

Bank Performance and Risk-Taking During Monetary Policy Tightening: Evidence from Nepal

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Abstract: *This study examines the impact of monetary policy tightening on the performance and risk-taking activities of banks in Nepal in the latest form of monetary policy periods based on a study of 2021-2025 quarterly panel data of 20 commercial banks in Nepal with a fixed effect and system generalized method of moments (GMM) analysis. The study has found private banks exhibited more contraction in credits, while public banks experienced worsened asset qualities. Our study clearly found that a large risk-taking channel of the effect of monetary policies prevails in a bank-centered system in Nepal. We observe that while it accomplished its short-run mission of liquidity conditions, it also jacked up costs of accessing credits to vulnerable sectors. We therefore recommend that to mitigate such unwanted spillover impacts of such policies soon, it is important that liquidity facilities and/or credit guarantees be provided as supplementary policies or that differentiated macro-regulations be applied.*

Keywords: monetary policy, bank performance, risk-taking, Nepal, credit distribution, panel data

JEL: E₅₂, G₂₁, G₂₈, G₃₂

I. INTRODUCTION

In imposing a cycle of monetary tightening as a means of combatting inflation or balance of payments pressures, commercial banks serve as a regularity whereby such desires are channeled into the economic activities of a country. Nevertheless, it is a fact that our understanding of the way such commercial banks respond while a tightening cycle is being implemented is inadequate, including in emerging countries such as those in South Asia. Nepal Rastra Bank (NRB) launched debatably one of the sharpest monetary policy tightening sprees in its history for 2021–2025 (NRB, 2024, Adhikari et al., 2026). Reasons

for such multiple NRB tightening measures include a rising inflation path that touched 8.1% in 2022, as well as challenges to its foreign exchange reserves that are vulnerable to market changes. Another reason was that it needs to keep its link to Indian Rupees as a new trend in global monetary tightening arrangements. This aggressive tightening cycle of NRB naturally offers a unique setting to study its results and impacts on commercial bankers in an advanced country in meeting all its objectives related to regulatory mandates, profit margins, as well as its overall credit risks.

Most of the current research regarding the bank lending channel and the risk-taking channel of monetary policy has focused on either advanced economy (Borio & Zhu, 2012; Jiménez et al., 2014) or relatively large emerging markets (Aysan et al., 2018; Nguyen et al., 2022, Kandel, 2025). Nevertheless, it is pertinent to note that in Nepal's particular setting, one might experience various modifications in traditional channels of transmission with possible intended as well as unintended outcomes. First, banking is highly regulated in Nepal, and banking regulations include strict guidelines related to mandated sectors of lending, whereby at least 25% of total lending is supposed to be in priority sectors such as agriculture, energy, and MCSMEs. Second, the high concentration of the banking sector, where the largest five banks out of 20 holds about 45% of total assets in Nepal's banking, security, and insurance systems, may lead to varying policy responses. Finally, Nepal's fixed exchange rate with India may lead to a different set of external transmission channels than those that a currency with a floating exchange rate would experience.

The current study overcomes important research gaps of monetary policy transition, outcomes of economic behavior and endogeneity concern. The objectives of this study are three-fold: first, to evaluate the effect that the tightening of monetary policy has upon bank liquidity, capital adequacy, and asset quality; second, to investigate the changing levels of risk behavior and credit allocation between agriculture, hydropower, and MCSME; and third, to determine whether there is any variation among the different types of ownership and business models of commercial banks. Evidence is provided through the application of fixed effects and system GMM using quarterly data across 20 commercial banks and will provide sound empirical support for central bank policy and regulatory frameworks in developing countries similar to those described herein.

II. LITERATURE REVIEW

Theoretical foundations. Theories that form a foundation for the impacts of a monetary policy using banking channels include two basic processes that take place through either “the bank lending channel and the risk-taking channel.” First, it was actually “Bernanke and Blinder (1988) that first described the bank lending channel” in an examination of “the responses of lending behavior to changes in reserve requirement or costs of funds.” Alternatively, when a country's central bank carries out a contractionary monetary policy, it will affect banks in a manner that makes them less likely to offer loans, specifically to non-transparent firms that have limited sources within which to finance their activities aside from through banking channels (Adrian & Liang, 2018).

The risk-taking channel is described in greater detail in Borio and Zhu (2012), Dell’Ariccia and Marquez (2024), and BIS (2024). Also, Dell’Ariccia et al. (2023) is a multi-faceted concept and involves several aspects including (1) asset value channels, whereby higher interest rates decrease value, as well as increased perceptions of risk; (2) search-for-yield behavior, whereby a bank either holds assets with higher risk because of the desire to capitalize off a low-interest rate environment, though this is more vulnerable when trimming rates, or because of a decrease in yield spread, whereby higher-risk assets are sought out by a bank as it attempts to capitalize off of a low rate environment, though in a tightening cycle, it is more vulnerable when trimming rates because of a possible decrease in yield spread); and (3) risk perceptions channels, whereby a prolonged low rate cycle allows an individual or a bank’s perception of risk. Beside these, the balance sheet channel as described in (Bernanke & Gertler, 1995) outlines how changes in interest rates caused by monetary policies directly influence the value of borrowers’ wealth and collaterals based upon assessment of risks by banks. The regulatory capital channel (Van den Heuvel, 2002) states that capital-constrained banks may respond to monetary shocks differentially based on regulatory capital requirements (Chen & So, 2023).

Empirical evidence from advanced economies. Research in developed economies demonstrates there is strong evidence of the transmission of monetary policy via banking systems. For instance, Jiménez et al. (2014) describe how, based on Spanish credit register data, tighter monetary policy decreased loan approval rates and increased defaults on loans, with effects primarily for banks with lower capital ratios. In addition, Ioannidou et al. (2015) found that lower short-term rates led banks to credibly lend to borrowers at risk of default, providing evidence for the risk-taking channel hypothesis (Rodrigues et al., 2023).

The global financial crisis from 2007 to 2009 resulted in a renewed interest in policy transmission through bank heterogeneity. Gambacorta and Marques-Ibanez (2011) found that weaker capital positions and a higher reliance on the wholesale funding markets showed greater contraction in lending during a tightening in monetary conditions. This finding is consistent with the literature in the “bank capital channel,” which focuses on the interaction between regulatory capital adequacy and monetary policy. In terms of bank performance, Altunbas et al. (2010) showed capital adequacy norms are associated with net interest margins compressing during periods of low interest rates for long durations of time but promote risk-taking, which is often subsequently recognized as losses, temporarily creating higher levels of profitability. In terms of tightening cycles, they shortly capture improvements in margins, but they increase provisioning to an asset’s material degrading quality (Segev et al., 2024).

Evidence from emerging and developing economies. The transmission mechanisms in emerging economies have unique characteristics arising from differences in financial systems and structures. Aysan et al. (2018) found evidence that monetary policy shocks in Turkey have asymmetric effects across banks. Loans by state-owned banks were based on counter-cyclical patterns, while loans by private banks remained at a constant rate. This is

crucial in identifying the role of ownership in implementing policies and is highly relevant in Nepal's partially owned banking system (IMF, 2024).

In South Asia, Khundrakpam and Jain (2012) found that in India, the transmission of monetary policy was nearly purely through a bank lending channel in which public sector banks were less sensitive to changes in the policy rate. Similarly, in Pakistan, Chen et al. (2017) showed that a higher buffer of liquidity in banks was related to an ability to insulate lending against a contraction in money (Duy et al., 2021; Allen & Saunders, 2004). Very few studies have been carried out specifically in the emerging economies of the Himalayan region, although related studies do exist. For instance, Zahid et al. (2021) found that in Bhutan (a country that also maintains a fixed exchange rate system) the transmission of a monetary system is carried out through credit and asset price changes, as opposed to interest rate changes.

Sectoral credit distribution and priority lending. Current research trends also include studies that examine the pass-through of monetary policies to the allocation of credits in various sectors of an economy. For instance, Beck et al. (2014) establish that contractionary monetary policies have a major effect on small to medium enterprises because such enterprises receive credits from commercial banks and have limited collaterals. This new pattern of credit distribution carries immense significance in terms of addressing issues of inclusivity.

This is because in countries such as India and Nepal, which have lending programs in priority sectors, the implications become more complex. Thamae et al. (2022) argue that in India, when banks face a contractionary monetary stance, they satisfy their lending target in a way that is described as “creative compliance,” including a re-categorization of loans or lending to a less risky group in priority sectors. In this scenario, although it is beneficial that loans are sectorized in a manner that presents data for lenders, it does not present an entire picture of credit provision for its intended recipients (Claessens & Coleman, 2023).

The Nepalese context: existing evidence and gaps. Nonetheless, despite its scarcity, publications related to the banking sector in Nepal have been growing steadily. Paudel (2022) highlighted research carried out pertaining to interest rate pass-through in Nepal, concluding that it experienced incomplete pass-through and a lag effect in its lending rates. Rayamajhi and Bhandari (2024) also scrutinized the variables that influenced bank profitability in Nepal, although they failed to concentrate specifically on interactions of monetary policies (as concluded in Khatiwada & Koirala, 2023; Altunbas et al., 2010).

A crucial research gap in this area is understanding how a Nepal regulatory framework impacts its conventional transmission channel, partly because of priority lending and liquidity criteria. Also, Nepal's fixed exchange rate regime in relation to India, as well as its independent monetary policies, indicate a distinct setting that has not been analyzed before (Khatiwada & Koirala, 2023). Moreover, the cycle of tightening that is to start from 2021 - 2025 offers a unique setting that can address such gaps. This is because previous research in Nepal has been carried out through annual data or performance measures, at

best without considering the element of risk-taking. This study is unique in that it will use high-frequency data that is quarterly to analyze data related to performance as well as risk-taking.

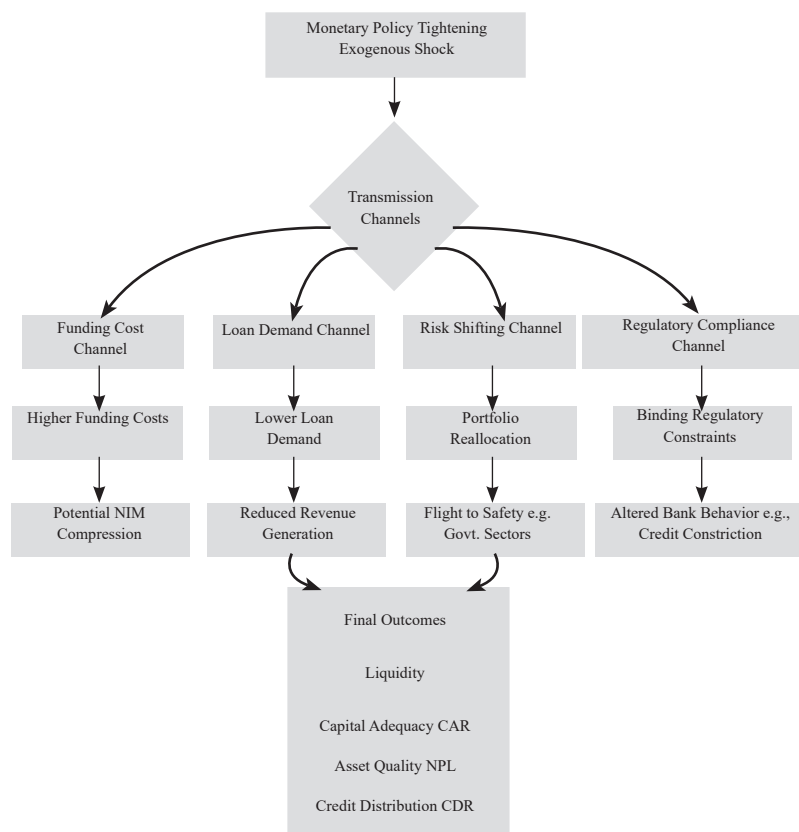
Problem from existing gap. Monetary policy tightening influences bank performance and risk taking via liquidity, funding cost, credit demand, and regulation. There have been very few researches in Nepal that studied the impacts of tightening monetary policy on the bank performance and risk taking of various banks. Hence, this research seeks to find out the effects of monetary policy tightening on Nepalese banks.

Objectives from the problem. The primary purpose of the research is to study the effects of monetary policy tightening on bank performance and risk taking in Nepal. More specifically, it seeks to determine its effects on bank performance, transmission mechanism, risk taking, and comparison between different bank groups.

Conceptual framework

Figure 1

Conceptual Framework of Monetary Policy Transmission through the Banking Sector



Hypothesis

- H1: MP tightening (base rate) has a positive and significant effect on banks' net liquidity.
 H2: MP tightening has no statistically significant effect on banks' capital adequacy ratio (CAR).
 H3: MP tightening increases banks' non-performing loans (NPL).
 H4: MP tightening significantly reduces banks' credit-to-deposit (CD) ratio.
 H5: Lagged non-performing loans have a positive and significant effect on current NPL.

III. RESEARCH METHODOLOGY

Research design and empirical strategy. This study uses quantitative panel data analysis interpretation (Baltagi, 2021). The major research strategy in this research study is a dynamic panel data analysis that examines the relationship between monetary policy tightening and banking performance indicators in Nepal in 2021–2025.

Data collection. This study has used secondary data from sources such as NRB supervision report and quarterly financials, annual reports of individual commercial banks.

Sample construction. This study's sample is comprised of 20 commercial banks that have been in continuous operation in Nepal from 2021-Q2 to 2025-Q2, thereby forming an unbalanced panel data set of 340 observations per bank. Overall, this sample covers 100% of assets in Nepal's banking sector. The sample consists of all licensed commercial banks that operated successively during the study period, provided complete quarterly reporting to NRB, and maintained a minimum asset balance of Rs. 50 billion throughout sampling time.

Data quality assurance. Several procedures were implemented for data quality assurance that include cross-validation between NRB reports and bank financial statements. We also conduct logical consistency checks for accounting identities. Missing data was treated using listwise deletion.

Table 1*Variable construction and measurement*

Section	Variable Type/ Indicator	Variable Name	Measurement/Formula	Description/Notes
Dependent Variables	Bank Performance Indicators	Liquidity Position	Net Liquidity Ratio = (Net Liquid Assets / Total Deposits) × 100	It measures the ability of banks to meet short-term obligations.
		Capital Adequacy	CAR = (Total Capital / Risk-Weighted Assets) × 100	The statement reflects the financial soundness and stability of the bank.
		Asset Quality	NPL Ratio = (Non-Performing Loans / Total Loans) × 100	It indicates the proportion of loans that are not generating income.
	Risk-Taking and Credit Distribution	Credit Growth	CD Ratio = (Total Loans / Total Deposits) × 100	The article captures the aggressiveness of banks in loan disbursement.
		Sectoral Allocation	Share of Agriculture, Hydropower, and MCSME Loans in Total Loans (%)	It reflects the distribution of credit across productive sectors.
Independent Variables	Monetary Policy Measures	Base Rate	Weighted average base rate across sampled banks	The figure represents the cost of lending and monetary stance.
		Policy Stance Dummy	Binary: 1 if Base Rate > 9%, 0 otherwise.	It distinguishes between tight and loose monetary policy phases.
	Bank-Level Controls	Bank Size	Natural logarithm of total deposits	Each bank has controls for the scale of operations.
		Profitability Margin	Net interest spread	It indicates earnings from core banking operations.
		Efficiency Ratio	Operating expenses/total income	The system measures operational efficiency; lower ratios indicate better performance.
Instrumental Variables	External Instrument	India's Repo Rate	The official policy rate of the Reserve Bank of India	It is used as an exogenous instrument, correlated with Nepal's monetary policy.
	Internal Instruments	Lagged Variables	Lagged endogenous variables in GMM estimation	It is used to address potential endogeneity and reverse causality.

Empirical models: Baseline fixed effects model. The primary specification employs a two-way fixed effects model:

$$Y_{it} = \alpha_i + \gamma_t + \beta_1 MP_t + \beta_2 X_{it} + \beta_3 Z_t + \epsilon_{it}$$

Where: y_{it} : performance or risk-taking indicator for bank i in quarter t , α_i : bank-specific fixed effects, γ_t : time-specific fixed effects, MP_t : monetary policy indicator (base rate), X_{it} : bank-level control variables, Z_t : macroeconomic controls, ϵ_{it} : error term.

Dynamic panel model (System GMM). To address dynamic persistence and endogeneity:

$$Y_{it} = \rho Y_{it-1} + \beta_1 MP_t + \beta_2 X_{it} + \alpha_i + \epsilon_{it}$$

The estimation was performed using the Blundell and Bond (1998) system GMM estimator, which incorporates specific moment conditions. Equation in differences: Instrumented with lagged levels of endogenous variables. Equation in levels: Instrumented with lagged differences in endogenous variables.

Heterogeneity analysis. Interaction models to examine differential effects.

$$Y_{it} = \alpha_i + \gamma_t + \beta_1 MP_{t-1} + \beta_2 (MP_t \times Group_i) + \beta_3 X_{it} + \epsilon_{it}$$

Where, $Group_i$ represents bank categories (public/private, size quartiles, specialization).

Estimation procedure: Preliminary analysis. We carried out a thorough and initial analysis to ensure the correctness of the data and the adequacy of the model specification. First, we proceeded to conduct descriptive statistics and distributional analysis of all variables. This was followed by an examination of correlations through pairwise correlations and variance inflation factor (VIF) of regressors to establish possible multicollinearity. Finally, we carried out unit root tests using ADF and Im-Pesaran-Shin (IPS) tests. This is to establish the integration status of data in order to circumvent a spurious regression relationship.

Main estimation sequence. To yield robust and trustworthy findings, a sequential estimation strategy was applied in the empirical analysis. In this strategy, a Pooled Ordinary Least Squares (POLS) estimator was first applied to establish a baseline or a focal point of possible evidence of a relationship, whereby we noted at this stage that this estimate was likely biased by unobserved heterogeneity. Subsequently, to commence our causal identification procedure, a two-way Fixed Effects (FE) model was applied, which allows us to control unobservable, fixed banking characteristics as well as common trends that affect all units in a broad manner. To examine whether a fixed or a random specification is more reasonable for our data, a Random Effects (RE) model was also applied, whereby determining the consistency and efficiency of our estimates in both models, a Hausman test was also conducted. Finally, to control possible endogeneity caused by overall persistence in bank performance data, a GMM system estimator was also utilized that incorporates internal moment methods.

Robustness checks. To make sure that our findings were robust, we conducted several robust checks. We considered alternative definitions of variables as well as different functional specifications to understand how our findings were affected by our variable definitions. We also conducted sub-sample analysis with data divided according to banking

ownership and business size to understand differences in results. Another robustness check involved re-modeling our study while including lagged independent variables to take care of reverse causality issues. Finally, we tested our findings against periods that may have influenced our findings in a unique manner by specifically identifying periods within the COVID-19 transition era that may have been acting as a confounding factor in our analysis.

Identification strategy: Addressing endogeneity concerns. The identification strategy addresses several sources of endogeneity. It accounts for reverse causality using lagged monetary policy variables, GMM estimation system with internal instruments, and Granger causality tests. It avoids omitted variable bias by using bank fixed effects to capture any time-invariant heterogeneity, time fixed effects to capture common macroeconomic shocks, and a rich set of bank-level covariates. It accounts for selection bias by constructing a balanced panel, when possible, and analyzing patterns of attrition.

Diagnostic testing. To test model robustness, a broad range of diagnostic tests were performed. Model specification was tested with the use of F-test fixed effects versus POLS), the Hausman test (fixed versus random effects), and the RESET test for functional form. In the case of the dynamic panel models, the Arellano and Bond (1991) test was used to test for autocorrelation, while the Hansen J-test and the Difference-in-Hansen tests tested the instrument set. In this study, we employed several residual tests, including the Breusch-Pagan test to check for heteroskedasticity and the Wooldridge (2010) test to assess serial correlation. We also used robust standard errors whenever the underlying assumptions were not met.

Ethical considerations. We are confident that we have adhered to high standards of ethics in our study by using only publicly available data, which is in an aggregated form so that individual banks have not been identified, and by being transparent in our methods.

IV. RESULTS AND DISCUSSION

Table 2

Summary of descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Performance Indicators				
Net Liquidity (%)	27.45	6.32	15.44	47.36
CAR (%)	13.42	1.35	10.16	23.31
NPL (%)	2.67	1.89	0.11	7.68
Risk-Taking Indicators				
CD Ratio (%)	82.15	7.24	60.39	99.69
Agriculture Lending (%)	14.21	7.85	6.26	41.49
MCSME Lending (%)	12.89	8.12	0.57	40.91
Policy Variables				
Base Rate (%)	8.12	1.87	5.02	11.73
Spread (%)	3.94	0.52	2.28	5.20

Note: Calculation through Eviews. 18

From Table 2, the overall statistics of the Nepalese banking system have been quite stable and compliant with standards in terms of regulatory criteria within the 2021-2025 period. From a key performance analysis, average banks have enjoyed healthy margins, boasting a net liquidity of 27.45% and a capital adequacy ratio of 13.42%, well above regulatory measures. Nonetheless, large disparities have been noted across banking entities, specifically in terms of their risk appetites. On average, their credit-to-deposit ratio was a prudent 82.15%, while their overall nonperforming loan metrics stood at a 2.67%, hiding large disparities in terms of banking entities' asset qualities, specifically at a 7.68% asset quality ratio in some banking firms. An important observation is that none of them have been able to meet overall lending criteria; while agricultural loans have justly exceeded overall banking quotas, those in micro, small, and medium enterprises remain at a meager 12.89%, specifically falling short of the overall regulatory requirement of 15%. This clearly points out that a large possession effect conceivably prevails in such a situation. Furthermore, a large variability in terms of its base rate of 11.73 and 5.02 well encapsulates the overall trend of its entire cycle and clearly marks a supportive foundation of its subsequent assessments in terms of microeconomic performance within a banking system.

Table 3
Impact of monetary tightening on bank performance

Components	(1) Net Liquidity	(2) CAR	(3) NPL	(4) CD Ratio
Base Rate	1.24** (0.52)	0.08 (0.12)	0.31** (0.14)	-2.15*** (0.63)
Bank Size	0.87 (0.74)	0.23 (0.19)	-0.18 (0.22)	-1.02 (0.89)
Spread	-0.45 (0.68)	0.12 (0.15)	-0.09 (0.17)	0.78 (0.82)
NPL (t-1)	-	-	0.42*** (0.08)	-
Observations	335	335	335	335
R-squared	0.38	0.22	0.45	0.41
Bank FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Note: Calculation through Eviews-18; Standard errors in parentheses; * p<0.01, ** p<0.05, * Significance level p<0.1**

Table 3 above highlights the results of a regression analysis carried out to establish the effect of monetary tightening in relation to performance metric 1, which is calculated as a balance of net liquidity between loans and deposits at a one percent increase in the base rate. From the table, a one percent increase in the base rate increased performance metric 1 by 1.24 percentage points. Tightening also restrained the expansion of credit, which meant that the Credit-to-Deposit Ratio fell 2.15 percentage points for every 1+ increase in the base rate. However, banks lost asset quality at the same time, as the same increase in interest rate increased non-performing loans by 0.31 percentage points as tighter policy increased credit stress. Capital adequacy ratios did not decline, which indicated that banks

were able to maintain their capital buffer despite the monetary pressure. The models exhibit adequacy in their explanatory power, particularly due to R-squared values of 0.45 for non-performing loans and 0.41 for credit-to-deposit ratios. Since the models include both bank fixed effects and time fixed effects, they effectively control unobserved heterogeneity and common shocks.

From the empirical findings of Table 3, five hypotheses are proposed and validated as follows. Firstly, H1 states that monetary policy tightening (Base Rate) significantly influences bank net liquidity positively and this hypothesis is proved with a significant value of 1.24. Secondly, H2 hypothesizes that monetary policy tightening does not influence capital adequacy ratio (CAR) and this hypothesis is proved to be valid with an insignificant coefficient value of 0.08. Thirdly, H3 asserts that monetary policy tightening influences non-performing loans (NPL) and this is proven with a positive and significant value of 0.31 at the 5% level. Fourthly, H4 claims that monetary policy tightening significantly decreases the credit-to-deposit (CD) ratio, and this is strongly proved with a significant value of -2.15 at the 1% level. Lastly, H5 claims that lagged NPL influences present NPL positively and this is also verified with a significant value of 0.42 at the 1% level. Bank size and spread remain statistically insignificant across models.

Table 4
Impact on sectoral credit distribution

Components	(1) Agriculture	(2) Hydropower	(3) MCSME
Base Rate	-0.28 (0.23)	0.12 (0.15)	-1.24** (0.51)
Bank Size	0.34 (0.32)	0.18 (0.21)	0.67 (0.72)
NPL	-0.19* (0.10)	-0.08 (0.07)	-0.38** (0.17)
CAR	0.11 (0.14)	0.07 (0.09)	0.12 (0.29)
Observations	335	335	335
R-squared	0.28	0.19	0.34
Bank FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes

Note: Calculation through Eviews-18

Table 4 shows a disproportionately negative effect of monetary tightening on Micro, Cottage, Small, and Medium Enterprises (MCSMEs). For example, a 1% rise in the base rate causes a statistically significant reduction of 1.24 percentage points in MCSME's share in total credit, indicating that the contraction of credit occurs in the most vulnerable sector. Conversely, the impact of a 1% increase in the base rate on agriculture and hydropower lending is statistically insignificant, suggesting that these sectors are to some extent insulated from credit constriction, with hydropower lending showing a slight positive coefficient, which may correspond with its priority sector and long-term nature. Further, a rise in

non-performing loans (NPL) also leads to a statistically significant decrease in lending to agriculture and MCSMEs, suggesting a clear risk-off effect where banks withdraw credit to perceived riskier sectors when asset quality deteriorates. Overall, these results imply that monetary policy transmission mechanisms in Nepal have distributional consequences, where the least financially secure segment of MCSMEs has more constrained access to credit.

Table 5
System GMM estimates

Components	(1) MCSME	(2) NPL	(3) CD Ratio
Lagged Dep. Var.	0.65*** (0.07)	0.42*** (0.08)	0.58*** (0.09)
Base Rate	-1.08** (0.43)	0.28** (0.12)	-1.89*** (0.58)
Bank Size	0.52 (0.61)	-0.15 (0.19)	-0.87 (0.74)
NPL	-0.29** (0.14)	-	-0.34* (0.18)
Observations	320	320	320
AR (1) p-value	0.023	0.017	0.028
AR (2) p-value	0.342	0.295	0.387
Hansen p-value	0.156	0.234	0.189

Note: Calculation through eviews-18

The findings from the system GMM estimation in Table 5, which appropriately addresses endogeneity and persistence of bank behavior, confirm and enhance the main findings of this study. The highly significant lagged dependent variables (0.42 to 0.65) validate the dynamic model specification and indicate that bank performance and credit distribution are influenced by their respective past values. Controlling for this persistence, it is also important to note that monetary tightening, as represented by the base rate, has an important negative impact: specifically, increasing the base rate by 1% reduces MCSME lending by 1.08 percentage points and the CD ratio by 1.89 percentage points while increasing NPLs by 0.28 percentage points. Moreover, as an important diagnostic test, it is reassuring that the output is valid, as it produces significant AR (1) and non-significant AR (2) p-values (indicating that there is no error term serial correlation) and Hansen test statistic values that indicate the validity of both instruments. This is an indication that it is not just credit that is being constrained by the tightening of monetary policies. Rather, small businesses are also being affected adversely in comparison, while the quality of bank assets is also being adversely affected.

Table 6*Heterogeneity results by bank type*

Components	Public Banks	Private Banks	Development Banks
MCSME - Base Rate	-0.89* (0.48)	-1.42*** (0.42)	-0.67 (0.71)
NPL - Base Rate	0.45** (0.18)	0.22* (0.12)	0.38 (0.24)
Liquidity - Base Rate	0.87 (0.67)	1.35** (0.53)	1.08 (0.82)
Observations	85	200	55

Note: Calculation through Eviews-18

From Table 6, analysis of heterogeneity indicates many differences in how different types of banking institutions respond to a tightening of funds in three categories. In terms of responsiveness, private banking institutions recorded the highest degree of responsiveness in terms of a large and statistically significant decline in MCSME loans of -1.42%, followed by a lower degree of responsiveness of -0.89% in public banking institutions. Development banking institutions recorded the lowest responsiveness. Worth noticing is that public banking institutions recorded a higher degree of challenges in terms of asset qualities as seen from a marked escalation in non-performing loans of 0.45%. Also, private banking institutions recorded a higher degree of initial responsiveness in terms of liquidity accrual of 1.35%, thus a cautious manner of handling liquidity.

Bank performance during tightening. The results indicate that monetary restrictive policies have a two-fold effect on bank performance. First, the significant positive relationship between base rate and net liquidity suggests that the central bank's monetary policy, specifically NRB's, has been effective in draining excess liquidity in the banking system, in line with the traditional liquidity effect hypothesis (BIS, 2024). This means that the interest rate channel of monetary transmission was also operational within this period. Contrary to expectations, a weak positive relationship with car ratios suggests that Nepali commercial banks have managed to maintain adequate reserves of their own capital even when their profits were affected adversely by the strict measures of the nation's monetary policies. This is in line with Dell'Araccia et al. (2023) that Dell'Araccia et al. (2022) stressed that commercial banks in developing countries have tended to maintain adequate reserves of their own capital even after strict monetary policies. On a negative note, a strong positive relationship with NPLs clearly indicates that the overall asset quality of Nepali commercial banks has been deteriorating in line with asset-quality channels of contractionary effect that reveal an inherent weakness in credit performance, particularly of marginally classified sectors of society (Jiménez et al., 2014; IMF, 2024).

Risk-taking and credit distribution. Sectoral analysis provides valuable information in terms of understanding impacts of monetary policies. For example, a strong negative relationship with MCSME lending clearly identifies that vulnerable sectors get affected by credit contraction in periods of slow economic conditions, a phenomenon that we have

witnessed in emerging countries (Duy et al., 2021). This is in line with a presumption that as banking conditions get tougher, lenders get constrained in financing sectors of the economy that are either assessed as vulnerable or lack clear assessment, as presented in a study by Borio and Zhu (2012). Though financing of sectors such as hydropower is quite steady as it is supported by governments, though it is a separate phenomenon, MCSME financing is more diverse in its impacts across sectors. This contrasts with financing of hydropower sectors because of its identified priority status that is usually accompanied by projects involving long-term infrastructure that come with their own financing terms, as evidenced in recent views concerning financing of green sectors (BIS, 2023). This presents an imperative need in understanding that differences in lender behavior over a period of several years also give us valuable pieces of evidence that identify crucial structure and related policies in determining our understanding of impacts of monetary transmission channels.

Dynamic effects and persistence. Based on estimates from the System GMM, banking behavior is highly persistent in terms of its trends over a period. This is clear because of the significance of the lagged variables in all the equations, because of which banking activities and related credit distribution have a high degree of inertia. This is an important factor in recognizing path dependence when it comes to research related to monetary policies (Rodrigues et al., 2023). This inertia basically means that it is possible that the effect of a change in monetary policies will continue long after the initial tightening cycle because of a feed-back component related to banking balance sheets.

Heterogeneity in responses. Some interesting differences in responses emerge across different banking types. For instance, private banks have been more sensitive in reducing lending to MCSMEs and have been proactive in increasing funding liquidity. This action can be explained by their profit-oriented mentality and increased consciousness of market signals pertaining to liquidity, supported by previous studies in terms of ownership of banks and risk-taking in emerging economies (Aysan et al., 2018). In contrast, public banks have been less sensitive in terms of credit extension but have been sensitive to non-performing loans. This indicates that they have been driven by social motives and perhaps do not have as tough a budget constraint as their private counterparts, supported by findings related to partially owned banking institutions (Khatiwada & Koirala, 2023; Claessens & Coleman, 2023).

From the given four points of discussions and from the results of hypothesis, monetary policy tightening (base rate) has been found to have a highly significant impact on bank liquidity and non-performing loans, along with lowering the CD ratio Dell'Ariccia et al. (2023). However, the impact of monetary policy on capital adequacy ratio is not found to be statistically significant. In addition, there is evidence of high persistence in credit risk via lagged NPL.

V. CONCLUSION AND IMPLICATIONS

The results obtained by this study offer empirical evidence of the effects of contractionary monetary policy on the performance of Nepal's banking sector from the period 2021 to 2025. First of all, the findings prove that the base rate has a distinctive and significant effect on the variables considered, since it positively affects the net liquidity and the amount of non-performing loans and reduces credit-to-deposit ratio. Secondly, it is important to mention that there was no statistically significant impact on the capital adequacy ratio in the case study area, which implies that bank capital remains rather unaffected under the impact of monetary conditions. In addition, strong persistence in credit risk was discovered; hence, previous non-performing loans significantly affect current NPLs. Summing up, the results imply that monetary policy implementation and its transmission in Nepal occurs via the liquidity channel, the credit channel, and the risk-taking channel. Although Nepal Rastra Bank has been rather successful in regulating and managing liquidity in the banking sector, the implemented contractionary policy has also led to credit contraction and increased credit risks. In addition, it should be stressed that the contractionary policy affects the banking sector in Nepal differently, based on the type of bank

Policy implications. Targeted Liquidity Facilities: Targeted liquidity facilities or even refinancing windows for specific sectors need to be considered by NRB. For instance, NRB needs to introduce priority sector long-term repo facilities (PLTROs) in the banking system that will provide funds to banks/financial institutions based on their priority sector assets in terms of MCSME and agricultural sectors. This will ensure that facilities pertaining to priority sectors get managed in a manner that is distinct from market loans or overall monetary policies and at a stage when overall demand is managed while overall macroeconomic objectives such as inflation or price stability remain unaltered. Dynamic Provisioning Framework: By making provisioning compulsory and countercyclical in nature, it will help banks maintain a buffer of funds in periods when economic expansion is registered, and such funds will act as a fallback in periods of economic contraction or when economic conditions become stressful. This will also take into consideration unaccounted-for possible loss that a bank is not aware of at present in its assessment of credits or already accomplished restructurings, as is being experienced in Spain. Macroprudential regulations' implementation should also be implemented in a more nuanced manner, as it is possible that banks behave in different ways, making one-size-fits-all approaches less effective in this situation. NRB should therefore concentrate its efforts on designing reserve requirement standards and capital buffers compatible with individual banking business models, ownership, and cyclic-risk profiles. In periods of tightening, it is recommended that individual reserve requirements depending upon exposure to MCSMEs and higher measures of countercyclical capital be applied.

Limitations and future research. It is important that one also identifies the limitations of such research and points out possible directions for such research in the current field in the future. On one hand, understanding bank responses at a macro-level is an important aspect, but it is not a suitable representation of the way such banks allocate their resources and, in turn, affect individual firms. Future research needs to make use of such data to identify

how individual banks extend their credits to common sectors within their geographical jurisdiction in periods of such monetary contraction. It is a small open economy, it is imperative that such research benefactors take cognizance of such macroeconomic variables as changes in Indian monetary policies and remittances from non-Nepalese sources.

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Appendices

Appendix I

Correlation matrix of key variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Net Liquidity	1.00									
2. CAR	0.23*	1.00								
3. NPL	-0.31**	-0.18*	1.00							
4. CD Ratio	-0.59***	-0.14	0.28**	1.00						
5. Base Rate	0.38***	0.09	0.45***	-0.42***	1.00					
6. Bank Size	0.15	0.22*	-0.17*	-0.23*	0.06	1.00				
7. Spread	-0.134	0.089	-0.09	0.21*	-0.04	0.11	1.00			
8. Agriculture	0.07	0.14	0.21*	0.06	0.13	-0.089	0.056	1.00		
Lending										
9. Hydropower	0.11	0.06	-0.04	-0.07	0.18*	0.14	0.09	0.16	1.00	
Lending										
10. MCSME	-0.26**	-0.11	0.33***	0.44***	-0.37***	-0.20*	0.14	0.28**	0.13	1.00
Lending										

*Note: *** p<0.01, ** p<0.05, * p<0.1. Correlation coefficients estimated using Pearson correlation method. *

Appendix II

Panel unit root test results (Fisher-type ADF test results)

Variable	Level	First Difference	Conclusion	p-value	Stationery
	χ^2 Statistic	p-value	χ^2 Statistic		
Bank Performance Variables					
Net Liquidity	24.56	0.018	45.23	0.000	I(0)
CAR	18.34	0.078	38.67	0.000	I(0)
NPL	26.78	0.008	42.15	0.000	I(0)
CD Ratio	12.45	0.256	34.89	0.001	I (1)
Policy Variables					
Base Rate	15.67	0.124	31.45	0.003	I (1)
Spread	22.34	0.034	40.12	0.000	I(0)
Sectoral Lending					
Agriculture Lending	19.23	0.062	36.78	0.001	I(0)
Hydropower	16.45	0.102	33.56	0.002	I (1)
Lending					
MCSME Lending	13.89	0.198	32.34	0.004	I (1)
Control Variables					
Bank Size	8.45	0.392	28.90	0.007	I (1)
Loan Growth	27.34	0.006	46.21	0.000	I(0)

Note: H_0 : All panels contain unit roots. H_1 : At least one panel is stationary.

Appendix III

Im-Pesaran-Shin test results

Variable	t-statistic	p-value	Lag Length	Conclusion
Net Liquidity	-2.45	0.007	1	Stationery
CAR	-1.89	0.029	1	Stationery
NPL	-2.78	0.003	1	Stationery
CD Ratio	-1.23	0.109	1	Non-stationary
Base Rate	-1.45	0.074	1	Stationery
MCSME Lending	-1.12	0.131	1	Non-stationary

Note: Automatic lag selection based on AIC criterion. H_0 : All panels contain unit roots.

Appendix IV

Variance inflation factor (VIF) test for multicollinearity

Variable	VIF	1/VIF
Base Rate	2.45	0.408
Bank Size	1.89	0.529
Spread	1.67	0.599
CAR	1.45	0.690
NPL	2.12	0.472
Agriculture Lending	1.78	0.562
MCSME Lending	2.34	0.427
Mean VIF	1.96	

Note. All VIF values below 5 indicate no severe multicollinearity concerns.

Appendix V

Robustness checks - alternative specifications

Specification	Base Rate Coefficient (MCSME)	Standard Error	R-squared	Observations
Main FE Model	-1.24**	(0.51)	0.34	335
Lagged Base Rate	-1.02**	(0.48)	0.32	320
Without Time FE	-1.45***	(0.49)	0.28	335
With Bank Clusters	-1.24**	(0.56)	0.34	335
Winsorized 5%	-1.18**	(0.50)	0.33	335
Excluding Outliers	-1.09**	(0.47)	0.35	328

Note: * p<0.01, ** p<0.05, * p<0.1**

Appendix VI

Data quality assessment

Quality Dimension	Assessment	Treatment
Completeness	99.1% data points available (337/340)	Listwise deletion for missing values
Consistency	Consistent variable definitions across periods	Verified against NRB reporting guidelines
Accuracy	Cross-verified with published financial statements	100% match for reported figures
Outliers	12 extreme observations were identified (3.5% of the sample).	Winsorized at 1st and 99th percentiles
Timeliness	Maximum 45-day reporting lag	All data is within NRB reporting deadlines.

Appendix VII

Sample composition by bank type.

Bank Category	Number of Banks	Observations	Percentage of Sample
Public Banks	3	51	15.0%
Private Commercial Banks	14	238	70.0%
Development Banks	3	51	15.0%
Total	20	340	100.0%

**Note:* Sample covers 20 banks over 17 quarters (2021Q2-2025Q2). *

Appendix VIII

Regulatory thresholds and compliance

Indicator	NRB Requirement	Sample Average	Compliance Rate
Minimum CAR	11%	13.42%	98.2%
Maximum CD Ratio	90%	82.15%	94.7%
Minimum Liquidity	20%	27.45%	100.0%
Agriculture Lending	12% of portfolio	14.21%	85.3%
MCSME Lending	15% of portfolio	12.89%	67.1%

Note. Compliance rates indicate percentage of bank-quarters meeting regulatory requirements.