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Do bank lending rates respond to monetary policy shocks in developing countries? Evidence from Nepal

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ABSTRACT

This paper investigates the dynamic response of the base rate to monetary policy shocks leveraging Local Projection and Structural VAR. We observe that interest rate pass-through from the policy rate to the base rate is immediate but incomplete. Moreover, we observe differential effects in the response depending on the prevailing state of the base rate. Our results suggest that the moderate pass-through is primarily driven by financial frictions arising from the dominance of term deposits in the deposit base. Additionally, we do not find evidence that bank concentration or monopoly power explains the limited pass-through.

Keywords: Base rate, Interest rate pass-through, Monetary policy shocks

JEL Codes: E43, N15

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1 Introduction

Monetary policymakers are keen to understand how monetary policy shocks propagate through the economy. In an interest rate targeting regime, these shocks typically transmit via interest rate channels[1], though the extent of interest rate pass-through depends on various financial frictions. In advanced economies with mature financial markets, interest rate pass-through tends to be immediate and complete (Mishra, Montiel, Pedroni, & Spilimbergo, 2014). Conversely, developing economies with less developed financial markets often experience delayed and incomplete pass-through (Mishra, Montiel, & Spilimbergo, 2012).

Existing literature, such as Mishra et al. (2014), Mishra, Montiel, and Sengupta (2016), Mishra et al. (2012), examining the effectiveness of monetary policy shocks in influencing bank lending rates documents the delayed and weakened pass-through in developing countries, including India. Estimates suggest an interest rate pass-through of approximately 0.4 percentage points, implying that a 1 percentage point increase in the policy rate leads to about a 0.4 percentage point rise in bank lending rates (Mishra et al., 2012). Since evidence on interest rate pass-through in Nepal is limited[2], it is important to assess the effectiveness of the interest rate channel in the Nepalese financial system.

This paper aims to investigate the dynamic effects of monetary policy shocks on bank lending rates in a low-income country setting. We select Nepal as a case study for several reasons. First, Nepal Rastra Bank transitioned from a quantity targeting regime to an interest rate targeting regime starting in July 2017, making it a natural setting to study monetary transmission under the new framework. Second, Nepal as one of the low-income countries with developing financial markets provides a valuable opportunity to investigate how monetary policy operates in emerging and developing market contexts. To our knowledge, this study is the first investigate the dynamic impact of monetary policy shocks on bank lending rates in Nepal.

We employ the local projection (LP) approach, instrument-augmented local projection (LP-IV), and structural VAR (SVAR) methods on monthly macroeconomic data sourced from the Database of Nepalese Economy, maintained by Nepal Rastra Bank (2025). In addition to these, we utilize the threshold local projection technique, which is well-suited for estimating dynamic effects in the presence of multiple regimes (Ramey, 2016). Depending on data availability and the specific requirements of each method, we use monthly data spanning from July 2004 (2004M7) to May 2025 (2025M5) for the SVAR analysis, and from July 2017 (2017M7) to May 2025 (2025M5) for the local projection approaches.

[1] Having said this, we do not undermine the importance of other transmission channels, such as the bank lending or asset channels.

[2] Exceptions include Maskay and Pandit (2010) and Pokhrel and Upreti (2025).

Our primary variables of interest include the weighted average base rate, weighted average interbank rate, and policy rate. We also incorporate control variables such as nominal imports, nominal remittances, and the nominal monetary base.

Our baseline results from local projection indicate that the interest rate pass-through is immediate but somewhat limited, with a peak effect estimated at 0.5 percentage points by the tenth month following the shock. This baseline model remains robust across various modifications, including the use of alternative control variables such as the monetary base and its two lags, the inclusion of the cash reserve ratio (CRR) as an additional policy instrument, an extension of the number of lags, and alternative identification methods like LP-IV and LP-SVAR. While the estimates from LP-IV and LP-SVAR tend to be more conservative, we cannot reject the null hypothesis that their coefficients differ statistically from those of the baseline estimates. Conversely, estimates from other model specifications appear more optimistic, consistent with the baseline results. Finally, differential effect analysis reveals that the effects of contractionary monetary policy shocks are stronger in low-interest rate environments compared to high-interest rate scenarios.

This paper contributes to the existing literature on monetary policy shocks and banking lending rates in low-income countries. Studies closely related to ours include Mishra et al. (2014), Mishra et al. (2016), Mishra et al. (2012). While Mishra et al. (2016), Mishra et al. (2012) document interest rate pass-through in India, and Mishra et al. (2014) analyze pass-through using large heterogeneous panel data from 132 countries, our study focuses specifically on the dynamic effects of monetary policy shocks on bank lending rates. Our approach differs from theirs in several key ways. First, we examine Nepal, a unique case due to its transition from a quantity-targeting regime to an interest rate-targeting regime, providing a natural setting to study interest rate pass-through. Second, we incorporate heterogeneity analysis, offering evidence of asymmetric effects of monetary policy shocks, even within a low-income country context.

In addition, Pokhrel and Upreti (2025) also study monetary policy pass-through in Nepal. Our work departs from theirs on several grounds. First, while they rely solely on SVARs, we employ local projections as well as a combination of local projections and SVARs. Second, whereas they impose Cholesky restrictions, we identify shocks using long-run restrictions. Third, we extend the analysis to explore differential effects across banks. Finally, we go beyond estimating the impacts to provide a richer discussion of the underlying mechanisms behind our findings.

The remainder of the study is organized as follows: Section 2 describes the data and methodology, Section 3 presents the empirical results and discussion, and Section 4 concludes.

2 Data and methods

This section details about the data used in the analysis and the method of analysis.

2.1 Data

The study uses monthly data on policy rates, cash reserve ratio (CRR) base rates, lending rates, imports, and remittances obtained from the Database on the Nepalese economy maintained by Nepal Rastra Bank (2025). Except for policy rates and CRR, all data have been deseasonalized to mitigate seasonality. Furthermore, imports and remittances have been log-transformed. Depending upon the econometric model and given the limitation on the availability of the data, we use monthly data from July 2017 to May 2025 and July 2004 to May 2025.

2.2 Methods

Empirical macroeconomists commonly employ methods such as Vector Autoregressions (VARs) and Local Projections (LPs) to examine the dynamic responses of economic variables to macroeconomic shocks. Identification in VARs rely on short-run restrictions (e.g., Cholesky decomposition), long-run restrictions (e.g., Blanchard and Quah (1989)), mixture of short-run and long-run restrictions (e.g., Clarida, Galí, and Gertler (2000)) or sign restrictions (e.g., Uhlig (2005)). Similarly, the local projection method proposed by Jordà (2005) has become a widely used alternative to VARs. While VARs and LPs yield identical impulse responses in population, they behave differently in finite samples (Plagborg-Møller & Wolf, 2021).

The paper uses Local Projection as the baseline model and implements Local Projection - Instrumental Variables (LP-IV) and Structural VAR (SVAR) as the alternative models.

2.2.1 Local Projection

This paper leverages local projection proposed by Jordà (2005) to estimate the dynamic effect of monetary policy shock on base rate. Following Ramey (2016), we estimate the following equation for local projection.

$$BR_{t+h} = \alpha + \Theta_h PR_t + \psi(L)\mathbf{X} + \epsilon_{t+h} \tag{1}$$

Here, BR denotes weighted average base rate, PR is the policy rate set by Nepal Rastra Bank, X is the vector of control variables. The polynominal lag operator, $\psi(L)$, corresponds to the two lags of control variables, including those of policy variable. The coefficient $\hat{\Theta}_h$ is of primary interest and captures the dynamic response of the base rate to a change in the policy rate.

2.2.2 Local Projection - Instrumental Variables

We extend the local projection discussed in Equation 1 by incorporating an additional layer – the interbank rate – to better mimic the actual monetary policy transmission mechanism.

$$IBR_t = \kappa + \theta PR_t + \phi(L)\mathbf{X} + \eta_t \tag{2}$$

$$BR_{t+h} = \lambda + \Gamma_h \widehat{IBR}_t + \Phi(L)\mathbf{X} + \nu_{t+h} \tag{3}$$

All notations in Equation 2 and Equation 3 are analogous to those in Equation 1, except for IBR, which denotes the weighted average interbank rate. The dynamic response of base rate to policy rate changes is captured by $\widehat{\Gamma}_h$. The key idea underlying the LP-IV approach is the transmission mechanism of a monetary policy shock: it first affects short-term interest rates—such as the interbank rate—which in turn influence the base rate. It is important to note that certain shocks, such as supply-side disturbances, may simultaneously affect both the interbank rate and the base rate. To address this endogeneity, we use the policy rate as an instrumental variable. Our instrument satisfies both the relevance criterion and the exclusion restriction. Following the implementation of the interest rate corridor (IRC) in July 2017, interbank rates have generally tended to move within the stated band, indicating that changes in the policy rate are directly transmitted to the interbank rate. We test the relevance criterion empirically[3], however, the narrative approach also justifies its validity in the post-IRC period. Exclusion restriction criterion is quite obscure to justify as it cannot be tested empirically. Considering that policy rates are primitive exogenous forces that are contemporaneously uncorrelated[4] with unobserved factors supports the validity of exclusion restriction.

2.2.3 Structural VAR

Following Mishra et al. (2014), we apply a structural VAR approach, leveraging the long-run restriction pioneered by Blanchard and Quah (1989)[5]. Irrespective of the choice of operational target, the monetary instruments by the central bank ultimately leads to changes in the monetary base (Mishra et al., 2014)[6]. As a result, nominal (or monetary) shocks have long-run effects on the nominal monetary base. In contrast, nominal shocks

[3] $\hat{\theta}$ in Equation 2 should be significant with associated t-statistics greater than 3.17 for relevance criteria to hold.

[4] Sometimes referred as sequential exogeneity in econometrics literature. While sequential exogeneity is the weak form of exogeneity, this assumption is sufficient for identification in our context.

[5] See Blanchard and Quah (1989) for a detailed explanation of long-run restrictions.

[6] See Mishra et al. (2014) for detailed understanding on how long-run identification strategy has been leveraged to disentangle nominal shocks from other economic shocks.

do not have persistent effects on inflation[7], and thus do not influence nominal lending rates in the long run. Finally, we define negative nominal shocks as one that reduces nominal monetary base in the long run.

$$\Delta Z_t = A(L)\xi_t \tag{4}$$

Here, ΔZ_t is a 2×1 vector comprising ΔLR and ΔRM, where LR and RM denote the weighted average nominal lending rate and nominal reserve money, respectively. $A(L)$ is a 2×2 matrix of coefficients representing the structural vector moving average (VMA). Finally, ξ_t denotes the structural orthonormal shocks, with $\xi_{2,t}$ interpreted as the nominal shock.[8]

$$BR_{t+h} = \delta + \Omega_h \xi_{2,t} + \Upsilon(L)\mathbf{X} + \zeta_{t+h} \tag{5}$$

After estimating nominal shock from SVAR, we plug in the estimated nominal shock into local projection framework as depicted in Equation 5. Equation 5 is akin to Equation 1, where we simply put the nominal shock estimated from SVAR in place of policy rate. Polynomial lag operator, $\Upsilon(L)$, and $\mathbf{X}$ have usual connotations.

3 Empirical results and discussion

The diagnostic of time-series data begins with testing for stationarity. We conduct a stationarity test on our variable of interest, the base rate. Our results indicate that the base rate is non-stationary in levels but becomes stationary after first differencing. This characteristic implies that the base rate follows a unit root process and is integrated of order one, I(1). Such a property makes the base rate suitable for analyzing the accumulated response to monetary policy shocks.

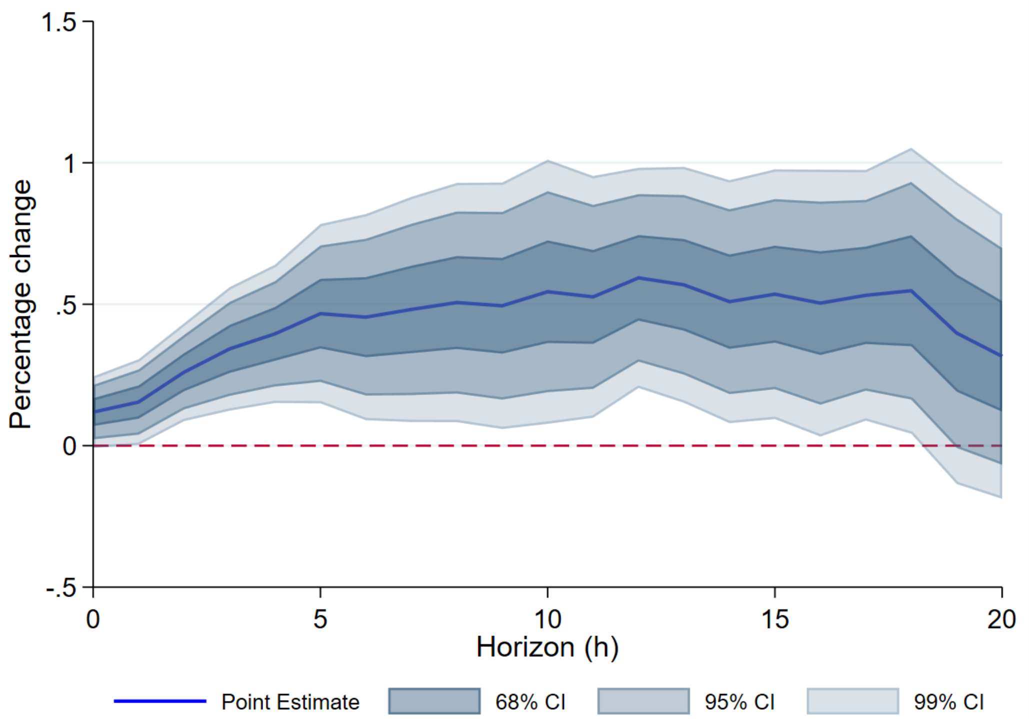
3.1 Baseline results

Figure 1 presents the dynamic response of the base rate to changes in the policy rate. We observe an immediate, albeit modest, response of the base rate to policy rate changes. A one percentage point increase in the policy rate gradually raises the base rate, starting from 0.1 percentage points in the first month and reaching about 0.5 percentage points by the tenth month. However, the response remains moderate, as full transmission of policy rate changes to the base rate is not observed within the span of a year.

[7] The steady-state behavior is observed in the consumer price index. Therefore, real and nominal lending rates are equal in the long-run.

[8] We present a succinct version of the structural VAR in this paper, without detailing the mathematical derivation or the economic rationale for recovering the structural VMA from its reduced form. For comprehensive discussions on identification strategies in VAR models, see Alessi, Barigozzi, and Capasso (2008) and Ramey (2016).

Figure 1: Dynamic response of base rate to change in policy rate



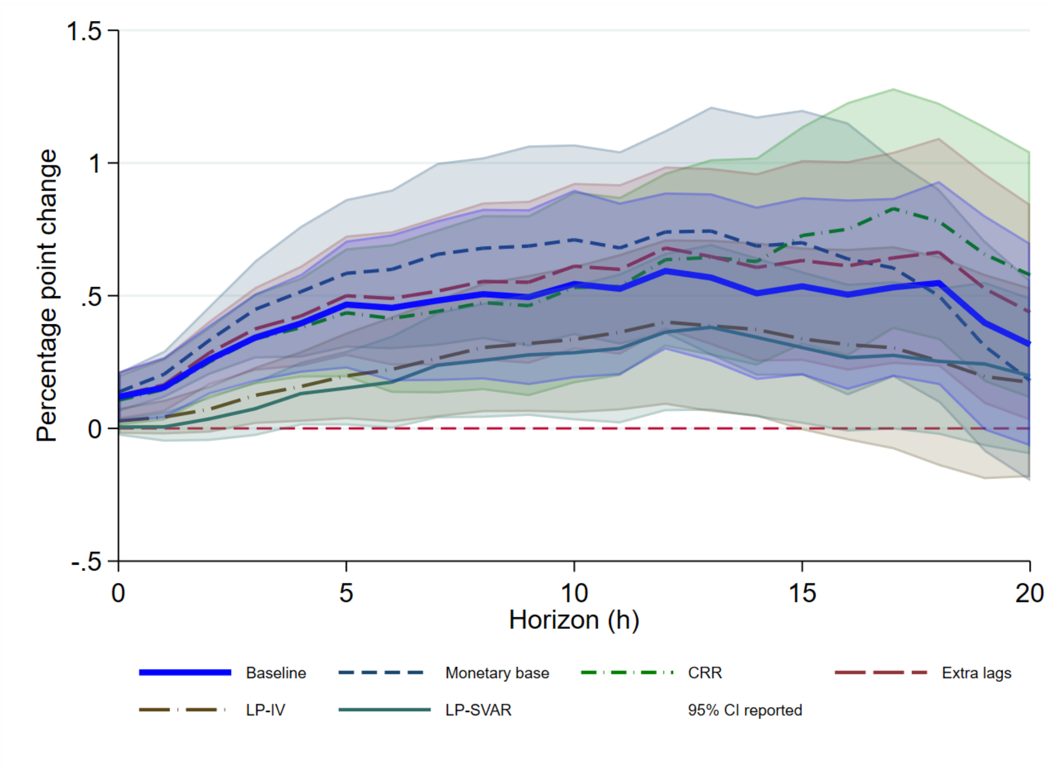
Note: The impulse responses shown in the figures are estimated using the LP approach. In the baseline model, the dependent variable is the weighted average base rate, while the key independent variable is the policy rate. Control variables include the log of imports, the log of remittances, and two lags each of the policy rate, log of imports, and log of remittances.

3.2 Robustness checks

Our observed results are consistent with estimates from five alternative specifications. First, we use monetary base and its two lags as the control variables instead of imports and remittances. The results are parallel to the baseline model. Second, we augment the baseline model by including the Cash Reserve Ratio (CRR) alongside the policy rate, which too replicates the baseline result. Third, we add an additional lag to assess the sensitivity of our results to lags. As expected, the results align with baseline findings, corroborating our baseline model. Fourth and fifth, we implement LP-IV[9] and LP-SVAR to substantiate our baseline model. While these two specifications produce the most conservative estimates, we fail to reject the null hypothesis that their coefficients differ from the baseline. The consistent results from five different specification provides strong support for the plausibility and robustness of baseline results.

[9]The first stage F-statistic is greater than 10. The first stage coefficient associated with policy rate is 1.19 and significant at 1 percent.

Figure 2: Dynamic response of base rate to change in policy rate - Alternative specifications



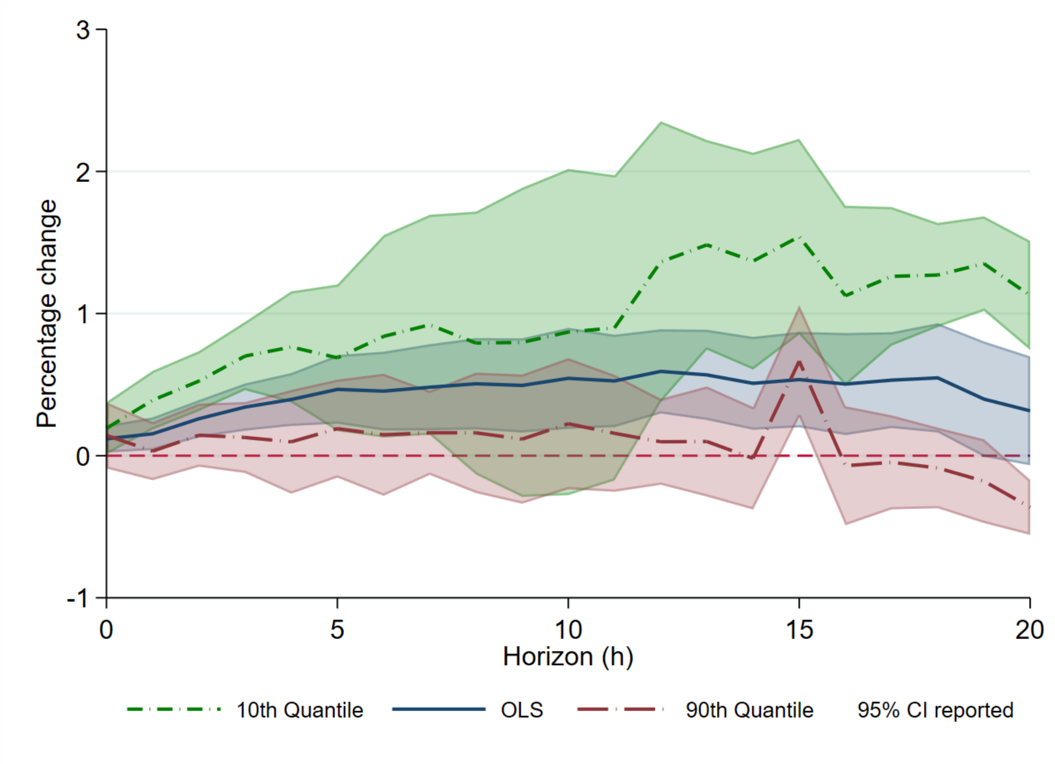
Note: The impulse responses shown in the figures are estimated using various specifications. First, monetary base refers to the model where we substitute imports and remittances with monetary base. Second, CRR denotes alternative model where we incorporate CRR as additional policy instrument. Third, extra lags refers to the model where we add one extra lag to the baseline model. Fourth, LP-IV denotes the local projection approach augmented with instrumental variables, where interbank rate serves as the endogenous variable and the policy rate as the exogenous instrument. Finally, LP-SVAR approach leverages nominal shocks obtained from SVAR and plug into the identified nominal shock into LP framework to generate dynamic response of base rate to the nominal shocks.

3.3 Differential effect analysis

We employ two sets of differential effect analysis. First, we use quantile regression approach to examine how changes in the policy rate affect the base rate, specifically when the base rate is in the bottom 10 percentile compared to when it is above the 10th percentile. Second, we use threshold local projection approach employed by Ramey and Zubairy (2018) to examine the interest rate pass through at different levels of excess reserves.

Figure 3 illustrate the response of base rate to policy rate changes in these two segments along with baseline impulse responses as benchmark. As expected, the transmission of policy rate changes to the base rate is rapid and complete when the base rate is in the bottom 10th percentile. In contrast, the response of base rate to changes in policy rate is compromised when it is in the upper 10th percentile.

Figure 3: Differential dynamic response of base rate to change in policy rate



Note: The 10th quantile refers to observations in the bottom 10% of the distribution, while the 90th quantile refers to those in the top 10%. The OLS estimates represent the baseline local projection results. All estimates are generated using the baseline local projection framework, with quantile-based estimates conditioned on the respective quantile subsamples.

We employ a threshold local projection method following Ramey and Zubairy (2018)[10], as described in Equation 6:

$$BR_{t+h} = S[\alpha + \Theta_h PR_t + \psi(L)\mathbf{X}] + (1 - S)[\alpha + \Theta_H PR_t + \psi(L)\mathbf{X}] + \epsilon_{t+h} \qquad (6)$$

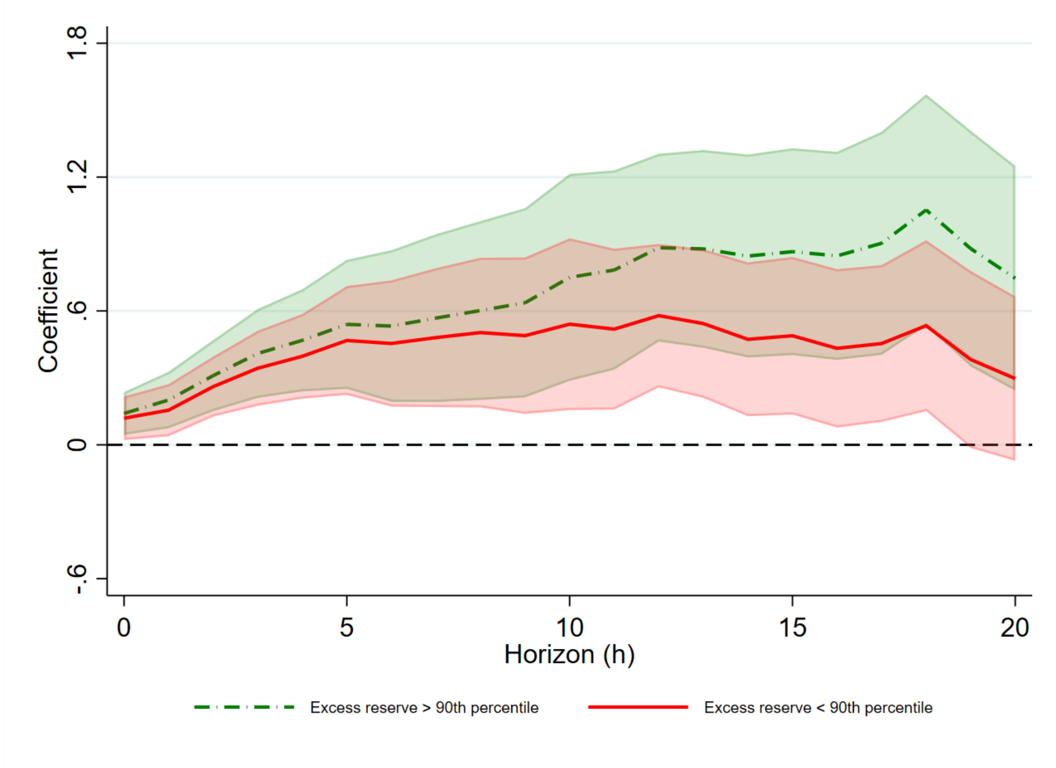
Equation 6 is analogous to Equation 1, with the key difference being the inclusion of a threshold indicator S. The variable S is a binary indicator that equals 1 if a benchmark macroeconomic variable exceeds a specified threshold, and 0 otherwise. In our case, S takes the value of 1 when excess reserves are above the 90th percentile, and 0 otherwise. All other variables retain their standard interpretations.

Figure 4 depicts how change in policy rates influences base rate at different levels of excess reserve. When excess reserve is above 90th percentile, the pass-through is stronger and gathers further strengths with time. Likewise, pass-through is comparatively weak when excess reserve is moderate. Substantially high excess reserve indicates that demand for loan is weaker than supply of deposit. In this situation, interbank rates and base rates are naturally at the lower end. Therefore, the observed effects are similar to that of Figure

[10]For more on threshold local projection, see Ramey and Zubairy (2018).

3.

Figure 4: Differential dynamic response of base rate to change in policy rate



Note: All three estimates are estimated using baseline model. Green dotted line presents the dynamic response of base rate to policy rate changes when excess reserve is above 90th percentile. Red solid line presents the dynamic response of base rate to policy rate changes when excess reserve is below 90th percentile.

3.4 Discussion

In this section, we further scrutinize our findings and explore potential reasons for the moderate transmission of monetary policy shocks, drawing on anecdotal evidence and relevant literature.

Our findings demonstrate immediate but moderate transmission of monetary policy shocks to bank lending rate. The findings we draw largely aligns with the broader literature on monetary policy shocks and banking lending rates in developing countries. For example, Mishra et al. (2012) observe a partial interest rate pass-through in low-income countries, where a one percentage point increase in policy rates leads to only a 0.4 percentage point increase in bank lending rates. In similar line, Mishra et al. (2016) document a modest response of lending rates to changes in the policy rate, estimating a peak transmission of about 0.4 percent per unit increase in the policy rate[11]. Likewise, Mishra et al. (2014) also observed findings similar to that of Mishra et al. (2012),

[11] A 25 basis point increase in the policy rate is associated with a peak increase in bank lending rates of only about 10 basis points.

documenting muted monetary policy transmission in low-income countries compared to advanced economies. Likewise, our findings also align with that of Pokhrel and Upreti (2025), documenting a pass-through of about 0.3 percentage point in Nepal. Literature attributes the weak transmission of monetary policy to factors such as high bank concentration, a developing stock market, financial repression, the non-negligible share of the informal sector, and inefficiencies in the real estate market.

First, given that bank concentration tends to be more pronounced in low-income countries, particularly where state-owned banks play a dominant role in the financial system, we assess the extent of bank concentration and market power in Nepal's banking industry. The Herfindahl-Hirschman Index (HHI) and Lerner Index for Nepalese commercial banks hover around 600 and 0.23, respectively (Figure A5), which is substantially below the conventional thresholds of 1,000 and 0.5. These figures suggest that Nepal's banking sector is relatively unconcentrated and operates under conditions of monopolistic competition, making it less likely that bank concentration is a major factor inhibiting interest rate pass-through.

Second, central banks in low-income countries actively monitor and manage interest rates to promote stability and inclusive growth. In Nepal, NRB has issued several directives aimed at regulating interest rates to protect the interests of both depositors and borrowers. For example, banks are required to calculate their base rate using the formula specified in the directive.

$$r_b = \underbrace{r_D w_D + r_B w_B}_{\text{Cost of fund}} + \underbrace{\frac{\nu D}{L} \times r_D w_D + r_B w_B}_{\text{Cost of compulsory reserve}} + \underbrace{\left(\frac{SL - \nu D}{L}\right) \times (r_D w_D + r_B w_B - r_G)}_{\text{Cost of statutory reserve}} + OCR \tag{7}$$

Following this framework, changes in the policy rate are predominantly transmitted to the base rate through the weighted average deposit rate and the weighted average interbank rate, conditional on the share of deposits and interbank borrowings in total loans. Accordingly, we estimate the impulse responses of the weighted average deposit rate and the weighted average interbank rate to changes in the policy rate. We find that the pass-through is immediate but incomplete in the case of deposit rates, whereas it is immediate and complete for the interbank rate. Given that deposits constitute the majority share of total loans, the moderate pass-through into deposit rates naturally results in a moderate overall pass-through into the base rate.

Why policy rate shocks do not fully propagate into deposit rates? One key reason why policy rate shocks do not fully propagate into deposit rates lies in the structural composition of bank deposits. Understanding this structure is essential to grasp the frictions in the transmission mechanism. In particular, the weighted average deposit rate, r_D, can be expressed as:

$$r_D = \underbrace{r_S^D \times w_S^D}_{\text{contribution of savings deposits}} + \underbrace{r_F^D \times w_F^D}_{\text{contribution of fixed deposits}}$$

Here, r_S^D and r_F^D denote the interest rates on savings and fixed (term) deposits respectively, while w_S^D and w_F^D represent their respective shares in the total deposit base[12].

In Nepal, fixed deposits account for about 65 percent of total deposits out of which about 50 percent are institutional fixed deposits (Nepal Rastra Bank, 2025). These term deposits are typically bound by contractual agreements that fix the interest rate over a specified period. As a result, even if the policy rate changes, banks cannot immediately adjust the interest rates on these existing fixed deposits. This creates rigidity in the average deposit rate, weakening the pass-through from policy rate changes to the overall cost of deposits. Consequently, the predominance of term deposits introduces a significant friction in the interest rate transmission mechanism. We also provide empirics supporting this conjecture by estimating dynamic response of deposit rate to changes in policy rates as discussed above.

Third, Nepal's stock market is relatively young compared to those of advanced economies, with fewer than 300 companies listed on the Nepal Stock Exchange Limited (SEBON, 2025). We estimate the dynamic response of the logarithm of the stock index to changes in the policy rate (Figure A6). The direction of the impulse response aligns with theoretical expectations, but the effect is largely muted. Moreover, the observed results do not hold under alternative specifications, which casts less optimistic outlook regarding our model[13]. Therefore, this interpretation should be made cautiously, as we are skeptical that it may not fully capture the nuanced dynamics of the stock market.

Fourth, a large informal sector and inefficiencies in the real estate market are common features of low-income countries, including Nepal. The informal economy is estimated to account for approximately 42 percent of Nepal's GDP (CEDECON, 2024). An economy with a substantial informal sector tends to face a steep aggregate supply curve, leaving limited room for policymakers to influence macroeconomic variables through fiscal and monetary policies (Montiel, 2011). Likewise, the real estate sector has remained stagnant, experiencing sluggish growth or even contraction in recent years.

This study examines the response of the base rate to changes in policy rates. Our findings open up several avenues for future research. First, future studies could investigate the asymmetric effects of monetary policy shocks. Second, they could explore the effects of

[12] $r_D = r_S^D \cdot w_S^D + r_F^D \cdot (1 - w_S^D)$. Then $\frac{dr_D}{dr_P} = \left(\frac{dr_S^D}{dr_P} - \frac{dr_F^D}{dr_P}\right) w_S^D + \frac{dr_F^D}{dr_P} + (r_S^D - r_F^D) \cdot \frac{dw_S^D}{dr_P}$

[13] The impulse response is consistent with theoretical expectation but statistical significance various across specifications. We have only presented baseline result in Appendix.

monetary policy shocks on aggregate demand, a topic of particular interest to monetary policymakers.

4 Concluding remarks

This paper investigates the dynamic response of the base rate to monetary policy shocks. We find that while the base rate adjusts immediately, the magnitude of the response is moderate. This finding is robust across a range of empirical specifications. Moreover, we observe differential effects in the response depending on the prevailing state of the base rate. Our results suggest that the moderate pass-through is primarily driven by financial frictions arising from the dominance of term deposits in the deposit base. In contrast to the findings of Mishra et al. (2014), we do not find evidence that bank concentration or monopoly power explain the limited pass-through. Finally, structural factors such as the large informal economy and inefficiencies in the real estate sector may also contribute to the sluggish transmission of monetary policy.

Our findings provide several policy recommendations. First, institutional fixed deposits should be discouraged to preclude banks from receiving an influx of easy deposits. Social security providers such as the Employee Provident Fund, Social Security Fund, and Citizen Investment Trust invest about 30 percent, 85 percent, and 50 percent of their fixed deposits in BFIs respectively[14], which should instead be invested in productive sectors. Second, developing the money market and encouraging market-based financing for large corporations can expedite monetary policy transmission and provide scope for banks to serve at the grassroots level.

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[14] These figures have been obtained from the annual report of FY2023/24 published by the respective organizations.

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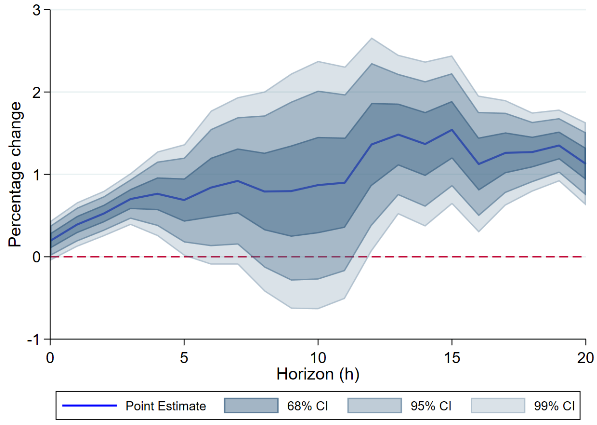
Appendix

Figure A1: Impulse Response Function - Baseline estimate

(a) Base rate: Bottom 10th percentile



(b) Base rate: Upper 10th percentile

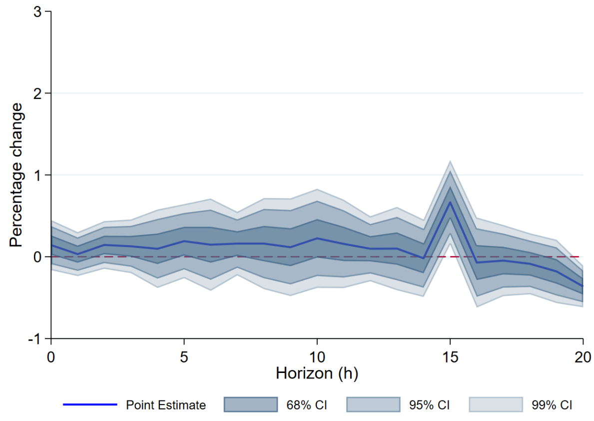
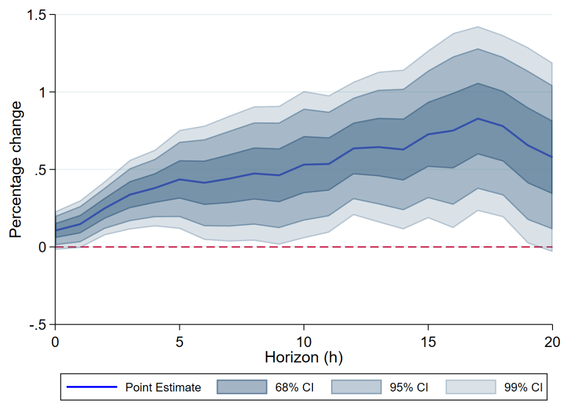
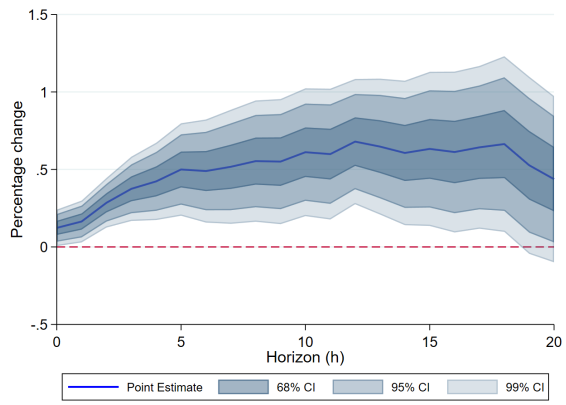


Figure A2: Dynamic Effects of Policy Rate Shocks on Base Rate (Various Specifications)

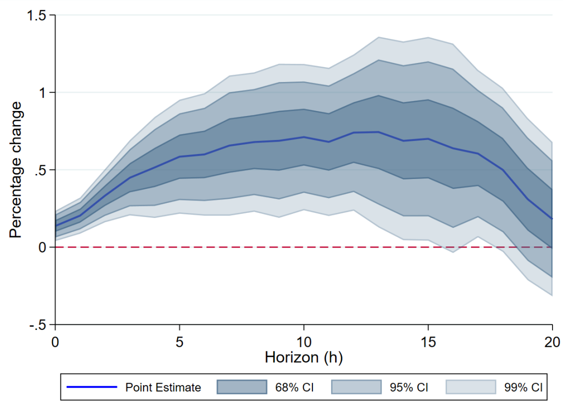
(a) LP Response: Figure 1



(b) LP Response: Figure 2



(c) LP Response: Figure 3



(d) LP-IV Response

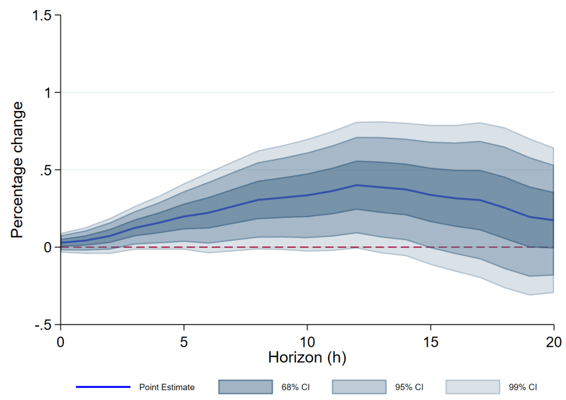


Figure A3: Bank concentration and market power

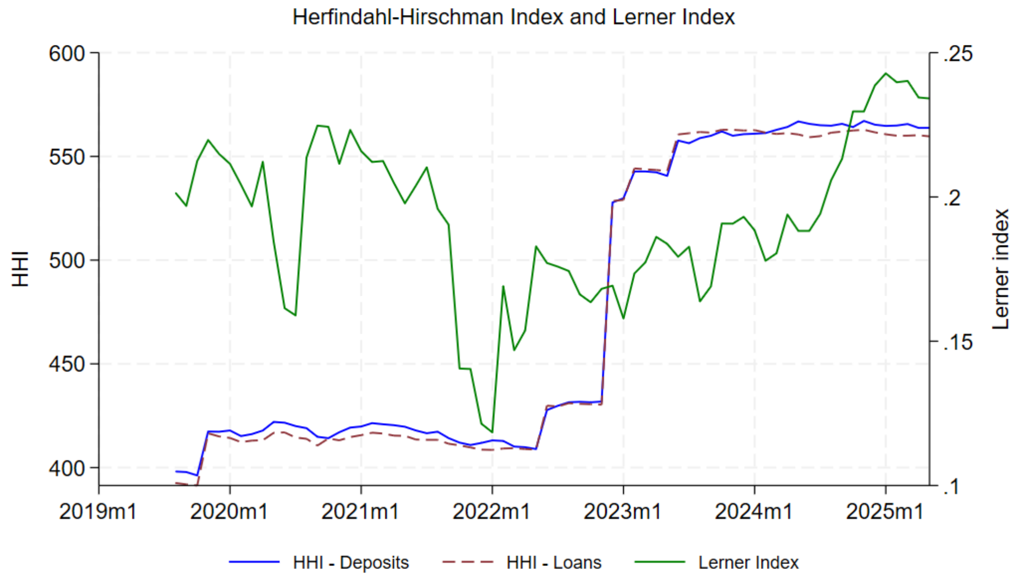


Figure A4: Dynamic response of interbank rates to change in policy rates

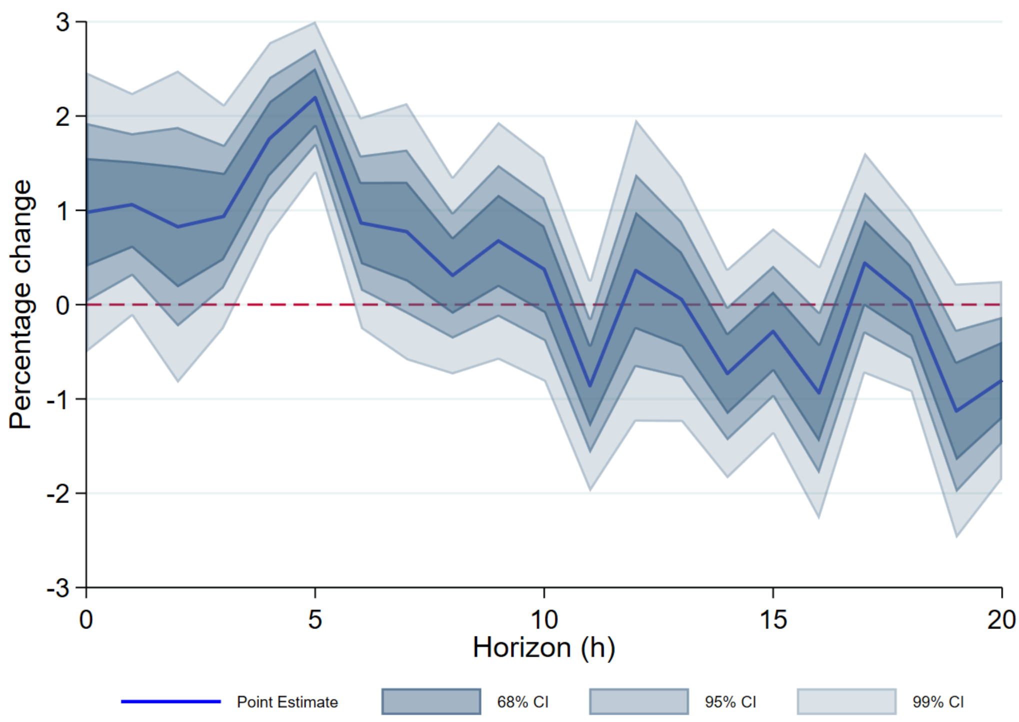


Figure A5: Dynamic response of deposit rates to change in policy rates

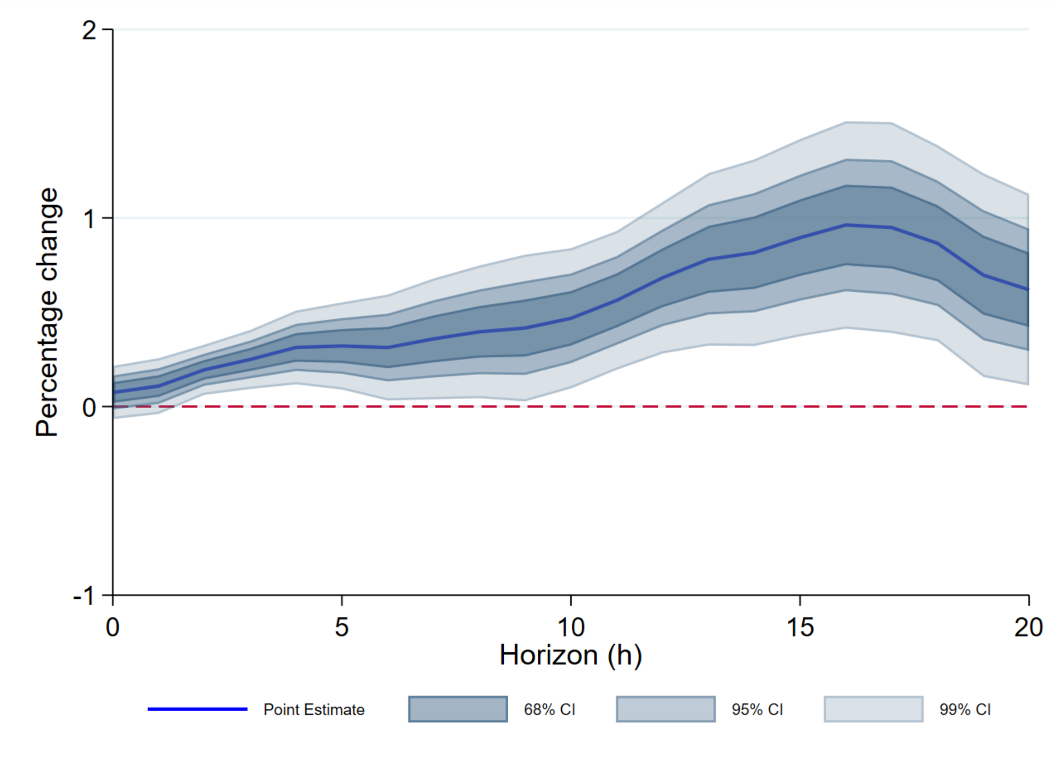


Figure A6: Dynamic response of NEPSE index to change in policy rates