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Is inflation persistence in Nepal substantially imported and influenced by shocks?

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Abstract

This study examines the inflation persistence in Nepal, stating whether macroeconomic shocks and the external drivers affect the persistence and the channels. Prior studies discuss imported inflation and the domestic transmission, but do not address evidences that how persistence changes after the shocks across the consumer price index (CPI) breakdown components. To address the gap, this study employed a dynamic framework. This study also modeled the shock regimes and examined the external influences. This study employed autoregressive (AR) models with shock interactions and local projections, using an instrument variable (IV), using the Reserve Bank of India's (RBI) repo rate as an external shift (lever) for Nepal's policy rate, which is further supported by placebo tests. This study revealed that the food inflation has a moderate and non-explosive persistence, whereas the non-food is mean-reverting. Earthquake (2015) raises the persistence of food inflation, but COVID reduces the persistence of headline inflation. The effect of Indian inflation is substantial, and the shocks from the policy rate (India) affect temporarily, which indicates the inflation persistence (Nepal) is component-specific and partly imported.

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1. Introduction

The sticky and volatile inflation, especially after the COVID-19 pandemic, has tended to develop a scholarly interest in formulating a concept whether the inflation could be actually persistent. Many empirical studies suggest that the inflation persistence has been decreasing in many economies who rely on inflation-target regime. However, in other emerging economies, where shocks to the inflation is common, and the expectations seem not to be strongly anchored, the inflation is seen to be quite high (Brandao et al., 2024; Marques et al., 2003; Moreno, 2010).

Our focus is towards a small, open economy like Nepal where this topic becomes crucial to investigate. Nepal has been maintaining a long-standing history of exchange-rate peg to the Indian rupee (conventional form). The country is also an importer of food and fuel, characterized by a large inflow of remittances. In this case, the domestic price levels react to the imported inflation (Indian inflation in Nepal), the changes in global commodity prices, disruptions in supply across the borders, and changes in the demand which is a consequence of remittances creating prices to inflate besides having domestic slack in the economy (Nguyen et al., 2016; Bems et al., 2018). Due to which, the traditional New-Keynesian closed-economy models are inadequate when it comes to the application to Nepal.

We could possibly assume that the inflation in Nepal may be persistently caused by the structural inertia, which could be by the indexation, contractual factor, and backward-looking expectations, or by the consecutive shocks (frequent food and fuel price spikes). This could lead us to the modern question, which is the main domain, whether the persistence as an inherent property, or mainly a product of policy regime or the shock processes (Marques et al., 2003; Moreno, 2010). This question is, therefore, relevant to Nepal, as the focus is on exogenous shocks and the adoption of changing monetary systems in the last 20 years.

Previous literatures focused on the determination of inflation in the long run by inspecting the money supply, outlay incurred by the fiscal aspects, imports, the exchange rate, and the inflation in India. Although these studies reported significant pass-through of Indian prices and external factors to the domestic inflation, they did not directly measure how much inflationary shocks are persistent and how it differs across the policy regimes. A study by Koirala (2012) used threshold autoregressive model to prove the regime-dependent inflation in Nepal. However, Koirala (2013) used state-space model with time-varying parameter to reflect the shifts in the inflation process. The study mainly corresponded to the time before the 2015 earthquake, introduction of a formal policy rate, and the COVID 19; however, the study did not use richer data of post-earthquake 2015 and post COVID 19 global shocks.

The periods since middle of 2010s have been unexpected in Nepal. There have been several effects on the inflation due to the 2015 earthquake and the associated trade disruptions, the transition to a corridor-type operating framework characterized by a policy rate, the COVID-19 pandemic and resultant global commodity and the supply chain disruptions (ongoing tensions in the middle east as well). During this period, the headline inflation has been either disinflationary or extremely volatile, which is guided by the food inflation and fuel prices and also by the administered tariffs. This pattern of events raises a major question to the policy, which is, has it changed the sensitivity of inflation to shocks, or do we have the new shocks striking a propagation mechanism which is the same?

This paper focuses on the concern that the inflation persistence in Nepal and whether it has been changed by major shocks. Understanding whether those shocks are shortly lived or are persistent (impacting the inflation in Nepal[1]) is one of the key concerns of the Monetary Policy. This is the why, we, through this study pose a major theme that whether the COVID-19 and global shocks radically alter the nature of long-lasting inflation shocks in a small, pegged economy like Nepal. We, thus model the pandemic and associated global unrests as a macro-scale, sort of exogenous shocks on the domestic demand, the imported inflation, and apply the 2015 earthquake as a structural measure in the past. We

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[1] Measuring the persistence of inflation is not only an academic work. In Nepal, the inflation is set at a target from the Monetary Policy (after the budget (fiscal side) sets the probable limit of it) and since the policy rate is rule based, it is important to assess how does the shocks behave (how do they linger to impact inflation in short/long run). Because, all these (keeping mind of the conventional peg and volatile external sector), the exercise of persistence is necessary to keep the long-term interest rate at a desirable (low) position (Fuhrer, 2010; Bems et al., 2018).

suppose in our hypothesis that persistence is an interaction, which is between the external shocks, exchange-rate-cum-remittance regime, and the with changing credibility of the domestic monetary policy, which is not predetermined.

When transitioning to the larger-scale time-series empirically, we use the medium-scale time-series together with the micro-econometric identification tools with the macro data. While measuring the persistence of headline and the sectoral inflation, the structural break tests (around important events), and the estimated importance of the external and domestic drivers are estimated using the monthly data in the prices, external variables, remittances, wages, and the interest rate. The instrumental-variable methods, which employ foreign policy shocks address the endogeneity in the relation between policy rates, and local-projection approaches, which identify the dynamic reaction of inflation to specified shocks, are applied before and after major events to tackle the endogeneity (Jordà, 2005; Angrist and Pischke, 2009).

In this way, there are four contributions which this paper makes. It first updates and expands to a longer monthly sample analysis of Nepal to explore the pre, post, and during the COVID period. Second, it breaks down persistence even within food as well as non-food inflation and in the headline inflation in overall. Third, it measures the relative significance of the domestic conditions and the external shocks using the external instruments which (measured by foreign markets of policies and commodities) using the local projections and IV. Fourth, it prompts the inferences to the operating structure of Nepal Rastra Bank's pegged to the exchange rate, comprising of the extent to which policy must respond to the temporary versus the persistent shocks.

The remaining part of the paper is structured in the following way. Section 2 has the theoretical and empirical literature review on inflation persistence. Section 3 is all about data and the methodology which is followed by the persistence measures, break tests, instrumental variable design, and the local projection methods. Section 4 contains the key empirical findings on the topic of baseline persistence, the effect of significant shocks and the sectoral decomposition. Section 5 gives the result of robustness checks, and the implications of the policy implications of the monetary policy regarding the Nepal exchange rate regime. Section 6 offers the novelty and prospects of future studies.

2. Literature Review

Theoretical Stances

A traditional definition of the inflation persistence is to have the ability of the inflationary pressures to stay above or below the target level over a long period (which is followed by an exogenous shock). The theoretical and sometimes the empirical literature often imposes persistence as a dynamic process that determine price on how the economic agents make up the expectations. In a univariate time-series setup, autoregressive coefficients which have the value near unity usually capture the persistence, but in multivariate systems, the connection between persistence and the joint development of inflation, output activity, and the shock systems is established (Marques et al., 2003; Cecchetti, 2010).

The structural perspective on persistence is laid down by several new Keynesian Phillips Curve (NKPC) models. We can say that, in a purely forward-looking NKPC, there is no concept like an inflation is a function of the future anticipations of the marginal costs. This suggests that the true persistence is methodologically inhibited (Galí and Gertler, 1999). The other hybrid forms of the NKPC includes the changes in the backward-looking or the indexation elements that reflect the inertia. And this, emerges among the firms when they use straightforward rules of price-setting (based on past experience of the inflationary events) (Galí and Gertler, 1999; Sill, 2011). In these kinds of arrangements, the high persistence is an indicator of the strong stakes of backward-looking behavior, price rigidities, and wage rigidities or both of them.

Adding more to this, modern literatures highlight the importance of expectations anchoring. This is best understood by the effect of short run shocks, which is short lived when long run inflation expectations are efficiently anchored aligned with the goal of the central bank. To the opposite of this, when the level of expectations is low, the shock diffuses more interestingly thereby strengthening the persistence (Cecchetti, 2010; Bems et al., 2018). This indicates that effective persistence could be refuted

by the central banks planning for the credible and well communicated policies, even when there are no alterations in the price and the wage rigidity.

In the same way, the external shocks are also important (also on the theoretical arguments) in small, open, and emerging economies. The influence of domestic inflation by imported goods and services, changes in the world commodity prices, changes in the exchange rates, and activities by foreign, monetary policies – all these could occur without the impact of domestic slack. In this case, the differences between the knowledge of domestic and imported persistence are a must because the external shocks can be high and serially correlated (despite of the domestic price-setting along with the weak inertia) (Bems et al., 2018, 2022; Brandão et al., 2024). Coming to an economy like Nepal where exchange-rate peg (conventional) and remittance flow are the primary characteristic, it would be nearly impossible to consider the inflation persistence without considering the open-economic mechanisms.

Empirical Evidences

In a study by Marques et al. (2003), they considered how the inflation persistence measures behave when they are measured on both the euro-area and on the national inflation series. Utilizing a univariate autoregressive model, non-parametric indicators, and the rolling window estimates, they estimated the persistence (of the different assumptions) of the inflation mean. They discover that persistence is often exaggerated when the changes in the mean inflation are ignored, and rely on the shock specific and regime sensitive measures. This setup of research could be useful in our study, because it explains both conceptual and measurement problems associated with comparing persistence (between subsamples or pre and post of the major shocks).

Similarly, Bilke and Stracca (2008) also developed a Persistence-Weighted Measure of the Core Inflation in the Euro Area which develops an index of core inflation that places a higher weight on elements that are more persistent. In their method, the HICP data allows the authors to estimate item-level persistence by using the autoregressive methods, and re-weight the basket based on the results. The key finding which they proclaimed is that, the food and energy prices may show a strong persistence and it was found that those variables should not be omitted in the measurement of the underlying inflation. We thus found, the methodology could be relevant to Nepal because it has encouraged for a separation of the persistence on the basis of food and non-food items and also on the basis of administered and market-administered prices.

Under the same pace, a study by Moreno (2010) explored the role of expectations formation in pattern of inflation within the several economies. By using the low-form Phillips-curve specifications, and the use of survey-based expectation indicators, the author establishes the usefulness of backward-looking expectations and the indexation to explain high persistence in some of the emerging economies (Moreno, 2010). From his study, it is recommended that the central banks focus more on expectation anchoring to minimize the persistence and its cost of the output. In the case of Nepal, this fact demonstrates the relevance of expectations management which can fill in structural and external gaps of the persistence.

Likewise, Bems at al. (2018) also examined a study by using the panel data that represents around 20 high emerging economies. The domestic slack, long-term expectation, and the external variables to inflation was estimated (variance decompositions was also seen). One of the important findings of theirs is that most of the fluctuation in the inflation is from inside the country and the expectations and the external factors also have a smaller (but non-negligible) impact. This paper, for us, serves as a reference point in taking to consider the domestic and external forces in the market scenario like Nepal.

The study entitled Monetary Policy with Uncertain Inflation Persistence focuses on the euro area by Brandão et al. (2024) estimated a New Keynesian DSGE framework to evaluate strong policy rules regarding the actual inflation persistence. They revealed that in a policymaking situation when the policymakers lack any information where the inflation is extremely persistent, the optimal strategy becomes to follow a more cautious and robust policies which could prevent underestimation of the persistence. This observation is also relevant to Nepal, because it demonstrates how the persistence uncertainty itself, could determine the monetary policy design, especially when the structural changes and new regimes, including post-COVID world, make past forecasts which could be less precise.

In case of Nepal, one of the first specific studies of Inflation Persistence in Nepal: A TAR Representation is provided by Koirala (2012)[2] seems to be a milestone. He uses a threshold autoregressive model that have been calibrated on monthly data on CPI inflation to model regime-specific dynamics (Koirala, 2012). It is observed that the persistence of inflation is higher in the high-inflation regimes in comparison to the low-inflation regimes. He also found that the structural breaks and non-linearity are the major determinants of the inflation process in Nepal. Such results have a direct impact on our study as they indicate that the persistence cannot be modeled as a single constant in the case of Nepal and it also imply that the study of the occurrence of major shocks in the inflation dynamics also could have changed.

In the other study by Koirala (2013), the Time-varying parameters of inflation model in Nepal: state space modelling is used. He used a state space model and the Kalman filter to estimate the stability of inflation model of Nepal. In the study, the time varying coefficients of the money, output, and exchange rate variables is studied using the monthly data. The results indicate a substantial parameter drift in the long run. We can understand that the transfer of shocks and the underlying existence of inflation has been changing with the transformation in the economy and in the policy system itself. This study is relevant to our study because we can understand that process of inflation in Nepal can be changed in its structure, but the sample used in earlier study was not long enough (did not capture all the relevant information). It also did not account for 2015's earthquake, the COVID-19's issue, and various post-COVID of which we explicitly included in our study.

Research Gaps

The theoretical and empirical works define the idea that inflation persistence is shaped by the expectations and the structural rigidities as well as the nature of shocks. It also focuses to the small open emerging economies which is equipped with challenges when the external forces are present. However, the literature we reviewed is predominantly on large scale, advanced or the emerging economies who rely on the inflation-target regime. But it is necessary that a study should be carried on the country which is small, pegged, and heavily rely on remittance inflow (like Nepal). As previous studies (especially in Nepal) lacked rigor and applicability of this concept. They primarily utilize either univariate or relatively small multivariate models, ignoring external policy or global shock instruments (including the micro-econometric aspect), which is, we must say a major deficiency then, which we through this study have tended to reorient it to a proper domain. Thus, the analysis of a long and large monthly data (optimum available), which separate the persistence among the major CPI elements, and use micro-econometric models, including the instrumental-variable and the local-projections, to determine the extent to which significant shocks tended to change the persistence inflation in Nepal, is a must, thus.

3. Data and Methodology

Data and variables

This study involves a sample of variables, all of which are monthly observations (January 2000 and June 2024) divided into the subsamples (since August 2016) to represent the period after the introduction of the NRB's repo rate[3]. The data are in the growth (%) form, the policy rates are maintained in their level

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[2]   We assess the study by Koirala (2012), who used TAR and stated that persistence depends on shocks/regimes. However, during 2012 it would be relevant (however, the shocks studied were not too sharp and the external sector dynamics were somehow not taken). As of today, we tend to incorporate the policy dynamics, external sector dynamics, and analyze shocks as well. This is also what we are trying to push forward through this paper.

[3]   NRB adopted an Interest Rate Corridor system in the year 2016 (hanging corridor at first and full-fledged from the year 2020 having the repo (policy) rate at the center of the corridor) and the policy domain is that, the weighted average interbank rate of BFIs should be anchored (close to each other) with the policy rate (Pokhrel and Upreti, 2025). And also, from Monetary Policy (2022/23) there was a major policy departure (following a rule-based system, transitioning from discretionary system), which is that the policy rate should not be set below the inflation (targeted). This is technically when the Real Interest rate (or the De-jure rate) = Policy Rate—Inflation rate should be positive. But this stance should regard the foreign reserve adequacy to cover the prospective imports in the country as well (NRB, 2022). We use policy rate in our study because, it has been preserved on a rule basis, so that the real rate of it would not be negative. This joint anchor makes the inflation and external sector also as an operating target, which is a must to assess in terms of its persistence.

form and the data of remittance[4] inflow has been taken under natural logarithms. The headline, food, and non-food inflation are the monthly changes of the CPI (they are not yearly rates). The global food price, oil price growth, and the REER (Real Effective Exchange Rate) growth (Nepal) are also in the month-to-month percentage form. Before the analysis the data are assured whether they are stationary, either in I(0) or at I(1) (Dickey and Fuller, 1979).

Table 1, provides the description of the variables, the construction and motivations, and the sources of data are related in.

Table 1. *Data and Sources*

Variables	Symbol	Motivations for data[5]	Source[6]
Inflation (Headline)[7]	$\pi_{h,t}$	Marques et al. (2003); Ha et al. (2019)	NRB
Food inflation	$\pi_{f,t}$	Ha et al. (2019)	
Non-food and services inflation	$\pi_{nf,t}$	Marques et al. (2003); Bilke and Stracca (2003); Shrestha (2006)	
Salary and Wage Rate Index	$swri_t$	NRB (2006)	
Policy rate (Nepal)	$pnrb_t$	Nordström et al. (2009); NRB (2022)	
Remittance inflows	$ln(remit_t)$	Maskay et al. (2015); Nguyen et al. (2016)	
Inflation (India)	$\pi_{in,t}$	Ginting (2007); NRB (2007)	RBI
Policy rate (India)	$prbi_t$	Ginting (2007); RBI (2021)	
Global oil price growth	$goil_t$	Choi et al. (2018); Ha et al. (2023)	World Bank
REER growth	$reer_t$	Boug et al. (2002); Nordström et al. (2009)	
Global food price growth	$gfood_t$	Ha et al. (2019); Bems et al. (2018)	FAO
Dummy (Earthquake 2015)	$Dequake_t$	IMF (2015)	Author
Dummy (COVID 19)	$Dcovid_t$	Binci et al. (2022); Harding et al. (2023)	

Note. Author's analysis

Empirical Strategy and Research Design

The main research question is whether the pandemic and the global shocks have entirely transformed the persistence of inflation in Nepal. For the analysis of inflation persistence (Levin and Piger, 2004; Fuhrer, 2010), we base our analysis on the autoregressive (AR) equations of the inflation and add them with the structural breaks and controls relevant to the model. The empirical approach is carried out with assessing the time-series properties of the data, unit-root tests, and the baseline diagnostic devices. Then we use the models of the baseline persistence, with additional explanatory variables of remittance inflows, salary and wage dynamics, and policy rates, thereby disaggregating domestic and external sources of inflation

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[4] We take the remittance inflow's data because, in Nepal the remittance is the major source of foreign exchange earnings (as of 28.2 % of GDP of Nepal-Remittance =Rs.1723.27 bn; GDP=Rs. 6107.22 bn at current price (NRB, 2025a)) and it's also one of the major sources of the demand stimulator (when the demand is high, where the capacity of our country is constrained (import dependent country), it pushes against the limited supply and the trade logistics, which leads to rise prices and cause inflation) in Nepal (because according to the NLSS 2022/23, around 72.4 % of remittance is expend for consumption, 15.8 % for loan repayment, and only 1.2 % for capital formation (NSO, 2024)). Remittance inflow in Nepal also has an inflationary effect (positive remittance shocks contributing to higher inflation than the negative shocks) (Dangal et al., 2023)). This also aids to keep remittance as demand side driver.

[5] We inspect the representative studies which use the similar variables which we use for our study. We did this to assess the validity and reliability of the variables used. We do not describe the reason of all of our variable choices in detail. Readers can refer to the cited papers.

[6] See. Data availability for the detailed data source and links just before the references.

[7] We see that the base year calculation of the CPI (Nepal) is recently changed (on the FY 2023/24). Prior that, the base year was changed on FY 2014/15 and on FY 2005/06, even before that. We have assessed the data, referencing to the base year 2014/15=100 (NRB, 2025b). We assess that the periodic rebasing in Nepal still poses challenges because of the measurement risks to capture the informal markets (Marques et al., 2003; Cecchetti, 2010). In a study by Adhikari and Raut (2024), Nepal has around 40 per cent of the informal economy. So, with all these assessments, we infer that the measure of the persistence in this study is on the basis of (official) price index, but not on the basis of cost-of-living stature of the common households.

persistence. Thereafter, we use the micro-econometric methods of local projections and instrumental-variable. This is done to trace the dynamic reactions and remove the effect of the endogeneity. The purpose of this research design (explanatory research design- quantitative research design (time series) with causal inference orientation aligns with the major mechanisms mentioned in the New Keynesian framework and the literature relevant to small-open economies (Galí and Gertler, 1999; Jordà, 2005; Angrist and Pischke, 2009).

Inflation Persistence Model – Baseline

After the test of the stationarity of the variables[8], the inflation persistence is measured using the simple autoregressive framework (AR1 framework[9]). The baseline model for inflation persistence is given by,

$$\pi_{i,t} = \zeta_i + \varphi_i \pi_{t-1} + \beta_{i'} X_t + \mu_{i,t} \dots \dots \dots \dots \text{Equation (1)}$$

In equation … (1) $\pi_{i,t}$ represents the monthly inflation for the ith component at time 't'. The φ_i represent the coefficient of the persistence of inflation, the higher value of which denotes that the shocks pertaining to the inflation decays slowly as time passes on (Levin & Piger, 2004). The X_t represent the array of the variables which consists of inflation growth (India), the REER growth (Nepal), world's food price growth, and the global oil price's growth). The equations are estimated using the method of OLS, and the inference is obtained through the heteroscedasticity and autocorrelation coefficient (HAC)'s standard error which is obtained through Newey west estimator (Newey & West, 1987).

Structural Breaks- Model

To account for the changes due to major events like the earthquake 2015 and the COVID 19, the interaction term using the dummy variables for those structural changes is augmented in the base model to the lagged value of the inflation. In case of the food inflation, the augmented equation would be:

$$\pi_{f,t} = \zeta_f + \varphi_f \pi_{f,t-1} + \kappa_f (\pi_{f,t-1} * Dequake_t) + \beta_{i'} X_t + \mu_{i,t} \dots \dots \dots \text{Equation (2)}$$

In equation … (2), the φ_f represents the persistence prior earthquake occurred in Nepal. The sum of, $\varphi_f + \kappa_f$ represents the persistence when there was the reconstruction after the earthquake going on. The representation of the dummies of $Dequake_t$ and $Dcovid_t$ represents the corresponding terms. This is to assess whether the earthquake and the COVID altered the propagation of the inflation persistence. This makes less complicated to analyze the persistence varying time and shocks than other time varying parameterized models (Cogley & Sargent, 2005; Levin & Piger, 2004).

Contemporary Period – Model

Characterizing the modern period from 2016 August till 2024 June, after the aftermath of the earthquake, we add the variables remittance inflow, SWRI, and the policy rates of India and Nepal and the Equation… (1) incorporating the headline inflation is estimated.

$$\pi_{h,t} = \zeta_h + \varphi_h \pi_{h,t-1} + \kappa_h (\pi_{h,t-1} * Dcovid_t) + \rho_1 \ln(remit_t) + \rho_2 SWRI_t + \rho_3 pnrb_t + \rho_3 prbi_t + \beta_{h'} X_t + \mu_{h,t} \dots \dots \dots \dots \text{Equation(3)}$$

In equation… (3), the κ_h represents the persistence difference during the period of COVID 19 in Nepal. The SWRI and the remittance inflow data represent the pressure of demand and the cost. Likewise, the data of policy rate of Nepal and India represent the monetary situation of the domestic and external sector. The external sector's policy rate is taken because Nepal is a pegged, open, and small economy. The model is specified using the New Keynesian framework which combines domestic situation, external pressure, and the policy perspectives (Galí & Gertler, 1999; Fuhrer, 2010).

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[8] The Augmented Dicky Fuller tests have been carried out to assess the stationarity of the variables (Dickey & Fuller, 1979).

[9] For the baseline model, we test the SBIC criterion and take the models (whether AR (1) or AR (2), whichever's criterion is lower is good for running the AR process (Schwarz, 1978; Lütkepohl, 2005). We take the samples from 2013 Feb till 2024 Jun and test for AR (1) and AR (2)'s SBIC and find that the SBIC value for headline inflation (AR (1) = 363.38<AR (2) = 366.64), for food inflation (AR (1) =451.08<AR (2) =452.34), and for non-food inflation (AR (1) =360.38>AR (2) =353.63). Though, only non-food inflation has AR (2)'s SBIC a greater value, for parsimony we take AR (1) for comparability and correct specifications.

Local Projections – Model

Taking the reference from Jordà (2005), we use the local projection method to assess the impact of the monetary policy changes of abroad (especially the repo rate as policy rate in India). Each of the horizons ranging from 0 till H and the component, the model estimated is:

$$\pi_{i,t+h} = \zeta_{i,h} + \varphi_{i,h}\Delta_i RBI_t + \Theta_{i,h'}Q_t + \mu_{i,t+h} \ldots\ldots\ldots\ldots \text{Equation (4)}$$

In equation … (4), the $\Delta_i RBI_t$ represents the repo rate of India which is a monthly change. The Q_t has the values of the REER and the global price changes. $\varphi_{i,h}$ is for the impulse response of the inflation (Nepal) pertaining to the shock in the policy rate of India, without incorporating the VAR's parametric structure. We use these projections because it is good for the short samples and breaks. We also then use the HAC standard errors to consider the overlapping horizons in the model (Jordà, 2005).

An IV Approach

We also use the instrument variable approach keeping in mind that the repo rate (Nepal) could affect in an endogenous way to the shocks which also simultaneously influence the inflation (in Nepal). To overcome this, we employ a 2SLS. We use the repo rate (RBI) as an external shift lever (instrument)[10] which could determine the repo rate (Nepal). The first stage which we drafted is:

$$PR_{NRB_t} = \psi_1 + \omega_i PR_{RBI_t} + \chi^i \varsigma_t + \nu_t \ldots\ldots\ldots \text{Equation (5)}$$

In equation … (5), ς_t represents the wholesome of growth of Indian inflation, the growth of global oil growth, the growth in REER, and the growth in the global food price. For the instrument (external shift lever) to be relevant, we know that the ω_i should not be equal to 0. We are also aware that for the same instrument to be valid, the F statistic from the first stage equation should be above 10 (Stock & Yogo, 2005; Angrist & Pischke, 2009). We estimate the second stage after the first stage with the inflation (headline)and the policy rate (used as an external shift lever).

$$\pi_{h,t} = \psi_2 + \vartheta_i PR_{NRB_{t(IV)}} + \varrho^i \varsigma_t + \epsilon_t \ldots\ldots\ldots \text{Equation (6)}$$

In equation … (6), the $PR_{NRB_{t(IV)}}$,which is obtained from the first stage equation (5) denotes the predicted values of the repo rate (NRB). We assess that the policy changes by RBI can affect the inflation of Nepal (directly or indirectly) through the policy changes of Nepal provided Nepal's linkage of trade, price, and expectations with India. And for this, we use the repo rate (RBI) as an external shift lever for the repo rate (NRB). This is done to separate the externally influenced component of the policy movement by NRB. The ϑ is the representation of the effect related to the externally influenced variation of the change in the repo rate (Nepal) to monthly inflation. We should not confuse that this is a causal effect due to the domestic policy only.

Placebo Tests

We do not use the overidentification tests (Sargen and Hansen tests) because (the NRB repo rate) IV specification is just-identified. For the supplement of the strong primary F -statistics, we use basic placebo tests to determine whether the RBI repo rate is a true exogenous policy tool, rather than only being an indicator of the general macroeconomic factors (Angrist and Pischke, 2009). The baseline second stage that we drafted is:

$$\pi_{h,t} = \psi_2 + \vartheta_i PR_{NRB_{t(IV)}} + \Xi^i \Psi_t + \epsilon_t \ldots\ldots\ldots \text{Equation (7)}$$

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[10] We are bordered by India from the three sides of our geography and there is also around 60 % of trade dependence with it (NRB, 2025ₐ). We also have a conventional peg (as a nominal anchor) of NPR with INR as well. In this case, NRB must be cautious to ensure the adequacy of foreign exchange reserves (for imports) and maintain the peg while managing the credit and liquidity (for smoothening the Aggregate Demand) to establish the price stability and the external sector stability. For this, the stance of monetary policy of India (RBI) is an important external consideration. The reason that we use repo rate (policy rate) is because it is one of most important measure of the policy stature and transmission mechanism of interest rate (which affects inflation). And according to Anand and Kapoor (2014), Monetary policy can play active role even if the shocks (in the food price) are largely supply driven and in this situation the increase in the interest (policy) rate can help to relax the inflation (India). Since we import the food items from India (see. NRB (2025ₐ)) the inflation (Nepal) is also affected. This is the reason we choose policy rate (RBI) as an external shift lever (instrument), which shifts our policy decisions. The reason that we mention the instrument as an *external shift (lever)* rather than a pure external instrument is, because it provides (likely) an exogenous variation in repo rate (NRB) allowing the likelihood of the spillover effect from India to inflation (Nepal) (Angrist and Pischke, 2009; Conley et al., 2012).

In equation … (7), the Ψ_t, represents whole sum of the global inflation growth, inflation of India, and growth of the REER. When the instrument is valid, it should predict the $PR_{NRB_{t(IV)}}$. The instrument's validity which we use, is to capture the repo rate (NRB) movements which can be externally affected. We do not intend to impose exclusion of the direct spillover from India. However, conditioned on Ψ_t, the variables which do not respond contemporaneously to the policy shocks should not be explained.

This is the why, we again estimate the second stage (equation…7) with two of the placebo dependent variables.

$$\pi_{h,t-1} = \psi_{plb2} + \vartheta_{plbi}PR_{NRB_{t(IV)}} + \Xi_{plb}{}^i\Psi_t + \epsilon_{plbt} \ldots \ldots \ldots \text{Equation (8)}$$

$$\Delta_{plft}SWRI_t = \psi_{plft2} + \vartheta_{plft}PR_{NRB_{t(IV)}} + \Xi_{plft}{}^i\Psi_t + \epsilon_{plft} \ldots \ldots \ldots \text{Equation (9)}$$

We estimate the inflation from the past in equation (8) which is represented by ($\pi_{h,t-1}$). We do this by identifying the policy innovation at time 't'. We also assess that under the exclusion restriction, the ϑ_{plbi} should be close to 0 and also should be insignificant. In equation … (9), the $\Delta_{plft}SWRI_t$ is the monthly growth of the wage and salary index. It should be least impacted by the external monetary shocks (of India) and should adjust slowly as well. Likewise, a negligible and insignificant ϑ_{plft} represent that the external shift lever used is valid. We tend to estimate a large placebo coefficient which suggests us that the policy rate (RBI) is apprehending the omitted factors which is already present in dynamics of the inflation or the salary and wage inflation dynamics.

In the cases where both the ϑ_{plbi} and ϑ_{plft} are small and statistically insignificant, and the baseline first-stage F statistic is significantly higher, the results assure us to the opinion that the RBI repo is good to apply as an external shift lever. The placebo tests, however, are not always conclusive in proving that the exclusion restriction is there. Nonetheless, they still provide a complementary weak instrument diagnostic, and provide a confidence of the interpretation of ϑ coefficients related to the externally affected movements in the repo rate (NRB) rather than a pure causal effect (Angrist & Pischke, 2009; Stock & Yogo, 2005).

Diagnostic Tests

We perform the several diagnostic tests on each of the regressions. The Anderson Darling test[11] is used to test for the normal distribution. Breusch Pagan test is used to test heteroskedasticity, and the Breusch Godfrey Lagrange (Multiplier) test is used to test the serial correlation (Anderson and Darling, 1962; Breusch, 1979; Breusch and Pagan, 1979; Godfrey, 1978). We see the chances of the cases of the heteroskedasticity and small traces of normality can be observed, the use of heteroskedasticity consistent (HAC) or robust standard errors aligns inferences to be valid. We look after the robustness as well, which takes the modern external variables and substitutes them with the lagged ones, thereby ensuring that the persistence parameters and the interactions with the COVID and the earthquake related events, are not substantially altered through alternative time-specifications.

Tools of Data Analysis

We develop all these models and test and analyze the data through STATA 18 and Python. We also use Statsmodels (Python) (Seabold and Perktold, 2010) for the figurative depictions and data analysis. We use GitHub copilot (LLM)[12] to generate the codes for the data analysis. We also use Quillbot AI (Premium) to paraphrase and shorten the lengthy sentences.

4. Results and Discussion

Description of the Variables

Before actual inspection of the models, we analyze the description of the variables as a support, given in the Table 2.

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[11] We use this test because the residuals obtained from the analysis of monthly data resemble fat tails (due to shocks) and this test gives an extra weight to the deviations of the tails which makes it sensitive to such kind of tail analysis (Anderson and Darling, 1962).
[12] Refer this site, https://docs.github.com/copilot/reference/ai-models

Table 2. *Description of the Variables*

Variables	Mean	Std. Dev.	Min	Max
Headline inflation	0.55	2.20	-2.30	12.51
Food inflation	0.60	2.37	-4.42	10.86
Non -food inflation	0.51	2.41	-4.34	14.75
REER growth	0.09	1.54	-6.73	6.48
Inflation (India)	0.44	0.67	-1.55	2.93
Oil growth (World)	0.84	9.26	-39.63	44.37
Food price growth (World)	0.32	2.58	-13.30	13.09
SWRI growth	0.85	1.47	-0.16	11.68
Remittance (ln)	11.28	0.26	10.45	11.89
Repo rate (India)	6.57	1.29	4.00	9.00
Repo rate (Nepal)	4.90	1.36	3.00	7.00

Note. Author's Analysis

Table 2 depicts that the inflation is half a percentage, but has a potent dispersion. We can see positive spikes in the food inflation. The oil and world food growth represent also have larger variance. Due to this reason, we consider those variables as an important external shock. We also see the repo rates (both of India and Nepal) are changing occasionally.

Unit Root Tests

We test the unit root test to assess whether the variables are stationary at levels or do they need any differencing. Although all the variables (except the Remittance) are in the percent form we confirm their stationarity for completeness. We do this because, modelling through stationary variables results in concrete results which re interpretable. Table 3 represents the ADF tests.

Table 3. *ADF Unit Root Tests*

Variable	ADF statistic	p-value	Observations
Headline inflation	-3.13	0.020	280
Food inflation	-2.83	0.056	278
Non -food inflation	-4.29	0.000	277
REER growth	-18.03	0.000	292
Inflation (India)	-8.01	0.000	130
Oil growth (World)	-10.27	0.000	290
Food price growth (World)	-9.55	0.000	292

Note. Author's Analysis

From Table 3, we can see that all the variables (the Food inflation, which is slightly above the 5 % significance level) are almost level stationary including the external variables. We thus model for the monthly data in the level series only and without differencing.

Contemporaneous Correlations

The contemporaneous correlation among the variables is necessary to model the variables under the study. We study the correlation in Table 4. After the correlation analysis, we can see that the headline inflation has a strong correlation with the food (strong) and non-food inflation. We can also inspect that all the inflation series in Nepal is strongly correlated to the inflation of India, from which we can draw conclusions that inflation in India could be a strong driver of the inflation in Nepal. We can also see a moderate correlation of the world food and oil price which seem to transmit by lags and is also affected by Nepal's policy stances.

Table 4. *Correlations Among the Variables*

Variable	Headline inflation	Food inflation	Non-food inflation	REER growth	Inflation (India)	Oil growth (World)	Food price growth (world)
Headline inflation	1.00						
Food inflation	0.89	1.00					
Non -food inflation	0.81	0.45	1.00				
REER growth	-0.08	-0.05	-0.08	1.00			
Inflation (India)	0.51	0.55	0.29	-0.17	1.00		
Oil growth (World)	0.11	0.09	0.09	-0.13	0.01	1.00	
Food price growth (World)	-0.08	-0.04	-0.10	-0.09	0.10	0.44	1.00

Note. Author's Analysis

Figure 1 represents the graphical representation of the Nepal's inflation dynamics. We can see that the direction and volatility of inflation in Nepal during the periods of study which is the precursor of the analysis in upcoming models. We can see from the inspection of figure that the persistence has tended to improve after incorporating the shocks.

Figure 1. *Representation of Inflation (Monthly) in Nepal.*
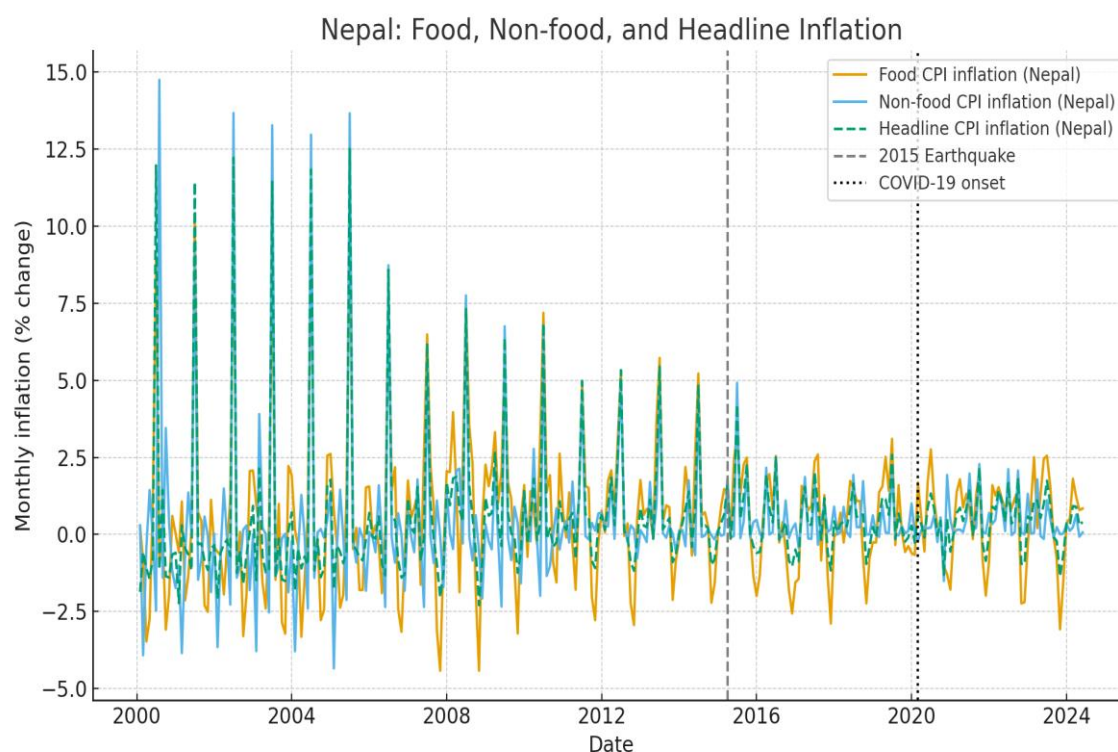
Note. Author's Analysis

Baseline Model (2000-2024)– Persistence

We regress each inflation data to the lag of it (one month) to examine the persistence of inflation. Table 5 represents all the control variables that has been used in the model. We put an interaction of COVID 19 dummy and the lagged inflation to evaluate the strength of the persistence after the pandemic.

Table 5. *Summary of the Baseline Model – Food Inflation*

Regressor	Coefficient	SE	p-value
Constant	-0.03	0.09	0.69
Food Inflation (lag)	0.22	0.08	0.00
Food Inflation (lag) (After COVID)	-0.00	0.11	0.99
World food growth	-0.09	0.04	0.01
Oil price growth	0.02	0.01	0.04
REER (growth)	0.02	0.09	0.85
Inflation (India)	1.02	0.19	0.00

Note. Author's Analysis

After inspection of Table 5, we can see that the coefficient is 0.22 (p-value<.00). This means that nearly 20 per cent ($1/5^{th}$) of the shock to the food inflation is carried over the next month. We see the interaction with the COVID is zero and insignificant as well. This means that the persistence of the food inflation did not change much after the COVID 19 pandemic. The inflation (Indian) shows a 1 per cent increase would increase more than 1 per cent in the food inflation (Nepal) in the same month. The oil price growth (has negligible impact) and REER growth have relatively small coefficient and is also statistically insignificant.

Table 6. *Summary of Non-Food Inflation's Persistence*

Regressor	Coefficient	SE	p-value
Constant	0.39	0.07	0.00
Non-Food inflation (lag)	-0.27	0.05	0.00
Non-food inflation (lag) (After COVID)	0.01	0.09	0.87
World food growth	-0.09	0.03	0.00
Oil price growth	0.01	0.01	0.01
REER (growth)	0.01	0.07	0.91
Inflation (India)	0.48	0.14	0.00

Note. Author's Analysis

From Table 6, we can that the non-food inflation's coefficient is negative and statistically significant. This means that a positive shock to the non-food inflation could result a lower persistence to the inflation over the next month. After COVID 19 pandemic there is no evidence of the change of persistence of non-food inflation. We can see that the 1 per cent increase in the Indian inflation would increase the non-food inflation (Nepal) around 0.48 percent over the next month. Similarly, the oil price growth has a negligible impact and REER growth has negligible and no impact to non-food inflation of Nepal.

Table 7. *Summary of Headline Inflation*

| Regressor	Coefficient	SE	p-value
Constant	0.15	0.05	0.00
Headline inflation (lag)	-0.02	0.06	0.69
Headline inflation (After COVID)	-0.03	0.11	0.76
World food growth	-0.09	0.03	0.00
Oil price growth	0.02	0.00	0.00
REER (growth)	0.02	0.07	0.78
Inflation (India)	0.84	0.15	0.00

Note. Author's Analysis

Inspecting Table 7, we can see that the headline inflation does not account for the dependence in the own lag as the coefficient is statistically insignificant. The headline inflation persistence in Nepal, as we can see, seems to be dependent on the inflation (India) and not merely to the external factors (Oil price growth-very negligible).

After the inspection of long sample persistence, we can assess Figure 2 where the actual and the fitted persistence of food inflation in Nepal is presented. The fitted persistence under the external control

variables (shocks), the fitted values closely resemble inflation after the year 2014 which explains dynamics of the food inflation dynamics in Nepal.

Figure 2. *Fitted Values and Actual Value of Food Inflation (Nepal)*
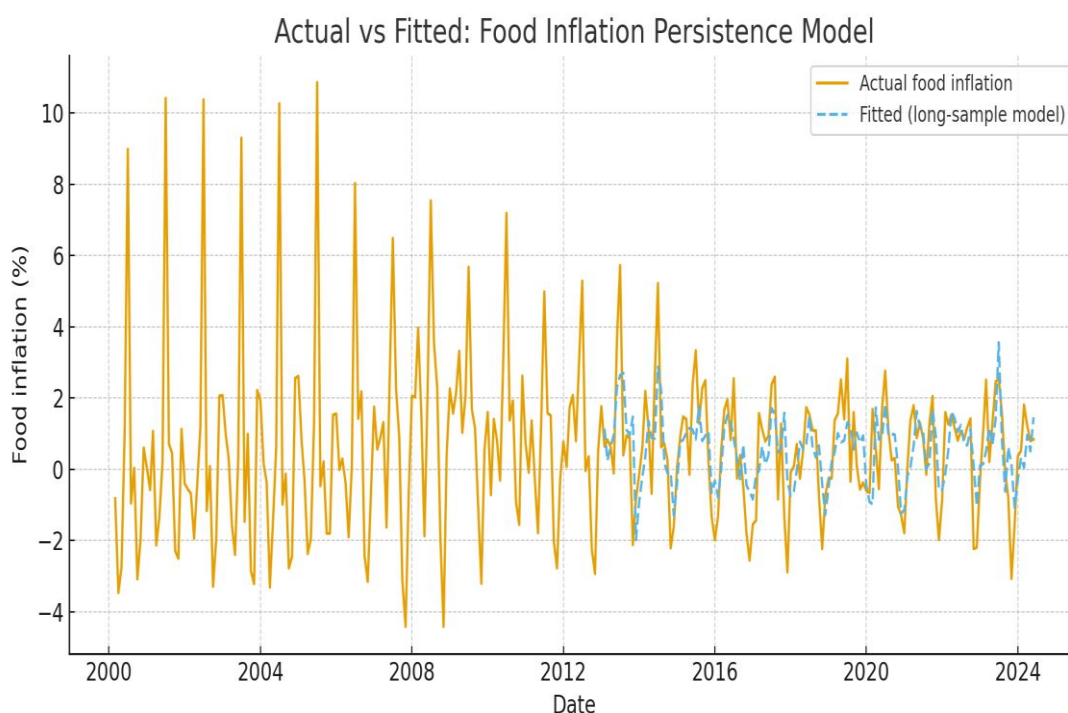
Note. Author's Analysis

Structural Changes – Earthquake 2015 and COVID 19 Pandemic

To analyze for the structural changes, an earthquake dummy April 2015 onwards and COVID dummy from March 2020 onwards. The earthquake 2015 included analysis is presented in Table 8.

Table 8. *Food Inflation and Earthquake 2015*

Regressor	Coefficient	SE	p-value
Constant	-0.04	0.08	0.64
Food Inflation (lag)	0.08	0.07	0.25
Food Inflation (After quake)	0.18	0.08	0.02
World food growth	-0.10	0.04	0.01
Oil price growth	0.02	0.01	0.03
REER (growth)	0.01	0.09	0.88
Inflation (India)	1.04	0.19	0.00

Note. Author's Analysis

Table 8 depicts that after 2015 earthquake; the persistence of the food inflation went 0.18 per cent higher when compared to pre-earthquake period. Compared to the baseline analysis, we can see the food inflation shocks took long period to get exhausted during the reconstruction period.

Table 9. *Non-Food Inflation and Earthquake (2015)*

Regressor	Coefficient	SE	p-value
Constant	0.40	0.07	0.00
Non-Food Inflation (lag)	-0.26	0.08	0.00
Non-Food Inflation (After quake)	-0.01	0.08	0.86
World food growth	-0.09	0.03	0.00
Oil price growth	0.01	0.01	0.01
REER (growth)	0.01	0.07	0.91
Inflation (India)	0.48	0.14	0.00

Note. Author's Analysis

We can in Table 9 that the non-food inflation (post-earthquake) is not significant because the reconstructions and supply constraints during the earthquake mainly affected the food related prices compared to non-food prices.

Analysis of Modern Period (2016-2024)

We use additional variables like the SWRI, remittance inflow, repo rate (from Nepal and India) to assess the several dynamics (labor market pressures, policy stances) to inspect the persistence of inflation in the light of the COVID's analysis as well.

Table 10. *Modern Period and Food Inflation*

Regressor	Coefficient	SE	p-value
Constant	-4.19	6.60	0.53
Food inflation(lag)	0.39	0.12	0.00
Food inflation (lag) (After COVID)	-0.11	0.11	0.35
World food growth	-0.09	0.05	0.06
Oil price growth	0.02	0.01	0.13
REER (growth)	0.26	0.10	0.01
Inflation (India)	0.78	0.19	0.00
Remittance (ln)	0.40	0.63	0.52
SWRI growth	-0.16	0.15	0.30
Repo rate (India)	-0.06	0.11	0.59
Repo rate (Nepal)	0.00	0.09	0.99

Note. Author's Analysis

In Table 9 we can see that in the recent years the food inflation has tended to last longer, the coefficient being 0.39 (statistically significant). The COVID interaction is insignificant. We can say that the COVID effect is not seen into the persistence in the long sample as well. Remittance, SWRI, and policy rates though play an important role, but are insignificant[13] to foods persistence in this sample.

Table 11. *Modern Period and Non-Food Inflation*

Regressor	Coefficient	SE	p-value
Constant	-0.79	3.33	0.81
Non-Food inflation(lag)	-0.20	0.15	0.18
Non-Food inflation (lag) (After COVID)	-0.12	0.14	0.37
World food growth	-0.07	0.03	0.01
Oil price growth	0.02	0.00	0.01
REER (growth)	0.06	0.06	0.27
Inflation (India)	0.21	0.13	0.09
Remittance (ln)	0.14	0.30	0.64
SWRI growth	0.04	0.07	0.54
Repo rate (India)	-0.16	0.15	0.27
Repo rate (Nepal)	0.10	0.09	0.29

Note. Author's Analysis

We see that the persistence of the non-food inflation (in the modern sample) is insignificant. The effect of the COVID is also ineffective. However, we can see that the world food and the oil price affect the non-food inflation since Nepal is an import reliant country. We could prospect that Remittance could have an impact on the non-food inflation's persistence in the modern sample. Though the coefficient is positive, it is statistically insignificant. This is because, Remittance do not directly fuel for the non-food

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[13] We are cautious about these insignificant results. Because the modern sample is relatively shorter and we've used other control variables as well, there may be the sign of multicollinearity. However, we cannot simply ignore this sample because for the modern period we can't collect much of the samples and the inclusion of other control variables also is a must to nullify the OVB effect (Omitted Variable Bias) (Greene, 2012).

inflation in Nepal because most of the non-food items are also exported, so it is somehow significant again with the headline inflation of India.

Table 12. *Summary of Headline Inflation in Nepal (Modern Period)*

Regressor	Coefficient	SE	p-value
Constant	-2.92	4.24	0.49
Headline inflation(lag)	0.25	0.13	0.04
Headline inflation (lag) (After COVID)	-0.23	0.13	0.07
World food growth	-0.09	0.03	0.00
Oil price growth	0.02	0.01	0.04
REER (growth)	0.15	0.04	0.00
Inflation (India)	0.59	0.12	0.00
Remittance (ln)	0.31	0.39	0.43
SWRI growth	-0.09	0.09	0.31
Repo rate (India)	-0.13	0.08	0.11
Repo rate (Nepal)	0.06	0.06	0.31

Note. Author's Analysis

We can assess that the headline inflation in Nepal shows a significant persistence with 0.25 per cent monthly persistence over next month (p-value<.05). The COVID interaction is also marginally significant, we can assess that, persistence fell during the pandemic period (when we were affected by the global factors). The Indian inflation is again significant and remittance, SWRI, and the policy rates tends so show same behavior in the modern period.

Robustness Analysis

We have analyzed the robustness tests to assess that the results are reliable. We, firstly, take a one-month lag of global variables to assess the persistence of inflation (Nepal). We do this to assess if the lagged variables also effect the inflation (Nepal) in the same dynamics or not.

Table 13. *Food Inflation with the Lagged Global Variables*

| Regressor	Coefficient	SE	p-value
Constant	0.07	0.08	0.38
Food inflation (lag)	0.29	0.12	0.01
Food inflation (lag) (After COVID)	-0.03	0.11	0.79
World food growth (Lag 1)	-0.05	0.04	0.30
Oil price growth (Lag 1)	0.02	0.01	0.04
REER (growth) (Lag 1)	0.22	0.08	0.01
Inflation (India)	0.64	0.18	0.00

Note. Author's Analysis

We can see that the lagged food inflation is significant and positive which effects the persistence at a month lag. The oil price is significant, though it has negligible effect because we import fuel and we do not have much industries which rely on fuel (our fuel consumption is quite low). The REER growth is significant and positive to the persistence of our inflation because whenever there are some changes in the REER, the imported goods become costlier to the Nepal (a real depreciation) and it is transferred to the food inflation. We estimate, thus a robust result because even after taking a lag, the food inflation shows a medium persistence with the COVID interaction barely showing any effect.

The Local Projections

We use this technique by using simple local projection (to consider micro-econometric view of shocks). We regress the future food and non-food inflation on the changing repo (India) rate under the control of the of food and oil price growth, and the growth of REER (under zero to twelve months horizons). We again estimate the coefficients produced by an impulse-response profile which shows the general way of capturing the Nepalese inflation (in response to a one-percentage-point rise in the repo rate (India)).

Figure 3. *Response of Inflation (Nepal's Food and Non-Food) in Response to 1 pp Rise in Policy Rate (RBI).*
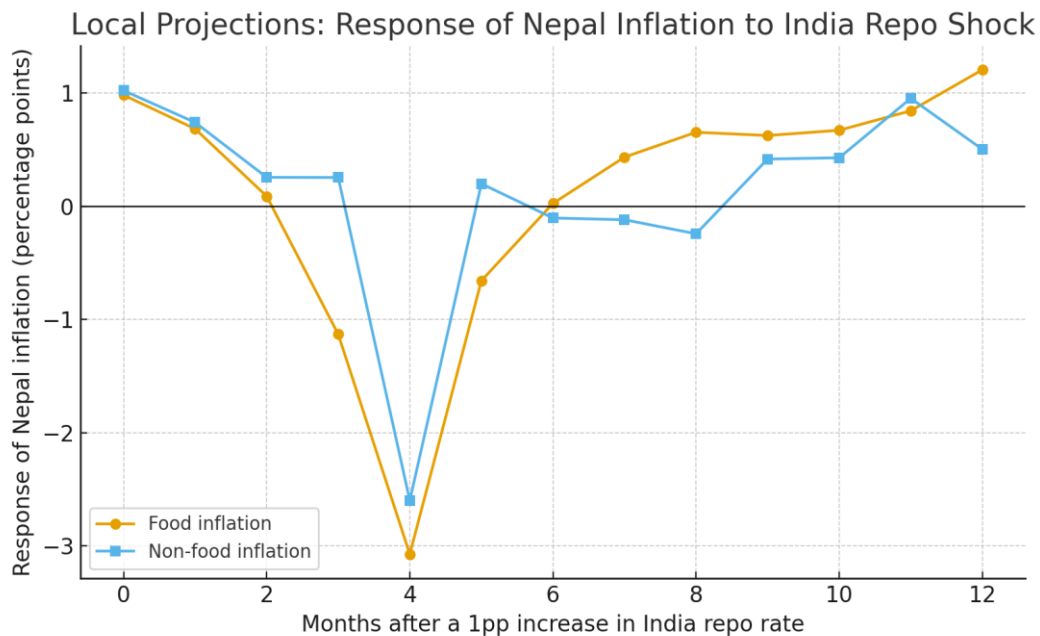
We assess the local projections (as represented in the Figure 3). In the short run both the inflation and policy rate (India) tend to be in the same direction (as the common underlying shocks are being responded at). This becomes distinctly negative after few months, particularly in food inflation which is due to the disinflationary effect of tighter monetary policy provided by the inflation peg linking with the trade flow and expectations. We can see that this effects fade after a year. This demonstrates that decisions of the monetary policy (India) have a significant (but temporary impacts) on the inflation (Nepal). This can be because of the temporary tightening of the imported price and the expectations channels by India rather than the change of inflation dynamics of Nepal.

IV Estimation

We use the local projection which assesses the overall (reduced form) spillover of the Monetary policy changes of India (tightening) to the inflation (Nepal). We use 2SLS, by using the repo rate (RBI) as an external shift (lever) to the repo (Nepal), to determine whether the spillover is enhanced or diminished by the policy movements. We use the IV analysis as a support to assess that the repo rate (NRB) movements (which is caused by external policy shifts, called as policy co-movement transmission channel), while keeping in mind that, repo rate (RBI) may directly affect the inflation in Nepal. We then analyze the model utilizing the data from 2018 July till 2024 June.

The First Stage

We analyze the first stage regressions on the repo rate (NRB) to the repo rate (RBI) keeping other control variables as it is. We present the results in Table 14.

Table 14. *First Stage Regression*

Variable	Coefficient	Robust SE	p-value
Constant	-0.28	0.42	0.50
Repo (India)	0.96	0.08	0.00
World food growth	-0.06	0.07	0.41
Oil price growth	-0.00	0.00	0.74
REER (growth)	-0.04	0.09	0.65
Inflation (India)	0.26	0.12	0.03

Wald F statistic (RBI Repo), $F_{(1,66)} = 128.3 > 10$ (Stock and Yogo, 2005).
The SE's are Heteroscedastic and Robust.

Note. Author's Analysis

We inspect that the coefficient of the Repo (India) is 0.96 (nearly equal to 1) and the F statistic is 128 (signifies the external shift (lever) is highly relevant) indicating a co-movement between the repo rate (RBI) and the repo rate (NRB).

The Second Stage

We regress the headline inflation with the NRB repo rate keeping other control variables as it is. We present the results of stage second in Table 15.

Table 15. *Second Stage Regression*

Variable	Coefficient	Robust SE	p-value
Constant	0.29	0.43	0.49
Repo (Nepal) Predicted	-0.02	0.08	0.77
World Food Growth	-0.09	0.04	0.01
Oil Price Growth	0.03	0.01	0.01
REER (growth)	0.15	0.06	0.01
Inflation (India)	0.65	0.11	0.00

Note. Author's Analysis

With the use of the inflation (India) and other control variables, we inspect that the IV coefficient of repo rate (NRB) is negative and of small magnitude and also is statistically insignificant[14]. We can also see that the coefficients of the inflation (India) and the world commodity prices, however, are high, but also have high precision. With the use of monthly frequency data (under the existing circumstances), the marginal changes in the repo (NRB) rate have limited short-run impacts on the monthly changes in the headline inflation, (though the policy shock itself is strongly identified) but the external price shocks and the changes in inflation (India) dominates the dynamics.

Placebo Tests

We have a just identified design of the IV so we cannot test for the Sargan-Hansen test for the test of overidentification. However, we suspect that the instrument, the repo rate (RBI) is just proxying the domestic conditions and test for placebo tests. When the instrument is valid, it predicts the endogenous regressor (repo rate (Nepal)). But the results should not be statistically significant in the regression of the outcomes of the placebo tests.

We perform the placebo tests with the use of the repo rate (RBI) as an external shift lever to the repo rate (NRB). We use the similar control variables, to keep placebo specifications could be compared with the main IV regression. We also deliberately chose the dependent variables that should otherwise be insensitive to the contemporaneous policy shocks. We estimate a regression of lagged headline inflation against the instrumented repo rate (NRB). The RBI repo rate is a measure in time t and it cannot be used to predict the past inflation (t-1). Due to which any potential effect would concern that the repo rate (RBI) is proxying the domestic conditions. We then regress on the instrumented repo rate (NRB) on the SWRI. We assume that the wages should be sticky and should not move rapidly when there are policy changes at times (short run). We expect that the IV coefficients would be expected to be statistically indistinguishable from zero. Table 16 depicts the placebo estimation.

Table 16. *Placebo Estimation and Falsification*

Dependent variables	IV coefficients	Robust SE	p-value
Headline inflation	-0.022	0.081	0.771
Headline inflation (Lagged)	0.002	0.082	0.983
SWRI growth	0.005	0.103	0.963

Note. Author's Analysis

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[14] This analysis does not mean that the policy (repo) rate is irrelevant. It only means that under the conditions such as the use of monthly data, pegged system, and in remittance reliant economy, the persistence in the inflation is dominated by the shocks (external sector – imported mainly) and not only from the disturbances in the domestic supply chains. This also aligns with the findings, that in small economies the policy rate is dominated by the financial situation and the expectation formation rather than just the price changes only (Brandão et al., 2024; Moreno, 2010).

We can inspect that the headline inflation (lagged), the IV coefficient nearly equal to 0 (0.002) with the p-value being insignificant. The coefficient of SWRI growth is also very small and statistically insignificant. In the baseline IV model, the IV coefficient (on instrumented repo (NRB)) is also small and insignificant (-0.024 and p-value-.771), however, in the first stage we can see a linkage from repo (RBI) to repo (NRB). We can assess, from this that in the first stage there is no spurious effect on the inflation (past) and the wages. This supports that the repo (RBI) is relevant external shift (lever) for the policy rate (NRB) on the headline inflation (using monthly data) rather than the pure causal effect. We also can assess that the repo rate (India) affects (Nepal) through the repo rate (Nepal) rather than with the past inflation or the wage dynamics (Nepal).

Residual Tests and Diagnostics

We estimate the residual diagnostic tests such as normality, serial correlation, heteroscedasticity, on the long sample's food inflation, headline inflation, and modern period of headline inflation. We use Anderson Darling tests of normality, Breusch Pagan test of heteroscedasticity, and Breusch Godfrey test for serial correlation.

Table 17. *Residual Tests*

	Anderson Darling test		Breush Godfrey test		Breush Pagan test	
Model	Stat	p-value	Stat	p-value	Stat	p-value
Food inflation (Long sample)	0.63	0.10	1.82	0.18	12.97	0.04
Headline inflation (Long sample)	1.89	0.00	0.68	0.42	13.39	0.04
Headline inflation (Modern sample)	0.30	0.57	0.14	0.71	7.46	0.68

Note. Author's Analysis

We see no serial correlation in the food-inflation regression and the residuals are also normally distributed. However, small trace of heteroscedasticity is seen due to volatility of food inflation. We also inspect that the headline inflation regression has some traces of normality issues and heteroscedasticity in it because headline inflation of Nepal has been hit by severe shocks in the long run (such as earthquake 2015 or COVID 19). However, if we inspect the modern sample, the headline inflation seems to residual robust (no issue of three of the diagnostics). We thus use the HAC standard errors in the entire estimation because some of the estimations show traces of heteroscedasticity and normality problems. We hence conclude, the models we estimate are well specified. Only some traces of heteroscedasticity and normality were there, for which we use HAC standard errors.

5. Conclusions

We derive three major conclusions from the empirical justifications. The food price inflation (Nepal) is seen to possess a moderate, non-explosive persistence across the period of observation (2000 Jan-2024-Jun) (lag coefficient = 0.22 that increases to 0.26 in accompanying the COVID shock). Likewise, we see that the non-food inflation exhibits a mean-reverting behavior[15] (lag = -0.27) and headline inflation exhibits insignificant intrinsic persistence (whenever exogenous factors are considered). The inflation (India) has a sizable contemporaneous pass through in all the specifications that we study. We find that it has a coefficient between 0.48 and 1.02. The REER, global food, and oil prices also influence the persistence (but the coefficients are smaller). In the modern period (2016 Aug-2024 Jun), we see that the food and headline inflation pose moderately high levels of monthly persistence (0.39 and 0.25 respectively), and the COVID19 shock reduces the headline persistence (negative interaction term). However, we also see that non-food inflation, is non-persistent and it is characterized by the external shocks. We also inspect Local projections which show that an increment in RBI repo rate by 1 pp, trigger a disinflationary effect on food inflation in Nepal (but this fades away in a year). This is consistent with the external spillover (temporary from India) through the mechanism of external trade, expectations, and the price. To the complement of this, the 2SLS estimates on the RBI repo rate as an external lever (shifting

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[15] We can see, unlike other emerging economies, the prices of the vegetables, cereals, and other food items prices are affected by seasonal (weather), transportation (supply chain logistics), and the import duties related factors. While, the non-food items are subject to frequent changes (or we can say, there are discrete changes) (Bems et al., 2018; Cecchetti, 2010).

agent) to depict the externally induced the repo movements (NRB). The instrumented repo on the monthly headline inflation is thus negligible and statistically insignificant and the imported inflation and the global commodity prices are responsible for the share of the short run variation. In overall, the correction of mild heteroskedasticity and non-normality through HAC standard errors is assessed.

We also inspect the consistency of the results with the results that inflation persistence is the regime and dependent of shocks rather than just a value (stated structural constant) dependent (Marques et al., 2003; Brandao-Marques et al., 2024). Previous studies in Nepal found a non-linear regimes and time-dependent parameters but on shorter time scales and until 2015 (Koirala, 2012; 2013). This study supports the dominant role of imported inflation and international commodity price changes on the short-term price changes. This is consistent with the empirical research conducted on small, open, and emerging economies (Bems et al., 2018). However, we also find new results that contribute for the justifications of the research question of this paper. First, we use a substantially longer monthly data on one hand (which incorporates the 2015 earthquake) and on the other hand we establish a corridor type operating framework incorporating a policy rate and considering COVID 19's international shocks. On the other side, we also assess a sectoral break-down of inflation persistence in food products, non-food products, and headline products under a conventional peg and large remittance inflows, and also, we introduce a micro-econometric layer in the use of local projections and using the external-agent or the external shift lever using the IV. For the policy departure of NRB (from the Monetary Policy of the FY 2022/23 following the rule-based policy, setting the policy rate above the target inflation taking care of the external dynamics) our results suggest that the main role of the policy rate is to anchor the real rate and the expectations, and the imported inflation and the external shocks dominate the short run behavior of the inflation (Nepal).

Novelty

The novelty of this paper lies in the analysis of the persistence (inflation) with an extended monthly data set (segregated to longer and modern samples). Further, to justify novelty, we use food and non-food's inflation data, instrumental variable, and pose an interpretation aggravating stated high and constant levels of inflation persistence in Nepal providing an assessment that the inflation persistence is moderate and differs between components and also is affected by the imported shocks and not only by the domestic policy rates.

Further Scope

Though we have tried attempting to analyze the persistence at optimal, we still percept that there are many works that makes the analysis of inflation persistence even more grand. We suggest that the further study could focus the analysis to incorporate aggregate CPI items using detailed data. Future study also can take item-level CPI or scanner-price data to determine how the persistence varies and how the behavior of the price-setting can be credited based on markets structure, informality and the imported content. Future studies could also incorporate (survey-based household) and firm inflation expectations to measure the importance of expectations anchoring in the persistence. It can also use the 3SLS using simultaneous equations as well. They also could incorporate the panel analysis of the Nepal kind of economies, and then compare the results. Finally, a small cross-country panel can also be used in future using similar pegged and remittance-intensive countries which is indicative of other structural characteristics.

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