Impact of Interest Rate Controls on Risk-taking Behavior of Kenyan Commercial Banks

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Abstract

This study investigates the impact of interest rate capping on banks' risk-taking behaviour in Kenya, a topic that has been underexplored in the existing literature. The study uses the non-performing loans ratio and z-score as proxies for risk appetite and employs a Difference-in-Difference (DiD) approach to analyse data from 26 commercial banks from 2013 to 2019. The study overcomes the challenge of the universal application of the cap across all Kenyan banks by capitalizing on the intensity of interest rates charged by different banks before the capping policy. The findings suggest that banks' risk appetite significantly increased post-capping, indicating the negative impact of interest rate controls on banks. This is consistent with the general trend observed in related literature. The effects vary across bank peer categories, with medium-sized banks exhibiting the most pronounced changes. The study also reveals that the effect of interest rate capping on risk-taking behaviour varies based on the capital adequacy levels of banks. Based on these findings, the study calls for a reconsideration of the universal application of interest rate caps and suggests tailored approaches based on bank size or capital adequacy. It urges regulatory bodies to adopt a dynamic approach and conduct periodic reviews to manage the evolving risk landscape. The study emphasizes the importance of continuous dialogue between regulatory bodies and financial institutions to foster adaptive regulatory frameworks that balance stimulating economic growth and maintaining financial stability.

Key Words: Interest rate controls, financial repression, Difference-in-Difference, risk-taking

1. INTRODUCTION

Interest rate capping is a widely used policy tool in developing economies aimed at protecting borrowers from excessively high lending rates. However, despite its popularity, there is limited understanding of how such caps influence the risk-taking behavior of banks, particularly in Sub-Saharan Africa. Existing research typically treats interest rate caps as a uniform intervention, failing to account for differences in how banks with varying pre-cap interest rates respond to the policy.

Kenya's experience presents a unique opportunity to fill this research gap. With a competitive banking sector, the introduction and subsequent repeal of interest rate caps between 2016 and 2019, and a dynamic regulatory environment, Kenya provides rich data to analyze heterogeneous impacts on banks' risk appetite. This study employs a novel intensity-based Difference-in-Differences method to capture these differential effects, addressing an important limitation in the literature. Given the ongoing policy debates surrounding financial regulation in Kenya and other African countries, a nuanced understanding of the consequences of interest rate capping is both timely and essential for designing effective interventions that balance financial inclusion, consumer protection, and banking sector stability.

It is claimed that interest rate controls are utilized to protect borrowers (Calice et al., 2020). They are also applied for economic reasons, such as supporting strategic sectors in cases of market failure or facilitating resource reallocation (Maimbo and Gallegos, 2014). Miller (2013) argues that such controls can assist priority sectors until they become self-sustaining or protect consumers from usury and exploitative lending practices. Furthermore, interest rate caps are often justified by the perception that banks earn excessive profits by overcharging borrowers. However, recent findings by Lan et al. (2024) show that financial controls can significantly reduce household participation in financial markets and shift them away from riskier assets.

In Kenya, the first post-liberalisation attempt to introduce interest rate caps came in the early 2000s under the Donde Bill, though it failed to gain traction (Bell et al., 2002). Renewed political pressure and growing concerns about high lending rates led to the successful amendment of the Banking Act in 2016, which imposed a ceiling lending rate of 4 percent above the Central Bank Rate (CBR) and a deposit floor rate of 70 percent of the CBR (Kavwele et al., 2018; Gichuki et al., 2019). These controls remained in effect until they were repealed in November 2019.

The interest rate capping law in Kenya gained significant political traction. First, it promised better returns for depositors through the deposit rate floor, responding to widespread dissatisfaction with stagnant interest earnings on savings. Second, it appealed to borrowers who believed that banks exaggerated their risk profiles, leading to excessive interest charges. The fixed lending cap, tied to the CBR, offered an appealing promise of affordability and fairness.

Despite this popular appeal, the capping policy had substantial implications for the banking sector. More than half of all loans and deposits were affected in the first year alone (Alper et al., 2020). Scholars such as Safavian & Zia (2018) and Gichuki et al. (2019) argue that such controls can have unintended negative effects, including credit rationing and deterioration in credit quality. Theoretically, low interest rates can lead banks to loosen lending standards and increase exposure to risky assets (Delis and Kouretas, 2011). Based on the models by Keeley (1990) and Dell'Ariccia & Marquez (2006), banks facing reduced margins may seek riskier investments to sustain profitability. In a liberalized market, this risk-taking is somewhat self-regulated by market forces. However, under an interest rate cap, the response is less predictable: banks are constrained from pricing risk adequately, but may still pursue high-yielding, riskier assets to maintain margins. At the same time, it is possible that caps reduce risk-taking if banks respond by restricting credit supply and lending only to low-risk borrowers to minimize losses. Thus, the theoretical direction of the effect remains ambiguous and calls for empirical investigation.

This study contributes to the literature by empirically examining how interest rate capping influenced bank risk-taking behaviour in Kenya. It adds value in three ways. First, it goes beyond binary treatment models by employing a novel intensity-based Difference-in-Differences approach. This allows analysis of how banks with different pre-cap interest rate exposures were differentially affected. Second, it examines heterogeneity by bank size and capital adequacy, offering policy-relevant insights for differentiated regulatory approaches. Third, it situates the findings within Kenya's dynamic political and economic context, helping to inform broader discussions in the region. Kenya's competitive banking sector, recent implementation of interest rate capping, and dynamic regulatory environment provide a rich context to understand the effects of interest rate controls on bank risk-taking in Sub-Saharan Africa. With over 40 registered commercial banks, Kenya has the highest number of banks in Africa, which makes it possible to assess the impact on both large and small banks (Manyaga, et al., 2020).

Using data from the Bank Focus database (2013–2019), the study finds that while interest rate caps made loans more affordable in the short run, they pushed banks toward higher risk exposure to preserve profitability. Notably, medium-sized banks exhibited the most pronounced behavioural shifts. Additionally, the effects were more muted for banks with stronger capital adequacy, suggesting that financial buffers mitigate the pressure to chase risk.

These findings challenge the blanket application of interest rate caps and highlight the unintended consequences of uniform financial regulations. Rather than advocating for different rules for different banks — which may be impractical in a shared regulatory environment — this study recommends a more cautious and data-informed approach to designing and implementing such policies. Policymakers should carefully assess potential trade-offs between consumer protection and financial sector stability. Stronger risk-based supervision, periodic policy reviews, and the use of macroprudential tools may offer

more practical alternatives to rigid interest rate ceilings. Moreover, continued dialogue between regulators and the banking industry can help ensure that reforms achieve their intended objectives without creating distortions or encouraging excessive risk-taking.

The rest of the paper is structured as follows: Chapter Two provides an overview of Kenya's financial system, highlighting trends in key financial stability indicators. Chapter Three outlines the theoretical framework and reviews relevant literature. Chapter Four presents the empirical methodology and explains the identification strategy. Chapter Five discusses the empirical findings. Finally, Chapter Six concludes with policy implications and directions for future research.

2. OVERVIEW OF KENYA'S FINANCIAL SYSTEM

Kenya's financial sector stands out as one of the most advanced compared to most countries in Sub-Saharan Africa. It encompasses a well-established stock exchange, non-bank financial institutions, various insurance companies, and numerous commercial banks (Musau et al., 2018). All these entities operate within a regulatory framework overseen by the Central Bank of Kenya (CBK) under the CBK Act (Gichuki et al., 2019). The banking sector, in particular, has witnessed significant growth in terms of deposits, assets, profitability, and customers served, attributable to a favourable macroeconomic environment emanating from a series of reforms since independence in 1963 (Johnson & Upadhyaya, 2015). Notably, the early 1990s regulatory reforms aimed to enhance market competition and efficiency (Kiemo & Kamau, 2020), and the sector has since attracted several foreign investors (Musau et al., 2018).

Compared to other African countries, Kenya's financial system demonstrates both similarities and contrasts. For instance, like Nigeria and South Africa, Kenya has a relatively diversified financial ecosystem that includes a formal stock exchange, mobile money platforms, and microfinance institutions. However, unlike South Africa, which has a more concentrated banking sector dominated by a few large banks, Kenya's system comprises about 40 commercial banks of varied sizes, leading to a more segmented market. In contrast to countries like Malawi and Tanzania, where financial deepening remains limited, Kenya has achieved greater financial inclusion, largely through mobile banking innovations such as M-Pesa (World Bank, 2022). This technological leap has enhanced access to credit and savings, particularly for unbanked populations, a development not mirrored as robustly in many peer economies.

Kenya's banking sector is categorized into three segments based on size: large, medium, and small banks (Ombongi & Long, 2018). Additionally, banks can be grouped by ownership structure: (i) foreign-owned, (ii) government-owned, (iii) large private locally-owned, and (iv) small and medium private locally-owned banks (Johnson & Upadhyaya, 2015). This segmentation results in distinct client bases. Large banks typically serve corporate clients, high-net-worth individuals, and government agencies; medium-sized banks cater to small and medium-sized enterprises (SMEs) and the urban

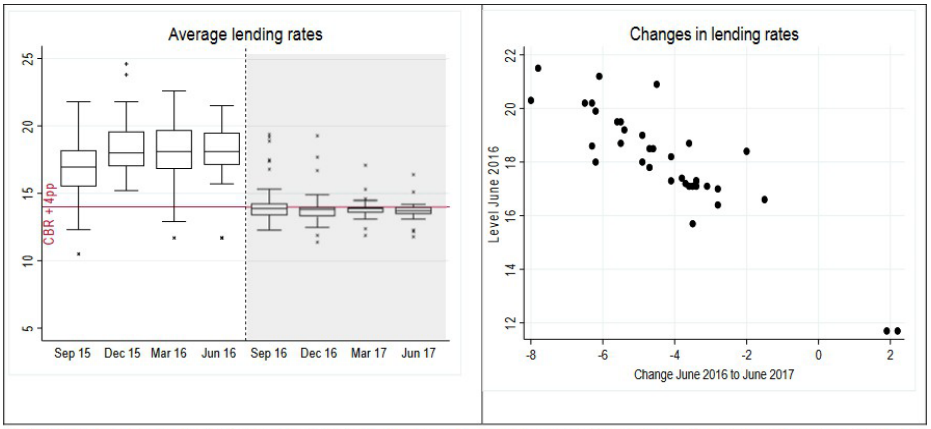
middle class; while small banks primarily serve low-income individuals, microenterprises, and the informal sector. This segmentation has resulted in lower competition and efficiency, as the market is dominated by a few large banks that have formed strategic alliances, creating a monopolistic competition environment (Kiemo & Kamau, 2020). Consequently, the impact of interest rate capping varied across these segments. Large banks, with more diversified income streams and stronger capital bases, were better positioned to absorb the effects, whereas small banks—more dependent on high-yield lending to riskier clients—faced greater challenges under the capped rate regime.

Kenya has made significant progress in improving financial stability and access (Johnson & Upadhyaya, 2015; Gichuki et al., 2019). However, as Ng'etich (2011) notes, wide interest rate spreads and low savings rates remain persistent issues. These spreads are driven by factors such as administrative costs, profitability goals, the cost of funds, and the burden of non-performing loans (Waruiru, 2012; Mbowe et al., 2020). High interest rates impede credit access for individuals and businesses with limited financial resources, hampering investment and economic growth. Public concerns regarding excessive lending costs have sparked global debates on interest rate capping, with Kenya being no exception.

Interest rate capping in Kenya is not novel—it existed before financial sector liberalization in 1991. Pre-liberalization bank loans were subject to an annual interest rate cap of 16 percent (Sambiri, 2014). Between 1981 and 1992, when rates were regulated, spreads were low. However, post-liberalization reforms allowed market forces to set rates, leading to sharp increases in spreads and lending rates. By 1994, lending rates had risen to 32 percent during a period of economic instability and a high prevalence of non-performing loans (Sambiri, 2014).

What distinguishes the 2016–2019 interest rate cap from earlier policies is its context and implementation mechanism. Unlike the pre-liberalization era, where rate caps were administratively imposed across a tightly regulated banking system, the 2016 law introduced caps within a liberalized, market-driven framework. Specifically, the law pegged the maximum lending rate at 4 percentage points above the Central Bank Rate (CBR), which was about 10 percent at the time—effectively capping lending rates at 14 percent (CBK, 2017). This regulatory shift occurred in a more mature, diversified financial system, with deeper linkages to global capital markets, mobile banking platforms, and a broader range of borrowers, thereby amplifying the policy's impact across different segments.

As shown in Figure 2 (Ferrari et al., 2018), this cap significantly reduced the average lending rate from about 18 percent to 13.9 percent. Only two banks had lending rates below 14 percent before the cap, and they raised their rates post-cap to align with the ceiling. The cap reduced rate variability, yet many banks found the cap binding and unprofitable, as the Annual Percentage Rate (APR) averaged 18.5 percent—well above the allowable ceiling. To mitigate reduced net interest margins, banks increased non-interest income through higher fees and commissions. By 2017, net interest income fell by 8.6 percent, while non-interest income grew by 6.2 percent (Ferrari et al., 2018).



Notes: Lending rates that are above the 14% cap after September 2016 are due to factors such as time needed to implement new interest rates for loans, loans in arrears that have not yet been regularized and loans that are currently subject to court process.

Figure 2: Impact of interest rate capping on bank lending rate in Kenya

Source: (Ferrari, *et al.,* 2018)

Table 1 outlines the banking sector's performance from 2010 to 2019, highlighting key changes in financial indicators. Before the cap (2010–2014), the average Capital Adequacy Ratio (CAR) stood at 20.90 percent. After the cap (2016–2019), this declined to 19 percent, indicating potential challenges in sustaining capital buffers, possibly due to compressed margins and slower loan book growth.

Table 1: Selected Financial Stability Indicators for Kenya

	Before-Cap				**Interest Cap Period**				
Selected Indicators	**2010**	**2012**	**2014**	***Average***	**2016**	**2017**	**2018**	**2019**	***Average***
Capital Adequacy Ratio	20.8	21.9	20.0	*20.90*	19.8	18.8	18.7	18.7	*19.00*
Core Capital to Risk-Weighted assets	18.7	18.9	16.0	*17.87*	17.0	16.5	17.2	16.8	*16.88*
NPL to gross loans Ratio	6.3	4.5	5.4	*5.40*	9.3	12.3	12.0	12.7	*11.58*
Return on Assets	3.7	3.8	3.4	*3.63*	3.3	3.2	3.1	2.52	*3.03*
Return on equity	30.7	34.2	26.6	*30.50*	24.6	25.8	27.6	21.2	*24.80*
Liquidity Ratio	38.4	35.2	32.7	*35.43*	41.8	43.7	50.7	50.92	*46.78*

Source: Central Bank of Kenya

The rise in Non-Performing Loans (NPLs)—from 5.40 percent pre-cap to 11.58 percent post-cap—requires a nuanced explanation. While the cap policy likely contributed to pushing banks to de-risk and limit credit to high-risk borrowers (leading to delayed repayments or informal lending), other macroeconomic and financial factors also played a role. For instance, droughts in 2016 and 2017 adversely affected agricultural productivity, weakening borrowers' repayment capacity. Additionally, political uncertainty surrounding the 2017 elections reduced business confidence and investment, compounding financial distress (World Bank, 2018). Moreover, fiscal pressures and delayed government payments to suppliers likely contributed to elevated

default rates. Hence, the post-cap surge in NPLs reflects both policy-induced lending constraints and broader economic shocks.

Nevertheless, the study employs a Difference-in-Differences (DiD) approach, which enhances causal inference by comparing changes in outcomes (such as NPLs) over time between a treatment group (banks more exposed to the cap) and a control group (banks less affected or unaffected). This design helps isolate the effect of the interest rate cap from other contemporaneous shocks. The core assumption underlying DiD is that, in the absence of the policy change, both groups would have experienced similar trends in NPLs—a condition tested through pre-treatment trend analysis. By leveraging this framework, the analysis accounts for time-invariant differences between the groups and common shocks affecting all banks equally, such as national macroeconomic conditions or political events. Thus, while droughts, fiscal delays, or election-related uncertainty may have increased NPLs economy-wide, the DiD estimate captures the *differential* impact of the cap on NPLs beyond these shared shocks.

While returns on assets and equity fell post-cap, signaling reduced profitability, the liquidity ratio rose from 35.43 to 46.78 percent. This suggests that banks shifted toward safer, more liquid assets—such as government securities—to preserve capital and reduce exposure to risky lending, a trend consistent with prudential risk management in a low-interest environment.

3. UNDERPINNING THEORIES AND RELATED LITERATURE

Decomposition of Interest Rates

Before delving into the theoretical frameworks of interest rate capping, it is essential to understand the factors contributing to high-interest rates within banks. Miller (2013) decomposed interest rates, identifying the key components, which include profits, non-performing loans, overhead costs, and costs of funds. Figure 3 provides a concise overview of these critical building blocks that influence interest rates, as evaluated by Miller (2013).

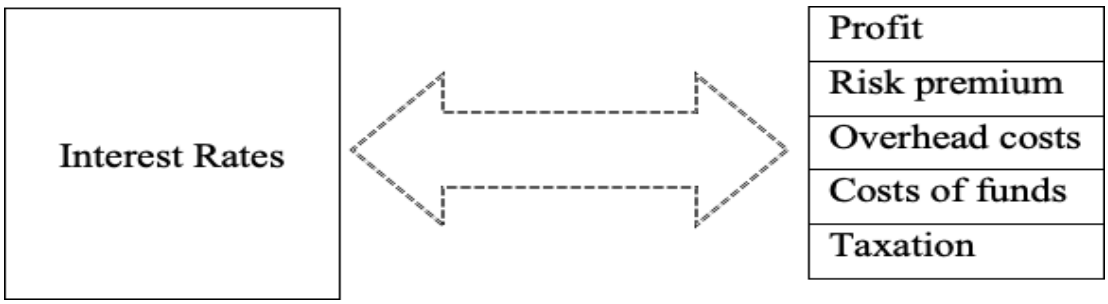


Figure 3: Decomposition of interest rates

The main objective of firms is to maximize profits, and as a result, they seek opportunities to cut costs and increase revenue. Consumers often perceive that banks offer lower deposit rates to minimize the cost of funds while charging exorbitant lending rates to maximize their earnings. Additionally, interest rate caps in many countries assume that banks have an insatiable need to earn excessive profits, especially in oligopolistic or concentrated environments.

High interest rates can also be driven by risk premiums. Banks assess the probability of loan repayment and set risk premiums accordingly. Borrowers with uncertain repayment abilities are offered high aggregated interest rates, which results in a higher risk of default, leading to increased risk premiums and lending rates (Ferrari *et al.,* 2018).

Moreover, banks sometimes face significant overhead expenses, such as administrative and loan processing costs, which contribute to higher lending rates. Evidence suggests that loan processing expenses tend to be higher for smaller loan volumes or micro-credit transactions (Helms & Reille, 2004). Advocates of interest rate capping argue that such measures could compel banks to reduce administrative costs and improve efficiency.

Lending rates are also influenced by the cost of funds, which is determined by a risk-free rate impacted by macroeconomic factors like savings, investment, and inflation levels. Some countries not only cap lending rates but also guide deposit rates. For instance, in Kenya, the deposit rate was set at 70 percent of the policy rate, the benchmark interest rate. Additionally, certain monetary policy decisions, such as increases in liquidity reserve requirements, may effectively act as implicit taxes on financial institutions since funds held under reserve requirements typically do not earn interest or receive lower-than-market-rate remuneration (Demirgüç-Kunt & Huizinga, 1999).

Theoretical Underpinnings

The Risk-Shifting Hypothesis

The Risk-Shifting Hypothesis, pioneered by Galai and Masulis (1976) and Jensen and Meckling (1976), explains how financial institutions respond to financial pressures by increasing their risk profiles. When traditional income streams diminish — for instance, due to policy-imposed interest rate caps — banks may respond by pursuing riskier assets in an effort to sustain profits (Eisdorfer, 2008; Gilje, 2016; Meuleman & Vander Vennet, 2020).

This theory resonates strongly with the context of interest rate capping in Kenya. The legislation placed a ceiling on lending rates, reducing the margins banks typically earn on their portfolio of loans. This compression of profits can undermine financial stability, as banks may respond by allocating their portfolios toward higher-risk ventures in a bid to make up for reduced income (Ferrari et al., 2018). Furthermore, banks may increase fees and commission income or ease underwriting standards —

adding additional financial fragility. Importantly, this process may manifest differently across banks, depending on their financial robustness and their ability to absorb financial stress.

Financial Repression

Financial repression refers to policy mechanisms — typically implemented by governments — that control financial markets and restrict financial institutions' operations, including the imposition of interest rate ceilings. Stiglitz (1993) highlights that while financial repression can aid policy goals (such as directing credit toward desirable sectors), it may undermine financial stability by reducing incentives for financial institutions to efficiently price risk and manage their portfolios. Capped interest rates may encourage banks to pursue greater-risk assets in a search for profits, thereby adding vulnerability to financial shocks.

This view directly relates to the policy context in Kenya, where regulators implemented an interest rate cap. The policy may inadvertently undermine financial stability by dampening incentives for careful risk management.

Empirical Literature

Interest rate caps have been implemented in a range of jurisdictions with conflicted and context-specific effects on financial institutions' behavior and stability (Table 1). Some empirical studies highlight positive effects, such as enhanced credit access for micro borrowers (Cubillos-Rocha et al., 2021; Murungi et al., 2023), while others underscore adverse outcomes, including reduced bank profitability, liquidity pressures, financial vulnerability, and contraction in credit, particularly for small firms (Alper et al., 2020; Kingori et al., 2023; Sheli, 2019). Furthermore, policy effects appear to vary by bank size, sector, and financial robustness, reflecting the heterogeneous mechanisms through which interest rate controls influence bank risk-taking.

This literature collectively signals a critical gap in understanding the mechanisms linking interest rate caps to bank risk profiles — especially in a developing country context with varying bank sizes and financial health. Our study contributes to this ongoing policy debate by employing a difference-in-differences strategy alongside bank-specific data to identify the causal effects of interest rate controls on bank risk-taking, while accounting for heterogeneity across financial institutions.

Author(s)	Country	Method	Key Finding
Cubillos-Rocha et al. (2021)	Colombia	Difference-in-differences	Interest rate caps facilitated credit access in microcredit, implying that policy intervention may ease financial constraints.

Author(s)	Country	Method	Key Finding
Alper et al. (2020)	Kenya	Systematic Review	Capped interest rates reduced credit to small businesses and small banks' loan books, with a contraction in the Kenyan economy; encouraged borrowing from informal markets, adding to financial fragility.
Pozo (2022)	Kenya	Qualitative Analysis	Capped interest rates forced borrowers toward informal financial markets, reflecting the policy's restrictive effects on financial stability and bank operations.
Murungi et al. (2023)	Kenya	Panel Regression	Capped interest rates increased agri-lending by small banks, demonstrating a potential policy-related redistribution of credit-risk toward this sector.
Kingori et al. (2023)	Kenya	Multiple Regression	Capped interest rates were associated with lower bank profitability and greater financial vulnerability, implying a potential upward shift in bank risk profiles.
Sheli (2019)	Kenya	Time Series Analysis	Capped interest rates resulted in lower liquidity for tier-one banks and eventual profits' recovery, although the number of loans remained largely stable, reflecting policy effects on financial robustness.
Demetriades & Luintel (2001)	South Korea	Time Series	Mild financial repression under restrictive regimes can increase bank lending and financial stability in non-competitive banking systems — a contrast to the effects under competitive regimes.

This study aims to investigate the impact of interest rate capping on bank risk-taking behaviour in Kenya, with a particular focus on variation across bank size and capitalization. Theoretical perspectives, notably the risk-shifting hypothesis, suggest that when profits are constrained by policy interventions, financial institutions may respond by pursuing riskier strategies in an effort to sustain their financial performance. However, not all banks are affected in the same way; their incentives and capacity to take on additional risk may differ based on their structural characteristics, such as their size and financial health. Consequently, this study posits the following hypotheses:

Hypothesis 1 (H1) — Banks under interest rate caps are more likely to take greater risks.

Hypothesis 2 (H2) — Small banks are more prone to greater risk-taking.

Hypothesis 3 (H3) — Weakly capitalized banks are more likely to take greater risks in response to capped interest rates.

4. EMPIRICAL STRATEGY

In examining the impact of interest rate capping on the risk-taking behaviour of commercial banks in Kenya, this study employs a Difference-in-Differences (DiD) approach. However, a significant empirical challenge emerges due to the universal application of the policy across all banks, which complicates causal identification under a conventional DiD framework. Furthermore, the standard DiD cannot account for cross-sectional variation in policy effects — for instance, distinguishing between banks whose interest rates were significantly above the 14 percent ceiling before its implementation and those that were at or below this threshold. This limitation also extends to assessing heterogeneity in risk-taking behaviour between large and small banks in Kenya.

To address these issues, this study adopts a variant of the DiD approach that utilizes cross-sectional variation in banks' pre-cap interest rates as a quasi-natural experiment. This strategy controls for time-invariant bank-specific factors and enables a treatment-control comparison to identify causal effects more credibly. Importantly, this method resonates with previously documented empirical strategies employing variation in policy exposure to uncover causal relationships (Bleakley, 2007; Cubillos Rocha et al., 2021; Wilson, 2022).

The key identification strategy for estimating the impact of interest rate capping is based on variation in banks' pricing behaviour prior to 2016. Banks that were already charging interest rates below the 14 percent ceiling before policy implementation are considered less affected by the policy, while those charging above this threshold are expected to be more influenced by it. This forms the main treatment variable — an interaction between Intensity and Post — as shown in equation (2). The Intensity variable measures the excess of bank i's average interest rate over the 14 percent ceiling prior to policy implementation (equation (1)):

$$iiiiiiiiiiiiiiii_{ii} = IIiiiiiiIIiiiii\ IIrriiii\ bbiibbbbIIii\ iihii\ ccrrcc - CCrrcc\ iiiiiiiIIiiiii\ IIrriiii \quad (1)$$

Equation (2) shows the reduced form of the DiD model measuring the impact of interest rate capping on the risk-taking behaviour of bank *i* at period *t*.

$$RRIIRRRR_{iiii} = \beta\beta_0 + \beta\beta_1(iiiiiiiiiiiiiiii_{ii} \times ccbbiiii_{ii}) + \delta\delta_{ii} + \delta\delta_{ii} + \alpha\alpha ZZ_{iiii} + \varepsilon\varepsilon_{iiii} \quad (2)$$

Where $RRIIRRRR_{iiii}$ denotes the risk measure of bank *i* at time *t*, $\delta\delta_{ii}$ represents the bank-specific fixed effects, $\delta\delta_{ii}$ denotes the time fixed effects, ZZ_{iiii} denotes the control variables in the model, and $\varepsilon\varepsilon_{iiii}$ denotes the error term. represents the causal effect of interest rate capping on a bank's risk-taking behaviour.

The empirical approach utilized in this study relies on the *common trends assumption* (Paruolo, *et al.,* 2015). This assumption is instrumental in establishing the causal effect of interest rate capping on banks' risk-taking behaviour. The underlying concept is that, before the implementation of the

interest rate cap, banks with high intensity (pre-capping interest rates significantly exceeding the cap) and low intensity (those with rates below or marginally above the cap) share similar trends in their risk-taking behaviour (Delis & Kouretas, 2011; Lindenberg & Westermann, 2012). It acts as a counterfactual, suggesting that, in the absence of the interest rate capping, the banks with different intensity levels would continue to follow the same trend in risk-taking behaviour. This assumption strengthens the identification of causal effects.

Variable description and measurement

The literature proposes various proxy measures for assessing the risk appetite of banks. For instance, Delis & Kouretas (2011) utilized the ratio of risk assets to total assets and the ratio of non-performing loans to total loans to evaluate banks' risk-taking behaviour. Samet *et al.* (2018) and Safiullah & Shamsuddin (2018) opted to use the loan loss provisions to gross loan ratio to measure credit risk. This ratio represents the reserves that banks set aside to cover potential credit losses. A higher ratio indicates greater credit risk, while a lower ratio indicates lower credit risk. Nkuna & Matola (2021) used the ratio of risk-weighted assets to total assets as a measure of credit risk, which captures both on-balance sheet and off-balance sheet exposures. Liquidity risk can be measured using the ratio of gross loans to total deposits, as suggested by Acharya & Mora (2015) and DeYoung & Jang (2016). In addition, Laeven & Levine (2009) and Samet *et al.* (2018) proposed using *z-score* as a proxy for insolvency risk.

This study utilized the non-performing loan (NPL) ratio as the primary proxy for risk-taking behaviour, controlling for market-specific, bank-specific, and macroeconomic factors. NPL is a measure of credit risk management. In addition, the study employed the z-score as an alternative proxy for robustness checks of the findings. The bank's *z-score* measures insolvency risk. A higher Z-score indicates a lower probability of insolvency. It means the bank is more stable, as it has higher profitability, better capitalization, and/or lower volatility in returns. We include a set of control variables to account for bank-specific and macroeconomic factors that may influence risk appetite, ensuring that the estimated effect of interest rate capping is not confounded by other drivers of bank stability. Capital adequacy ratio (CAR) reflects the bank's buffer against losses and is expected to be positively associated with stability. Return on assets (ROA) captures profitability; while typically linked to stability, in this context, higher ROA may also reflect greater risk-taking, potentially explaining its negative sign. Cost-to-income ratio (CIR) measures operational efficiency, and net interest margin (NIM) reflects the bank's earning capacity from core lending activities. Bank size (SIZE) is included to control for scale effects and diversification. Herfindahl-Hirschman Index (HHI) captures market concentration, which can affect competition and risk incentives. Finally, GDP growth and inflation control for macroeconomic conditions that influence the operating environment and systemic risk.

These controls together provide a comprehensive framework for isolating the impact of regulatory changes on bank risk appetite. Table 2 discusses these variables in detail.

Table 2: Variable Description

Variable	Description	Measurement
Bank size (SIZE)	Measures the market share of the bank utilizing a weighted composite index encompassing net assets, customer deposits, capital, reserves, and the number of deposit and loan accounts. A bank is considered large if its weighted index is 5 percent or higher, medium if it falls between 1 percent and 5 percent and small if less than 1 percent.	Weighted composite index.
Return on asset (ROA)	A profitability indicator measures the effectiveness of asset utilization crucial for assessing the financial performance and efficiency of banks (Delis & Kouretas, 2011).	The ratio of net income to total assets.
Capital adequacy ratio (CAR)	Evaluates a bank's ability to cover its risks, especially relevant for regulatory compliance and maintaining financial stability.	The ratio of total capital to risk-weighted assets.
Risk-weighted assets ratio (RWA)	Measures the bank's capital adequacy against its risk exposure. Crucial to understand how well a bank's capital aligns with its risk profile, especially relevant in a changing regulatory environment due to the capping policy (Nkuna & Matola, 2021). A higher RWA ratio indicates higher risk-taking and vice versa (Juelsrud & Wold, 2020)	Ratio of risk-weighted assets to total assets.
Non-performing loans ratio (NPL)	The proportion of loans that are likely to be written off. Reflects the quality of a bank's loan portfolio, offering insights into its credit risk management, vital for stability assessment. According to Andries *et al.* (2015), a higher NPL ratio indicates higher credit risk for the bank.	The ratio of non-performing loans to total loans and advances.
Bank *z-score* (ZSCORE)	A proxy of risk-taking behaviour measuring the stability of the bank. It signals the bank's probability of failure. According to Dias (2021), a higher ZSCORE signals higher stability and thus lower risk-taking.	(ROA + CAR) / σ(ROA). Where σ(ROA) is the standard deviation of ROA from 2013 to 2019
Interest rate (*r*)	The annual interest rate charged on loans and credit. It reflects the cost of borrowing and influences the bank's profitability.	Percentage
Cap Intensity	Measures the difference between the actual interest rate charged by a bank before the implementation of the cap and the ceiling rate of 14 percent. It reflects the likely impact on the bank.	The difference between the actual interest rate charged by a bank before the implementation of the cap and the ceiling rate of 14 percent
Cost to income ratio (CIR)	A bank-specific variable used to control for operational efficiency. A higher CIR indicates declining efficiency, signalling a bank's failure to effectively manage its operational costs (Andries, *et al.,* 2015; Dias, 2021).	The ratio of total operating expenses to total operating income
Net interest margin (NIM)	A bank-specific variable used to control for profitability. Higher profitability is anticipated to increase the bank's risk-taking behaviour (Dias, 2021).	The difference between interest income and interest expenses relative to interest-earning assets.
Herfindahl-Hirschman Index (HHI)	Measures market concentration within the banking sector. The HHI signals market competitiveness and concentration.	Percentage
GDP growth	Annual percentage increase in the Gross Domestic Product. A macroeconomic control reflects the broader economic context and its impact on banking activities and financial stability.	Percentage

Inflation rate	The percentage change in the overall price level of goods and services. It reflects the inflationary environment and its implications for interest rates, impacting banks' profitability.	Percentage

Source: Author's compilation

Common Trends Assumption Test

To validate the credibility of the Difference-in-Differences (DiD) approach, we first performed a parallel trends test to check whether the treatment and control groups were following a similar trajectory prior to policy intervention. This is a crucial prerequisite for DiD, as a violation of this condition would undermine causal inference. The banks were classified into control and treatment groups based on their interest rate positions relative to the policy's 14 percent cap. Specifically, banks with interest rates close to or below the cap were classified as controls, while those with significantly higher interest rates were placed in the treatment group. Because there is no clear cutoff for distinguishing these groups, we performed robustness checks by shifting the boundary across the spectrum of differences — from the minimum to the maximum — to account for potential misclassification. This approach guarantees that the results are not sensitive to a particular boundary.

To formally test for parallel trends, we estimated the following regression using only the pre-intervention data:

$$OOOOiiccbbOOii_{iiii} = \beta\beta_0 + \beta\beta_1(TTIIiirriiOOiiiiii_{ii} \times TTiiOOii_{ii}) + \delta\delta TTIIiirriiOOiiiiii_{ii} + TTiiOOii_{ii} + \varepsilon\varepsilon_{iiii}$$

$OOOOiiccbbOOii_{iiii}$ is a measure of risk-taking behaviour for unit ii at time ii

$TTIIiirriiOOiiiiii_{ii}$ is a dummy variable indicating whether the unit is in the treatment group

$TTIIiirriiOOiiiiii_{ii} \times TTiiOOii_{ii}$ are interaction terms between the time indicator and the treatment group indicator.

The coefficient of interest is the $\beta\beta_1$. In this context, $\beta\beta_1$ measures whether there is a differential trend between the treatment and control groups in the pre-treatment period. A significant $\beta\beta_1$ suggests that the pre-treatment trends for the treatment and control groups are different, which violates the parallel trends assumption. This would mean that the groups are not comparable in the context of the difference-in-difference analysis.

Table 3: Parallel Trends Pre-Treatment test

		Z-score		NPL-Ratio	
Treatment Intensity Threshold	Year	Coefficient	P-Value	Coefficient	P-Value
Intensity threshold=0	2014	0.0950931	0.816	-0.4072738	0.963
Intensity threshold=0	2015	0.0616119	0.88	-0.2083856	0.981
Intensity threshold=0.5	2014	0.0671595	0.82	0.7696827	0.905
Intensity threshold=0.5	2015	0.0303894	0.918	0.3767883	0.953
Intensity threshold=1	2014	0.0671595	0.82	0.7696827	0.905
Intensity threshold=1	2015	0.0303894	0.918	0.3767883	0.953
Intensity threshold=1.5	2014	0.0671595	0.82	0.7696827	0.905
Intensity threshold=1.5	2015	0.0303894	0.918	0.3767883	0.953
Intensity threshold=2.0	2014	0.0259169	0.905	1.746912	0.714
Intensity threshold=2.0	2015	0.0366961	0.866	1.313633	0.783
Intensity threshold=2.5	2014	-0.0034068	0.985	-1.322065	0.746
Intensity threshold=2.5	2015	0.006826	0.971	0.9291811	0.820
Intensity threshold=3.0	2014	0.0171576	0.913	0.5024164	0.878
Intensity threshold=3.0	2015	0.0326458	0.835	3.634889	0.270
Intensity threshold=3.5	2014	0.0233853	0.881	0.3211761	0.922
Intensity threshold=3.5	2015	0.033009	0.832	2.880922	0.379
Intensity threshold=4.0	2014	0.0299202	0.856	1.539322	0.641
Intensity threshold=4.0	2015	0.0479122	0.771	4.587450	0.168

In Table 3, the coefficient $\beta\beta_1$ is found to be insignificant when analysing both NPL ratios and z-scores as risk measures. This insignificance holds even when the composition of control and treatment groups is adjusted by varying the intensity threshold across its entire range, from the lowest to the highest intensity. Consequently, these results suggest that the pre-treatment trends between the control and treatment groups are parallel, validating the use of the difference-in-differences methodology for this analysis. Figure 4 reaffirms the results obtained in Table 3 by visually portraying parallel trends between the control groups before the treatment period.

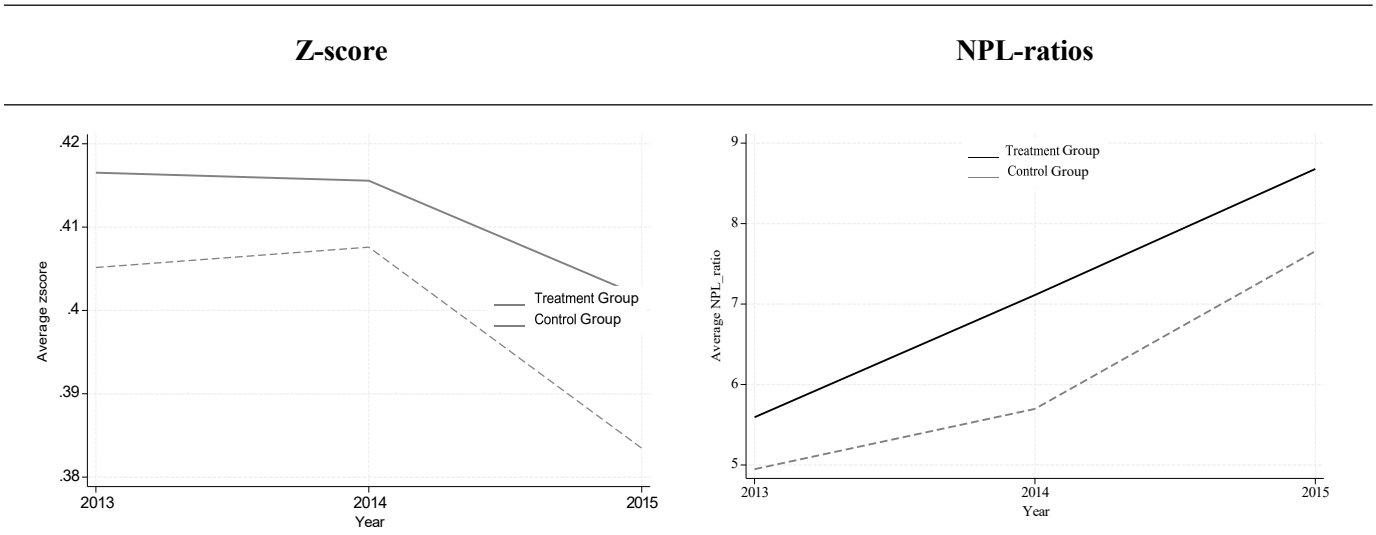


Figure 4: Parallel Trends in Pre-Treatment

Data Sources

This study utilizes data from the Bank Focus database, a comprehensive banking database containing variables for banks and other financial institutions globally. It covers the period from 2013 to 2019, which conveniently aligns with the timeframe of interest for this study. This dataset was employed for computing the risk variables and bank-specific variables used in the analysis. Data on interest rates charged by each commercial bank in Kenya before and after capping were sourced from the CBK. The macroeconomic variables were obtained from the International Monetary Fund's World Economic Outlook.

Sampled Banks

As of 2019, Kenya had about 40 banking institutions, 9 were categorized as large banks, 10 as medium banks, and 21 as small banks based on a weighted composite index (Central Bank of Kenya, 2020). This study sampled 26 banks for the analysis. To ensure a good representation of different categories based on bank size, the study sampled 11 small banks, 7 medium banks, and 8 large banks (Table 3).

Table 3: Kenyan Banks Sampled for the Analysis

	Bank Name	**2019 Market Share Index**	**Peer Category**
1	KCB Bank Kenya Ltd	13.89	Large Banks (Average market Share 8.81)
2	Equity Bank Kenya Ltd	10.24	
3	NCBA Bank Kenya PLC	10.10	
4	The Co-operative Bank of Kenya Ltd	9.65	
5	Diamond Trust Bank Kenya Ltd	7.63	
6	Absa Bank Kenya Plc	6.80	
7	Standard Chartered Bank (K) Ltd	6.37	
8	Stanbic Bank Kenya Ltd	5.78	
9	Bank of Baroda (K) Limited	3.11	Medium Banks (2.04)
10	Prime Bank Ltd	2.59	
11	National Bank of Kenya Ltd	2.19	
12	Citibank N.A. Kenya	2.12	
13	Bank of India	1.56	
14	Ecobank Kenya Ltd	1.42	
15	SBM Bank Kenya Ltd	1.32	
16	Bank of Africa Ltd	0.80	Small Banks (0.42)
17	Victoria Commercial Bank Limited	0.78	
18	Guaranty Trust Bank Limited	0.77	
19	African Banking Corporation Ltd	0.57	
20	Guardian Bank Limited	0.36	
21	UBA Kenya Bank Ltd	0.34	
22	M-Oriental Commercial Bank Ltd	0.31	
23	Paramount Bank Ltd	0.23	
24	Access Bank (Kenya) PLC	0.21	
25	Middle East Bank (K) Ltd	0.18	
26	Jamii Bora Bank	0.12	

Source: (Central Bank of Kenya, 2020)

5. DISCUSSION OF RESULTS

Summary Statistics

Tables 4 and 5 provide the descriptive statistics of the variables used in the analysis. Table 4 offers insights into the full samples (all observations), and further compares the periods before and after the implementation of the capping policy. Table 5 complements the discussion by providing an overview based on bank size, revealing potential variations among small, medium, and large banks.

Table 4 shows that an average commercial bank in Kenya allocates 67.51 percent of its total assets to risky assets, indicating a relatively higher appetite for risk. The mean risk-weighted assets ratio experienced a slight increase post-capping, suggesting a potential impact on banks' overall risk exposure. Table 5 further indicates that large banks exhibit a notably higher mean in the risk-weighted assets ratio (82.52 percent), signalling a higher risk appetite compared to small (58.58 percent) and medium banks (64.17 percent). This implies that larger institutions are more comfortable taking on risk, potentially due to greater resources and diversified portfolios.

The results indicate that a ratio of non-performing loans averaged 12.62 percent of total loans and advances for the full sample and the full analysis period. Table 4 further shows that the NPL ratio exhibited a significant increase post-capping. It more than doubled from an average of 7.05 percent pre-capping to 16.79 post-capping, implying challenges in loan performance influenced by the policy change. However, the higher standard deviation suggests a broader range of strategies adopted by banks in managing non-performing loans post-capping. Furthermore, Small banks show a higher than overall average NPL ratio of 16.97 percent compared to medium banks (13.26 percent) and 6.2 percent for large banks. This finding is further complimented by similar observed patterns in loan loss provisions. The results are plausible, suggesting small banks' challenges in managing NPLs.

The capital adequacy ratio remained relatively stable, with a slight decrease after the capping policy. The standard deviation indicates consistent capital adequacy across banks, suggesting that the policy did not significantly impact capital positions. As indicated in Table 5, Small banks have a lower mean in the CAR, possibly indicating challenges in maintaining capital adequacy. This suggests that smaller banks may face constraints in meeting regulatory capital requirements.

Table 4 indicates that the average ROA slightly decreased post-capping from 1.79 percent to 1.34 percent, indicating potential challenges in maintaining profitability. The increased standard deviation suggests greater variability in returns among banks, reflecting diverse financial performances. Furthermore, Table 5 reveals significant variations in profitability among banks of varied sizes. Large banks show a higher average ROA (3.21 percent), implying better financial performance compared to smaller counterparts. This underscores the scale advantages that larger banks may have in generating returns on their assets.

The average cost-to-income ratio was 68.64 percent, indicating that, on average, banks spend nearly 69 percent of their income on operating costs. During the pre-capping policy period, the ratio was slightly lower at 66.69 percent, however, it increased to 70.1 percent in the post-capping, signalling declining operational efficiency in most banks. In addition, small banks exhibit a notably higher CIR at 89.63 percent, suggesting higher operational expenses compared to medium banks at 59.33 percent, and 49 percent for large banks. Similarly, smaller banks have lower net interest earnings at 5.81 percent compared to medium (5.84 percent) and large banks (8.27 percent). The results indicate that small banks face substantial challenges in effectively managing operational costs than larger banks.

Both mean and standard deviation in the market share index show marginal changes, indicating overall stability in market share among banks before and after the cap. This suggests that the policy change did not significantly alter the competitive landscape of the Kenyan banking industry. However, as expected, large banks exhibit a significantly higher mean in the market share index, indicating greater market dominance. This suggests that larger banks have a more substantial presence in the market, potentially influencing industry dynamics.

Table 4: Descriptive Statistics

	Full Samples (N = 182)				Pre-Capping (N = 78)				Post-Capping (N = 104)			
	Mean	*Min*	*Max*	*SD*	*Mean*	*Min*	*Max*	*SD*	*Mean*	*Min*	*Max*	*SD*
Risk-weighted assets ratio (%)	67.51	1.90	100	21.63	66.48	3.57	97.25	21.05	68.29	1.90	100	22.12
Non-performing loan ratio (%)	12.62	0.00	76.2	14.81	7.05	0.00	27.67	6.11	16.79	0.00	76.2	17.8
Loan loss reserve ratio (%)	11.31	0.18	339.1	30.31	10.88	0.18	339.1	41.19	11.63	0.37	127.47	18.59
Capital Adequacy Ratio (%)	22.93	5.07	47	8.02	23.52	12.70	47	7.65	22.49	5.07	42.6	8.3
Return on Assets (%)	1.53	-15.17	5.57	2.63	1.79	-8.20	5.57	2.57	1.34	-15.17	4.38	2.67
Bank Z-Score	0.41	-0.00	1.39	.3	.41	0.02	1.12	.27	.42	-0.00	1.39	.32
Cost to Income ratio (%)	68.64	16.01	428.84	46.01	66.69	22.47	217.94	38.55	70.1	16.01	428.84	51.03
Net interest margin (%)	6.57	0.19	12.15	2.17	6.66	1.87	12.15	2.3	6.51	0.19	11.66	2.07
Market Share Index (%)	3.36	0.12	14.4	3.79	3.39	0.17	14.1	3.72	3.34	0.12	14.4	3.86
GDP growth (%)	4.55	3.73	5.52	.64	4.49	3.73	4.9	.54	4.59	3.74	5.52	0.70
Number of Banks	42.29	42.00	43	.45	42.67	42.00	43	.47	42	42.00	42	0
Inflation Rate (%)	6.22	4.50	8.01	1.04	7.06	6.02	8.01	.82	5.59	4.50	6.35	.68
Herfindahl-Hirschman Index	665.2	595.76	711.55	35.57	653.1	595.76	711.55	47.59	674.27	662.65	705.88	18.36
Annual lending rate (%)	15.77	11.50	24.6	2.65	17.28	11.90	24.6	2.36	14.64	11.50	22.6	2.27
Cap Intensity	1.27	-3.00	10.1	2.65	2.78	-2.60	10.1	2.36	0.14	-3.00	8.1	2.27

Table 5: Summary Statistics by Bank Category

	Small Banks (N = 75)				Medium Banks (N = 51)				Large Banks (N = 56)			
	Mean	*Min*	*Max*	*SD*	*Mean*	*Min*	*Max*	*SD*	*Mean*	*Min*	*Max*	*SD*
Risk-weighted assets ratio (%)	58.58	1.90	100	26.41	64.17	36.21	84.38	13.75	82.52	64.24	97.25	8.97
Non-performing loan ratio (%)	16.97	0.00	76.2	17.65	13.26	0.40	64.87	15.69	6.2	1.06	15.36	3.34
Loan loss reserve ratio (%)	18.96	0.18	339.1	44.63	7.97	0.57	79.32	14.71	4.1	1.74	8.49	1.76
Capital Adequacy Ratio (%)	21.72	5.07	39.00	7.08	23.47	8.78	38.4	8.30	24.06	14.40	47.00	8.84
Return on Assets (%)	0.03	-15.17	3.83	3.03	1.9	-4.07	4.38	1.99	3.21	1.90	5.57	0.89
Bank Z-Score	0.39	-0.00	1.12	0.3	0.44	0.03	1.39	0.37	.42	0.18	1.3	0.22
Cost to Income ratio (%)	89.63	40.55	428.84	56.89	59.33	16.01	230.52	40.71	49	37.00	63.25	5.48
Net interest margin (%)	5.81	0.19	9.86	1.87	5.84	0.69	9.66	1.86	8.27	5.03	12.15	1.86
Market Share Index (%)	0.41	0.12	0.99	0.22	2.04	1.07	4.18	0.76	8.51	5.31	14.4	2.49
GDP growth (%)	4.56	3.73	5.52	0.64	4.54	3.73	5.52	0.64	4.55	3.73	5.52	0.64
Number of Banks	42.27	42.00	43	0.45	42.31	42.00	43	0.47	42.29	42.00	43	0.46
Inflation Rate (%)	6.21	4.50	8.01	1.05	6.24	4.50	8.01	1.03	6.22	4.50	8.01	1.04
Herfindahl-Hirschman Index	665.51	595.76	711.55	34.86	664.75	595.76	711.55	37.05	665.2	595.76	711.55	35.8
Annual lending rate (%)	16.18	12.40	24.6	3.01	15.31	11.50	20.5	2.27	15.66	12.60	20.7	2.42
Cap Intensity	1.68	-2.10	10.1	3.01	0.81	-3.00	6	2.27	1.16	-1.90	6.2	2.42

Table 5 reveals variations in interest charges among banks of distinct categories. Small banks had the highest interest rates averaging 16.18 percent per annum compared to 15.31 percent for medium banks and 15.66 percent for large banks. The variation in interest rates could be influenced by several factors, including the size and scale of the bank's operations, their risk profiles, and potentially different lending strategies.

The key explanatory variable for the study is post-capping interest intensity. At the time of capping policy implementation, the interest rate of an average bank was 278 basis points higher than the ceiling rate. This implies that, on average, banks had to lower their interest rates by 278 points to comply with the capping policy. Jamii Bora bank was most impacted, with an average interest rate exceeding the ceiling by 733 basis points. Consequently, this bank had to make a substantial reduction in its interest rate to meet the policy requirements. On the other hand, Citibank N.A. Kenya had a rate of 1.27 points below the ceiling, implying that it was already in compliance with the policy at the time of its implementation (*Figure 4*). The capping policy had varying impacts on different banks, depending on their initial interest rates relative to the ceiling rate. The rest of the empirical findings address the changes in banks' risk-taking behaviour after the implementation of the cap.

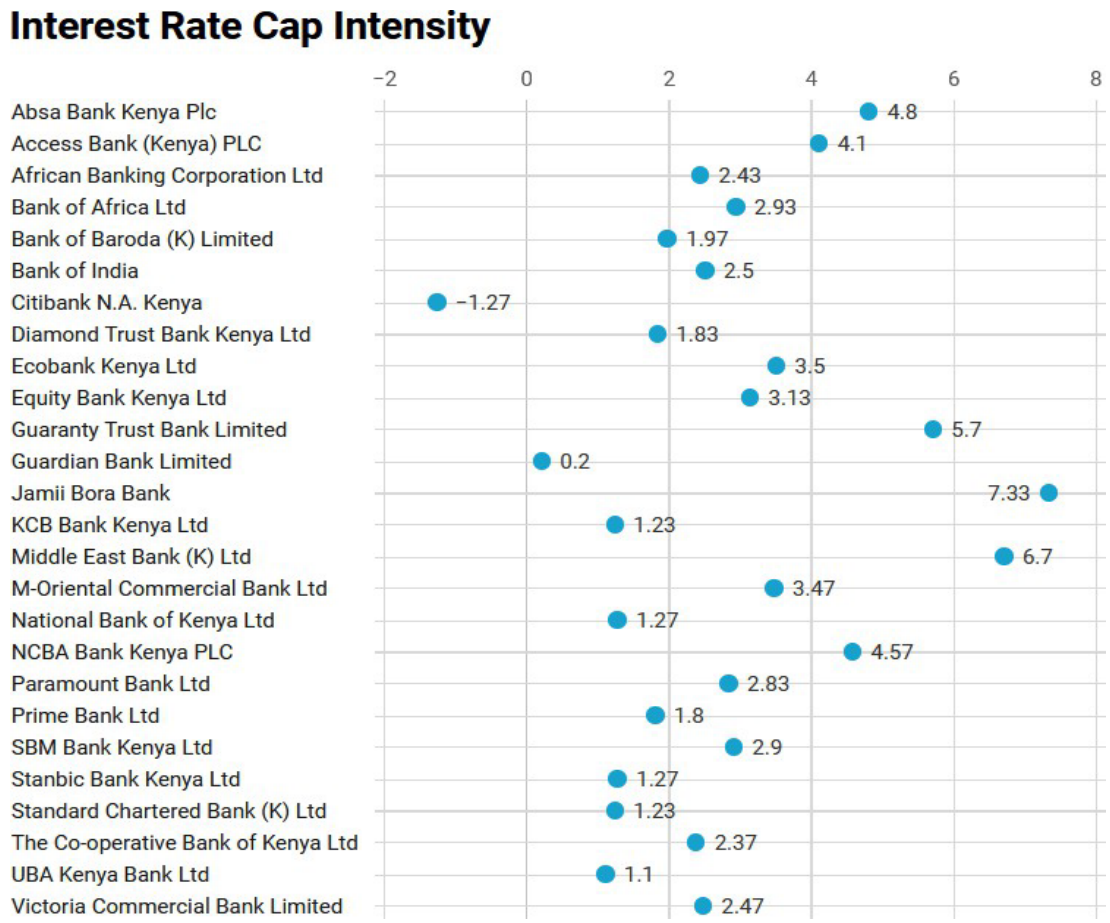


Figure 4: Interest rate capping intensity

5.2 Correlation Analysis

Table 6 presents the results of the Pearson pair-wise correlation analysis of the key variables used in the study. The Bank ZSCORE[1] is positively associated with CAR, ROA, NIM, and SIZE but negatively related to NPL, POST_INTENSITY, CIR, HHI, and GDP. This indicates that stable banks have higher capital stocks, returns on assets, and net interest earnings on assets. In addition, the stability of the bank increases with its market share. Conversely, less efficient banks were more likely to be unstable. More importantly, the results indicate that there are no strong linear associations between all the variables pairs, signalling general independence of each other. The lack of strong correlations is essential for avoiding multicollinearity issues in regression analysis and provides a foundation for a more robust and reliable empirical examination of the specified relationships.

Table 6: Pearson Pair-wise Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ZSCORE	1.00										
(2) NPL	-0.40	1.00									
(3) POST_ INTENSITY	-0.03	0.01	1.00								
(4) CAR	0.45	-0.35	0.01	1.00							
(5) ROA	0.41	-0.45	-0.26	0.16	1.00						
(6) CIR	-0.53	0.43	0.13	-0.26	-0.72	1.00					
(7) NIM	0.21	-0.08	0.03	-0.07	0.48	-0.50	1.00				
(8) SIZE	0.21	-0.18	-0.05	0.02	0.48	-0.32	0.58	1.00			
(9) GDP	-0.02	0.17	-0.29	-0.05	0.03	-0.09	0.00	-0.01	1.00		
(10) INFLATION	0.03	-0.24	0.23	0.05	0.01	-0.06	0.06	0.01	0.09	1.00	
(11) HHI	-0.03	0.09	-0.13	-0.03	0.00	-0.03	0.00	0.02	-0.25	0.08	1.00

Source: Author's estimations

5.3 Empirical Results

The study assessed the role of interest rate capping on banks' risk appetite in Kenya, employing the NPL ratio as the primary proxy for risk-taking behaviour. Table 7 presents the results of the baseline model for NPL. The natural log form of the response variable was used as a remedy for its highly skewed distribution. Three specifications were estimated: (i) random effects, (ii) bank-level fixed effects, and (iii) bank and time fixed effects.

The results indicate consistently positive and significant coefficients for *POST_INTENSITY* across all specifications. The coefficient in column (3), controlling for bank-level and time-fixed effects, indicates that a one-unit increase in the interest rate intensity of the capping policy increased the bank's risk-taking appetite by 7.59 percent, significant at a 5 percent level. The finding signals disproportionate effects of the capping policy on banks' NPLs. The results suggest that banks that initially charged higher interest rates exceeding the cap ceiling rate experienced more pronounced risk-taking post-capping compared to their counterparts. The results concur with the general trend observed in related literature

[1] The higher the Z-score, the lower the likelihood of financial distress.

including Ng'ang'a (2017), Okwany (2017), Njuguna (2018), and Gichuki *et al.* (2019), affirming the notion that interest rate capping is associated with increased risk appetite among commercial banks.

A low-interest environment eases the interest burden for short-term borrowers; thus, it may seem plausible to expect a slight decline in NPLs with interest capping, contradicting this study's findings. However, while the cap might make loans affordable for borrowers, it negatively affects banks' interest income (Gichuki, *et al.,* 2019; Alper, *et al.,* 2020; Cubillos-Rocha, *et al.,* 2021). Most banks tend to change their lending practices to maintain profitability. As argued by Škarica (2014) and Andries *et al.* (2015), interest controls encourage banks to shift towards riskier borrowers or loan products with higher returns to compensate for the reduced interest income. In some cases, lending standards, including screening exercises, are lowered to attract more borrowers. These changes in lending practices contribute to an increase in NPL as banks take on riskier assets. This explains the observed increase in risk-taking associated with the 2016 capping policy in Kenya. This behavioral shift is consistent with the **"search-for-yield" hypothesis**, which suggests that banks respond to income compression by taking on higher-risk clients to preserve margins.

Table 7: Impact of interest rate capping on risk-taking - NPL

	(1)	(2)	(3)
VARIABLES	**Ln(NPL)**	**Ln(NPL)**	**Ln(NPL)**
POST_ INTENSITY	0.0486**	0.0522**	0.0759**
	(0.0230)	(0.0219)	(0.0364)
CAR	-0.0175*	-0.0131	-0.00975
	(0.00911)	(0.0104)	(0.00911)
ROA	-0.0444	-0.0307	-0.0143
	(0.0285)	(0.0238)	(0.0174)
CIR	0.00392***	0.00330**	0.00362***
	(0.00134)	(0.00132)	(0.000907)
NIM	0.0766*	0.0693*	0.0855**
	(0.0412)	(0.0374)	(0.0335)
SIZE	-0.0274	0.0452	0.0619
	(0.0265)	(0.0615)	(0.0514)
HHI	0.00607***	0.00595***	0.00349
	(0.00146)	(0.00149)	(0.00220)
GDP	0.474***	0.476***	0.0243
	(0.0835)	(0.0832)	(0.0310)
INFLATION	-0.302***	-0.308***	-0.955***
	(0.0480)	(0.0472)	(0.140)
Constant	-2.524*	-2.695*	4.851***
	(1.420)	(1.431)	(1.035)
Observations	182	182	182
R-squared	0.452	0.460	0.542
Number of Banks	26	26	26
Bank FE	No	Yes	Yes
Year FE	No	No	Yes

Ln(NPL) denotes the natural log of the NPL ratio. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's estimation

Besides the POST_INTENSITY, the control variables also revealed interesting insights into the Kenyan banking sector. CIR, a proxy for operational efficiency, exhibited a positive relationship with the NPL, statistically significant across all specifications. When controlled for bank-level and time-fixed effects, the results indicate that a unit increase in CIR is associated with a rise in NPL by 0.36 percent. The results suggest that banks with higher operational expenses relative to income experienced a greater increase in their NPL and, thus, higher risk-taking. The positive relationship between CIR and NPL in the Kenyan banking sector aligns with the findings of previous studies by Mohanty *et al.* (2018), Dias (2021), and Msomi (2022), but contrast Andries *et al.* (2015). The negative relationship observed by Andries *et al.* (2015), may be attributed to differences in the specific context and sample of their study as different banking systems and regulatory environments can influence the relationship between operational efficiency and NPLs. This study's findings can be attributed to several factors. Besides internal operational inefficiencies, a high CIR may reflect a higher cost structure for the bank, which can put pressure on its profitability. To maintain profitability, banks may resort to riskier lending practices, such as extending credit to borrowers with weaker credit profiles or relaxing credit standards, such as thorough screening. These riskier loans are more likely to result in non-performing loans, as borrowers may struggle to meet their repayment obligations.

The results further indicate that CAR has a negative relationship with the NPL in column (1). However, its statistical significance diminishes when controlling for bank-fixed effects in column (2) and incorporating time-fixed effects in column (3). Nevertheless, the negative relationship between CAR and NPL suggests that well-capitalized banks face a relatively lower increase in NPLs, hence moderate risk-taking. The coefficient for NIM shows a positive relationship with NPL. This suggests that more profitable banks are highly risk-taking, potentially indicating a willingness to extend credit to riskier borrowers or relax credit standards. Specifically, column (3) of Table 7 indicates that a one-unit increase in net interest margin is associated with an 8.55 percent increase in the bank's risk appetite. The findings are consistent with Amuakwa–Mensah & Boakye–Adjei (2015) but contradict Akter & Roy (2017).

Market concentration, measured by HHI, is positively associated with NPL, indicating that a more concentrated market may contribute to higher risk-taking among Kenyan banks. In essence, the results suggest that a less competitive market environment encourages riskier lending practices among banks to maintain profitability. Several studies provide insights into why a more concentrated market may contribute to higher NPL. For example, Chen *et al.* (2018) found that in a concentrated market, banks face less competition, leading to reduced pressure to maintain strict credit standards and risk management practices. As a result, it leads to more willingness to extend loans to borrowers with weaker credit profiles, increasing the likelihood of NPL. Furthermore, Stiroh (2004) reveal that in concentrated markets, banks have greater market power and pricing ability, which leads to higher interest rates

charged to borrowers, especially those with limited alternatives. As a result, borrowers face difficulties in meeting their loan obligations, increasing the probability of NPL.

Macroeconomic controls also played a crucial role in influencing the risk appetite among Kenyan banks. GDP growth has a positive relationship, suggesting that economic expansion is associated with an increase in the NPL and, thus, more risk-taking. The findings align with the observations by Murumba (2013) in Nigeria. However, the results contradict several other studies, including Tanasković & Jandrić (2015) and Makri *et al.* (2014), that report a negative relationship between GDP and NPL. These studies argue that a growing economy provides individuals and businesses with more resources and opportunities to repay their debts, leading to a decrease in NPL. The contradictory findings in the literature and the observations made in this study suggest that there may be other factors at play in the Kenyan banking sector that influence the relationship between GDP growth and risk appetite. These factors could be specific to the Kenyan context, such as the structure of the banking industry, regulatory frameworks, or the level of competition among banks. The positive relationship between GDP growth and NPL may be influenced by factors such as relaxed lending standards, increased competition among banks, or insufficient risk management practices. These factors may lead Kenyan banks to take on more risk during periods of economic expansion, despite the generally accepted notion that economic growth reduces the risk of debt default. Furthermore, inflation exhibits a negative relationship, indicating that periods of higher inflation are associated with a decline in risk-taking among Kenyan banks.

In summary, the results highlight several key insights on how interest rate capping and other structural factors shape banks' risk-taking behavior in Kenya. The study finds that Kenya's 2016 interest rate capping policy significantly increased banks' risk appetite, particularly among institutions that previously charged higher rates, as evidenced by a 7.59% rise in non-performing loans (NPLs) for each unit increase in cap intensity. This aligns with the search-for-yield hypothesis, suggesting that income compression led banks to take on riskier borrowers to preserve margins. Additionally, operational inefficiency (CIR) and higher profitability (NIM) were positively associated with NPLs, indicating that both cost pressures and stronger earnings can drive risk-taking. Market concentration (HHI) also contributed to higher NPLs, implying that reduced competition may weaken credit discipline. Unexpectedly, GDP growth correlated with increased NPLs—possibly due to procyclical lending—while inflation showed a negative relationship, potentially reflecting improved repayment capacity or credit tightening during high inflation periods. Overall, the findings reveal that interest rate caps may undermine financial stability when not complemented by robust supervisory oversight and risk-sensitive regulation.

Robustness Tests

Alternative risk proxy of risk-taking

Following Samet *et al.* (2018) and Bayar *et al.* (2021), ZSCORE was used as an alternative proxy for banks' risk-taking behaviour for robustness checks. Unlike the NPL, which measures credit risk, ZSCORE measures bank risk from an insolvency perspective. A higher ZSCORE indicates higher stability and, thus, lower risk-taking behaviour. Table 8 presents the results of the ZSCORE regression. The response variable was logged to address its skewed distribution. The focus remains on the *POST_INTENSITY* variable, which serves as a key indicator of the intensity of the interest rate capping policy.

The coefficient in column (3) shows that a unit increase in interest cap intensity was associated with a 7.53 per cent decline in ZSCORE, significant at a 5 percent level. The negative coefficient for *POST_INTENSITY* suggests that banks with higher pre-capping interest rates experienced a more significant decline in their stability, indicating a heightened insolvency risk post-capping. This finding aligns with the notion that interest rate capping may adversely affect the stability of commercial banks, potentially making them more vulnerable to insolvency risks. More importantly, the results are consistent with those of the NPL model, which measures credit risk. Both the ZSCORE and NPL models suggest that the interest rate capping policy increased the risk-taking for Kenyan banks. Therefore, this consistency strengthens the validity of the findings from this study.

Table 8: Effect of interest rate capping on risk appetite - ZSCORE regression

	(1)	(2)	(3)
VARIABLES	**Ln(ZSCORE)**	**Ln(ZSCORE)**	**Ln(ZSCORE)**
POST_ INTENSITY	-0.0139	-0.0161	-0.0753**
	(0.0163)	(0.0154)	(0.0310)
CAR	0.0352***	0.0329***	0.0315***
	(0.00567)	(0.00556)	(0.00554)
ROA	-0.0831***	-0.0899***	-0.0981***
	(0.0155)	(0.0147)	(0.0149)
CIR	-0.000929	-0.000398	-0.000539
	(0.000994)	(0.000958)	(0.000953)
NIM	0.0423	0.0504*	0.0477*
	(0.0263)	(0.0262)	(0.0260)
SIZE	0.0612**	0.0637	0.0616
	(0.0288)	(0.0409)	(0.0406)
HHI	-0.000872	-0.000884	-0.00234
	(0.000690)	(0.000654)	(0.00225)
GDP	-0.0321	-0.0310	0.0359
	(0.0406)	(0.0383)	(0.110)
INFLATION	0.0132	0.0155	0.191
	(0.0232)	(0.0219)	(0.123)
Constant	-1.683***	-1.728***	-2.080

	(0.647)	(0.608)	(2.153)
Observations	182	182	182
R-squared	0.385	0.389	0.418
Number of Banks	26	26	26
Bank FE	No	Yes	Yes
Year FE	No	No	Yes

Ln(ZSCORE) denotes the natural log of the ZSCORE ratio. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's estimation

Alternative Control Variables: Heterogeneous Treatment Effects

To assess the robustness of the main findings and explore heterogeneity in banks' responses to the interest rate regulation, we extended the baseline model by modifying the control variables and introducing interaction terms. This approach helps to examine whether the effect of regulatory intensity varies systematically across banks with different characteristics, particularly bank size.

Banks were grouped into small, medium, and large categories using a weighted market share index. The POST_INTENSITY, our measure of regulatory intensity, was interacted with each of the bank size categories to estimate the effect of interest rate regulation on risk-taking behaviour—measured by the natural logarithm of the non-performing loan (NPL) ratio—within each peer group.

This model estimates the effect of POST_INTENSITY separately for each bank size category by fully interacting it with all groups, without using a reference category. This allows direct interpretation of regulatory impact within each group, avoiding arbitrary baselines and providing clearer insights into heterogeneity. Such transparency is especially useful for policy analysis, enabling a tailored understanding of how different banks respond to regulation.

The results, presented in Table 9, indicate that the coefficients on all three interaction terms are positive. This suggests that interest rate regulation is associated with increased risk-taking across all bank categories. However, the magnitude and statistical significance of the effects vary by size. Medium-sized banks show the largest and most statistically significant increase in risk-taking in response to regulatory intensity, implying that they are more sensitive to interest rate caps compared to both large and small banks. This may reflect their relatively higher exposure to the loan market segments most affected by rate caps, or their more limited ability to absorb regulatory shocks through diversification or strong capital buffers.

The coefficients for large and small banks are also positive, though smaller and less statistically robust. These results underscore the presence of heterogeneity in banks' behavioural responses to regulation and highlight the need for policymakers to consider bank size when evaluating the effects and potential unintended consequences of interest rate controls.

The results in Table 9 indicate that the coefficients for all the interactions are positive, consistent with the findings of the base NPL model in Table 7.

Controlling for CIR, ROA, HHI, GDP, and INFLATION, the interaction terms underscore the importance of considering bank size categories when evaluating the effects of interest rate controls. Interestingly, the results suggest that medium-sized banks in Kenya are more sensitive to such regulatory interventions, experiencing a more pronounced change in their risk-taking behaviour compared to large and small banks.

Table 9: Robustness test – Interaction cap intensity and bank peer category

	(1)	(2)	(3)
VARIABLES	**Ln(NPL)**	**Ln(NPL)**	**Ln(NPL)**
POST_INTENSITY × Large Banks	0.0560*	0.0556	0.0947
	(0.0334)	(0.0330)	(0.0633)
POST_INTENSITY × Medium Banks	0.0926*	0.0969**	0.136*
	(0.0501)	(0.0450)	(0.0766)
POST_INTENSITY × Small Banks	0.0499*	0.0526*	0.0817
	(0.0286)	(0.0293)	(0.0531)
CIR	0.00213**	0.00170*	0.00165
	(0.000950)	(0.000945)	(0.00129)
CAR	-0.0188**	-0.0131	-0.00977
	(0.009	(0.0108)	(0.00918)
	39)		
ROA	-0.0462*	-0.0315	-0.0162
	(0.0277)	(0.0254)	(0.0256)
HHI	0.00599***	0.00604***	0.00350
	(0.00144)	(0.00147)	(0.00374)
GDP	0.470***	0.472***	0.0249
	(0.0850)	(0.0853)	(0.184)
INFLATION	-0.302***	-0.307***	-0.943***
	(0.0499)	(0.0488)	(0.206)
Constant	-1.884	-2.022	5.690
	(1.217)	(1.255)	(3.581)
Observations	182	182	182
R-squared	0.448	0.452	0.530
Number of Banks	26	26	26
Bank FE	No	Yes	Yes
Year FE	No	No	Yes

Ln(NPL) denotes the natural log of the NPL ratio. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's estimation

The role of capital adequacy in influencing the extent and direction of the effect of the relationship between interest capping and risk-taking was also evaluated as part of the robustness tests. This effect was captured as an interaction between cap intensity and capital adequacy ratio (CAR) denoted as *POST_INTENSITY × CAR*. The results of the analysis are in Table 10. The coefficients of POST_*INTENSITY* (positive) and *CAR* (negative) are consistent with the results in Tables 7 and 9. However, the coefficient for the interaction is significant and negative in specifications (1) and (2). The

findings suggest that the impact of the cap on risk-taking is influenced by the banks' capital adequacy. Hence, the effect is less pronounced or mitigated when banks have higher levels of capital adequacy. These banks, due to their stronger capital positions, are better equipped to navigate the challenges posed by stringent interest rate policies.

Table 10: Robustness test – Interaction cap intensity and capital adequacy

VARIABLES	(1) Ln(NPL)	(2) Ln(NPL)	(3) Ln(NPL)
POST_INTENSITY	0.155***	0.151***	0.161**
	(0.0500)	(0.0524)	(0.0736)
CAR	-0.0159*	-0.0123	-0.00951
	(0.00914)	(0.0104)	(0.00900)
POST_INTENSITY × CAR	-0.00412**	-0.00399*	-0.00385
	(0.00209)	(0.00220)	(0.00279)
CIR	0.00464***	0.00379**	0.00374**
	(0.00152)	(0.00145)	(0.00145)
NIM	0.0696*	0.0630*	0.0798*
	(0.0375)	(0.0360)	(0.0427)
SIZE	-0.0351	0.0274	0.0479
	(0.0290)	(0.0643)	(0.0667)
HHI	0.00628***	0.00613***	0.00367
	(0.00149)	(0.00151)	(0.00365)
GDP	0.488***	0.485***	0.0154
	(0.0786)	(0.0779)	(0.179)
INFLATION	-0.307***	-0.311***	-0.969***
	(0.0441)	(0.0442)	(0.198)
Constant	-2.783*	-2.831*	4.904
	(1.460)	(1.445)	(3.518)
Observations	182	182	182
R-squared	0.456	0.461	0.547
Number of Banks	26	26	26
Bank FE	No	Yes	Yes
Year FE	No	No	Yes

Ln(NPL) denotes the natural log of the NPL ratio. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's estimations

The results follow the common trends assumption

To ensure the robustness of the findings, I re-estimated the NPL model while adhering to the common trends assumption. Initially, banks were classified into two groups based on their pre-cap intensity: *"low intensity"* and *"high intensity"*. Banks surpassing the 75th percentile of pre-cap intensity were labelled as *high intensity* (indexed as 1), while those below were classified as *low intensity* (indexed as 0). I reasoned that high-intensity banks would be more susceptible to the effects of the cap compared to their low-intensity counterparts.

Subsequently, I employed a probit model, with the intensity dummy as the response variable, controlling for both bank-level and macroeconomic factors. This approach helped to evaluate the degree of overlap in the distributions of *"low intensity"* and *"high intensity"* banks, known as the common support region. This space ensures that both groups possess comparable characteristics, essential for unbiased estimation.

Observations falling outside the common support region indicate a lack of overlap in covariate distributions between the two bank groups, potentially introducing bias into the estimation of interest rate capping effects. Figure 4 illustrates this common space region for banks based on pre-cap intensity. The vertical dotted lines delineate the minimum threshold of -1.5 points and the maximum of 6 points, providing a clear visual representation of the common support.

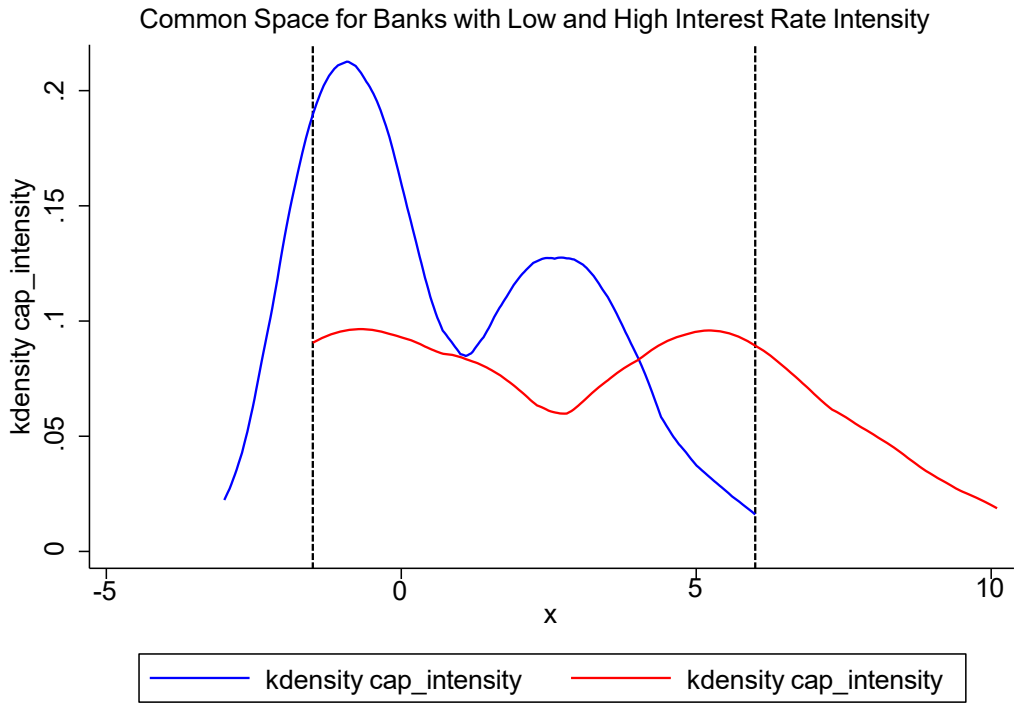


Figure 5: The common support region based on the pre-cap intensity

Based on the analysis, I identified 5 banks that fell outside the common space. Citibank Kenya's intensity fell below the minimum threshold, while Guaranty Bank, Jamii Bora Bank, Middle East Bank, and NCBA exceeded the maximum threshold. To ensure comparability and reduce potential biases, these banks were excluded from further analysis.

The NPL equation was re-estimated, focusing on the remaining banks, and the results are in Table 11. Notably, the coefficient of POST_INTENSITY remains consistently positive and significant across all specifications. This reaffirms our earlier observations from Table 7, indicating that banks with higher cap intensity tended to exhibit greater risk-taking behaviour to sustain profitability.

Table 11: Robustness test – Common trends assumptions

VARIABLES	(1) Ln(NPL)	(2) Ln(NPL)	(3) Ln(NPL)
POST_ INTENSITY	0.0545*	0.0592**	0.116*
	(0.0293)	(0.0270)	(0.0602)
CAR	-0.0125	-0.00747	-0.00553
	(0.0113)	(0.0133)	(0.0122)
ROA	-0.0487	-0.0469	-0.00820
	(0.0453)	(0.0429)	(0.0306)
CIR	0.00270	0.00117	0.00387*
	(0.00262)	(0.00290)	(0.00188)
NIM	0.0673	0.0421	0.0787*
	(0.0415)	(0.0423)	(0.0441)
SIZE	-0.0213	-0.00291	0.0213
	(0.0297)	(0.0906)	(0.0807)
HHI	0.00676***	0.00668***	0.00408
	(0.00170)	(0.00173)	(0.00253)
GDP	0.477***	0.473***	0.00983
	(0.0986)	(0.101)	(0.0335)
INFLATION	-0.322***	-0.321***	-1.029***
	(0.0581)	(0.0593)	(0.179)
Constant	-2.942*	-2.786	5.000***
	(1.665)	(1.717)	(1.163)
Observations	147	147	147
R-squared	0.448	0.452	0.534
Number of Banks	21	21	21
Bank FE	No	Yes	Yes
Year FE	No	No	Yes

Ln(NPL) denotes the natural log of the NPL ratio. Robust standard errors in parentheses
**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's estimations

6. CONCLUSION

This study examines how the imposition of a universal interest rate cap in Kenya influenced banks' risk-taking behaviour amid a persistently low-interest-rate environment. Banks often respond to low returns by shifting towards higher-yield, riskier assets to protect profitability. However, the interest rate cap constrained returns across the board, including for riskier loans, potentially altering banks' incentives and risk profiles.

Using a Difference-in-Differences framework and data from 26 Kenyan commercial banks between 2013 and 2019, this analysis leverages variation in pre-cap interest rate intensity to isolate the cap's effects. The findings demonstrate a significant increase in risk-taking post-cap, as measured by

elevated non-performing loan ratios and reduced z-scores, particularly among medium-sized banks and those with lower capital adequacy. These results are consistent with prior literature highlighting the unintended consequences of price controls on financial stability.

The evidence suggests that the impact of interest rate caps is not uniform but varies by bank characteristics such as size and capitalization. While this might suggest a role for selective or tiered caps, the practical challenges of such a policy are considerable. Differentiated caps would require complex regulatory monitoring and enforcement mechanisms, risk creating market distortions by advantaging some banks over others, and potentially encourage regulatory arbitrage. Moreover, tiered caps risk confusing consumers and undermining confidence in regulatory fairness.

Given these concerns, a more feasible and effective policy approach would be to reconsider the use of interest rate caps altogether. Instead, regulatory authorities should focus on alternative strategies that support financial inclusion and maintain stability without distorting market signals. These may include enhancing risk-based supervisory frameworks, strengthening credit risk management practices, developing targeted credit guarantee schemes for underserved segments, promoting financial literacy, and encouraging innovation in credit assessment technologies.

Finally, the study underscores the importance of an adaptive regulatory framework supported by continuous dialogue between regulators, banks, and other stakeholders. Such engagement is essential to monitor evolving market conditions, identify emerging risks early, and calibrate regulatory interventions dynamically to balance the goals of economic growth, credit access, and financial stability.

In sum, while interest rate caps aim to protect borrowers, their universal application can inadvertently incentivize greater risk-taking by banks. Policymakers should thus exercise caution in implementing or maintaining such caps and instead pursue nuanced, evidence-based approaches to safeguard both the banking sector and broader economic welfare.

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