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The economic impact of changes in bank capital requirements in South Africa: A macro-econometric approach

1. Introduction

This paper provides an analysis of the macroeconomic implications of a change in bank capital requirements in South Africa. Capital requirements, which mandate banks to hold a certain proportion of their risk-weighted assets (RWAs) in the form of equity capital,¹ are a key component of banking regulation. These policy measures are designed to ensure long-run financial stability by strengthening banks' capacity to withstand unexpected shocks, absorb losses and reduce the risk of bank failures that could jeopardise the smooth functioning of the financial system. Existing empirical evidence indicates significant long-term advantages associated with implementing countercyclical capital requirements. Specifically, such regulation substantially lowers the probability of banking crises and reduces extreme economic volatility (Angelini et al., 2015).

¹ The capital held by banks in response to regulatory requirements can take several forms, refer to the Appendix for a more detailed discussion on the capital stack.

However, capital regulation also involves trade-offs, as they may influence the lending behaviour of financial intermediaries (Kanngiesser et al., 2017).² Regulatory tightening can prompt banks to reduce lending, increase lending rates, or alter the composition of their loan portfolios, leading to a temporary contraction in credit supply and potentially dampening economic activity in the short to medium term (Conti et al., 2023).

Cross-country studies, such as those by Aiyar, Calomiris and Wieladek (2016), indicate that elevated capital requirements generally curtail credit growth, disproportionately impacting smaller and less profitable banks. In the South African context this result is underscored by the work of Pillay and Makrelov (2025), who find that higher capital requirements significantly constrain lending, especially among small banks. Sibande and Milne (2025) find that larger, better-capitalised South African banks are relatively insulated from these effects, highlighting heterogeneity in bank responses to higher capital requirements.³

While disaggregated bank-level data can provide more granular insights into the behaviour of individual banks under different regulatory regimes, this paper emphasizes aggregate-level analysis to capture the systemic effects on the South African economy. We approach the problem using aggregated macroeconomic and banking data within a vector autoregressive (VAR) modelling framework. This methodology allows for the simultaneous consideration of multiple variables, capturing the dynamic relationships between macroeconomic indicators, banking sector performance, and regulatory changes.^{4 5}

² Higher capital ratios might cause decrease of RWAs rather than the raising of new equity, which may translate to a reduction in lending. Empirical studies find that loan growth declines for several quarters following a change in regulation, but that the largest impact typically occurs within a year (Noss & Toffano, 2016).

³ For more examples of the regulatory impact on the banking sector within the context of South Africa see de Jager et al. (2021); Merrino et al. (2024); Sibande et al. (2024).

⁴ This paper should ideally be read together with two companion papers - du Rand, Sikhosana and van Lill (2025) and Hollander (2025). The first companion paper delves into the more micro-level analysis, utilising a bank-level approach to better understand individual bank responses to higher capital requirements. The second companion paper is more theoretical in nature and utilises a dynamic stochastic general equilibrium (DSGE) model to analyse the counterfactual of a change in the level of regulatory capital that banks need to hold. Together, these three papers provide a holistic perspective on the consequences and impact of bank capital regulation in South Africa, covering both micro- and macro-level outcomes.

⁵ Structural VARs have become the workhorse model for policy analysis in macroeconomics and finance due to their ability to identify causal relationships while maintaining flexibility in capturing complex dynamic interactions (Sims, 1980). In the context of banking regulation, SVARs have proven effective at isolating the transmission channels of prudential policy changes (Kashyap & Stein, 2000; Jiménez et al., 2017). Recent applications to capital requirements specifically include Noss & Toffano (2016), who analyze UK data and Conti et al. (2023) who employ narrative identification approaches.

Deteriorating borrowing conditions from an increase in capital requirements could translate to deferred spending and investment, which could be detrimental to measures of aggregate economic activity. Empirical studies suggest that the initial economic impact from tightened capital standards is generally modest, with effects typically peaking within a year and diminishing as banks adjust their capital structures and lending portfolios (Conti et al., 2023; Noss & Toffano, 2016). Over the long run, the macroeconomic costs appear minimal, with research consistently finding negligible permanent output losses once banks complete their adjustments (Angelini et al., 2015).

Our findings mirror the results from the cited studies. We find that higher capital requirements have a moderate but short-lived effect, mainly affecting the behaviour of the banking sector and credit market conditions. Corporate credit spreads narrow slightly, and we observe a modest decline in corporate credit growth, while household credit indicators are less sensitive to these changes.

One major challenge in this type of analysis is identifying the causal impact of changes in capital requirements on other variables within the system. Within a VAR setting, proper identification of causal effects is crucial for accurately measuring the impact of regulatory changes. To address this, we explore several identification strategies, which are described in the methodology section.⁶

An important consideration in interpreting our findings is the distinction between statistical significance and economic significance. We recognise that economically meaningful effects can exist even when confidence intervals are wide, and conversely, that statistically significant results may not always translate to economically relevant policy impacts. Throughout our analysis, we explicitly distinguish between the precision of our estimates (statistical significance) and the magnitude of estimated effects (economic significance).

In South Africa, where banks traditionally operate with substantial capital buffers above regulatory minima, the macroeconomic impacts of tighter capital requirements have

⁶ Identification strategies are techniques employed to distinguish the effects of a policy change from other simultaneous economic influences, enabling a clearer estimation of causal relationships.

historically been muted, underscoring the importance of gradual implementation and clear policy communication. Nevertheless, exploring these dynamics is crucial as South Africa moves towards implementing the newly announced positive cycle-neutral countercyclical capital buffer (PCN CCyB), which will be fully phased in by January 2026. We conclude the paper by outlining the policy lessons learned from this article for the CCyB in South Africa.

2. Data and variable selection

The variables utilised in our models can be grouped into three categories: capital requirement measures, banking sector indicators, and macroeconomic variables. Regarding variable selection, we employ two model specifications: A benchmark model and an extension to this model. Below, we introduce the selected variables for our benchmark model and briefly motivate their inclusion.

2.1. Benchmark model

The core variables included in the benchmark model include a measure of capital requirements (to be discussed in the next section), bank credit extended to corporates and households, lending spreads, the sovereign bond spread,⁷ inflation, the repo rate and the growth in gross domestic product (GDP).⁸ All variables are recorded at monthly frequency⁹ and growth rates are calculated as year-on-year

2.1.1. Capital requirements

Given that the central focus of this paper is identifying the effects of a capital requirement increase, careful consideration is necessary when selecting an appropriate empirical measure for capital regulation. The regulatory minimum on the capital adequacy ratio (CAR) of a bank is the most used in empirical literature as it directly corresponds to

⁷ This is the yield differential between SA and US 10-year bonds.

⁸ We considered several larger models, which include variables such as different asset prices and bank profitability measures. No variant of the larger models produced significantly different conclusions, so we present the more parsimonious models, including only variables that we felt could be most strongly justified.

⁹ GDP is recorded at a quarterly frequency. To convert it to monthly frequency we use linear interpolation.

regulatory targets.¹⁰ However, using changes in the minimum required CAR as the primary policy indicator can be problematic, as it captures only the impact at the moment when policy becomes binding or enforced and may also introduce endogeneity issues in the model as changes in capital requirements themselves might be responding to changes in economic conditions.

In practice, regulatory changes are typically announced with considerable lead time, allowing banks to gradually adjust their capital positions and portfolios. Because such announcement effects precede actual changes in the minimum required CAR, relying solely on changes to this ratio at effective dates may omit crucial anticipatory behaviour by banks, creating challenges for accurate identification. Therefore, alternative measures that capture announcement as well as implementation effects might be necessary to properly isolate regulatory changes.

One such alternative approach would be to use a measure of capital requirement changes based on implementation dates only and then explore anticipation effects through lead/lag structures in the model. Another alternative measure of changes in capital requirements is a capital index, which captures not only the implementation dates but also the announcement effects associated with regulatory policy changes. Both approaches have merits, however, we chose the capital index approach since it allows for a more nuanced measure of overall regulatory stance by incorporating various types of actions (announcements, enforcement, scope/level changes, guidance) with different potential impacts, often weighted according to their perceived importance.

Furthermore, an index based on discrete, dated regulatory decisions (especially announcements) can be argued to be more plausibly exogenous than simple changes in minimum capital requirements. Therefore, following the methodologies employed by Merrino et al. (2024) and Meuleman & Vander Vennet (2020), our capital index

¹⁰ Minimum required capital adequacy ratios are bank-specific regulatory limits, which specifies a minimum on the ratio of qualifying capital and reserves to risk weighted assets that banks must maintain in order to avoid potentially costly restrictions on operations being imposed by the regulatory authority.

aggregates regulatory actions into six key components: announcement, enforcement, level changes, scope changes, further guidance and deactivation.

To construct the capital index, we first compile all significant regulatory actions relating to capital requirements¹¹ from Prudential Authority (PA) directives and other communication. These actions are classified into six main components: (1) Announcement, the date when regulatory changes are first communicated; (2) Enforcement, the date when changes officially take effect; (3) Level changes, adjustments to the level of existing capital rules; (4) Scope changes, adjustments to the scope of existing capital rules; (5) Further guidance, regulatory communications that influence banks' capital decisions without altering formal rules; and (6) Deactivation, the removal of existing requirements; (Merrino et al., 2024).

Figure 1 compares the evolution of the traditional capital adequacy ratio¹² and the newly constructed capital index within the South African context. While these two measures display broadly similar trends, the capital index provides additional granularity and precision, particularly in capturing the timing of policy announcements and incremental policy shifts. Consequently, the capital index is preferred for our analysis, as it better isolates the specific timing and magnitude of regulatory changes at a macroeconomic level, enhancing the accuracy and clarity of our econometric modelling.

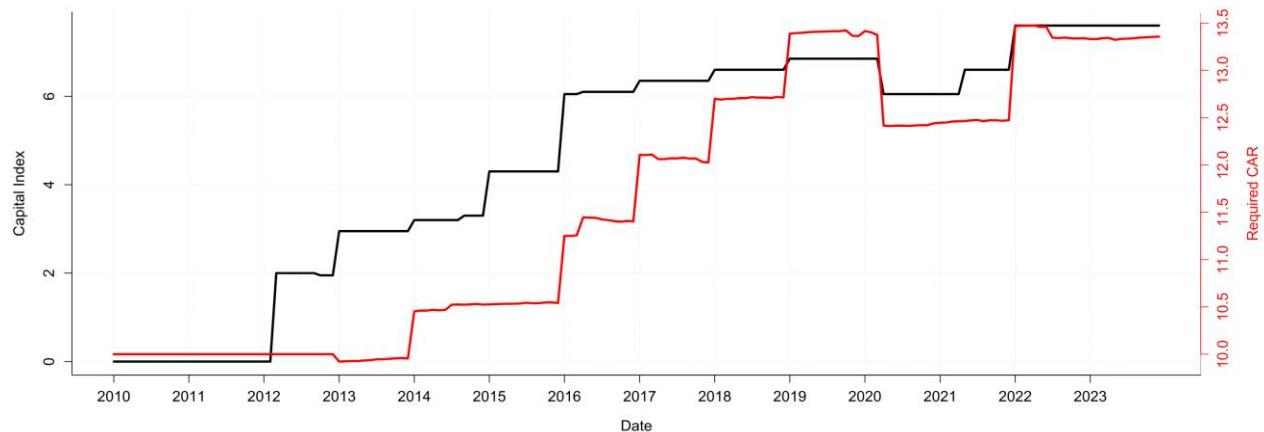
An important methodological caveat concerns the simultaneous implementation of multiple Basel III regulatory reforms during our sample period. We acknowledge that capital and liquidity requirements were announced and implemented over overlapping timeframes, making it difficult to disentangle their separate effects. Our capital index is designed to capture actions specifically related to capital requirements; however, our estimates may capture some combined effects of broader regulatory changes, including liquidity regulations such as the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) that were also being phased in during this period. This limitation is common to most empirical studies of Basel III implementation. The development of separate

¹¹ Details on the capital requirements included in the capital index are discussed in the appendix.

¹² Constructed as the weighted average of capital adequacy ratios across all active banks, at date of effect, where the share of total assets of a bank relative to those in the entire market determines the weight of that bank.

indices for capital and liquidity requirements would be a valuable enhancement for future research.

Figure 1: The time paths of (i) the capital index used in this paper (black line, left axis), and (ii) the weighted average capital adequacy ratio across banks at date of effect (red line, right axis).



Source: SARB and authors' calculations

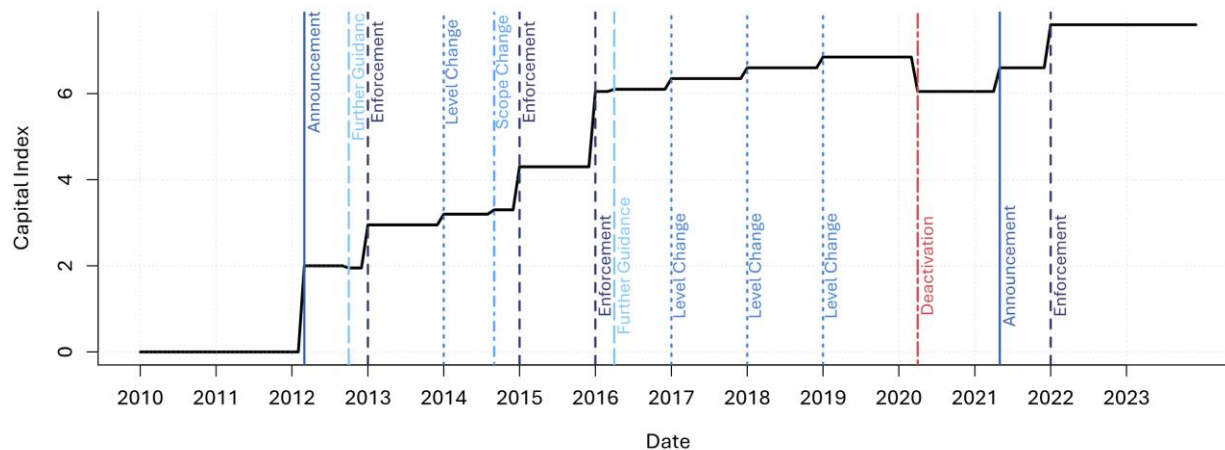
An annotated construction of the capital index is depicted in Figure 2, with vertical lines marking the specific regulatory events that imply changes in the index. Each event's contribution to the index is weighted according to its importance—major policy changes receive higher weights, incremental adjustments moderate weights, and informational guidance smaller weights.¹³

We acknowledge that results may be sensitive to different choices of weights in the construction of the capital index, however, we leave such consideration for future research. Nevertheless, the weighting approach we used enables the index to reflect both the timing and relative impact of regulatory changes, resulting in an intuitive and robust measure that enhances the analytical precision of our results compared to simply using the minimum required CAR. Further details on the index construction, including the specific South African regulatory events included their classification into the six

¹³ Enforcement receives the highest weight of 1, announcement is assigned a weight of 0.5, level change is 0.25, scope change is 0.1, further guidance is assigned 0.05, and for deactivation, the weight is set to the number of adjustments the capital requirement encountered during its life cycle. That is, when a capital requirement is deactivated, the cumulative index for the capital requirement drops to zero.

components, and the precise weights assigned to each event type, can be found in the appendix.

Figure 2: Detail on the construction of the capital index. The black line represents the value of the index at each point in the sample, and the annotated vertical lines denoting the events that induced a change in the index.



Source: SARB and authors' calculations

2.1.2. Macroeconomic variables and banking indicators

Below we discuss the macroeconomic and banking variables used in the benchmark model. We consider several macroeconomic variables for analysing the broader impact of banking sector changes on the economy, all depicted in the first few panels of Figure 3. GDP and inflation are central measures of economic activity in our model. GDP growth is particularly relevant, as tightening capital requirements could lead directly to reduced credit availability, influencing investment and consumption decisions in negative ways that can show up as reductions in growth (Conti et al., 2023).

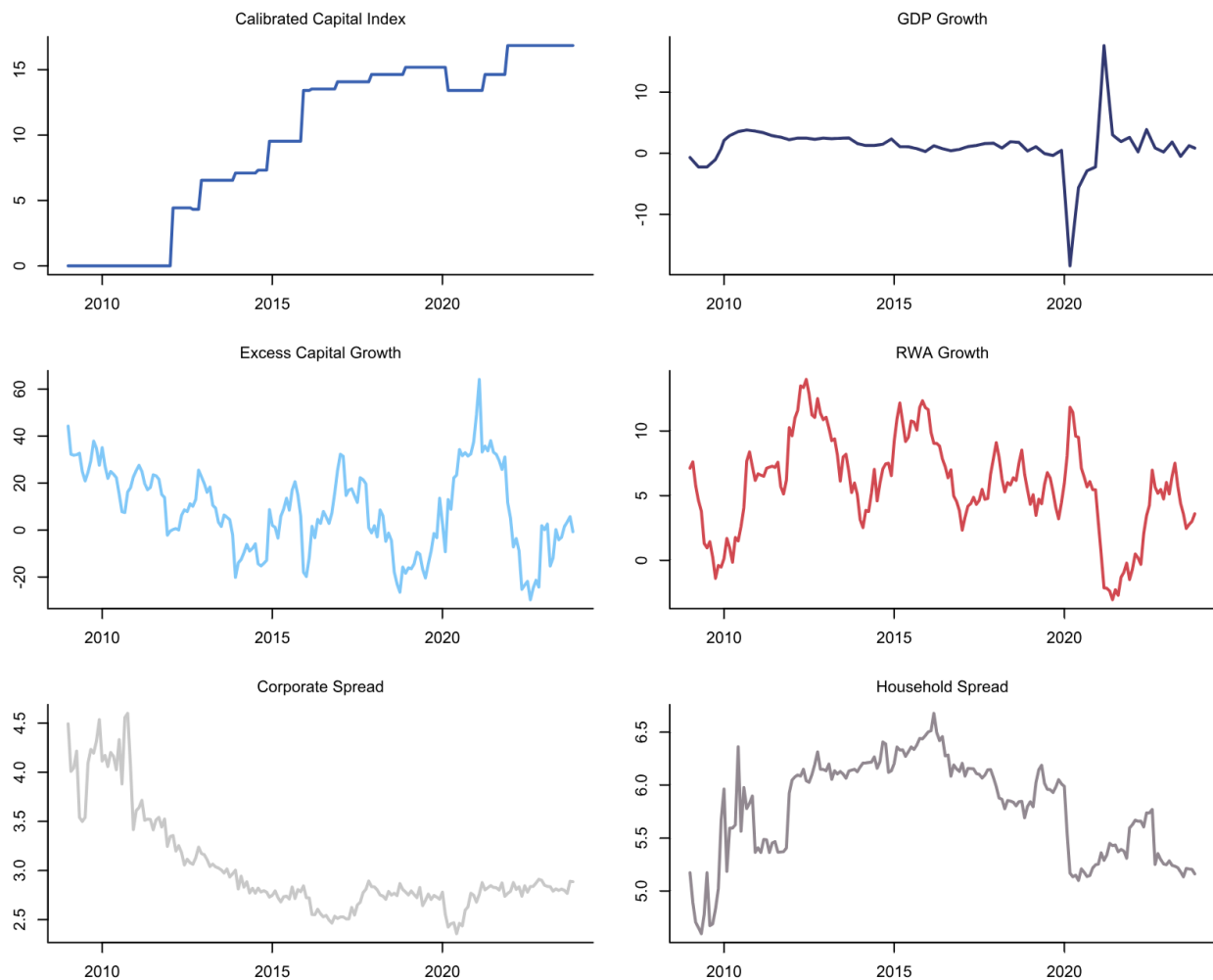
Inflation provides insight into how changes in banking sector behaviour might indirectly impact price stability through altered lending conditions. Additionally, the inclusion of the repo rate allows the model to capture the interplay between monetary and capital regulation policy adjustments, credit market dynamics, and the overall economic environment. This set of variables allows our model to capture the feedback mechanisms

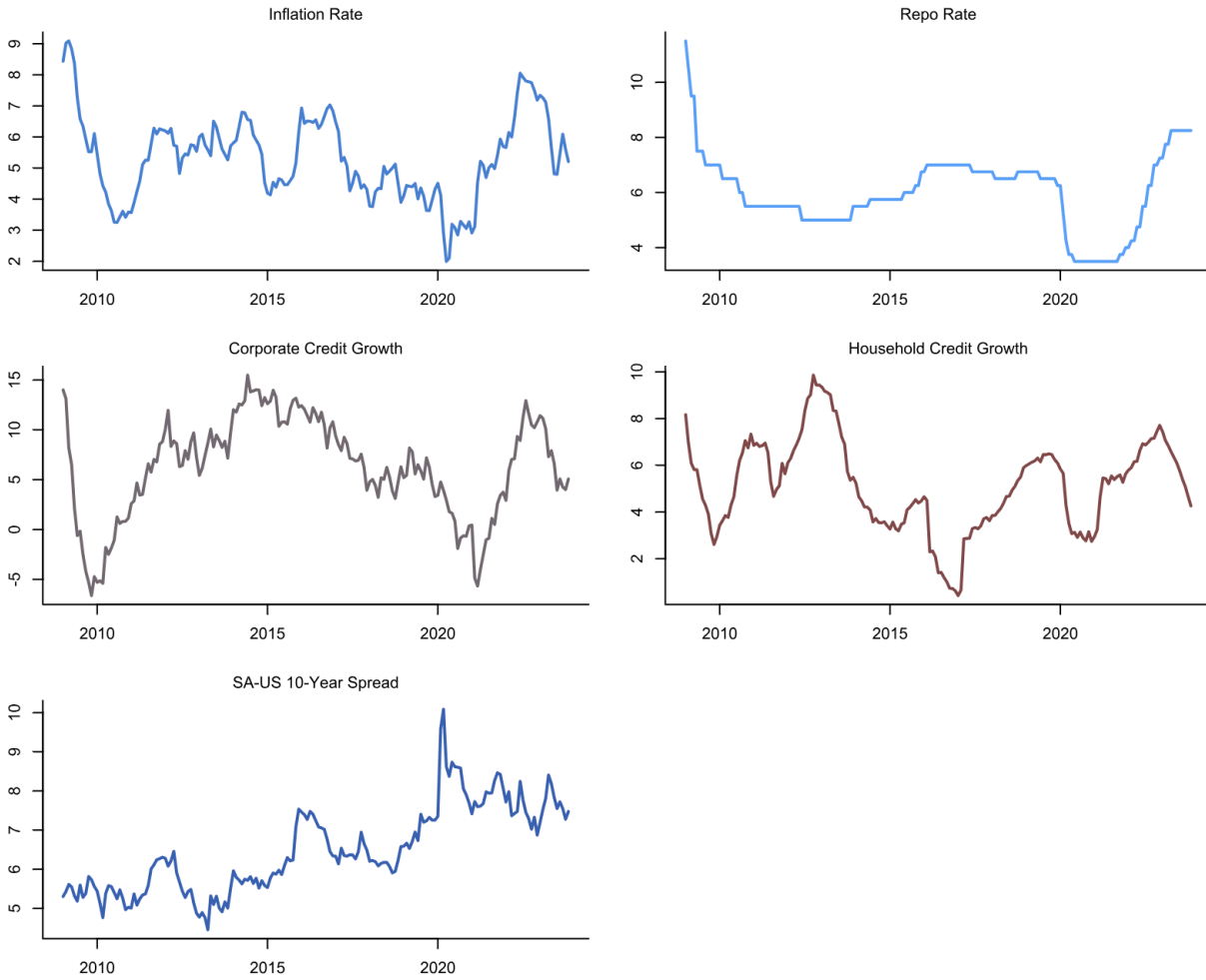
between monetary and macroprudential policy, banking behaviour, and macroeconomic outcomes.

Several banking indicators, shown in Figure 3, are integrated into our analysis to capture banks' responses to shifts in capital regulations and economic conditions. Lending spreads (between deposits and lending) for households and corporates serve as critical indicators of credit market conditions, revealing how banks adjust their pricing behaviour in response to increased capital requirements. A widening spread often reflects an increase in the cost of intermediation, which could result from higher capital requirements forcing banks to hold more capital against their lending activities. This adjustment can subsequently dampen credit demand from both households and corporates, slowing down spending, investment, and overall economic growth (Pillay & Makrelov, 2025).

Figure 3 also presents credit growth to corporates and households. Differentiating between household and corporate credit is important to understanding the distributional impacts of tighter banking regulation. Household credit primarily includes mortgages and personal loans, whereas corporate credit involves business loans and investment financing. These sectors respond differently to tightening credit conditions, potentially resulting in divergent outcomes for consumption and investment. Thus, analysing these variables separately enables a nuanced assessment of how regulatory changes impact various segments of the economy (Sibande & Milne, 2025).

Figure 3: Time-paths of the variables employed in the core model and its extension. Indices are reported in index levels, rates, ratios and spreads in percentage points, while stock or flow variables are in percentage points of year-on-year growth rates.





Source: SARB, FRED and authors' calculations

The sovereign spread, represented by the South African-US 10-year yield differential on government bonds, is another key variable capturing investor perceptions of sovereign risk and general financial market conditions. Changes in bank capital requirements could affect sovereign yields by influencing market perceptions of economic stability and financial sector resilience. This relationship is particularly salient in emerging markets like South Africa, where sovereign bond markets significantly influence overall financial conditions. Elevated sovereign spreads typically indicate heightened perceived risk, potentially restricting financing options for the private sector and exerting further downward pressure on economic growth.

2.2. Extension of the benchmark model¹⁴

Beyond these variables for the benchmark model, we incorporate additional banking sector indicators to extend our benchmark model, notably RWAs and excess capital (i.e. additional capital banks voluntarily hold above regulatory minima). Holding excess capital is costly, so banks actively manage these buffers in response to regulatory expectations and market conditions. Including excess capital in our analysis thus offers valuable insights into banks' strategic decision-making, highlighting how they adjust their balance sheets following regulatory interventions (Pillay & Makrelov, 2025). Incorporating RWAs allows for feedback to and from the regulatory and economic environment to bank asset allocation behaviour in a concise way. When regulatory pressures increase, one possible reaction from banks is to readjust their assets portfolios allocations to reduce RWA (Conti et al., 2023).

3. Methodology

Following the seminal contribution of Sims (1980), Structural Vector Autoregressions (SVARs) have become a cornerstone of empirical research in macroeconomics and finance. The widespread adoption of these structural models stems from their capacity to effectively capture key characteristics of macroeconomic time series, their relative ease of implementation, and the clear interpretability of their outputs (Wang & Woźniak, 2025).

In this study, we employ a Bayesian approach to estimating SVARs, primarily because Bayesian inference offers distinct advantages in small-sample settings – a common scenario when working with South African macroeconomic data (Woźniak, 2024).¹⁵ As shown in the previous section, our benchmark model comprises nine monthly macroeconomic and banking indicators, spanning the period from January 2010 to

¹⁴ Further attempted extensions not included in this paper were bank stock and housing prices. Bank stock prices allow analysis of how regulatory actions influence market perceptions of bank health and stability. The housing price index is considered due to its role in reflecting changes in household wealth and collateral values, which could affect consumption and investment decisions. Housing prices are particularly sensitive to credit availability, and changes in lending conditions prompted by regulatory tightening can thus have pronounced spillover effects on broader economic activity. Including the housing price index provides a fuller understanding of the wealth and collateral channels through which regulatory changes propagate through the economy.

¹⁵ While small sample size concerns an important reason to use Bayesian methods, it is not the only reason. According to Wang & Woźniak (2025), recent advancements in Bayesian methods have allowed “the incorporation of a large number of variables, sophisticated identification strategies, and non-linearity in the model specification”. For an in depth discussion on model formulation refer to Wang & Woźniak (2025).

September 2024. We also present results derived from an extension of this benchmark specification.

A critical aspect of our approach involves identifying structural shocks, ensuring that we accurately isolate the effects of policy changes on variables from effects due to other economic changes. Identification is especially challenging in the context of regulatory changes, where it may be difficult to disentangle the direct effects of policy shifts from those driven by broader economic conditions.¹⁶ To address this, we employ methods to identify plausibly exogenous variation in capital requirements to determine their causal impact (Nakamura & Steinsson, 2018; Arias, Rubio-Ramírez, & Waggoner, 2018).

Once we have selected an appropriate identification strategy, we provide estimates on the dynamic causal effects of well-identified shocks to capital requirements on banking and macroeconomic indicators.¹⁷ Furthermore, it is difficult to disentangle the effect of capital and liquidity requirements, considering that both were announced and implemented over the same period. Given that our capital index is designed to capture actions related to capital requirements, our estimates may capture some combined effects of broader regulatory changes. The development of separate indices for capital and liquidity requirements would be a valuable enhancement for future research.

Identification in the case of the benchmark Bayesian SVAR occurs with restrictions placed only on the contemporaneous relationship between variables in the model (also referred to as zero restrictions).¹⁸ In addition to identification via zero restrictions, we implement alternative identification strategies for the SVAR model. These include sign restrictions following Rubio-Ramírez, Waggoner and Zha (2010); and a combination of zero and sign restrictions as proposed by Arias, Rubio-Ramirez and Waggoner (2018).

¹⁶ This is also referred to as the endogeneity problem within applications in econometrics.

¹⁷ Dynamic causal effects of aggregate shocks to economic policy is often represented via impulse response functions (Olea et al., 2025).

¹⁸ We also attempted structural shock identification via heteroskedasticity as in Lütkepohl et al., 2024 and Markov switching heteroskedasticity as in Lütkepohl, 2020. However, the addition of these additional elements did not make a material difference in the results obtained and are therefore not reported in this paper.

The contemporaneous ordering of the variables in the system are the capital index, GDP, inflation, repo rate, credit extension, credit spread and sovereign spread.¹⁹ Identification in this benchmark model is achieved through contemporaneous zero restrictions.²⁰ Zero restrictions explicitly impose constraints on certain instantaneous relationships between variables based on theoretical justifications, effectively setting certain contemporaneous impacts to zero.²¹ For example, given the ordering of variables, with the capital index placed first, we impose that the regulatory index is contemporaneously exogenous and not affected within the same period by innovations in macroeconomic variables such as GDP or inflation, though it may contemporaneously affect them. Instead, these regulatory changes initially influence banking sector variables, reflecting plausible economic structures and institutional delays in transmission channels (Rubio-Ramírez, Waggoner & Zha, 2010).

The economic theory guiding our identification strategies rests on plausible assumptions about the timing and nature of policy transmission. For our zero restrictions approach, we assume that regulatory policy operates as a slow-moving instrument that does not react to high-frequency macroeconomic shocks within the same month, reflecting the deliberate and forward-looking nature of prudential policy decisions. This assumption allows us to treat the capital index as contemporaneously exogenous to macroeconomic variables while permitting it to affect those macroeconomic variables within the same period. For our sign restrictions approach, we impose theoretically motivated constraints based on established transmission channels: tighter capital requirements are expected to increase banks' cost of intermediation by requiring them to hold more expensive equity capital against their lending activities, thereby constraining credit growth.

¹⁹ This means that the capital index is regarded as most exogenous in this setting. In other words, changes in the capital index filter through to other variables within the same period, while changes in other variables do not have an immediate impact on the capital index. On the other extreme, the sovereign spread reacts to changes in all other variables in the same period.

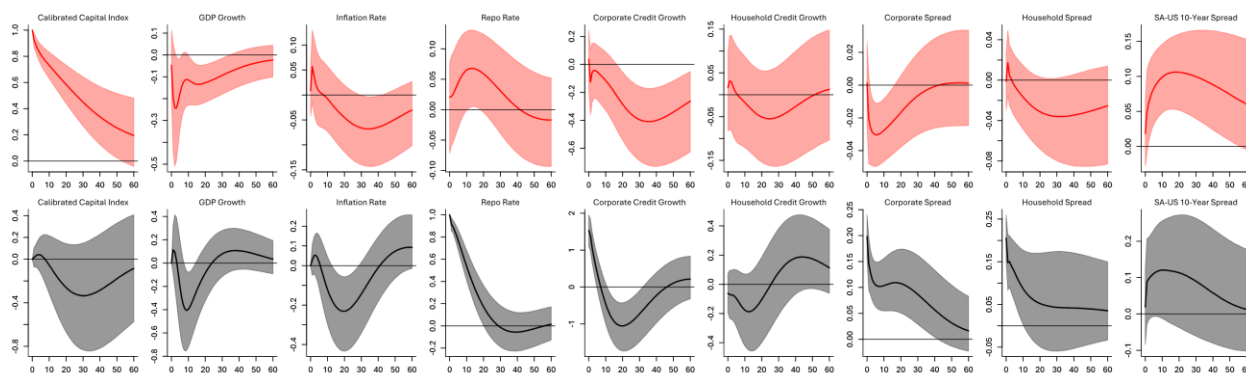
²⁰ While zero restrictions impose straightforward assumptions on instantaneous relationships among variables, they may not capture all realistic dynamics. Sign restrictions complement zero restrictions by introducing theoretical consistency—for example, explicitly ensuring that tighter capital requirements reduce lending rather than unintentionally capturing demand-driven declines in credit.

²¹ The phrasing contemporaneous here, in the context of VARs, is meant to reflect within the same period.

4. Results

In this section, we present results from different model specifications, starting with a benchmark SVAR model comprising nine variables. Figure 4 presents impulse response functions (IRFs) generated from a 1 index point increase to the capital index and a 100 basis point increase to the repo rate using these zero restrictions. Following an increase to the capital index, household credit variables—including credit growth and lending spreads—show minimal reaction, with household credit growth declining by less than 0.04 percentage points at its trough. This suggests household lending conditions remain relatively insulated or that banks prioritize adjustments in other loan portfolios initially (or potentially make capital adjustments).

Figure 4: Responses of variables (across columns) in the baseline model to: (i) a 1 index point increase in the capital index (top row), and (ii) a 100 basis point increase in the repo rate (bottom row). Solid lines represent median deviation from expected values, and shaded areas represent the 32% to 68% percentiles of the confidence set.



Corporate lending spreads exhibit moderate tightening alongside a medium-term reduction in corporate credit growth of roughly 0.4 percentage points, suggesting banks prefer portfolio adjustments away from corporate lending due to higher associated capital costs. To contextualize these magnitudes, the peak decline in corporate credit growth represents approximately 2% of the historical standard deviation over our sample period, indicating an economically meaningful but modest impact. This result aligns with international evidence, such as Noss & Toffano (2016), who document similar sensitivity in corporate lending relative to household credit in response to regulatory tightening.

When assessing broader macroeconomic variables, our findings indicate modest impacts. Inflation demonstrates negligible sensitivity (less than 0.05 percentage points), and GDP shows only a small and temporary contraction, 0.2 percentage points at its trough, in response to a capital requirement increase. Additionally, a slight widening in sovereign bond spreads is observed, suggesting increased perceived sovereign risk in financial markets following regulatory tightening. These results closely echo findings from Conti et al. (2023), reinforcing the notion that macroprudential tightening primarily impacts banking credit channels without significant.

To contextualise our results, we compare the effects of capital requirement increase against conventional monetary policy interventions—a 100 basis point increase in the repo rate. Notably, the repo rate hike produces significantly more pronounced negative impacts on GDP and inflation, demonstrating monetary policy's broader macroeconomic reach. This underscores the targeted nature of macroprudential policy on the credit market specifically, whereas monetary policy interventions have more widespread economic repercussions (Conti et al., 2023).

To gain deeper insights into banks' portfolio management, we expand the model by including two additional banking variables: excess capital growth and RWA growth. The inclusion of these variables allows us to explicitly examine banks' balance-sheet adjustments in response to capital shocks, addressing a gap identified by Conti et al. (2023). Figures 5 and 6 present impulse responses from two variants of the extended specification. In Figure 5 we consider the extended model with a focus on corporate credit, while Figure 6 exhibits the dynamics associated with the extended model with household credit as focal point.

From Figure 5 we see that given an increase in the capital index, macroeconomic variables remain stable, although the sovereign spread widens slightly. Within this setting corporate credit indicators and excess capital and RWAs display limited responses, echoing findings from Deli & Hasan (2017) who report moderate initial responses of RWAs to capital requirement adjustments. In Figure 6, we see a similar a similar response to the increase in the capital index for the macroeconomic variables of interest. In this

setup the corporate indicators show a more pronounced response, with corporate credit spreads tightening more than in the household credit case.

5. Robustness checks

We next employ alternative identification strategies to test the robustness of our findings in the previous section. We utilise combined zero and sign restrictions as outlined by Arias, Rubio-Ramirez and Waggoner (2018). Sign restrictions supplement zero restrictions by imposing theoretical constraints on the direction (positive or negative) of certain responses without specifying exact numerical relationships. Specifically, we constrain credit growth to decrease in response to increased capital requirements, aligning with theoretical predictions of tighter credit conditions following regulatory tightening.

Figure 5: Responses of variables (across columns) in the extended model with corporate credit to: (i) a 1 index point increase in the capital index (top row), (ii) a 100 basis point increase in the repo rate (bottom row). Solid lines represent median deviation from expected values, and shaded areas represent the 32% to 68% percentiles of the confidence set.

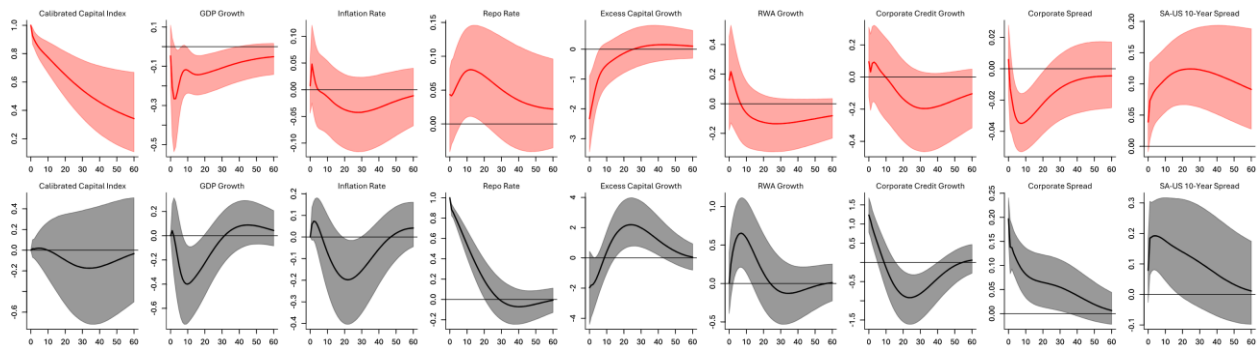


Figure 6: Responses of variables (across columns) in the extended model with household credit to: (i) a 1 index point increase in the capital index (top row), (ii) a 100 basis point increase in the repo rate (bottom row). Solid lines represent median deviation from expected values, and shaded areas represent the 32% to 68% percentiles of the confidence set.

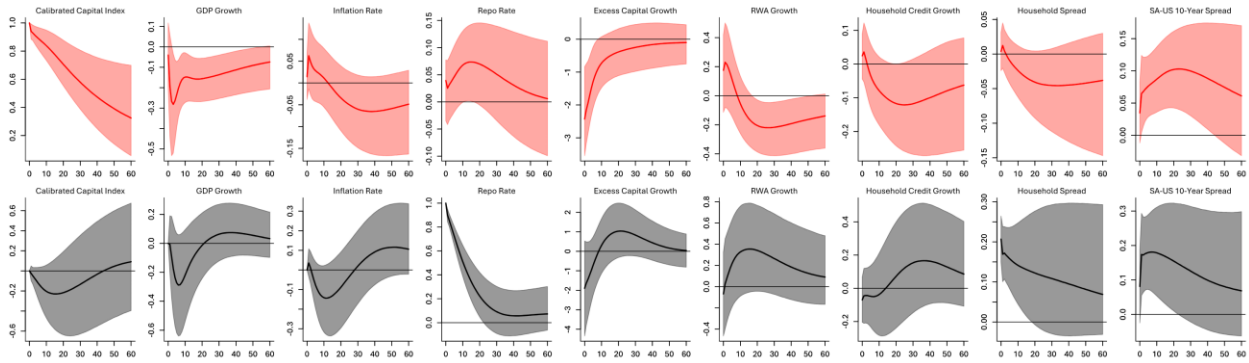
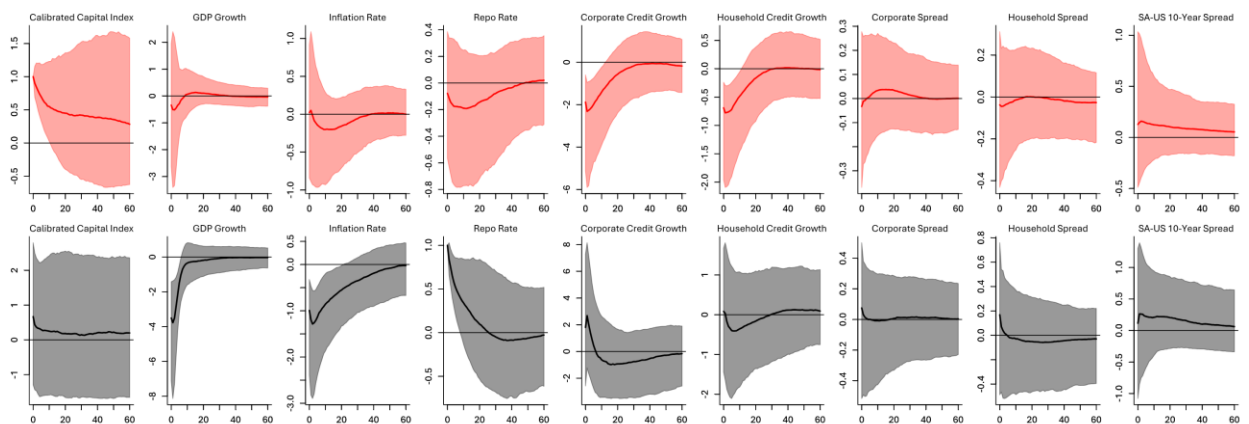


Figure 7 demonstrates that under this combined identification strategy, household and corporate credit exhibit stronger negative responses compared to the zero-restriction-only baseline, reinforcing the importance of the credit channel. Macroeconomic variables, however, remain relatively unaffected, highlighting the targeted nature of macroprudential policy interventions.

Figure 7: Responses of variables (across columns) in the benchmark model with sign restrictions to: (i) a 1 index point increase in the capital index (top row), and (ii) a 100 basis point increase in the repo rate (bottom row). Solid lines represent median deviation from expected values, and shaded areas represent the 32% to 68% percentiles of the confidence set.



In summary, our findings consistently align with the existing literature, underscoring that macroprudential policy predominantly impacts banks' lending behaviour, particularly through the credit channel. Broader macroeconomic impacts are modest and delayed, highlighting the nuanced and targeted nature of macroprudential policies in maintaining financial stability while managing economic fluctuations.

6. Conclusion and policy implications

This study examined the macroeconomic implications of changes in bank capital requirements within South Africa, employing a Bayesian SVAR framework. Our analysis indicates that increased capital requirements have moderate but short-term impacts, primarily concentrated on banking sector behaviour and credit market conditions. Corporate credit spreads tighten modestly, accompanied by a reduction in corporate credit growth, whereas household credit indicators exhibit more limited sensitivity. These findings align closely with existing empirical evidence, emphasizing the heterogeneity of banks' lending responses and underscoring the relative resilience of household lending in South Africa.

The robustness of these findings was tested through several identification strategies, including zero restrictions and combined zero and sign restrictions. Our results consistently showed that the immediate effects of regulatory tightening are largely confined to credit market conditions rather than broader macroeconomic variables such as GDP and inflation, which remain largely unaffected in the short term. These outcomes highlight that the short-term economic costs associated with tightening capital requirements are modest and primarily transmitted through reduced credit availability.

For policymakers in South Africa, our findings suggest several key implications. First, regulatory announcements influence banks' anticipatory behaviour; thus, clear communication and gradual phasing-in of capital requirements can minimise disruptive short-term economic effects. Second, due to the modest macroeconomic impacts observed, policymakers should be able to employ countercyclical capital buffers to bolster financial stability without triggering substantial immediate economic downturns. However,

careful attention must be given to the differentiated impacts across banking segments, particularly small versus large banks, to ensure equitable regulatory outcomes. Lastly, continued monitoring of bank balance sheets and lending patterns remains crucial, as the strategic responses observed highlight the importance of understanding banks' adaptive behaviour in shaping policy effectiveness in South Africa's evolving regulatory environment.

Given our findings, we believe South African regulators should continue their established practice of gradually introducing higher capital requirements when they are required, coupled with transparent and early communication. Additionally, coordination between macroprudential and monetary policy could further mitigate adverse short-run effects; a topic designated for future research.

Policymakers should be particularly cautious in timing these regulatory changes during stable economic periods to minimise disruptions. If future crises necessitate easing capital requirements, releasing built-up capital buffers promptly could alleviate credit pressures without significant risks to financial stability. In particular, the CCyB is designed with these anticipatory effects in mind. The policy design of CCyB is explicitly cyclical, which is likely to reduce the reputation or signalling effects of banks taking advantage of reductions in this policy measure. However, until we have real-world evidence of responses to reductions in the PCN CCyB, this remains speculative.

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Appendix

The capital held by banks in response to regulatory requirements can take several forms, depending on the specific regulatory instruments utilised. These typically include Common Equity Tier 1 (CET1), additional Tier 1 (AT1) capital, and Tier 2 capital. Tier 1 (CET1 plus AT1) capital represents a bank's core capital, consisting primarily of common equity and retained earnings, and is considered the most reliable form of capital in absorbing losses during periods of financial stress. Within Tier 1 capital, CET1 capital is the highest quality component, composed mainly of common shares and reserves, and is subject to the most stringent regulatory standards. Banks must maintain sufficient CET1 capital to ensure they have a robust buffer against potential losses. Tier 2 capital, on the other hand, includes less stable forms of capital such as subordinated debt and hybrid instruments. While still important, Tier 2 capital serves more as a supplementary buffer and is typically relied upon in more extreme stress scenarios. The accumulation of these different capital types reflects the regulatory emphasis on ensuring that banks have sufficient loss-absorbing capacity to withstand both anticipated and unanticipated shocks to their balance sheets.

Below we have a table that represents the capital stack in South Africa. Starred (*) requirements are bank specific. Other requirements are uniform across banks. In South Africa the minimum total capital requirement = 11.5% + min (3.5%, P2A + DSIB).

Tool	Description	SARB / PA	Basel
CCyB	Countercyclical capital buffer	1% (from 2026)	max of 2.5%
CCB	Capital conservation buffer	2.5%	2.5%
D-SIB*	Domestic systemically important bank capital add on	x	max of 2.5%
Pillar 2B*	Bank specific capital requirement	x	-
Pillar 2A	Systemic risk add-on	1%	max of 2%
Pillar 1	Base minimum	8%	8%

Construction of the capital index

The capital index is based on the period following the introduction of the Basel III requirements. This is mainly informed by the fact that the CCyB – the capital requirement whose impact the paper aims to assess – is a Basel III capital requirement and has some similarities with other Basel III capital requirements included in the index. On 8 October 2010, the South African Reserve Bank (SARB) gave notice to banks that it was in the process of amending the Regulations relating to Banks (hereinafter “the Regulations”) to incorporate the Basel III requirements issued by the Basel Committee on Banking Supervision (BCBS). On 8 February 2012, the SARB again issued notice to banks, which indicated that the first draft of the proposed amended Regulations was due to be issued for comment at the end of March 2012.²² The final amended Regulations were published on 12 December 2012 with an effective date of 1 January 2013. However, considering the time it usually takes banks to adjust their capital and that the notice to banks on 8 October 2010 had already indicated that Basel III requirements would become effective on 1 January 2013, we assumed that banks started adjusting their capital levels in line with the proposed amended Regulations issued for comment in March 2012. Therefore, the capital index captures changes in Basel III capital requirements from March 2012 to December 2023.

As part of the Basel III capital requirements, we specifically considered the Pillar 2A capital requirement,²³ the capital conservation buffer (CCB), and the capital buffer for domestic systemically important banks. In addition to these risk-based capital requirements we also included the non-risk-based leverage ratio requirement which serves as a backstop to the risk-based capital requirements. On 8 October 2010, the SARB also gave notice of the strengthening of pre-Basel III capital requirements through an increase in the minimum common equity requirement and an increase in the Tier 1

²² However, we could not find the published proposed Regulations to confirm whether they were in fact issued on this date. Generally, communication on proposed regulatory actions issued for comment was not publicly available for all capital requirements introduced during the study period. That is, proposed directives on changes to capital requirements were generally published from 2020 onwards. Therefore, we focused only on final directives, guidance notes and circulars which were published for all capital requirements during the study period.

²³ While Pillar 2A was introduced in January 2008 on the adoption of Basel II, it continued with the introduction of Basel III and increased somewhat during the years prior to the phasing in of other Basel III capital requirements in January 2016 and reduced thereafter.

capital requirement. However, total minimum capital requirements would remain unchanged. Therefore, we did not consider these changes.

Furthermore, unlike Merrino et al. (2024), we exclude the CCyB from the index for several reasons. First, the CCyB requirement in respect of exposures to counterparties in South Africa has been at 0% since its phase-in started in 2016. Second, we note that banks with private sector credit exposure in jurisdictions who have set positive CCyB rates are required to maintain capital in line with the reciprocity requirement. Even though on a weighted average basis this would be insignificant, including the CCyB in the index, when studying the impact of changes in capital requirements on credit extension and the broader economy, has potential to introduce endogeneity in the model since adjustments to the CCyB requirement are themselves informed by periods of excess aggregate credit growth in the economy. Third, it is important to note that the CCyB is made up of similar capital (i.e. CET1 capital) as other capital requirements such as the CCB, which is included in the index. Therefore, excluding the CCyB from the index does not necessarily mean that the capital index fails to capture effects of changes in capital requirements more broadly. Lastly, as explained above, we focused only on final directives issued by the SARB, which were available for all capital requirements introduced over the study period. Therefore, since the study period for the capital index ends in December 2023, the index excludes both the proposed directive on the PCN CCyB issued in November 2023 and the final directive issued in December 2024. However, it is important to note that banks are typically given up to 12 months following the issuing of the final directive to increase their capital levels and therefore we use the date of issue of the final directive as the announcement date.

For each capital requirement, we select weights to represent specific regulatory actions taken monthly during their life cycle, from the date of announcement until the date of deactivation. These regulatory actions are classified into six main components: (1) *Announcement*, the date when regulatory changes are communicated through final directives; (2) *Enforcement*, the date when changes officially take effect; (3) *Level changes*, adjustments to the level of existing capital requirements; (4) *Scope changes*, adjustments to the scope of existing capital requirements; (5) *Further guidance*,

regulatory communication that influences banks' capital decisions without altering actual requirements; and (6) *Deactivation*, the removal of existing requirements.

A similar classification of regulatory actions was first proposed by Meuleman and Vander Vennet (2020). However, Merrino et al. (2024) differ from Meuleman and Vander Vennet (2020) in that they assign a weight of 0.5 for when the policy tool is announced and a weight of 1 for when the policy tool is activated for the first time. Meuleman and Vander Vennet (2020) assume that the policy tool is activated on the date of announcement and therefore assign a weight of 1. While we recognise that banks typically respond to announced policy changes ahead of the enforcement date, it is unlikely that they would adjust bank capital by the full extent of the policy change. We therefore follow the approach of Merrino et al. (2024). That is, enforcement receives the highest weight of 1, announcement is assigned a weight of 0.5, level change is 0.25, scope change is 0.1, and further guidance is assigned 0.05. For deactivation, the weight is set to the number of adjustments the capital requirement encountered during its life cycle. That is, when a capital requirement is deactivated, the cumulative index for the capital requirement drops to zero. We then sum the cumulative weights of all capital requirements to get the overall capital index.

Sibande et al. (2024) also construct a narrative indicator for macroprudential regulation more broadly. They distinguish between dates of communication about regulations intended to be passed and their drafting thereof and dates of implementation of the regulation. Furthermore, they identify regulatory actions that may result in banks either responding by adjusting their capital buffers and/or risk weights. However, our capital index is more narrowly focused on capital requirements, considers relatively more regulatory actions taken over the entire life cycle of capital requirements and does not consider capital floors that place certain limits on the calculation of risk weighted assets of banks using internal models. Furthermore, our index differs from simple dummy variables because of its cumulative nature and the weighting of different types of events (e.g., distinguishing announcements from enforcement and level changes from guidance). This weighting is intended to reflect varying intensities of policy actions.