



# Nexus between Monetary Policy and Financial Inclusion in Nepal: An Autoregressive Distributed Lag Approach

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## Abstract

**Purpose:** This study examines the dynamic relationship between monetary policy instruments and financial inclusion in Nepal, analyzing how key monetary policy tools affect access to financial services.

**Design/methodology/approach:** This study employs an Autoregressive Distributed Lag approach (ARDL) bounds testing approach on annual time series data from 1999 to 2024 to examine both short-run dynamics and long-run relationships between monetary policy instruments and financial inclusion in Nepal. The Financial Inclusion Index, constructed via Principal Component Analysis from deposit-to-GDP and credit-to-GDP ratios, serves as the dependent variable, while key monetary policy tools and urban population share are included as explanatory variables.

**Findings:** The ARDL bounds test confirms significant long-run relationships between monetary policy instruments and financial inclusion. Cash Reserve Ratio (CRR) exhibits a significant negative impact, while Standing Liquidity Facility (SLF) shows a marginally significant negative effect. Policy rate demonstrates no significant long-run impact. Urban population shows strong positive relationships.

**Implications:** Policymakers should adopt coordinated approaches incorporating financial inclusion objectives into monetary frameworks, utilizing differential reserve requirements and targeted rural infrastructure investments.

**Originality/Value:** This research uniquely applies ARDL methodology to examine the monetary policy-financial inclusion nexus in Nepal, providing novel empirical evidence on differential impacts of specific monetary instruments and contributing to the limited South Asian financial inclusion literature.

**JEL Classification:** E52, G21, G28, O16, R11

## Introduction

Financial inclusion has become a pivotal element in the development strategies of emerging economies, particularly in South Asia, where large segments of the population remain excluded from formal financial systems (Beck et al., 2007; Demirgüç-Kunt et al., 2018). Defined as the accessibility, availability, and effective usage of affordable financial services for all individuals, especially marginalized and low-income groups, financial inclusion is widely recognized as a catalyst for poverty alleviation, economic resilience, and equitable growth (Sahay et al., 2015; Cihak et al., 2016; World Bank, 2018).

Despite considerable global advancements, Nepal, as one of South Asia's least developed countries, continues to grapple with deep-rooted disparities in financial access across geography, income, gender, and ethnicity (Ferrari et al., 2021; Sharma & Pant, 2019). Approximately 55% of adults remain outside the purview of formal financial services, particularly in remote and rural areas (Demirgüç-Kunt et al., 2018; Pant, 2016). This exclusion is more than a developmental concern; it constrains the nation's broader macroeconomic

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agenda by undermining the efficiency of credit allocation, weakening the transmission of monetary policy, and limiting savings mobilization (Khatriwada, 2016; Paudel, 2019).

Monetary policy, administered by Nepal Rastra Bank (NRB), plays a central role in shaping the macro-financial landscape through instruments such as the cash reserve ratio (CRR), standing liquidity facility (SLF), and policy interest rates (Gaire, 2018; Paudel, 2019). While the traditional mandate of monetary policy emphasizes price stability and financial system soundness, its implications for financial inclusion have garnered increasing attention in recent years (Mishkin, 2013; Dahal & Fiala, 2020). The transition of Nepal's monetary policy framework from direct controls to more market-based instruments introduces complexities in understanding how policy tools influence financial access (Sharma & Dangal, 2020). In this light, financial inclusion can be conceptualized not merely as a policy outcome but also as a transmission channel for monetary policy, a proposition supported by emerging theoretical insights from the financial accelerator model (Bernanke et al., 1999) and the bank lending channel framework (Kashyap & Stein, 2000).

However, in Nepal's context, the intersection between monetary policy and financial inclusion remains empirically underexplored. Existing studies have predominantly treated the two domains in isolation, offering little clarity on their dynamic interrelationship. While international research demonstrates that monetary policy can both enable and constrain financial inclusion through its influence on credit costs, liquidity availability, and bank outreach, there is limited empirical evidence from Nepal to substantiate such interactions (Khan, 2011; Mbutor & Uba, 2013; Evans, 2016). Moreover, there is a dearth of quantitative assessments that explore how individual monetary policy instruments affect financial inclusion across multiple dimensions, such as access, usage, and quality.

This gap in the literature is further accentuated by Nepal's unique institutional and demographic characteristics. Rapid urbanization, digital penetration, and financial sector reforms have reshaped the economic terrain, yet their mediating role in monetary policy outcomes has received scant attention (NRB, 2020). Consequently, there is an urgent need for rigorous, context-sensitive inquiry that captures the evolving dynamics of the monetary policy–financial inclusion nexus in Nepal. This study aims to address this critical gap by empirically examining the long- and short-run effects of key monetary policy instruments (i.e., CRR, SLF, and policy interest rates) on financial inclusion in Nepal from 1999 to 2024. Using the ARDL bounds testing approach, the study investigates the dynamic equilibrium relationships between monetary variables and a composite financial inclusion index developed through principal component analysis. Furthermore, the research incorporates urbanization as a mediating factor to assess how demographic transitions affect the transmission of monetary policy to financially excluded populations.

By integrating econometric rigor with contextual insights, this research contributes to a more complex understanding of the interdependencies between monetary policy and inclusive finance in a low-income, structurally constrained economy. The findings are expected to inform more coherent, coordinated, and inclusive macro-financial policies that can simultaneously advance the objectives of economic stability, financial deepening, and social equity in Nepal. Ultimately, this study aims to position financial inclusion not as a by-product of economic growth but as a core instrument through which inclusive development and effective monetary governance can be mutually reinforced.

## Literature Review

### *Theoretical Foundations of the Monetary Policy–Financial Inclusion Nexus*

Financial inclusion has gained prominence as a key development priority, particularly in emerging and low-income economies. It refers to the availability, access, and usage of formal financial services by all individuals, especially the underserved (Demirgüç-Kunt et al., 2017). Its multidimensional nature includes banking access, credit provision, savings, insurance, and digital financial tools (Sahay et al., 2015). Given its complex and evolving dimensions, measuring financial inclusion requires more than traditional indicators like bank branch density or account ownership. Scholars have proposed composite indices that encapsulate multiple aspects. Notably, Sarma (2008) developed a Financial Inclusion Index based on penetration, availability, and usage dimensions, while Chakravarty and Pal (2013) enhanced this with an axiomatic approach to capture variations more precisely.

In Nepal, various empirical studies have sought to measure financial inclusion using both basic and composite indicators. These studies highlight persistent regional disparities, especially between urban centers and remote rural regions, as well as between different socioeconomic groups (Pant, 2016; Sharma & Pant, 2019). Such gaps highlight the need for structural reforms and targeted policy interventions aimed at creating an inclusive financial environment.

Monetary policy, as a central macroeconomic tool, plays a vital role in shaping financial and economic stability. Central banks utilize a range of instruments, including policy interest rates, reserve requirements, open market operations, and liquidity facilities, to manage inflation, support growth, and maintain financial system stability (Bernanke & Gertler, 1995; Mishkin, 2013). In Nepal, the NRB has implemented a progressive modernization of its monetary policy framework, transitioning from direct instruments to more market-based tools. Key instruments include the CRR, which directly affects banks' credit expansion capacity (Paudel & Acharya, 2020); the SLF, which provides short-term liquidity to banks and stabilizes interbank markets (NRB, 2022); and the policy interest rate, which signals the central bank's monetary stance (Gaire, 2018).

Despite these developments, the transmission of monetary policy in Nepal remains constrained by structural challenges such as financial sector informality, high levels of dollarization, and underdeveloped capital markets (Khatriwada, 2016). These limitations hinder the broader reach of monetary interventions and reduce their efficacy in influencing inclusive financial outcomes. From a theoretical standpoint, several transmission channels connect monetary policy to financial inclusion. The interest rate channel, grounded in classical monetary theory, posits that policy rate adjustments influence the cost of borrowing, thereby affecting access to credit, particularly for low-income and informal sector participants (Mehrotra & Yetman, 2015). The bank lending channel, rooted in the credit view of monetary transmission, emphasizes the role of financial intermediaries in extending credit; tighter monetary policy could restrict bank lending disproportionately to unbanked or underbanked populations (Bernanke & Blinder, 1988). Furthermore, increased financial inclusion itself can reinforce monetary transmission by expanding the proportion of the population responsive to monetary policy, thus enhancing its effectiveness and reach (Mehrotra & Yetman, 2015).

However, this relationship is not unidirectional. Financial inclusion, when pursued rapidly without sufficient regulatory safeguards, can create vulnerabilities, such as over-indebtedness, informal lending expansion, or poor credit quality, that may challenge monetary stability (Khan, 2011). As Evans (2016) suggests, monetary policy frameworks in financially excluded contexts may require recalibration, as conventional transmission assumptions may not hold in settings where large population segments operate outside formal financial systems.

In addition, the nexus between monetary policy and financial inclusion is both theoretically grounded and practically significant. It operates through bidirectional feedback loops that shape credit access, liquidity distribution, policy responsiveness, and financial system resilience.

### Empirical Evidence

Empirical investigations into the relationship between monetary policy and financial inclusion reveal considerable variation, driven by contextual and institutional differences across countries. Mbutor and Uba (2013), analyzing the Nigerian context, found that contractionary monetary policy, implemented through higher reserve requirements and policy interest rates, tended to constrain financial inclusion by limiting credit access to underserved populations. Their findings align with the interest rate channel and bank lending channel theories (Bernanke & Blinder, 1988; Mehrotra & Yetman, 2015), which suggest that higher borrowing costs and tighter liquidity directly impact the availability of credit for financially excluded groups. Conversely, expansionary monetary conditions were associated with improved access, highlighting the delicate balance between price stability goals and inclusive growth.

A broader cross-country study by Lenka and Bairwa (2016) examined SAARC economies, including Nepal, and similarly concluded that expansionary monetary policy promotes financial inclusion. However, they emphasized the heterogeneity of impacts, noting that the strength of this relationship depends heavily on the maturity of financial markets and the institutional environment. Their findings suggest that the transmission mechanisms of monetary policy are not uniform across countries, reinforcing the need for country-specific empirical evaluations. Sharma (2016) further nuanced this view by demonstrating that reserve requirements, more than policy rates, significantly influenced financial inclusion outcomes in financially underdeveloped countries. This distinction emphasizes the importance of disaggregating monetary tools rather than generalizing policy effects.

Despite policy efforts in Nepal, such as targeted credit mandates, interest rate subsidies, and increased financial institution licensing, the country's financial inclusion remains uneven (NRB, 2020). Data from Demirgüç-Kunt et al. (2018) show that while account ownership rose from 25% in 2011 to 45% in 2017, it still lags behind regional averages. The persistence of financial exclusion, especially in rural and mountainous areas, is driven by factors such as poor infrastructure, low financial literacy, and regional inequalities (Sharma & Dangal, 2020; Ferrari et al., 2021). These structural issues limit the effectiveness of monetary transmission, especially in reaching marginalized groups, a constraint consistent with Evans (2016), who argues that standard monetary frameworks may be less effective where formal financial systems are inaccessible to large population segments.

In terms of Nepal-specific empirical evidence, the literature is notably sparse. Gajurel and Pradhan (2012) assessed the influence of monetary policy on credit expansion but did not explicitly link these effects to financial inclusion dimensions. Their focus on aggregate credit growth, rather than disaggregated access by geography or income level, limits the applicability of their findings to inclusion debates. Similarly, Dahal et al. (2018) acknowledged progress in expanding financial service points but noted the absence of empirical evaluation of how monetary tools affect comprehensive inclusion metrics.

This gap in the Nepalese literature is significant. While monetary policy tools such as CRR, SLF, and policy rates have been actively employed, their differentiated impacts on financial inclusion across socio-demographic segments and regions remain unquantified. Moreover, prior studies have yet to explore long-run versus short-run dynamics or mediating factors such as urbanization. Without such disaggregated, longitudinal analysis, it is difficult to ascertain how monetary policy interacts with Nepal's unique financial architecture, institutional limitations, and geographical constraints.

### Methods

This study utilizes annual time series data from 1999 to 2024 for Nepal. The dependent variable is a Financial Inclusion Index (FIN\_INDEX), constructed using principal component analysis (PCA), in line with Sarma (2008) and Chakravarty and Pal (2013). The index integrates deposit-to-GDP and credit-to-GDP ratios, capturing the dual dimensions of savings mobilization and credit penetration.

These indicators were selected based on theoretical relevance and data availability. The deposit ratio reflects trust in formal institutions and access to savings mechanisms (Beck et al., 2007; Demirgüç-Kunt et al., 2017), especially critical in Nepal's context of informal savings and subsistence agriculture (Pant, 2016). Conversely, the credit ratio indicates access to financial resources for productive uses, a core dimension of financial inclusion in developing economies (Sahay et al., 2015; Ferrari et al., 2021). Together, they represent both sides of financial intermediation and serve as robust proxies when broader indicators are unavailable (Hannig & Jansen, 2010; Chakravarty & Pal, 2013).

Due to limited long-term data on alternative dimensions like branch density or digital usage, this focused approach ensures consistency over the study period. PCA was employed to extract the latent financial inclusion construct, effectively handling multicollinearity and capturing shared variance. The first principal component explained approximately 85% of total variance, validating the dimensional choice and methodological soundness (Sarma, 2008).

The independent variables comprise three monetary policy tools of the Nepal Rastra Bank: CRR, SLF, and policy interest rate (POLICY\_RATE), selected for their central role in the monetary framework (Khatiwada, 2016; Gaire, 2018). The study also includes urban population (% of total) as a control variable, given its strong correlation with financial access in Nepal's urban-centric financial infrastructure (Sharma & Pant, 2019). Data sources include NRB publications, the World Bank's Global Financial Development Database, and the IMF's Financial Access Survey.

### Model Specification

To explore both short-run dynamics and long-run relationships, we employ the ARDL bounds testing approach (Pesaran et al., 2001). This method accommodates variables integrated at different levels ( $I(0)$  or  $I(1)$ ), performs well with small samples, and mitigates endogeneity through lag structures.

The ARDL model is specified as:

$$\Delta FIN\_INDEX_t = \alpha_0 + \sum_{i=1}^p \beta_i \Delta FIN\_INDEX_{t-i} + \sum_{i=0}^{q1} \gamma_i \Delta CRR_{t-i} + \sum_{i=0}^{q2} \delta_i \Delta SLF_{t-i} + \sum_{i=0}^{q3} \theta_i \Delta POLICY\_RATE_{t-i} + \sum_{i=0}^{q4} \lambda_i \Delta UR\_POP_{t-i} + \phi_1 FIN\_INDEX_{t-1} + \phi_2 CRR_{t-1} + \phi_3 SLF_{t-1} + \phi_4 POLICY\_RATE_{t-1} + \phi_5 UR\_POP_{t-1} \lambda_6 \dots (i)$$

Where  $\Delta$  denotes the first-difference operator,  $\alpha_0$  is the intercept,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\theta$ , and  $\lambda$  are short-run coefficients,  $\phi$  terms represent long-run relationships, and  $\varepsilon_t$  is the error term. Optimal lags ( $p$ ,  $q_1$ – $q_4$ ) were determined using the Akaike Information Criterion (AIC), resulting in ARDL(2, 2, 0, 2, 1) as the best fit.

The estimation procedure involves:

- **Stationarity testing** using ADF and PP tests to confirm none of the variables are  $I(2)$ ;
- **Lag selection** using AIC;
- **Bounds testing** to check for long-run cointegration;
- **Estimation** of long-run and short-run coefficients;
- **Diagnostic tests** including Breusch-Godfrey (serial correlation), Breusch-Pagan-Godfrey (heteroscedasticity), Jarque-Bera (normality), and CUSUM/CUSUMSQ (model stability).

This systematic approach ensures robust, reliable, and theoretically grounded results.

## Results and Analysis

The Financial Inclusion Index shows a steady improvement from 1999 to 2024, with an average annual growth rate of 3.2% and a mean value of 0.40, ranging from 0 to 1, indicating substantial variation over time. Monetary policy instruments exhibit notable fluctuations: the CRR averages 5.06% with moderate variation ( $SD = 0.99$ ), while the SLF is more volatile (mean = 4.25%,  $SD = 2.65$ ), particularly during liquidity stress. The policy rate trends downward, averaging 6.73%. Urban population increased from 12.86% to 21.45%, highlighting Nepal's gradual urbanization.

The unit root test results presented in Table 2 indicate mixed integration orders among the variables.  $FIN\_INDEX$ , CRR, and SLF are non-stationary at levels but become stationary after first differencing, confirming they are integrated of order one,  $I(1)$ .  $POLICY\_RATE$  shows stationarity at level with intercept only (t-statistic: -3.339) at 5 percent significance but non-stationarity with trend. Urban population remains non-stationary even after first differencing, suggesting potential higher-order integration. This mixed integration order justifies the ARDL approach employed in this study.

**Table 1:** Descriptive Statistics

Statistics	FIN_IN-DEX	CRR	SLF	POLICY_RATE	UR_POP
Mean	0.401	5.058	4.250	6.731	17.413
Median	0.346	5.000	3.000	6.750	17.283
Maximum	1.000	6.000	8.000	9.000	21.451
Minimum	0.000	3.000	1.500	5.000	12.857
Std. Dev.	0.332	0.993	2.654	1.029	2.694
Skewness	0.437	-0.912	0.223	0.259	0.043
Kurtosis	1.900	2.768	1.314	2.594	1.794
Jarque-Bera	2.140	3.660	3.297	0.470	1.585
Probability	0.343	0.160	0.192	0.790	0.453
Observations	26	26	26	26	26

**Table 2:** Unit Root Test Results (Augmented Dickey-Fuller)

Variable	Level		First Dif-ference	
	Intercept	Intercept & Trend	Intercept	Intercept & Trend
FIN_INDEX	0.102	-2.958	-3.978***	-3.944**
CRR	-1.823	-2.246	-4.951***	-4.837***
SLF	-1.090	-2.085	-4.567***	-4.454***
POLICY_RATE	-3.339**	-3.357*	-5.359***	-5.279***
UR_POP	-0.923	-2.114	-1.702	-1.786

Note(s). \*\*\* indicates significance at the 1% level; \*\* at the 5% level; \* at the 10% level.

The F-bounds test (Table 3) confirms cointegration, with an F-statistic of 5.92 exceeding the 1% upper critical value (4.37), indicating a long-run relationship between monetary policy and financial inclusion in Nepal. This validates the ARDL approach and supports analysis of both long- and short-run dynamics.

**Table 3:** F-Bounds Test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.915564	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Long-run estimates (Table 4) indicate significant negative relationships between monetary policy instruments and financial inclusion. CRR has a statistically significant negative effect (coefficient: -0.059,  $p = 0.016$ ), suggesting that higher reserve requirements reduce banks' capacity to extend credit, thereby constraining financial inclusion. The SLF also shows a marginally significant negative impact (coefficient: -0.023,  $p = 0.078$ ), implying that tighter liquidity conditions may modestly hinder financial inclusion, though the effect is less pronounced than that of CRR.

**Table 4:** Long-run Coefficients (ARDL Model)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CRR	-0.059	0.021	-2.794	0.016
SLF	-0.023	0.012	-1.925	0.078
POLICY_RATE	0.003	0.022	0.115	0.910
UR_POP	0.141	0.013	10.666	0.000
C	-1.804	0.334	-5.406	0.000

The policy rate does not show a statistically significant long-run relationship with financial inclusion (coefficient: 0.003,  $p = 0.910$ ), suggesting its limited influence in Nepal's context. This may reflect structural inefficiencies in the monetary transmission mechanism, such as market segmentation and institutional constraints. In contrast, the urban population has a strong positive effect (coefficient: 0.141,  $p < 0.001$ ), highlighting the role of urbanization in expanding financial access through improved infrastructure and service delivery.

The error correction model (Table 5) reveals a significant adjustment toward long-run equilibrium, with the error correction term ( $-0.869$ ,  $p < 0.001$ ) indicating that 87% of short-run deviations are corrected within a year. In the short run, CRR shows a mixed effect: the immediate impact is positive but insignificant (coefficient: 0.013,  $p = 0.451$ ), while the lagged effect is marginally significant (coefficient: 0.042,  $p = 0.060$ ), suggesting a delayed response in financial inclusion following changes in reserve requirements.

**Table 5:** Vector Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.568	0.402	-3.904	0.002
FIN_INDEX(-1)	-0.869	0.164	-5.303	0.000
CRR(-1)	-0.051	0.021	-2.422	0.032
SLF	-0.020	0.011	-1.829	0.092
POLICY_RATE(-1)	0.002	0.020	0.115	0.911
UR_POP(-1)	0.123	0.024	5.190	0.000
D(FIN_INDEX(-1))	0.302	0.190	1.590	0.138
D(CRR)	0.013	0.017	0.778	0.451
D(CRR(-1))	0.042	0.020	2.072	0.060
D(POLICY_RATE)	-0.041	0.014	-2.899	0.013
D(POLICY_RATE(-1))	-0.013	0.011	-1.151	0.272
D(UR_POP)	0.392	0.135	2.899	0.013
CointEq(-1)	-0.869	0.123	-7.091	0.000

Unlike its long-run insignificance, the policy rate shows a significant short-run negative effect on financial inclusion (coefficient:  $-0.041$ ,  $p = 0.013$ ), though the lagged effect remains insignificant. This divergence underscores the complexity of interest rate transmission in Nepal, where initial rate changes may temporarily restrict financial access before the system adjusts. Urban population growth, by contrast, has a strong immediate positive impact (coefficient: 0.392,  $p = 0.013$ ), highlighting the rapid benefits of urbanization through better infrastructure and financial connectivity.

Diagnostic tests (Table 6) confirm model robustness. The Breusch-Godfrey LM test indicates no serial correlation ( $F = 1.983$ ,  $p = 0.188$ ), and the Breusch-Pagan-Godfrey test supports homoscedasticity ( $F = 0.739$ ,  $p = 0.688$ ). These results affirm the reliability of the ARDL model and the validity of the findings within Nepal's policy context.

**Table 6:** Diagnostic Tests

Test	Statistic	Probability
Breusch-Godfrey Serial Correlation LM Test (F-statistic)	1.983	0.188
Breusch-Godfrey Serial Correlation LM Test (Obs*R-squared)	6.815	0.033
Heteroskedasticity Test: Breusch-Pagan-Godfrey (F-statistic)	0.739	0.688
Heteroskedasticity Test: Breusch-Pagan-Godfrey (Obs*R-squared)	9.693	0.558
Heteroskedasticity Test: Breusch-Pagan-Godfrey (Scaled explained SS)	3.398	0.984

## Discussions

This study reveals that monetary policy instruments significantly influence financial inclusion in Nepal, highlighting complex trade-offs between financial stability and inclusion objectives. The negative long-run relationship between the CRR and financial inclusion corroborates findings by Mbutor and Uba (2013) and Lenka and Bairwa (2016), suggesting that tighter reserve requirements restrict banks' lending capacity, particularly to underserved populations. This supports the bank lending channel theory (Bernanke & Blinder, 1988), which posits that increased reserve constraints limit credit extension, particularly affecting marginalized groups. As Beck et al. (2007) argued, financial institutions tend to shift focus toward more profitable clients under regulatory pressure, exacerbating exclusion, an especially pertinent concern in Nepal, where financial access disparities remain pronounced (Sharma & Pant, 2019).

The findings also highlight the differential effects of monetary policy instruments. While CRR significantly impedes financial inclusion, the policy rate exhibits no long-run impact, reflecting structural inefficiencies in Nepal's monetary transmission mechanism. This is consistent with Sharma's (2016) findings that reserve-based tools have greater influence on financial access than interest rate policy in underdeveloped financial systems. Supporting this, Cihak et al. (2016) and Gajurel and Pradhan (2012) emphasize that the effectiveness of monetary tools is highly context-dependent, particularly in economies with shallow financial markets and institutional bottlenecks. This aligns with Khatiwada's (2016) critique of Nepal's fragmented financial intermediation and Ferrari et al.'s (2021) assertion that in such contexts, transmission via credit volumes often supersedes price channels. As Demirgüç-Kunt et al. (2017) and Mehrotra and Yetman (2015) observed, policy effectiveness in developing economies hinges not only on instrument calibration but also on the maturity of financial infrastructure, areas where Nepal continues to face considerable constraints.

The robust positive association between urbanization and financial inclusion reinforces the critical role of demographic factors. This is in line with Ferrari et al. (2021) and Sahay et al. (2015), who found that urban growth often facilitates financial access through



enhanced infrastructure and institutional proximity. The magnitude of the urbanization coefficient suggests that demographic transition may partially counterbalance the negative effects of restrictive monetary policies. This complements Chakravarty and Pal's (2013) multidimensional framework of financial inclusion and reflects Dahal et al.'s (2018) findings on the importance of spatial distribution in shaping financial development in Nepal.

Furthermore, the error correction term indicates a rapid speed of adjustment, approximately 87% of disequilibrium corrected annually, suggesting a responsive financial system. This supports Paudel's (2019) assertion of policy sensitivity within Nepal's financial sector, despite inherent inefficiencies. However, as Hannig and Jansen (2010) caution, short-run adjustments do not guarantee sustained improvements in service quality or accessibility, particularly in rural or remote areas. The temporal divergence in policy effects, where the policy rate is influential in the short run but not in the long term, exemplifies the dynamic complexity described by Evans (2016) in the transmission of monetary policy in developing economies.

These findings contribute to the broader literature on financial inclusion and policy effectiveness in South Asia. While Lenka and Bairwa (2016) identified cross-country heterogeneity in policy-inclusion dynamics, the present study adds depth by focusing on Nepal's institutional context. The evidence suggests that structural and geographical barriers, as emphasized by Sharma and Dangal (2020) and the World Bank (2018), produce unique patterns of financial service delivery that moderate the impact of conventional policy tools. This lends credence to Mehrotra and Yetman's (2015) argument for context-specific policy design, moving beyond one-size-fits-all frameworks.

## Conclusion and Implications

This study analyzed the relationship between monetary policy instruments and financial inclusion in Nepal using an ARDL approach. The findings reveal a significant long-run impact of monetary policy on financial inclusion, with the CRR exerting a negative effect. This underscores the trade-offs between monetary stability and inclusion goals, emphasizing the importance of coordinated policy frameworks. The differential effects of policy instruments highlight the critical role of instrument choice: reserve requirements influence financial inclusion via the bank lending channel, while the policy rate shows limited effectiveness, likely due to structural weaknesses in Nepal's transmission mechanism. The strong positive link between urbanization and financial inclusion points to the need for targeted efforts to bridge urban-rural financial access gaps.

This study advances theoretical understanding by confirming that tighter reserve requirements constrain credit supply and financial inclusion, consistent with the bank lending channel theory, particularly in contexts like Nepal where structural inefficiencies limit monetary transmission. It highlights the context-dependent effectiveness of monetary instruments, showing reserve requirements impact inclusion more than policy rates in underdeveloped financial systems.

Policy implications from this study include the need for greater alignment between Nepal Rastra Bank's monetary policy and financial inclusion objectives. Incorporating explicit inclusion targets within the monetary policy framework, as practiced in countries like India and Malaysia, could enhance policy coherence. To alleviate the adverse impact of CRR, NRB might consider differentiated reserve

requirements based on bank size, geographic focus, or lending portfolio, enabling banks serving underserved areas to better support financial inclusion while maintaining stability.

Given urbanization's significant role, investments in digital financial infrastructure, agent banking, and mobile banking are essential to reach rural and remote populations cost-effectively. Additionally, the limited influence of the policy rate suggests strengthening Nepal's monetary transmission through financial market development, increased banking competition, and improved central bank communication to enhance the effectiveness of interest rate policy tools.

These insights contribute to understanding monetary policy-financial inclusion dynamics in developing economies. For Nepal, they provide evidence-based guidance to design monetary frameworks that balance inclusion with macroeconomic stability. Future research could explore heterogeneous impacts of monetary policy across different inclusion dimensions and regions and examine how fintech innovations shape policy transmission in Nepal's evolving financial landscape.

## Limitations and Further Research

This study recognizes several limitations and identifies avenues for future research. The financial inclusion index used, while informative, captures only select dimensions; incorporating broader indicators such as account ownership and digital financial service usage would provide a more comprehensive measure. Although the ARDL approach yielded robust results despite a limited sample size, future studies could benefit from larger datasets and alternative methods like SVAR or panel data analysis for deeper insights. Additionally, complementing this quantitative analysis with qualitative research on the institutional and behavioral mechanisms influencing monetary policy's effect on financial inclusion could offer more in-depth and context-sensitive policy guidance.

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## Conflict of Interest

The authors declare no conflict of interest related to this study.

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## Ethical statement

This research did not require ethical approval as it does not involve any human or animal experiments.

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