The Disappearance of Bank Capital Pro-Cyclicality in Emerging and Low-Income Economies under Basel III

Working paper

December 2025

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Abstract

This paper analyzes the cyclicality of bank capital ratios in emerging and low-income economies over the period 2004–2024, with particular attention to developments following the introduction of Basel III. Using a panel of 1,185 banks across 122 countries, we study how economic growth affects banks' capital ratios and whether this relationship varies across regions, income groups, and levels of capitalization. Unlike risk-weighted measures, leverage-based capital ratios provide a clearer assessment of banks' capacity to absorb shocks and support credit supply during downturns. Our findings indicate that prior to 2014, capital ratios were broadly procyclical, but in the last decade this relationship has weakened or reversed in many emerging economies. Banks with higher capital buffers exhibit the strongest countercyclical behavior, reflecting an enhanced ability to sustain lending under adverse conditions, while banks operating near regulatory minima remain largely acyclical, constrained by regulatory requirements. Regional heterogeneity is pronounced, with Latin America, developing Asia, and the Middle East showing the most substantial improvements. The results suggest that the principles underlying modern macroprudential regulation, particularly the accumulation of countercyclical capital in expansions to support lending in downturns, are increasingly influencing bank behavior, even in jurisdictions where Basel III has not been fully implemented.

Keywords: Bank Capital Ratios; Procyclicality; Countercyclical Capital Buffers; Emerging Markets; Macroprudential Regulation.

JEL Classification: G21; E44; F36.

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Content

1. Introduction

Higher capital ratios (that is, common equity of banks as a percentage of total assets) are associated with less systemic risk and lower probabilities of individual bank collapse (Thakor, 2014). Capital acts as a safeguard that enables banks to endure shocks that might otherwise trigger distress episodes. The level of capital a bank maintains shapes its incentives to manage risks responsibly and determines its capacity to absorb losses during adverse economic conditions[6].

From a theoretical perspective, two main viewpoints highlight different consequences of bank capitalization. One argues that stronger capital positions enhance banks' discipline in asset selection and strengthen their incentives to monitor borrowers effectively (Holmstrom and Tirole, 1997). Related research suggests that higher capital can also support long-term growth by enabling banks to expand lending, foster liquidity creation, and strengthen their competitive position (Mehran and Thakor, 2011; Allen et al., 2011; Berger and Bouwman, 2013).

A contrasting perspective emphasizes that higher capital may limit certain liquidity or intermediation services or introduce inefficiencies in contracting, ultimately reducing liquidity creation (Diamond and Rajan, 2001). Some studies further suggest that higher capital requirements might induce banks to take on greater risk (Acosta-Smith et al., 2024). Despite these differing viewpoints, both perspectives agree on a fundamental point: banks with higher capital ratios are inherently less fragile.

This lesson became particularly evident after the Global Financial Crisis of 2007–2009 (GFC), which, according to Thakor (2018), among others, was fundamentally a solvency crisis. If this prevailing view is accurate, one could argue that the GFC might have been prevented[7] by requiring banks to maintain higher levels of capital. Moreover, recent empirical evidence suggests that higher capital requirements, even when reducing lending in the short term, lead to safer bank borrowing standards in the medium term, with limited downside effects on the economy (Cappelletti et al., 2024).

Even if we accept that higher capital reduces bank risk, the method used to determine an optimal capital level can lead to very different bank behaviors over time. As a result, the interaction between banks' risk-taking and the business cycle can vary significantly depending on the capital framework. For example, capital ratios based on Risk-Weighted Assets (RWAs), while often associated with higher efficiency and profitability, have been shown to be relatively ineffective at mitigating risk (Bitar et al., 2018) and tend to exhibit strong procyclicality

[6] For a comprehensive review of this topic, see Thakor (2014).

[7] Or at least mitigated, if one accepts that crises are sometimes inevitable to rebalance the economic system after periods of sustained growth, as suggested by findings in Reinhart and Rogoff (2009).

in practice (Gambacorta and Karmakar, 2018). This procyclicality arises because banks—particularly large institutions that rely on internal models to compute RWAs—may be required to hold more capital precisely during economic downturns, when uncertainty is highest and liquidity is tight. Risks that accumulate unnoticed during expansions become fully visible in recessions, causing measured RWAs to rise sharply, reducing risk-weighted capital ratios, and constraining banks' ability to sustain lending. This mechanism reinforces the credit cycle: lending expands in good times and contracts in bad times, a pattern that is undesirable from a regulatory and macroprudential perspective.

Thus, Basel III and its subsequent revisions introduced several tools intended to mitigate the inherent procyclicality of bank capital, most notably the countercyclical capital buffer (CCyB). These measures are designed to ensure that capital requirements become more demanding during economic expansions, when risks tend to build up quietly, and can be relaxed during downturns to support the flow of credit, particularly toward more constrained borrowers such as SMEs. In this framework, regulators aim for capital to be accumulated in good times, so that it can be drawn down when conditions deteriorate; thereby smoothing the credit cycle and reducing systemic vulnerabilities.

This implies that, from a macroprudential perspective, the traditional negative association between bank capital and economic growth—documented in many settings, including Carvallo and Ortiz (2018)—should have weakened or even reversed in recent years. In this study, we study precisely this question. In our empirical models, we focus on simple capital ratios rather than risk-weighted measures, following evidence from Gambacorta and Karmakar (2018) showing that the Basel III leverage ratio tends to display a more countercyclical profile than risk-weighted counterparts.

Our focus is on emerging market economies, where empirical evidence remains scarce, particularly in the post–Basel III period. We are fully aware that Basel III has primarily been adopted by advanced economies and that no formal implementation should be expected in much of the developing world. Nonetheless, there are several reasons why emerging market economies, being highly integrated into the global financial safety network, may also have experienced improvements in the countercyclicality of capital ratios.

First, large banks in non-advanced economies may have internalized the logic of Basel III regulations. If the prevailing consensus is that a higher capital ratio implies a lower probability of collapse, such larger ratios could reduce banks' funding costs and help align the socially optimal capital ratio with the privately chosen one —an argument often cited to explain why banks tend to be undercapitalized from a social standpoint[8].

[8] According to Thakor (2014) socially optimal capital requirements may be higher than what individual banks would choose on their own, because banks typically do not take into account the broader social costs associated with systemic failures and contagion effects.

Second, preparation for eventual implementation (delayed by the COVID-19 pandemic and the subsequent recovery period) may have motivated banks to increase their capital levels well above their optimal targets, and in ways consistent with the phase of the business cycle. Moreover, because banks in developed countries are subject to regulatory standards that also influence their subsidiaries in developing economies, an additional channel emerges through which cyclical dynamics may change even in jurisdictions where Basel III has not been implemented.

A dedicated branch of the literature indeed examines how regulatory arbitrage and the implementation of macroprudential policies in some countries generate international spillovers, including, for instance, emerging markets. Bonfim and Costa (2017), show that foreign regulations can affect domestic credit depending on the specific rule, the type of bank, and the transmission channel, with branches and subsidiaries responding differently. Similarly, Marques et al. (2025) find that higher capital requirements imposed on parent banks reduce both funding and lending in their foreign subsidiaries, thereby tightening credit supply and constraining risk-taking abroad. Other authors similarly highlight the presence of international regulatory spillovers, suggesting that global standards may exert influence even where they are not formally enforced. In this line, Bahaj and Malherbe (2024) document that national capital rules shape international bank flows (tighter requirements prompting outflows and looser ones attracting inflows) while Chen and Friedrich (2023) show that stricter foreign countercyclical capital buffers significantly reduce Canadian banks' cross-border lending, illustrating the strong international transmission of CCyB adjustments.

Our study builds on the literature showing that capital ratios have historically been procyclical (e.g., Jokipii and Milne, 2008; Brei et al., 2016; Valencia and Bolaños, 2018; Cuong and Shimizu, 2021). The evidence is mixed regarding bank size: some authors attribute procyclicality primarily to small banks (Haubrich, 2020), while others find it more pronounced among large banks (Montagnoli et al., 2021). For an emerging market, Colombia, García-Suaza et al. (2012) document that bank capital buffers fluctuate over the business cycle, with larger banks exhibiting countercyclical behavior while smaller banks remain largely constant. These set of results motivate our inclusion of bank size not only as a control variable by as a possible mediator/moderator of the effect. Existing studies that include emerging economies generally rely on relatively old or restricted samples, often ending too early to capture progress in the implementation and alignment of new macroprudential tools designed to reduce systemic risk and support smoother post-crisis adjustments.

With this gap in mind, we use a large panel of banks (1,185 in total) across a broad set of emerging and low-income countries (122 in total) from 2004 to 2024 to examine the cyclicality of capital ratios, with a particular focus on how this relationship has evolved over the past decade—a period marked by significant transformations in the global financial safety net.

In general terms, we confirm that, prior to 2014, capital ratios were predominantly procyclical, but this relationship has reversed over the past decade. Our results, however, exhibit considerable heterogeneity across world regions. Among non-advanced economies, Latin America and the Caribbean as well as Developing Asia and the Middle East have shown the greatest progress in moderating procyclicality. By contrast, Central and Eastern Europe and Sub-Saharan/North Africa countries show less improvement. In the case of Central and Eastern Europe, capital ratios were largely acyclical even before 2014, limiting observable changes, while in Sub-Saharan and North Africa, progress has been confined to a smaller subset of institutions, conditional on the initial level of the capital ratio.

Building on this point, the second part of our paper focuses on a heterogeneity of particular interest: whether the cyclicality of capital ratios depends on their level. Specifically, we investigate whether better-capitalized banks are more or less procyclical than banks closer to regulatory minima. Theoretically, banks with larger capital buffers should have more room to maneuver during a crisis, suggesting that their capital ratios could be countercyclical, or at least acyclical. To test this hypothesis, we implement a panel quantile regression with bank-level fixed effects, analogous to the models used in the first part of the paper. These results confirm that banks with higher capital ratios are indeed less sensitive to the business cycle and, in some regions, even become countercyclical in the latter half of the sample. Additionally, we document novel evidence showing that bank equity as a proportion of total assets exhibits substantial heterogeneity in its response to both bank-level and country-level determinants, consistent with expectations that better-capitalized banks can respond more effectively to internal and external shocks.

Overall, our findings point to several policy implications of practical relevance. The reduced procyclicality of capital ratios in many emerging economies suggests that the principles underlying modern macroprudential regulation, particularly the idea of accumulating capital in good times to preserve credit flows in downturns, may already be influencing bank behavior even where Basel III has not been formally implemented. The pronounced regional heterogeneity in our results shows that this progress remains uneven. Differences in the depth and timing of Basel III implementation appear to shape how banks adjust their capital buffers over time. These patterns underscore the value of more effective supervisory frameworks supported by the global safety net, closer scrutiny of internal risk-weighting practices, and a stronger capacity to deploy countercyclical capital instruments in jurisdictions where procyclical behavior remains entrenched.

The evidence that better-capitalized banks behave more countercyclically reinforces the case for higher capital requirements, both because they enhance individual bank resilience and because they help stabilize aggregate credit conditions during periods of stress. Taken together, these results support a more proactive regulatory stance and suggest that further strengthening of macroprudential frameworks could yield signifi-

cant benefits in reducing the amplitude of credit cycles and mitigating the social costs of financial instability.

The rest of this document is organized as follows. In the second section, we review the literature most closely related to our work and position our contribution within it, with particular reference to studies on the relationship between bank capital ratios, the business cycle, and growth. In section three, we present our empirical models, define the variables, and motivate our methodological approach. Section four describes our data, data sources, and the preprocessing steps undertaken. The results are presented in section five, following the order introduced above: first, the average effects, and then the effects across the full conditional distribution of the capital ratio. Finally, we conclude with a discussion of policy implications and possible avenues for future research.

2. Procyclicality of Capital Ratios and the Roles of Capital Buffers

The relationship between bank capital and the business cycle is a widely examined dimension of the macroprudential policy literature. One set of studies documents procyclicality in capital buffers, often emphasizing differences across regions and bank characteristics. Jokipii and Milne (2008) show that banks in EU15 countries tend to adjust their capital buffers countercyclically, whereas banks in accession countries behave procyclically, highlighting the influence of institutional quality and regulatory development, and emphasizing the necessity to consider emerging and advanced economies separately.

Stolz and Wedow (2011) find that German savings banks generally maintain countercyclical capital buffers, although low-capital banks fail to converge to the capital levels of stronger banks, leading to persistent heterogeneity in cyclical responses.

Evidence from Latin America reveals a mixed picture: Carvallo et al. (2015) document procyclical buffer dynamics linked to adjustment costs, bank size, profitability, and risk exposure. Similar cross-country variation appears in Valencia and Bolaños (2018), who show that bank capital buffers are procyclical primarily in developing countries, whereas competitive pressures in advanced economies tend to increase buffers and dampen cyclical fluctuations. Long-run historical evidence from Haubrich (2020) further indicates that small banks' capital ratios are particularly procyclical, while large banks are less sensitive to aggregate conditions, pointing to an important size dimension that recurs throughout the empirical literature (see as well García-Suaza et al., 2012).

There exists a related set of studies on how risk-sensitive capital requirements under Basel II and Basel III contribute to cyclical dynamics. Empirical work consistently finds that risk-weighted capital ratios tend to be more procyclical than leverage ratios. Brei et al. (2016) show that the leverage ratio exhibits a countercyclical pattern by constraining banks during booms and easing pressures during recessions, thereby acting as a backstop to the procyclical tendencies of risk-weighted requirements. Lya and Shimizu (2021) provide further evidence that Basel II and III risk-sensitive requirements have measurable procyclical effects on lending in European countries, emphasizing the need for countercyclical capital buffers to offset these dynamics.

Theoretical models align with these empirical findings, Zhu (2008) argues that risk-sensitive standards allow banks to adopt active portfolio strategies but risk reinforcing credit cycles without additional buffers, while Heid (2007) shows that capital buffers help banks manage downturns by reducing the procyclical impact of Basel II requirements. Repullo and Suarez (2013) compare regulatory regimes and show that while Basel II was safer than Basel I, it was also more procyclical; they conclude that optimal capital requirements in environments with high social costs are higher and less cyclical, broadly consistent with Basel III's design.

Another large set of studies examines the operation of countercyclical capital buffers (CCyBs) and their interaction with economic conditions. Much of this work documents asymmetric effects: tightening requirements tends to increase capital and reduce risk-taking, while loosening requirements does not always translate into capital rebuilding or expanded lending. Benbouzid et al. (2022) show that CCyB tightening raises capital and reduces credit risk, whereas buffer releases fail to significantly increase capital but raise market perceptions of bank riskiness. Lang and Menno (2025) provide a state-dependent perspective by showing that higher requirements reduce lending only modestly when banks are profitable or hold voluntary buffers, but when banks are constrained, reductions in requirements have large positive effects on lending. These findings support the idea of maintaining a positive neutral CCyB during normal times, allowing authorities to release buffers when conditions deteriorate.

Empirical evidence from crisis episodes highlights how CCyBs and related buffers operate as shock absorbers. During the COVID-19 pandemic, several studies show that buffer releases helped sustain lending. Jude and Levieuge (2025) find that releasing the CCyB, particularly alongside monetary easing, lowered lending rates more than either policy alone. Neef et al. (2023) show that CCyB reductions in Europe increased lending by approximately 5.6 percent of total assets, with the strongest effects in mortgage markets and among weakly capitalized banks. Avezum et al. (2024) report similar findings for Brazil, where buffer releases mitigated procyclical pressures on household and small business lending. Longer-term evidence from Sivec and Volk (2023) shows that releasing buffers equivalent to a CCyB during the 2008 crisis in Slovenia increased credit supply to healthy firms while encouraging more provisioning for weaker borrowers, illustrating how

buffers can improve the allocation of credit in downturns. Additional work highlights the importance of international coordination: Bahaj and Malherbe (2024) show that uncoordinated CCyB adjustments can generate destabilizing cross-border capital flows, as countries tend to raise buffers too much in booms and cut them excessively in downturns.

Several studies analyze the design and implementation of CCyBs, emphasizing the importance of accurate indicators and timing of implementations. Herz and Keller (2023) show that authorities often rely on discretionary indicators such as house prices, credit growth, and non-performing loans, rather than the Basel-recommended credit-to-GDP gap, which many studies find to be an unreliable predictor of cyclical risk. González et al. (2017) and Martínez and Oda (2021) similarly question the early-warning properties of the credit-to-GDP gap, proposing alternative indicators that better capture cyclical vulnerabilities. Fève et al. (2019) focuses on another dimension by showing that when CCyBs apply only to traditional banks, credit can leak into the shadow banking sector, amplifying boom–bust cycles; their findings underscore the importance of broad regulatory coverage.

A final set of contributions examines the interaction of CCyBs with monetary policy and financial stability. Krenz and Zivanovic (2024) find that small CCyBs combined with accommodative monetary policy reduce the duration of financial crises. Poeschl and Mikkelsen (2024) show that CCyBs mitigate the feedback loop between uncertainty shocks and banking panics, improving welfare. Pariès et al. (2023) demonstrate that building CCyBs in good times reduces the likelihood of hitting the monetary policy reversal rate and strengthens the transmission of negative rates. Couaillier et al. (2025) provide evidence that during crises—particularly for banks with large undrawn credit lines—institutions often preserve distance from their buffers by cutting lending rather than drawing down capital, raising concerns that certain Basel III buffers may not be fully countercyclical in practice.

Taken together, the literature indicates that the procyclicality of bank capital stems from both market forces and regulatory design. Economic expansions reduce incentives for voluntary capital accumulation and encourage risk-taking, while risk-sensitive capital requirements tend to amplify these behaviors unless counterbalanced by robust countercyclical tools. Conversely, downturns reveal the vulnerability of thin capital buffers, making the timely release of countercyclical capital buffers (CCyBs) a critical mechanism for sustaining lending. The effectiveness of capital regulation ultimately depends not only on the design of these buffers but also on banks' initial capitalization, the broader policy environment, institutional quality, and the magnitude of cross-border spillovers. The combined evidence from empirical studies, together with insights from theoretical research, underscores the need for a systematic assessment of whether recent policy and regulatory developments have successfully reduced the procyclicality of bank capital, particularly in emerging market economies.

3. Methodology

Our empirical models, which include both traditional panel regressions and panel quantile regressions, incorporate a set of bank-specific and country-specific covariates. The main coefficient of interest measures the association between economic growth and bank capital ratios, while an interacting dummy variable captures how this relationship changes from 2014 onward. Since growth is a macro-level variable at the country level, the bank-level covariates should not be interpreted as traditional control variables. A control variable, by definition, must influence both the treatment (growth) and the outcome (capital ratios), which is not the case here naturally. Instead, these micro-level covariates should be viewed as potential mediators. For example, a bank's size may be fundamental to understanding the cyclicality of its capital ratios, and non-performing loans can amplify or moderate the impact of growth on capital ratios. Country-level macro variables, on the other hand, can be treated more conventionally as controls, as they capture both the broader economic environment and its influence on bank capital. Controlling for these effects is therefore important for isolating the relationship between growth and capital ratios. We do not claim causality in any case although we notice that indeed the cause should flow from the macroeconomy to the bank specific conditions when interpreting.

3.1. Panel Data Model

Our primary specification is a panel regression model with bank-level fixed effects. The dependent variable is the bank capital ratio ($CapitalRatio_{it}$), measured as the ratio of regulatory capital to total assets. The baseline model is given by:

$$CapitalRatio_{it} = \alpha_i + \beta_1 Growth_{c,t} + \beta_2\left(Growth_{c,t} \times Post2014_t\right) + \beta_3 ROE_{i,t} + \beta_4 NonPerformingLoans_{i,t} + \beta_5 Reserves_{i,t} + \beta_6 Size_{i,t} + \beta_7 Inflation_{c,t} + \varepsilon_{i,t}, \quad (1)$$

where i indexes banks and t indexes years, α_i are bank fixed effects capturing time-invariant heterogeneity across banks, $Growth_{c,t}$ is the annual real GDP growth rate in country c, $Post2014_t$ is an indicator equal to 1 for years 2014 and later (corresponding to the first implementation of Basel III in advanced economies), $ROE_{i,t}$ is return on equity, $NonPerformingLoans_{i,t}$ is the share of impaired loans, $Reserves_{i,t}$ is the ratio of loan loss reserves to non-performing loans, $Size_{i,t}$ is the natural logarithm of total assets, and, $Inflation_{c,t}$ is the annual consumer price inflation.

The coefficient β_1 captures the baseline pro-cyclicality of bank capital ratios, while β_2 identifies changes in cyclicality after 2014. Standard errors are corrected using Newey-West in the robustness section, with virtua-

lly no-changes in the model outcomes. The model is estimated separately for different country groups (e.g., lower-income, upper-income, and by geographic region) to examine heterogeneity in the relationship between growth and bank capital.

3.2. Quantile Panel Data Model

To investigate whether the level of capital ratios affects the cyclicality of bank capital, we employ a panel quantile regression with fixed effects (Koenker, 2004, 2017). This approach allows us to estimate the conditional distribution of capital ratios across quantiles $\tau \in (0,1)$, rather than focusing solely on the mean, thereby capturing heterogeneous responses of banks with different capitalization levels:

$$Q_{CR_{it}}(\tau|X_{i,t}) = \alpha_i(\tau) + \beta_1(\tau)Growth_{c,t} + \beta_2(\tau)\left(Growth_{c,t} \times Post2014_t\right) + \beta_3(\tau)ROE_{i,t} + \beta_4(\tau)NonPerformingLoans_{i,t} + \beta_5(\tau)Reserves_{i,t} + \beta_6(\tau)Size_{i,t} + \beta_7(\tau)Inflation_{c,t}, \quad (2)$$

where $Q_{CR_{it}}(\tau|X_{i,t})$ represents the τ-th conditional quantile of the capital ratio given covariates $X_{i,t}$, and $\alpha_i(\tau)$ are bank-level fixed effects at the τ-th quantile. This specification allows us to test whether better-capitalized banks (higher quantiles) are less sensitive to the business cycle than banks closer to regulatory minima (lower quantiles). Similar to the fixed-effects panel model, the quantile regressions are estimated for the full sample and across different regional groups to analyze heterogeneous responses. Confidence intervals are constructed via bootstrapping.

4. Data

Table 1 presents summary statistics for the key variables used in the empirical analysis of bank capital pro-cyclicality. The table includes both bank-specific indicators and macroeconomic variables to capture internal and external determinants of bank capital behavior. Bank-level variables are drawn from the *BankFocus* and include: the *Capital Ratio*, measured as the ratio of a bank's regulatory capital to total assets; *ROE*, the return on equity calculated from net income; *Non-Performing Loans*, the share of impaired loans relative to total assets; *Reserves to Loans*, the ratio of loan loss reserves to non-performing loans; and *Size*, the natural logarithm of total assets, used as a proxy for bank scale. Macroeconomic indicators, collected from the *World Bank (WDI)* and *IMF (WEO)*, include Inflation, the annual percentage change in consumer prices, and growth, the annual real GDP growth rate.

Summary statistics show substantial variation across banks and countries. For instance, capital ratios have a mean of 12.8% but range from 0% to 97.75%, as we have excluded observations out of this feasible range from an accounting perspective, reflecting heterogeneity in capitalization. ROE exhibits extreme values, highlighting volatility in bank profitability across the world. Non-performing loans and loan loss reserves also display wide dispersion, while macroeconomic conditions vary considerably across emerging and low-income economies in the sample. These descriptive statistics provide a foundation for understanding the determinants of bank capital pro-cyclicality in the subsequent empirical analysis.

Table 1. Summary Statistics of Bank and Macroeconomic Variables Used in the Models

Indicator	*Abbreviation*	*Source*	*Median*	*Mean*	*Std.Dev*	*Max.*	*Min.*
Capital Ratio (% of Bank's Total Assets)	CapitalRatio	BankFocus	16.42	12.8	12.29	97.75	0
Return on Equity using Net Income	ROE	BankFocus	7.27	8.21	22.93	515.55	-820.71
Bank's Total Non-Performing (Impaired) Loans as a percent of Total Assets	NonPerformingLoans	BankFocus	5.41	2.09	10.7	195.8	0
Bank's Loan Loss Reserves as a percentage of Non-Performing (Impaired) Loans	Reserves2Loans	BankFocus	7.31	3.75	11.46	100	0
Natural Log of Bank's Total Assets	Size	BankFocus	13.28	13.32	1.94	18.58	3.93
Annual Inflation Rate	Inflation	WDI-World Bank	6.82	4.04	17.37	557.2	-12.3
Annual Real Growth Rate	growth	WEO-IMF	3.44	4	4.76	63.3	-32.9

Note: All variables are measured at the bank-year level unless otherwise specified. Capital ratio, return on equity (ROE), non-performing loans, loan loss reserves, and bank size are sourced from BankFocus. Capital ratios have been trimmed to include only values between 0% and 100%. Inflation and real GDP growth are obtained from the World Bank's World Development Indicators (WDI) and the IMF's World Economic Outlook (WEO), respectively.

Table 2 provides an overview of the sample used in the empirical analysis, broken down by income group and geographical region. Income classification follows the World Bank's definitions, with countries categorized as lower-income or upper-income based on their gross national income per capita. The full sample compri-

ses 122 countries, 1,185 banks, and 8,863 bank-year observations. Specifically, there are 53 lower-income countries and 69 upper-income countries represented. Regionally, the sample includes 44 African countries, 39 Asian countries, 14 European countries, 24 Latin American countries, and 1 country from Oceania. The number of banks and observations varies across groups, reflecting differences in financial sector size and data availability. This information highlights the broad coverage in terms of emerging and low-income economies in the analysis, providing context for interpreting the results on bank capital pro-cyclicality. Additional information on the countries is included in the Appendix, in Table A1.

Table 2. Sample Composition by Income Group and Region

Group	*Number of Countries*	*Number of Banks*	*Number of Observations*
Whole Sample	122	1,185	8,863
Lower Income	53	357	2,571
Upper Income	69	828	6,292
Africa	44	267	1,859
Asia	39	400	3,435
Europe	14	333	2,217
Latin America	24	182	1,347
Oceania	1	3	5

Note: This table reports the number of countries, banks, and bank-year observations in the sample. Income groups are classified according to the World Bank's income group definitions. Regional groups reflect the geographical location of banks' home countries. The whole sample includes all 122 countries in the study.

5. Results

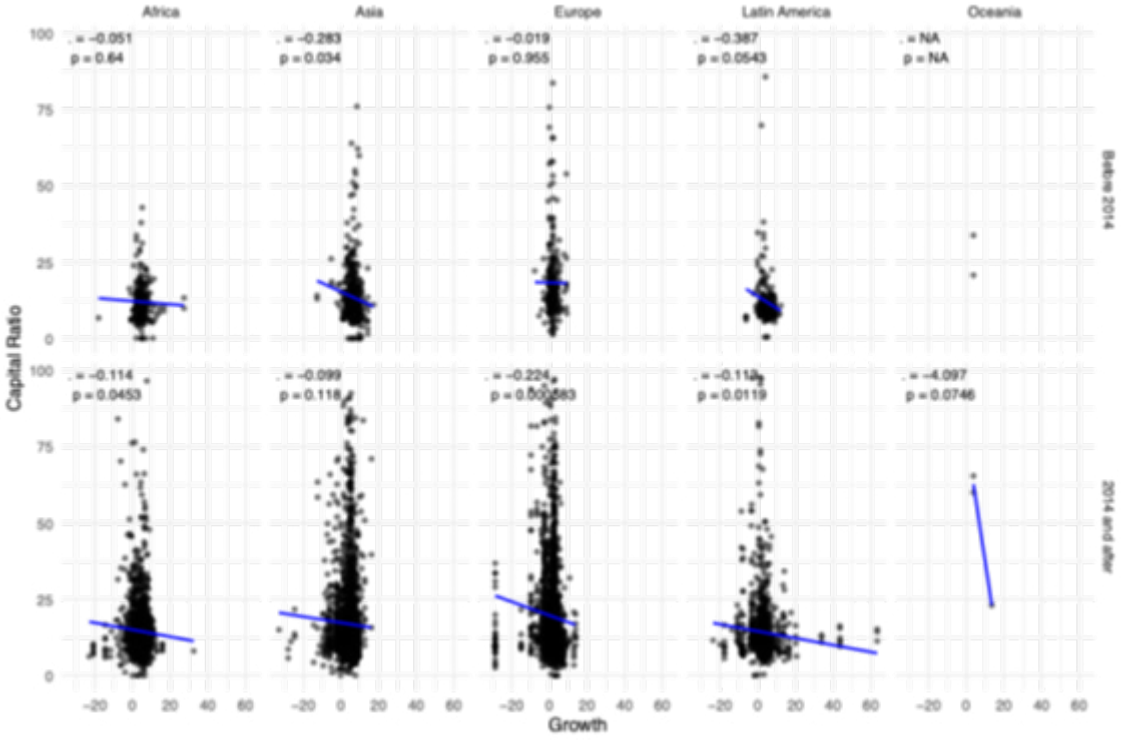
Figure 1 presents a preliminary regression analysis investigating the relationship between capital ratios and economic growth across five global regions: Sub-Saharan Africa and North Africa (*Africa* for brevity), Developing Asia and the Middle East (*Asia* for brevity), Central and Eastern Europe (*Europe* for brevity), Latin America and the Caribbean Latin America (*Latin America* for brevity), and two Pacific Island Nations (*Oceania*, for brevity). The figure compares the relationship between growth and capital ratios across two periods: before and after 2014. Visual inspection of the panels suggests that the impact of growth on capital ratios has changed unevenly across regions after 2014. In particular, emerging Asia and Latin America exhibit a noticeable flattening of the regression line in the post-2014 period, indicating that changes in growth now have a weaker

effect on capital ratios than before. In contrast, the slopes in Africa and Europe appear relatively stable or even move in the opposite direction, suggesting that the growth–capital ratio relationship may have become more procyclical in these regions. Overall, this visual evidence motivates a deeper analysis of heterogeneous shifts, with the weakening effect concentrated in certain emerging economies rather than being a uniform phenomenon in the developing world.

At first glance, one might attribute this pattern to stricter regulation in Latin America and emerging Asia, where supervisors have moved more quickly to align their frameworks with Basel III than in other emerging regions. However, the implementation of Basel III across emerging economies has evolved in ways that do not map neatly onto regional categories. Several Latin American and emerging Asian jurisdictions adopted the main components of the framework at an early stage and in some cases introduced requirements that exceed the international minimum. Stronger capital definitions, more demanding buffer structures, and closer scrutiny of internal risk weighting practices are common features among the more advanced adopters in these regions. Brazil, Chile, Mexico, China, and a number of Southeast Asian economies illustrate this pattern, which reflects a deliberate effort to strengthen banking resilience and to reduce vulnerabilities to external shocks. At the same time, progress within these same regions is far from uniform. Some countries have opted for gradual or partial alignment due to limited supervisory capacity, more fragile financial systems, or concerns about the short-term adjustment costs of tighter prudential rules.

Emerging markets outside Latin America and Asia display a similar degree of diversity. Several economies in Central and Eastern Europe, particularly those closely linked to the European regulatory framework, have moved rapidly toward full alignment with the Basel standards, while others in the Middle East and Sub-Saharan Africa have proceeded at a slower pace. These contrasts suggest that the degree of Basel III stringency is shaped primarily by domestic regulatory choices, institutional strength, and the structure of national banking sectors. Variation in the treatment of risk weighted assets and in the sequencing of liquidity requirements reinforces this pattern. Overall, differences in implementation across emerging economies reflect country specific decisions rather than consistent regional trends. For this reason, examining the heterogeneity in the cyclicality of bank capital, as we do in this paper, becomes highly relevant.

Figure 1. Preliminary Association between Bank Capital Ratios and GDP Growth by World Region



Note: This figure illustrates the relationship between bank capital ratios and GDP growth across different regions. The regressions underlying the figure do not include country- or bank-level controls, nor do they incorporate fixed effects. Grouping categories for regions are described in Appendix Table A1.

5.1. Panel Data Model Results

Table 3 presents the main regression results from our panel data model with bank-level fixed effects, where we examine the determinants of bank capital ratios, with particular emphasis on the role of real economic growth. Unlike much of the traditional literature on bank capital buffers, which often focuses on dynamic adjustments by including lagged capital ratios, our analysis does not aim to capture these adjustment dynamics. Instead, we adopt an approach similar to that used in corporate finance studies (e.g., Fama and French, 2011), concentrating on the impact of economic growth on capital ratios before and after the early implementation of Basel III. All results remain robust when standard errors are estimated using a Newey-West correction of the variance-covariance matrix, as reported in the robustness checks subsection. Additional checks related to the choice of the post-Basel cutoff year are reported in the Appendix.

The dependent variable in all models is the capital ratio, defined as regulatory capital relative to total assets, without risk adjustments, which is consistent with the leverage ratio emphasized in Basel III. The model includes the following predictors: Growth, capturing annual real GDP growth; Growth × Post-2014, interacting growth with a post-2014 indicator to assess changes in the growth-capital relationship following the earliest Basel III implementations; ROE; Nonperforming Loans; Reserves; Size, measured as the logarithm of total assets; and Inflation.

Results for the full sample, presented in the second column of the table, show a strong negative effect of GDP growth on capital ratios (-0.40, $p<0.001$), consistent with the pro-cyclicality of bank capital documented in prior studies. In other words, during periods of above-average economic growth, a one percentage point increase in GDP growth is associated with a reduction of roughly 40 basis points in the capital ratio before 2014. The interaction term Growth × Post-2014 is positive and highly significant (0.43, $p<0.001$), indicating that after 2014, the same one percentage point increase in GDP growth corresponds to an increase of approximately 3 basis points in the net effect on capital ratios. Put differently, the introduction of Basel III appears to have fully offset the prior pro-cyclicality, resulting in a more neutral or even slightly counter-cyclical relationship between growth and capital.

Bank-specific variables provide additional economic insights. ROE is positively associated with capital ratios, implying that a one percentage point increase in profitability leads to roughly a 2-basis point increase in the capital ratio. Reserves also exhibit positive effects, reflecting that banks with higher loan loss provisions maintain stronger capital buffers. Size has a large negative impact: a one log-point increase in total assets corresponds to a decrease of more than 4 percentage points in the capital ratio for the full sample, highlighting that larger banks systematically hold lower capital ratios, likely due to diversification and risk management advantages. Nonperforming loans show negative but generally small effects, except in certain regional subsamples where asset quality exerts a more pronounced downward pressure on capital. Inflation coefficients vary across subsamples, underscoring heterogeneous macroeconomic transmission effects.

Subsample analyses by income group and region reveal meaningful heterogeneity. The reduction in pro-cyclicality post-2014 is particularly strong for upper-income countries (interaction coefficient 0.55, $p<0.001$) and in Asia (0.28, $p<0.001$) and Latin America (0.37, $p<0.001$). In these cases, the implied change in the GDP growth-capital relationship is economically significant, translating into a moderation or near reversal of the pre-2014 pro-cyclicality. Lower-income countries and Africa display smaller and less statistically significant interaction coefficients, suggesting that weaker institutional frameworks or constraints in regulatory capacity may limit the extent to which capital ratios respond counter-cyclically.

Our findings align closely with prior evidence on the procyclicality of bank capital and the moderating role of regulatory reforms. Consistent with studies by Carvallo et al. (2015) and Valencia and Bolaños (2018), we find that capital ratios in emerging and lower-income economies were strongly procyclical before 2014, with higher GDP growth associated with lower capital buffers. The significant reduction in procyclicality observed after 2014 supports the theoretical and empirical literature on the countercyclical effects of Basel III and related regulatory measures. Similar to Brei et al. (2016) and Lya and Shimizu (2021), our results indicate that leverage-based measures of capital are less procyclical than risk-weighted ratios, highlighting the stabilizing role of regulatory backstops. The heterogeneous effects across income groups and regions are also consistent with Jokipii and Milne (2008) and Haubrich (2020), who document that institutional quality, supervisory capacity, and bank size shape the sensitivity of capital buffers to economic conditions.

In particular, our finding that larger banks systematically hold lower capital ratios echoes the long-run evidence on size-related differences in cyclical responsiveness. Moreover, the pronounced post-2014 moderation of procyclicality in Asia and Latin America complements recent studies on countercyclical capital buffers (Benbouzid et al., 2022; Lang and Menno, 2025), suggesting that Basel III has enhanced the ability of banks to maintain stable capital even during periods of rapid growth, consistent with the intended shock-absorbing function emphasized in the CCyB literature (Neef et al., 2023; Avezum et al., 2024). Taken together, our results extend the existing literature by providing a comprehensive, multi-region assessment that quantifies the impact of Basel III on the cyclical behavior of bank capital across emerging markets, showing that regulatory reforms have contributed to reducing procyclicality while highlighting the continued importance of bank-specific characteristics and institutional context.

Overall, these results indicate that the introduction of Basel III has contributed to a substantial moderation of the pro-cyclicality of bank capital ratios. Before 2014, banks reduced their capital ratios by around 40 basis points for every one percentage point increase in GDP growth. After 2014, this effect is effectively neutralized, with the net impact on capital ratios close to zero or slightly positive. Bank-level characteristics, including profitability, reserves, and size, continue to exert significant influence on capital ratios. Taken together, these findings provide clear evidence that regulatory reforms have strengthened the stability of bank capital across a wide range of economic and institutional environments, while also highlighting the heterogeneity of responses across income groups and regions.

Table 3. Panel Regression Results on Bank Capital Ratios with Bank-Level Fixed Effects

	Full Sample	***Upper Income***	***Lower Income***	***Africa***	***Asia***	***Europe***	***Latina America***
Predictors	*Effect*	*Effect*	*Effect*	*Effect*	*Effect*	*Effect*	*Effect*
Growth	-0.40 ***	-0.52 ***	-0.16 *	-0.11	-0.29 ***	0.14	-0.36 ***
	(-0.48 – -0.33)	(-0.61 – -0.43)	(-0.31 – -0.02)	(-0.27 – 0.05)	(-0.41 – -0.18)	(-0.20 – 0.48)	(-0.52 – -0.20)
Growth X Post-2014	0.43 ***	0.55 ***	0.14 *	0.1	0.28 ***	-0.12	0.37 ***
	(0.35 – 0.51)	(0.46 – 0.64)	(0.00 – 0.28)	(-0.06 – 0.26)	(0.17 – 0.39)	(-0.46 – 0.22)	(0.21 – 0.53)
ROE	0.02 ***	0.01 **	0.04 ***	0.03 ***	0	0.04 ***	0.03 *
	(0.01 – 0.02)	(0.00 – 0.02)	(0.03 – 0.05)	(0.02 – 0.04)	(-0.01 – 0.01)	(0.02 – 0.05)	(0.00 – 0.05)
Nonperforming Loans	0	0	-0.06	0.03	-0.04	-0.01	-0.19 ***
	(-0.02 – 0.02)	(-0.02 – 0.02)	(-0.12 – 0.01)	(-0.05 – 0.10)	(-0.08 – 0.00)	(-0.04 – 0.01)	(-0.28 – -0.10)
Reserves	0.05 ***	0.06 ***	0.08 ***	0.06 *	0.07 ***	0.02	0.19 ***
	(0.03 – 0.07)	(0.04 – 0.09)	(0.04 – 0.13)	(0.01 – 0.11)	(0.03 – 0.12)	(-0.02 – 0.05)	(0.12 – 0.26)
Size (Log of Assets)	-4.13 ***	-5.28 ***	-2.20 ***	-2.05 ***	-2.25 ***	-10.18 ***	-5.34 ***
	(-4.43 – -3.82)	(-5.66 – -4.90)	(-2.70 – -1.71)	(-2.60 – -1.51)	(-2.77 – -1.73)	(-10.83 – -9.52)	(-6.05 – -4.63)
Inflation	0.03 ***	-0.03 ***	0.04 ***	0.04 ***	-0.04 **	-0.09 ***	0.04 *
	(0.03 – 0.04)	(-0.05 – -0.01)	(0.03 – 0.05)	(0.03 – 0.05)	(-0.06 – -0.01)	(-0.13 – -0.05)	(0.00 – 0.07)
Observations	7935	5992	1943	1435	3136	2082	1277
AIC	48837.945	37087.436	11504.453	8401.684	19569.021	12755.984	7280.006
log-Likelihood	-24410.973	-18535.718	-5744.227	-4192.842	-9776.511	-6369.992	-3632.003

Note: ** p<0.05 ** p<0.01 *** p<0.001.* Table 3 reports panel regression results with bank-level fixed effects. The dependent variable is the bank capital ratio. Key predictors include annual real GDP growth (Growth), the interaction of growth with a post-2014 indicator (Growth × Post-2014), return on equity (ROE), non-performing loans (Nonperforming Loans), loan loss reserves (Reserves), bank size (Size, measured as the natural logarithm of total assets), and inflation (Inflation). The Post-2014 indicator equals 1 for years 2014 and later, corresponding to the initial implementation period of Basel III. Standard errors are clustered at the bank level, and 95% confidence intervals are reported in parentheses. Significance levels are indicated as: * p<0.05, ** p<0.01, *** p<0.001. Columns show results for the full sample, by income group, and by region.

5.2. Quantile Panel Data Model Results

Table 4 reports the results of our panel quantile regression with bank-level fixed effects for the full sample (Panel A). This methodology allows us to examine how the relationship between economic growth and bank capital ratios varies across banks with differing capital positions, capturing heterogeneity that conventional mean regressions overlook. The quantiles (0.10, 0.25, 0.50, 0.75, and 0.90) represent banks with relatively low to high capital buffers. Subsample results by income group and region are reported in Panels B to F of Table A2 in the Appendix.

The results reveal a pronounced procyclical pattern prior to Basel III. At the 0.10 quantile, corresponding to banks with low capital ratios near regulatory minimums, a one percentage point increase in GDP growth is associated with a 0.40 percentage point reduction in the capital ratio ($t=-4.11$, $p<0.01$). This effect diminishes across higher quantiles, falling to -0.13 at the 0.90 quantile, indicating that banks with larger buffers are less sensitive to macroeconomic fluctuations. These findings reflect the structural constraints faced by undercapitalized banks, which adjust capital ratios more aggressively in response to economic expansions, while better-capitalized institutions exhibit relative stability.

The interaction term between growth and the post-2014 period is positive and statistically significant across most quantiles, indicating that Basel III implementation has mitigated procyclical responses. For low-capital banks (tau=0.10), the coefficient of 0.40 nearly offsets the pre-2014 effect, implying that the net response of capital to growth is effectively neutral after 2014. For higher-capital banks, the interaction remains positive but smaller, suggesting that regulatory reforms have strengthened capital stability predominantly for institutions closest to regulatory minimums. These patterns are consistent with the intended countercyclical role of Basel III, which stabilizes vulnerable banks without constraining well-capitalized institutions.

Bank-specific characteristics exhibit consistent effects across quantiles. Size, measured as the logarithm of total assets, is negatively associated with capital ratios throughout the distribution, indicating that larger banks systematically maintain lower buffers. Return on equity is positive and significant at lower and median quantiles, implying that profitability supports capital accumulation, but its effect weakens or becomes slightly negative at higher quantiles, reflecting potential trade-offs between dividend distributions and buffer accumulation. Loan loss reserves are generally positive and increasingly significant at higher quantiles, indicating that banks with larger capital buffers maintain more provisions, enhancing resilience. Nonperforming loans exert minimal influence, with small negative effects at median quantiles, suggesting limited direct impact on capital across the distribution. Inflation effects are generally small and statistically insignificant, consistent with the view that contemporaneous price-level changes have little direct effect on capital once other factors are accounted for.

Table 4. Panel Quantile Regression Results on Bank Capital Ratios (Panel A: Full Sample)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	**27.09**	1.46	18.52	<0.01
	Growth	**-0.40**	0.10	-4.11	<0.01
	Growth X Post-2014	**0.40**	0.10	4.04	<0.01
	ROE	**0.02**	0.01	2.20	0.03
	Nonperforming Loans	-0.01	0.02	-0.33	0.74
	Reserves	0.02	0.03	0.70	0.49
	Size (Log of Assets)	**-1.23**	0.10	-12.31	<0.01
	Inflation	-0.02	0.02	-1.06	0.29
tau=0.25	Intercept	**32.00**	1.25	25.52	<0.01
	Growth	**-0.29**	0.04	-7.49	<0.01
	Growth X Post-2014	**0.29**	0.04	7.84	<0.01
	ROE	**0.02**	0.01	2.73	0.01
	Nonperforming Loans	-0.01	0.01	-0.58	0.56
	Reserves	**0.05**	0.02	2.48	0.01
	Size (Log of Assets)	**-1.49**	0.08	-17.74	<0.01
	Inflation	0.00	0.02	-0.21	0.84
tau=0.5	Intercept	**36.09**	1.22	29.55	<0.01
	Growth	**-0.23**	0.03	-7.95	<0.01
	Growth X Post-2014	**0.23**	0.03	8.44	<0.01
	ROE	0.01	0.01	0.93	0.35
	Nonperforming Loans	-0.02	0.01	-1.53	0.13
	Reserves	**0.10**	0.02	4.31	<0.01
	Size (Log of Assets)	**-1.70**	0.08	-20.71	<0.01
	Inflation	0.01	0.01	0.97	0.33
tau=0.75	Intercept	**42.71**	1.50	28.38	<0.01
	Growth	**-0.15**	0.05	-3.30	<0.01
	Growth X Post-2014	**0.17**	0.04	3.80	<0.01
	ROE	-0.01	0.01	-1.49	0.14
	Nonperforming Loans	0.00	0.02	-0.15	0.88
	Reserves	**0.14**	0.03	4.94	<0.01
	Size (Log of Assets)	**-2.06**	0.10	-20.73	<0.01
	Inflation	0.02	0.02	1.22	0.22
tau=0.9	Intercept	**55.03**	1.96	28.07	<0.01
	Growth	-0.13	0.08	-1.53	0.13
	Growth X Post-2014	**0.16**	0.08	1.95	0.05
	ROE	-0.03	0.02	-1.63	0.10
	Nonperforming Loans	-0.01	0.04	-0.30	0.76
	Reserves	**0.19**	0.05	3.87	<0.01
	Size (Log of Assets)	**-2.75**	0.13	-21.79	<0.01
	Inflation	0.04	0.03	1.25	0.21

Note: This table reports quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A corresponds to the full sample, while the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America) are reported in the Appendix. Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported along with bootstrapped standard errors (based on 1,000 replications), t-statistics, and p-values. All models include bank fixed effects. Statistical significance is indicated by conventional levels.

These quantile-specific results align with and extend prior evidence on the procyclicality of bank capital. Consistent with Carvallo et al. (2015) and Valencia and Bolaños (2018), banks with low capital ratios exhibit stronger procyclical adjustments, while well-capitalized banks respond more moderately, echoing Haubrich (2020) on the size and capitalization dimensions of cyclical sensitivity. The moderating effect of Basel III, evident in the positive post-2014 interaction terms, supports the countercyclical objectives emphasized by Brei et al. (2016), demonstrating that regulatory reforms enhance the stability of vulnerable banks without unnecessarily constraining well-capitalized institutions. These findings also reinforce evidence from studies of countercyclical capital buffers, including Benbouzid et al. (2022) and Lang and Menno (2025), by showing that policy interventions reduce the sensitivity of low-capital banks to macroeconomic fluctuations, consistent with the shock-absorbing role documented in Neef et al. (2023) and Avezum et al. (2024). By examining the entire distribution of capital ratios, our analysis reveals heterogeneity in banks' responses to growth shocks and highlights the disproportionate stabilizing effect of Basel III on banks most exposed to procyclical pressures.

The quantile regression framework provides a richer understanding of capital dynamics than conventional mean-based models. It confirms that procyclicality is concentrated among undercapitalized banks, while larger banks maintain more stable buffers. Basel III implementation has substantially moderated these dynamics, particularly for banks operating near regulatory minimums, reflecting the effectiveness of regulatory reforms in enhancing resilience across the banking sector. The declining sensitivity of capital ratios to GDP growth across higher quantiles, combined with the significant post-2014 interaction effects, underscores the importance of accounting for heterogeneity when evaluating regulatory impact and the distributional effects of macroprudential policy.

6. Robustness and Additional Analyses

Figure 2 presents the evolution of the procyclical behavior of bank capital ratios over time, based on the coefficient on GDP growth from our baseline panel regression for the full sample. The estimates are obtained by varying the cut-off year used to define the pre- and post-regulatory periods, spanning from 2006 to 2023. The figure includes 95 percent confidence intervals for each estimate, allowing assessment of statistical significance.

The results indicate a clear temporal pattern. In specifications with earlier cut-off years, the GDP growth coefficient is strongly negative, reflecting pronounced procyclicality: banks tend to reduce capital ratios during periods of economic expansion, particularly those operating near regulatory minimums. As the cut-off year

approaches 2014, coinciding with the initial phase of Basel III implementation, the magnitude of the negative coefficient declines and, in some specifications, approaches zero or becomes slightly positive. This shift suggests a substantial moderation of procyclical dynamics following the introduction of Basel III. The confidence intervals narrow in the post-2014 period, indicating that the observed reduction in procyclicality is statistically robust and not driven by sampling variability.

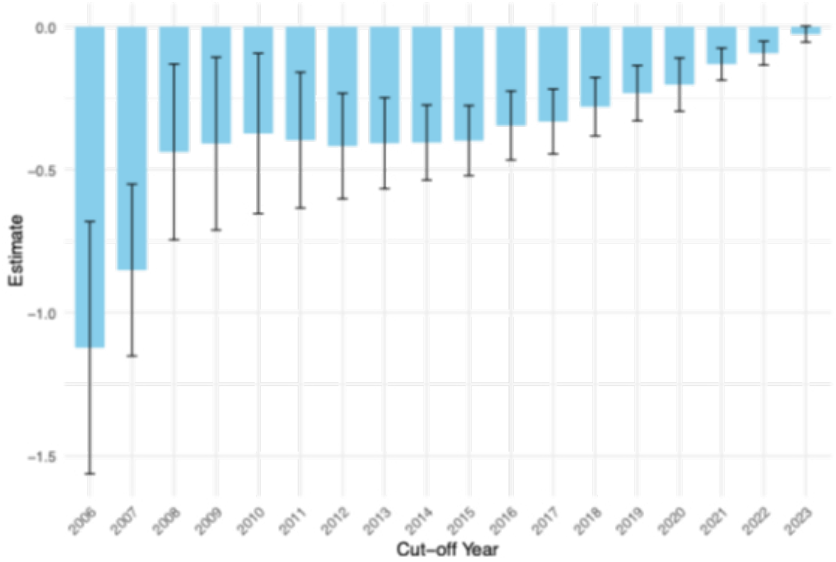
Summing-up, the figure illustrates that the cyclical sensitivity of bank capital is not constant but evolves with regulatory developments. The pattern demonstrates that Basel III has contributed to stabilizing capital ratios, particularly for banks most exposed to cyclical pressures. The gradual decline in the negative GDP growth coefficient highlights the regulatory framework's effectiveness in mitigating the procyclical tendencies of bank capital over time, consistent with the policy objective of enhancing resilience across the banking sector.

Figure 3 provides a formal assessment of the temporal evolution of the cyclical sensitivity of bank capital. Panel A shows the F-statistic from the baseline panel model using the full sample, with specifications identical to those in Table 3, while varying the cut-off year from 2006 to 2023. Panel B presents the joint Wald χ^2 statistic testing the null hypothesis that both the coefficient on GDP growth and the coefficient on its interaction with the post-cut-off period are jointly zero.

Both statistics display a clear temporal pattern. From 2014 onwards, the F-statistic and the joint Wald statistic increase noticeably, reaching a peak in 2015, before gradually declining. This pattern signals a structural change in the relationship between GDP growth and bank capital ratios, with the strongest evidence emerging in the period immediately following the initial implementation of Basel III in developed economies. The elevated values of both statistics indicate that the impact of growth and its interaction with the post-regulatory period on capital ratios is statistically significant and economically meaningful during this interval.

Guided by these results and the timing of regulatory reforms, we select 2014 as the reference year for the post-Basel III period. This choice is based on theoretical and regulatory considerations rather than purely statistical criteria, avoiding potential distortions from mechanically identifying a break point in the data. The figure thus provides robust evidence that the introduction of Basel III coincides with a measurable structural shift in the cyclicality of bank capital, reinforcing the view that regulatory reforms have contributed to moderating procyclical pressures across the banking sector.

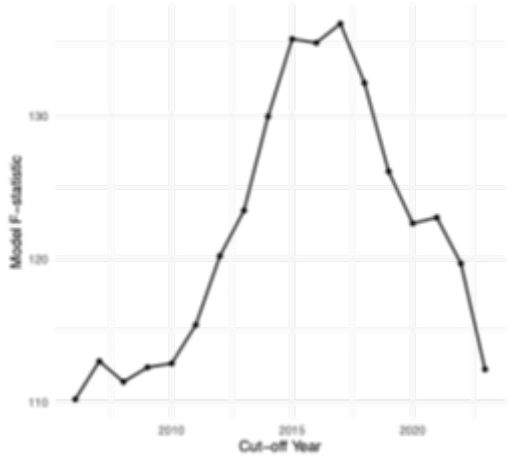
Figure 2. Procyclicality of the Capital Ratio Over the Time: Full Sample Results



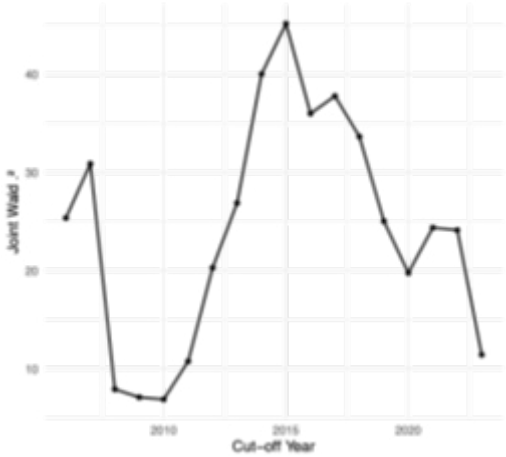
Note: The figure displays the coefficient on GDP growth from our baseline specification using the full sample, varying only the cut-off year used to split the analysis. Associated 95% confidence intervals are shown alongside the coefficient, with the cut-off year ranging from 2006 to 2023.

Figure 3. F-Statistic and Join Wald Statistic (slope and growth and change in slope)

Panel A: F-statistic



Panel B: Joint Wald χ^2 Statistic



Note: The left panel of the figure displays the F-statistic from a panel model using the full sample, with the same specifications as in Table 3, but varying the cut-off year between 2006 and 2023. The right panel presents the Wald test for the null hypothesis of joint insignificance of the coefficient on GDP growth and the coefficient on the interaction of growth with the post-cut-off period. As observed, the structural break appears to fall between 2014 and 2016, with a peak in both statistics in 2015. We select 2014 as our reference year, corresponding to the earliest implementation of Basel III in developed countries. This choice is guided by theoretical considerations rather than searching for a break point in the data, which would imply additional adjustments in the estimated break date. Given the relatively short time span of our sample, formal structural break tests are not feasible.

7. Conclusions

Our results carry on important implications for policy. First, the finding that capital ratios have become less procyclical in many emerging market economies suggests that the broader logic of modern macroprudential regulation—particularly the use of countercyclical buffers—may be diffusing even in jurisdictions where the regulatory frameworks have not been formally adopted or fully implemented. This is consistent with the idea, supported by the literature, that market discipline, cross-border supervisory practices, and the presence of foreign-owned banks can partially transmit regulatory standards beyond national borders. It also reinforces the view that expectations about future regulatory tightening may already be influencing bank behavior, prompting institutions to maintain more resilient capital structures throughout the business cycle. These findings complement prior work showing procyclical buffer dynamics in developing economies (Carvallo et al., 2015; Valencia and Bolaños, 2018) and indicate that the introduction of Basel III has begun to moderate this procyclicality, consistent with evidence that countercyclical and leverage-based requirements can stabilize capital ratios even outside the formal adoption of international standards (Brei et al., 2016; Lya and Shimizu, 2021).

Second, the heterogeneity we document across regions underscores that countercyclicality cannot be taken for granted. While some emerging economies appear to have internalized the stabilizing role of capital during downturns, others remain vulnerable to the traditional pattern in which lending contracts exactly when it is most needed. For policymakers in these regions, our results highlight the importance of strengthening supervisory capacity, monitoring banks' internal models more closely, and developing credible macroprudential institutions capable of enforcing capital standards with a longer-term, systemic-risk perspective. The regional and income-group differences we observe are in line with earlier findings by Jokipii and Milne (2008) and Stolz and Wedow (2011), which show that institutional quality and regulatory development strongly shape how banks adjust their capital across the cycle. Taken together, this suggests that promoting countercyclical capital behavior requires not only the right regulatory tools but also the institutional capacity to enforce them effectively.

Third, the finding that both better-capitalized banks and those operating close to regulatory minimums display weaker cyclical sensitivity—whether procyclical or countercyclical—carries important implications for the debate on optimal capital levels. In particular, the fact that banks with larger capital buffers have recently become more countercyclical even when they have been traditionally insensitive to the cycle across regions suggests that higher capitalization enhances their ability to support credit supply during downturns. If stronger capital positions indeed allow banks to maintain lending when economic conditions deteriorate, then policies that promote higher capitalization—whether through stricter minimum requirements, prudential surcharges, or mechanisms that lower the cost of equity funding—may yield benefits that extend beyond institution-level resilience. They could also mitigate the amplitude of credit cycles and help smooth macro-

economic fluctuations, thereby reducing the broader social costs of financial instability. This aligns with the view widely discussed in the literature that private incentives often undervalue the systemic benefits of robust capitalization, providing justification for a more active and forward-looking regulatory stance. These observations further suggest that dynamic, state-contingent capital regulations that account for bank size and initial capitalization could enhance the effectiveness of macroprudential tools while supporting credit provision in a countercyclical manner.

The caveat is that the reasoning above primarily applies to higher-income markets. However, even in lower-income markets, where better-capitalized banks do not necessarily behave countercyclically, they tend to remain largely acyclical. This acyclicality itself is beneficial, as it mitigates the traditional tendency of banks to amplify economic cycles during both booms and downturns. Although these banks may not actively stabilize credit, their limited cyclical sensitivity reduces the risk of extreme contractions and expansions, providing an important layer of resilience in environments where formal macroprudential tools may be weaker or less enforced.

Across regions, banks at the lower end of the capital ratio distribution also exhibit relatively weak cyclical sensitivity, both before and after 2014. Unlike better-capitalized banks, whose countercyclical behavior can reflect an active ability to sustain lending during downturns, the muted cyclicality of these low-capital banks likely reflects mechanical constraints. Being close to regulatory minimums, their capital ratios cannot fluctuate widely without risking regulatory breaches or market exit. While this acyclical behavior may reduce some extreme swings, it is not inherently beneficial—it is a byproduct of regulatory constraints rather than an active stabilizing role in the financial system. Nevertheless, even this mechanical acyclicality may provide marginal stability benefits, particularly in lower-income or highly constrained markets, by limiting the scope for banks to exacerbate downturns through forced deleveraging.

Finally, our findings point to an agenda for future research. Understanding why some emerging economies have successfully reduced the procyclicality of capital while others have no, requires deeper analysis of institutional quality, supervisory intensity, and the interaction between domestic policy frameworks and global financial conditions. Moreover, further work is needed to evaluate whether the countercyclical behavior we observe in the last decade is robust to extreme stress events or whether it may weaken under more severe shocks. Nonetheless, the results presented here provide encouraging evidence that progress is possible and that the principles underlying modern macroprudential regulation are starting to materialize in bank behavior across a broader set of countries than previously documented. These insights reinforce the idea that even in the absence of formal adoption of Basel III, well-capitalized banks can play a stabilizing role, and that prudential regulation, combined with institutional quality, supervisory rigor, and cross-border regulatory spillovers, can reduce procyclicality and promote financial resilience across a diverse set of emerging economies.

References

Acosta-Smith, J., Grill, M., & Lang, J. H. (2024). The leverage ratio, risk-taking and bank stability. *Journal of Financial Stability*, 74, 100833.

Allen, F., Cadetti, E., & Marquez, R. (2011). Credit market competition and capital regulation. *Review of Financial Studies*, 24, 983–1018.

Avezum, L., Oliveira, V., & Serra, D. (2024). Assessment of the effectiveness of the macroprudential measures implemented in the context of the Covid-19 pandemic. *International Review of Economics & Finance*, 93, 1542–1555.

Bahaj, S., & Malherbe, F. (2024). The cross-border effects of bank capital regulation. *Journal of Financial Economics*, 160, 103912.

Benbouzid, N., Kumar, A., Mallick, S. K., Sousa, R. M., & Stojanovic, A. (2022). Bank credit risk and macro-prudential policies: Role of counter-cyclical capital buffer. *Journal of Financial Stability*, 63, 101084.

Berger, A., & Bouwman, C. (2013). How does capital affect bank performance during financial crises? *Journal of Financial Economics*, 109(1), 146–176.

Bitar, M., Pukthuanthong, K., & Walker, T. (2018). The effect of capital ratios on the risk, efficiency and profitability of banks: Evidence from OECD countries. *Journal of International Financial Markets, Institutions & Money*, 53, 227–262.

Bonfim, D., & Costa, S. (2017). The effect of foreign bank regulation on domestic credit. *Journal of Financial Intermediation*, 29, 1–25

Brei, M., Gambacorta, L., & Meeks, R. (2016). The cyclicality of banks' capital buffers. *Journal of Financial Stability*, 24, 22–30.

Cappelletti, G., Marques, A. P., & Varraso, P. (2024). Impact of higher capital buffers on banks' lending and risk-taking in the short- and medium-term: Evidence from the euro area experiments. *Journal of Financial Stability*, 72.

Carvallo, O., & Ortiz, I. (2018). Do bank capital requirements affect credit and growth? *Journal of Financial Stability*, 36, 36–52. https://doi.org/10.1016/j.jfs.2018.02.001

Carvallo, O., Kasman, A., & Kontbay-Busun, S. (2015). The Latin American bank capital buffers and business cycle: Are they pro-cyclical?. *Journal of International Financial Markets Institutions & Money*, 36, 148–160.

Chen, D. X., & Friedrich, C. (2023). The countercyclical capital buffer and international bank lending: Evidence from Canada. *Journal of International Money and Finance*, 139, 102962.

Couaillier, C., Lo Duca, M., Reghezza, A., & RODRIGUEZ D'ACRI, C. O. S. T. A. N. Z. A. (2025). Caution: Do not cross! distance to regulatory capital buffers and corporate lending in a downturn. *Journal of Money, Credit and Banking*, 57(4), 833-862

Cuong Ly, K., & Shimizu, K. (2021). Did Basel regulation cause a significant procyclicality? *Journal of International Financial Markets, Institutions & Money*, 73, 101365.

Diamond, D., & Rajan, R. (2001). Liquidity risk, liquidity creation, and financial fragility. *Journal of Political Economy*, 109, 278–327.

Fama, E. F., & French, K. R. (2011). Capital structure choices. *Critical Finance Review*, 1(1), 59-101.

Fève, P., Moura, A., & Pierrard, O. (2019). Shadow banking and financial regulation: A small-scale DSGE perspective. *Journal of Economic Dynamics & Control*, 101, 130–144.

Gambacorta, L., & Karmakar, S. (2018). Leverage and risk-weighted capital requirements. *56th issue (December 2018) of the International Journal of Central Banking*

García-Suaza, A. F., Gomez-Gonzalez, J. E., Pabón, A. M., & Tenjo-Galarza, F. (2012). The cyclical behavior of bank capital buffers in an emerging economy: Size does matter. Economic Modelling, 29(5), 1612-1617.

Haubrich, J. G. (2020). How Cyclical Is Bank Capital?. *Journal of Financial Services Research*, 58(1), 27-38

Heid, F. (2007). The cyclical effects of the Basel II capital requirements. *Journal of Banking & Finance*, 31(12), 3885-3900

Herz, B., & Keller, J. (2023). How Do Regulators Set the Countercyclical Capital Buffer?. *International Journal of Central Banking*, 19(3), 99-137.

Holmstrom, B., & Tirole, J. (1997). Financial intermediation, loanable funds, and the real sector. *The Quarterly Journal of Economics*, 112(3), 663-691

Jokipii, T., & Milne, A. (2008). The cyclical behaviour of European bank capital buffers. *Journal of Banking & Finance*, 32(8), 1440-1451

Jude, C., & Levieuge, G. (2025). Doubling down: The synergy of CCyB release and monetary policy easing. *Journal of International Money and Finance*, 155, 103330.

Koenker, R. (2004). Quantile regression for longitudinal data. *Journal of multivariate analysis*, 91(1), 74-89

Koenker, R. (2017). Quantile regression: 40 years on. *Annual review of economics*, 9(1), 155-176

Krenz, J., & Zivanovic, J. (2024). Macroprudential capital requirements, monetary policy, and financial crises. *Economic Modelling*, 139, 106823.

Lang, J. H., & Menno, D. (2025). The state-dependent impact of changes in bank capital requirements. *Journal of Banking & Finance*, 176, 107439.

Marques, A. P., Martín, D. V., Salleo, C., & Cappelletti, G. (2025). Macroprudential policy spillovers in international banking groups. Beggar-thy-neighbour and the role of internal capital markets. *Journal of Banking & Finance*, 171, 107349.

Martínez, J. F., & Oda, D. (2021). Characterization of the Chilean financial cycle, early warning indicators and implications for macro-prudential policies. *Latin American Journal of Central Banking*, 2(1), 100024.

Mehran, H., & Thakor, A. (2011). Bank capital and value in the cross-section. *Review of Financial Studies*, 24, 1019–1067.

Montagnoli, A., Mouratidis, K., & Whyte, K. (2021). Assessing the cyclical behaviour of bank capital buffers in a finance-augmented macro-economy. *Journal of International Money and Finance*, 110, 102256

Neef, H. O. D. D., Schandlbauer, A., & Wittig, C. (2023). Countercyclical capital buffers and credit supply: Evidence from the COVID-19 crisis. *Journal of Banking & Finance*, 154, 106930.

Pariès, M. D., Kok, C., & Rottner, M. (2023). Reversal interest rate and macroprudential policy. European Economic Review, 159, 104572.

Reinhart, C. M., & Rogoff, K. S. (2009). *This time is different: Eight centuries of financial folly*. Princeton University Press.

Repullo, R., & Suarez, J. (2013). The Procyclical Effects of Bank Capital Regulation. *Review of Financial Studies*, 26(2), 452–490.

Sivec, V., & Volk, M. (2023). Empirical Evidence on the Effectiveness of Capital Buffer Release. *International Journal of Central Banking*, 19(3), 139–173.

Stolz, S., & Wedow, M. (2011). Banks' regulatory capital buffer and the business cycle: Evidence for Germany. *Journal of Financial Stability*, 7(2), 98–110.

Thakor, A. V. (2014). Bank capital and financial stability: An economic trade-off or a Faustian bargain? *Annual Review of Financial Economics*, 6, 185–223.

Thakor, A. V. (2018). Post-crisis regulatory reform in banking: Address insolvency risk, not illiquidity! *Journal of Financial Stability*, 37, 107–111.

Valencia, O. C., & Bolaños, A. O. (2018). Bank capital buffers around the world: Cyclical patterns and the effect of market power. *Journal of Financial Stability*, 38, 119–131.

Zhu, H. B. (2008). Capital Regulation and Banks' Financial Decisions. *International Journal of Central Banking*, 4(1), 165–21.

APPENDIX

Table A1. List of Countries and Classifications in Sample

Africa	*Income Group*	*Asia*	*Income Group*	*Europe*	*Income Group*
Algeria	Lower	Afghanistan	Lower	Albania	Upper
Angola	Lower	Armenia	Upper	Belarus	Upper
Benin	Lower	Azerbaijan	Upper	Bosnia and Herzegovina	Upper
Botswana	Upper	Bahrain	Upper	Bulgaria	Upper
Burkina Faso	Lower	Bangladesh	Lower	Hungary	Upper
Burundi	Lower	Bhutan	Lower	Kosovo	Upper
Cape Verde	Lower	Brunei Darussalam	Upper	Montenegro	Upper
Cameroon	Lower	Cambodia	Lower	North Macedonia	Upper
Chad	Lower	China	Upper	Poland	Upper
Congo	Lower	Georgia	Upper	Republic of Moldova	Upper
Cote d'Ivoire	Upper	India	Lower	Romania	Upper
Dem. Rep Congo	Lower	Indonesia	Upper	Russian Federation	Upper
Djibouti	Lower	Islamic Republic of Iran	Lower	Serbia	Upper
Egypt	Lower	Iraq	Lower	Ukraine	Upper
Eswatini	Upper	Jordan	Lower		
Ethiopia	Lower	Kazakhstan	Upper		
Gabon	Upper	Kyrgyzstan	Upper	Latin America	
Gambia	Lower	Lao People's Democratic Republic	Lower	Argentina	Upper
Ghana	Lower	Lebanon	Upper	Aruba	Upper
Guinea	Lower	Malaysia	Upper	Barbados	Upper
Guinea Bissau	Lower	Maldives	Upper	Bolivia	Lower
Kenya	Lower	Mongolia	Upper	Brazil	Upper
Lesotho	Lower	Myanmar/Burma	Lower	Chile	Upper
Liberia	Lower	Nepal	Lower	Colombia	Upper
Libya	Upper	Oman	Upper	Costa Rica	Upper

Madagascar	Lower	Pakistan	Lower	Dominican Republic	Upper
Malawi	Lower	Palestinian Territories	Lower	Ecuador	Upper
Mali	Lower	Philippines	Upper	El Salvador	Upper
Mauritania	Lower	Qatar	Upper	Grenada	Upper
Mauritius	Upper	Sri Lanka	Upper	Guatemala	Upper
Morocco	Upper	Syrian Arab Republic	Lower	Guyana	Upper
Mozambique	Lower	Tajikistan	Lower	Jamaica	Upper
Namibia	Upper	Thailand	Upper	Mexico	Upper
Niger	Lower	Turkiye	Upper	Nicaragua	Lower
Nigeria	Lower	Turkmenistan	Upper	Panama	Upper
Rwanda	Lower	United Arab Emirates	Upper	Paraguay	Upper
Senegal	Lower	Uzbekistan	Lower	Peru	Upper
Seychelles	Upper	Vietnam	Upper	Saint Lucia	Upper
Sierra Leone	Lower	Yemen	Lower	Suriname	Upper
South Africa	Upper			Trinidad and Tobago	Upper
South Sudan	Lower			Uruguay	Upper
Togo	Lower	Oceania		Venezuela	Upper
Uganda	Lower	Papua New Guinea	Upper		
United Rep. Tanzania	Lower	Samoa	Upper		
Zambia	Lower				
Zimbabwe	Lower				

Note: This table lists all countries included in the sample along with their assigned continent and income group. Income classifications are based on the World Bank's definitions, with countries categorized as lower-income or upper-income according to gross national income per capita. Continents are assigned according to standard geographical groupings. Oceania includes only Papua New Guinea and Samoa.

Table A2. Panel Quantile Regression Results on Bank Capital Ratios (Panel B: Upper Income)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	**32.96**	2.08	15.85	0.00
	Growth	**-0.46**	0.12	-3.97	0.00
	Growth X Post-2014	**0.46**	0.12	3.95	0.00
	ROE	0.01	0.01	1.25	0.21
	Nonperforming Loans	-0.01	0.02	-0.46	0.65
	Reserves	0.05	0.04	1.33	0.18
	Size (Log of Assets)	**-1.59**	0.14	-11.55	0.00
	Inflation	**-0.07**	0.04	-1.77	0.08
tau=0.25	Intercept	**37.68**	1.75	21.52	0.00
	Growth	**-0.33**	0.04	-7.96	0.00
	Growth X Post-2014	**0.33**	0.04	7.79	0.00
	ROE	0.01	0.01	1.80	0.07
	Nonperforming Loans	-0.01	0.02	-0.89	0.37
	Reserves	**0.09**	0.02	3.85	0.00
	Size (Log of Assets)	**-1.85**	0.12	-15.47	0.00
	Inflation	**-0.04**	0.02	-2.83	0.00
tau=0.5	Intercept	**41.77**	1.78	23.42	0.00
	Growth	**-0.26**	0.03	-8.34	0.00
	Growth X Post-2014	**0.28**	0.03	8.60	0.00
	ROE	0.00	0.01	0.65	0.51
	Nonperforming Loans	-0.02	0.01	-1.87	0.06
	Reserves	**0.12**	0.02	5.82	0.00
	Size (Log of Assets)	**-2.06**	0.12	-16.90	0.00
	Inflation	-0.01	0.01	-0.92	0.36
tau=0.75	Intercept	**49.09**	1.98	24.80	0.00
	Growth	**-0.17**	0.05	-3.66	0.00
	Growth X Post-2014	**0.21**	0.05	4.03	0.00
	ROE	-0.01	0.01	-1.62	0.11
	Nonperforming Loans	0.00	0.02	-0.24	0.81
	Reserves	**0.15**	0.03	5.35	0.00
	Size (Log of Assets)	**-2.46**	0.13	-18.54	0.00
	Inflation	0.00	0.02	-0.02	0.98
tau=0.9	Intercept	**62.99**	2.74	22.97	0.00
	Growth	-0.11	0.09	-1.26	0.21
	Growth X Post-2014	**0.23**	0.10	2.39	0.02
	ROE	-0.02	0.02	-0.89	0.37
	Nonperforming Loans	0.02	0.05	0.37	0.72
	Reserves	**0.16**	0.05	3.27	0.00
	Size (Log of Assets)	**-3.26**	0.18	-18.39	0.00
	Inflation	0.01	0.02	0.45	0.65

Note: This table reports the results of quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A–F correspond, respectively, to the full sample, the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America). Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported—one for each quantile—along with bootstrapped standard errors, t-statistics, and p-values. All models include bank fixed effects. Bootstrapped standard errors are based on 1,000 replications. Statistical significance is indicated by conventional levels.

Table A2. Panel Quantile Regression Results on Bank Capital Ratios (Panel C: Lower Income)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	**24.05**	1.85	12.99	0.00
	Growth	**-0.26**	0.12	-2.07	0.04
	Growth X Post-2014	**0.29**	0.12	2.45	0.01
	ROE	**0.05**	0.02	2.58	0.01
	Nonperforming Loans	0.09	0.05	1.94	0.05
	Reserves	-0.07	0.05	-1.57	0.12
	Size (Log of Assets)	**-1.12**	0.13	-8.47	0.00
	Inflation	0.01	0.03	0.44	0.66
tau=0.25	Intercept	**29.69**	1.73	17.17	0.00
	Growth	**-0.24**	0.08	-2.94	0.00
	Growth X Post-2014	**0.24**	0.07	3.21	0.00
	ROE	**0.03**	0.01	2.32	0.02
	Nonperforming Loans	0.06	0.02	2.26	0.02
	Reserves	-0.03	0.03	-1.10	0.27
	Size (Log of Assets)	**-1.41**	0.13	-10.78	0.00
	Inflation	0.01	0.01	1.38	0.17
tau=0.5	Intercept	**32.95**	1.86	17.67	0.00
	Growth	**-0.19**	0.06	-3.16	0.00
	Growth X Post-2014	**0.18**	0.06	3.28	0.00
	ROE	0.02	0.01	2.02	0.04
	Nonperforming Loans	0.02	0.04	0.66	0.51
	Reserves	0.01	0.05	0.29	0.77
	Size (Log of Assets)	**-1.56**	0.14	-10.97	0.00
	Inflation	0.01	0.02	0.78	0.43
tau=0.75	Intercept	**37.29**	2.44	15.25	0.00
	Growth	-0.13	0.06	-2.03	0.04
	Growth X Post-2014	**0.16**	0.06	2.54	0.01
	ROE	-0.01	0.02	-0.54	0.59
	Nonperforming Loans	-0.01	0.05	-0.27	0.79
	Reserves	0.12	0.07	1.58	0.11
	Size (Log of Assets)	**-1.80**	0.18	-10.15	0.00
	Inflation	**0.08**	0.04	1.94	0.05
tau=0.9	Intercept	**47.45**	3.06	15.49	0.00
	Growth	-0.13	0.14	-0.91	0.36
	Growth X Post-2014	0.16	0.14	1.17	0.24
	ROE	-0.04	0.03	-1.40	0.16
	Nonperforming Loans	-0.10	0.06	-1.57	0.12
	Reserves	**0.25**	0.07	3.42	0.00
	Size (Log of Assets)	**-2.36**	0.22	-10.92	0.00
	Inflation	**0.10**	0.04	2.19	0.03

Note: This table reports the results of quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A–F correspond, respectively, to the full sample, the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America). Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported—one for each quantile—along with bootstrapped standard errors, t-statistics, and p-values. All models include bank fixed effects. Bootstrapped standard errors are based on 1,000 replications. Statistical significance is indicated by conventional levels.

Table A2. Panel Quantile Regression Results on Bank Capital Ratios (Panel D: Africa)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	**27.14**	3.98	6.81	0.00
	Growth	-0.14	0.09	-1.53	0.13
	Growth X Post-2014	0.15	0.09	1.62	0.11
	ROE	**0.03**	0.01	2.10	0.04
	Nonperforming Loans	-0.02	0.19	-0.11	0.91
	Reserves	0.06	0.07	0.77	0.44
	Size (Log of Assets)	**-1.33**	0.29	-4.65	0.00
	Inflation	0.03	0.05	0.56	0.57
tau=0.25	Intercept	**28.64**	3.37	8.50	0.00
	Growth	**-0.20**	0.06	-3.20	0.00
	Growth X Post-2014	**0.19**	0.06	3.16	0.00
	ROE	0.02	0.01	1.72	0.09
	Nonperforming Loans	0.00	0.14	-0.03	0.97
	Reserves	0.11	0.08	1.39	0.17
	Size (Log of Assets)	**-1.36**	0.24	-5.72	0.00
	Inflation	**0.03**	0.03	1.03	0.30
tau=0.5	Intercept	**32.76**	3.25	10.07	0.00
	Growth	**-0.23**	0.05	-4.52	0.00
	Growth X Post-2014	**0.23**	0.05	4.46	0.00
	ROE	0.02	0.01	2.12	0.03
	Nonperforming Loans	0.02	0.10	0.22	0.82
	Reserves	**0.18**	0.05	3.58	0.00
	Size (Log of Assets)	**-1.61**	0.23	-7.05	0.00
	Inflation	**0.05**	0.02	2.87	0.00
tau=0.75	Intercept	**38.23**	3.41	11.20	0.00
	Growth	**-0.21**	0.06	-3.53	0.00
	Growth X Post-2014	**0.20**	0.06	3.41	0.00
	ROE	0.02	0.02	1.17	0.24
	Nonperforming Loans	0.02	0.12	0.16	0.88
	Reserves	**0.24**	0.08	2.81	0.01
	Size (Log of Assets)	**-1.93**	0.24	-8.02	0.00
	Inflation	**0.06**	0.01	4.56	0.00
tau=0.9	Intercept	**48.98**	4.84	10.12	0.00
	Growth	-0.14	0.17	-0.82	0.41
	Growth X Post-2014	0.10	0.17	0.59	0.55
	ROE	-0.03	0.04	-0.81	0.42
	Nonperforming Loans	0.18	0.14	1.31	0.19
	Reserves	**0.35**	0.08	4.18	0.00
	Size (Log of Assets)	**-2.56**	0.33	-7.76	0.00
	Inflation	**0.05**	0.03	1.89	0.06

Note: This table reports the results of quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A–F correspond, respectively, to the full sample, the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America). Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported—one for each quantile—along with bootstrapped standard errors, t-statistics, and p-values. All models include bank fixed effects. Bootstrapped standard errors are based on 1,000 replications. Statistical significance is indicated by conventional levels.

Table A2. Panel Quantile Regression Results on Bank Capital Ratios (Panel E: Asia)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	27.14	4.22	6.44	0.00
	Growth	-0.14	0.08	-1.81	0.07
	Growth X Post-2014	0.15	0.08	1.86	0.06
	ROE	0.03	0.01	2.00	0.05
	Nonperforming Loans	-0.02	0.20	-0.10	0.92
	Reserves	0.06	0.07	0.82	0.41
	Size (Log of Assets)	-1.33	0.30	-4.43	0.00
	Inflation	0.03	0.05	0.53	0.59
tau=0.25	Intercept	**28.64**	3.76	7.61	0.00
	Growth	**-0.20**	0.05	-3.72	0.00
	Growth X Post-2014	**0.19**	0.05	3.60	0.00
	ROE	0.02	0.01	1.79	0.07
	Nonperforming Loans	0.00	0.15	-0.03	0.98
	Reserves	0.11	0.07	1.49	0.14
	Size (Log of Assets)	**-1.36**	0.26	-5.15	0.00
	Inflation	0.03	0.03	1.16	0.25
tau=0.5	Intercept	**32.76**	3.47	9.45	0.00
	Growth	**-0.23**	0.05	-4.73	0.00
	Growth X Post-2014	**0.23**	0.05	4.67	0.00
	ROE	**0.02**	0.01	2.09	0.04
	Nonperforming Loans	0.02	0.11	0.20	0.84
	Reserves	**0.18**	0.05	3.29	0.00
	Size (Log of Assets)	**-1.61**	0.24	-6.63	0.00
	Inflation	**0.05**	0.02	2.94	0.00
tau=0.75	Intercept	**38.23**	3.68	10.39	0.00
	Growth	**-0.21**	0.06	-3.54	0.00
	Growth X Post-2014	**0.20**	0.06	3.37	0.00
	ROE	0.02	0.02	1.17	0.24
	Nonperforming Loans	0.02	0.13	0.15	0.88
	Reserves	**0.24**	0.09	2.59	0.01
	Size (Log of Assets)	**-1.93**	0.26	-7.55	0.00
	Inflation	**0.06**	0.01	4.43	0.00
tau=0.9	Intercept	**48.98**	5.20	9.42	0.00
	Growth	-0.14	0.17	-0.78	0.43
	Growth X Post-2014	0.10	0.17	0.57	0.57
	ROE	-0.03	0.04	-0.79	0.43
	Nonperforming Loans	0.18	0.16	1.16	0.25
	Reserves	**0.35**	0.09	3.80	0.00
	Size (Log of Assets)	**-2.56**	0.34	-7.41	0.00
	Inflation	**0.05**	0.03	1.99	0.05

Note: This table reports the results of quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A–F correspond, respectively, to the full sample, the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America). Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported—one for each quantile—along with bootstrapped standard errors, t-statistics, and p-values. All models include bank fixed effects. Bootstrapped standard errors are based on 1,000 replications. Statistical significance is indicated by conventional levels.

Table A2. Panel Quantile Regression Results on Bank Capital Ratios (Panel F: Europe)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	**27.14**	3.78	7.18	0.00
	Growth	-0.14	0.09	-1.51	0.13
	Growth X Post-2014	0.15	0.10	1.55	0.12
	ROE	**0.03**	0.01	2.11	0.03
	Nonperforming Loans	-0.02	0.20	-0.10	0.92
	Reserves	0.06	0.07	0.81	0.42
	Size (Log of Assets)	-1.33	0.27	-4.94	0.00
	Inflation	0.03	0.05	0.54	0.59
tau=0.25	Intercept	**28.64**	3.36	8.53	0.00
	Growth	**-0.20**	0.05	-3.58	0.00
	Growth X Post-2014	**0.19**	0.06	3.50	0.00
	ROE	**0.02**	0.01	1.98	0.05
	Nonperforming Loans	0.00	0.15	-0.03	0.98
	Reserves	0.11	0.08	1.47	0.14
	Size (Log of Assets)	**-1.36**	0.24	-5.78	0.00
	Inflation	**0.03**	0.03	1.04	0.30
tau=0.5	Intercept	**32.76**	3.29	9.97	0.00
	Growth	**-0.23**	0.05	-5.03	0.00
	Growth X Post-2014	**0.23**	0.04	5.05	0.00
	ROE	0.02	0.01	1.90	0.06
	Nonperforming Loans	0.02	0.10	0.21	0.83
	Reserves	**0.18**	0.05	3.24	0.00
	Size (Log of Assets)	**-1.61**	0.23	-7.03	0.00
	Inflation	**0.05**	0.02	2.55	0.01
tau=0.75	Intercept	**38.23**	3.56	10.75	0.00
	Growth	**-0.21**	0.05	-3.82	0.00
	Growth X Post-2014	**0.20**	0.05	3.62	0.00
	ROE	0.02	0.01	1.30	0.19
	Nonperforming Loans	0.02	0.12	0.16	0.88
	Reserves	**0.24**	0.09	2.75	0.01
	Size (Log of Assets)	**-1.93**	0.25	-7.87	0.00
	Inflation	**0.06**	0.01	4.80	0.00
tau=0.9	Intercept	**48.98**	4.97	9.85	0.00
	Growth	-0.14	0.14	-0.94	0.35
	Growth X Post-2014	0.10	0.14	0.69	0.49
	ROE	-0.03	0.04	-0.81	0.42
	Nonperforming Loans	0.18	0.15	1.21	0.23
	Reserves	**0.35**	0.09	3.80	0.00
	Size (Log of Assets)	**-2.56**	0.33	-7.66	0.00
	Inflation	**0.05**	0.02	3.17	0.00

Note: This table reports the results of quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A–F correspond, respectively, to the full sample, the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America). Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported—one for each quantile—along with bootstrapped standard errors, t-statistics, and p-values. All models include bank fixed effects. Bootstrapped standard errors are based on 1,000 replications. Statistical significance is indicated by conventional levels.

Table A2. Panel Quantile Regression Results on Bank Capital Ratios (Panel F: Latin America)

		Effect	*Std. Error*	*T- statistic*	*P-value*
tau=0.1	Intercept	**27.14**	4.04	6.72	0.00
	Growth	-0.14	0.08	-1.79	0.07
	Growth X Post-2014	0.15	0.08	1.84	0.07
	ROE	**0.03**	0.01	1.98	0.05
	Nonperforming Loans	-0.02	0.21	-0.10	0.92
	Reserves	0.06	0.07	0.78	0.44
	Size (Log of Assets)	**-1.33**	0.29	-4.67	0.00
	Inflation	**0.03**	0.05	0.52	0.60
tau=0.25	Intercept	**28.64**	3.48	8.23	0.00
	Growth	**-0.20**	0.05	-3.61	0.00
	Growth X Post-2014	**0.19**	0.05	3.57	0.00
	ROE	0.02	0.01	1.71	0.09
	Nonperforming Loans	0.00	0.16	-0.03	0.98
	Reserves	0.11	0.08	1.36	0.17
	Size (Log of Assets)	**-1.36**	0.24	-5.60	0.00
	Inflation	**0.03**	0.03	1.03	0.30
tau=0.5	Intercept	**32.76**	3.34	9.81	0.00
	Growth	**-0.23**	0.05	-4.70	0.00
	Growth X Post-2014	**0.23**	0.05	4.87	0.00
	ROE	0.02	0.01	1.85	0.07
	Nonperforming Loans	0.02	0.11	0.20	0.84
	Reserves	**0.18**	0.05	3.54	0.00
	Size (Log of Assets)	**-1.61**	0.23	-6.93	0.00
	Inflation	**0.05**	0.02	2.50	0.01
tau=0.75	Intercept	**38.23**	3.49	10.96	0.00
	Growth	**-0.21**	0.06	-3.49	0.00
	Growth X Post-2014	**0.20**	0.06	3.34	0.00
	ROE	0.02	0.02	0.91	0.36
	Nonperforming Loans	0.02	0.13	0.14	0.89
	Reserves	**0.24**	0.09	2.66	0.01
	Size (Log of Assets)	**-1.93**	0.24	-7.98	0.00
	Inflation	**0.06**	0.01	4.53	0.00
tau=0.9	Intercept	**48.98**	5.05	9.70	0.00
	Growth	-0.14	0.17	-0.81	0.42
	Growth X Post-2014	0.10	0.17	0.59	0.56
	ROE	-0.03	0.04	-0.78	0.44
	Nonperforming Loans	0.18	0.16	1.17	0.24
	Reserves	**0.35**	0.07	4.67	0.00
	Size (Log of Assets)	**-2.56**	0.34	-7.58	0.00
	Inflation	**0.05**	0.02	2.25	0.02

Note: This table reports the results of quantile panel regressions estimated at the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles of the conditional distribution of the banks' capital-ratio. Panels A–F correspond, respectively, to the full sample, the upper- and lower-income country groups, and the regional subsamples (Africa, Asia, Europe, and Latin America). Lower quantiles represent banks operating with relatively low capital ratios, while higher quantiles correspond to banks with larger capital buffers. For each covariate, five coefficients are reported—one for each quantile—along with bootstrapped standard errors (1,000 replications), t-statistics, and p-values. All models include bank fixed effects.

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