 0.423 and 0.429. Inflation can raise profits when banks anticipate it and price it into their loans (Perry, 1992), and in Pakistan it moved

closely with interest rates over the sample period. Because inflation is not stationary in our data, its coefficients should be read with care.

Private banks earn more than public banks in most models. Private owners press managers harder for profit, while state banks often carry policy lending and legacy bad loans (Micco, Panizza, & Yañez, 2007). The private premium on ROE is largest at the bottom in Model D and disappears at Q0.90, so among the most profitable banks ownership makes little difference, while at the weak end private banks do markedly better than state banks. In Model B, by contrast, the premium rises across quantiles.

Conclusion and policy implications

This study asked whether the Basel III capital rules that the SBP phased in between 2013 and 2019 helped or hurt bank profits. Using annual data on 29 listed banks for 2011–2023 and quantile methods, we find that the regulatory capital ratio raises both ROA and ROE. The gain is largest for the most profitable banks and, for ROE, absent for the least profitable ones, and instrumental variables estimates that allow for the effect of profit on capital give the same picture. Credit risk and high costs reduce profits, while income diversification, lending, deposit funding and private ownership raise them, with effects that differ across the distribution.

Several policy lessons follow. The results give the SBP no reason to relax Basel III capital rules on profit grounds, because higher capital did not reduce the profits of Pakistani banks over this period. Raising capital will not by itself rescue weak banks, however. For banks at the bottom of the distribution, capital protects depositors but does not restore earnings, so supervisors should combine capital requirements for these banks with plans to cut bad loans and operating costs. Since the most profitable banks gain most from capital, they can meet higher buffers without much strain, which is relevant for any extra buffers the SBP sets for systemically important banks. Bank managers, for their part, should treat capital and loan quality together, since the return on extra capital is highest where bad loans are low.

The study has limits. The panel is short and includes only five public banks, so ownership groups cannot be studied separately. The capital ratio has extreme values that need careful treatment, and the analysis does not separate Tier 1 from total capital or the conservation buffer from the minimum requirement. Future work could study these parts of the ratio, examine the effect of capital on bank risk as well as profit, and compare Islamic with conventional banks.

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