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Credit-Induced Boom-Bust Cycle in Nepal

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Abstract

Credit to the private sector has been expanding rapidly in Nepal, yet the real sector's growth has remained sluggish. If credit expansion continues to grow faster than the real sector, the existing vulnerability could become a systemic risk for the broader economic system, potentially leading to an economic slowdown characterized by the boom-bust cycle. This study examines how sectoral credit allocation influences macroeconomic outcomes, particularly real GDP growth and inflation, by employing the Local Projections Approach to Impulse Response Functions (LP-IRFs)- a robust technique that estimates the dynamic responses of variables without assuming a specific structural model, offering flexibility and reliability over traditional VAR methods. Using quarterly time-series data for 67 observations from FY 2006/07Q4 to FY 2023/24Q2, the study finds that the rapid expansion of private-sector credit will ultimately lead to an economic slowdown. Specifically, credit concentrated in the non-tradable sector predicts lower output and higher inflation, thereby increasing the risk of economic downturns. Conversely, credit directed toward the tradable sector supports sustained economic growth and stable prices. The findings suggest that sectoral allocation of credit plays a critical role in determining macroeconomic boom-bust cycles. Policy recommendations include improving regulatory oversight and redirecting credit toward tradable sectors to mitigate financial vulnerabilities and enhance long-term growth prospects.

Keywords: Boom-Bust, Impulse response function, Local projections, Tradable, Non-tradable

JEL Classification: E51, E63, G21, O42

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Introduction

The rapid expansion of credit by banks and financial institutions in the economy, often associated with financial reforms and liberalization, easing regulations, and economic expansion, poses a policy dilemma (Dell'Ariccia et al., 2016). An increase in credit means greater access to finance, allowing financially constrained firms or economic units to borrow and invest, thereby increasing the economy's productive capacity and supporting economic growth (Mian et al., 2020). However, excessive credit growth, particularly when concentrated in the household and non-tradable sectors, fuels overall household demand, which may lead to financial instability through increased leverage and asset price bubbles that ultimately end in economic busts (Mian et al., 2020; Müller & Verner, 2023). Historically, several credit booms ended in busts and subsequent financial and economic crises, including the Nordic Crisis in the early 1990s, the Japanese Banking crisis in the early 1990s, and the Eurozone crisis in the early 2000s (Müller & Verner, 2023). However, policymakers have paid little attention to these crises because monetary policy at the time targeted the interest rate (Dell'Ariccia et al., 2016). The Global Financial Crisis (GFC) of 2007-8 was the event that fundamentally changed the view and established the role of credit booms, financial frictions, and excessive leverage in propagating the financial crisis and the subsequent economic recession following the credit and asset price bust.

In recent years, Nepal's credit to the private sector has doubled and reached about 100 percent of GDP, far above the levels of peer South Asian countries, due to a series of expansionary monetary policies by the Nepal Rastra Bank (NRB) in the past. Nepalese private industry seems to be over-indebted, considering the credit disbursed by both banking and non-banking financial institutions. Most recently, the NRB responded to the crisis caused by the COVID-19 pandemic with an accommodative monetary policy, which has amplified the credit boom and facilitated the economic recovery after the crisis but just after a year NRB made a policy reversal and introduced restrictive policy measures concerning the overheating of the economy due to huge credit expansion that has resulted into the economy slowdown, government revenue depleted, trade volume declined, and some serious problems have emerged in the financial system thereby leading to a credit induced boom-bust cyclical patterns (IMF, 2023).

This boom-bust cycle, coupled with Nepal's inefficient financial markets and weak regulatory oversight, raises concerns about systemic risks. The sluggish real sector growth and persistent trade deficits, fueled by credit-led import financing, further complicate the economic landscape. Existing literature suggests that the

sectoral allocation of credit, whether to tradable or non-tradable sectors, critically influences whether a boom ends in a bust. Credit to non-tradable and household sectors often predicts financial crises and productivity slowdowns, while credit to tradable sectors supports stable growth (Müller & Verner, 2023). However, few empirical studies in the Nepalese context have examined how the sectoral allocation of credit influences macroeconomic outcomes, such as GDP growth and CPI inflation, over time. This gap forms the basis of our research problem.

This study aims to fill this gap by examining the dynamic relationship between sectoral allocation of private sector credit and macroeconomic outcomes in Nepal. Specifically, it addresses the following research questions:

i. How does private sector credit influence real GDP growth and inflation in Nepal?

ii. Does the sectoral allocation of credit (tradable vs. non-tradable) matter in determining whether a credit boom leads to sustained growth or a bust?

To answer these questions, we utilize the Local Projections Approach to Impulse Response Functions (LP-IRFs), a method that provides flexible and robust estimates of the dynamic impact of credit shocks over time.

This study is motivated by the need to understand the dynamic interplay between private sector credit and macroeconomic outcomes in Nepal, where credit booms have amplified economic volatility. The significance of this research lies in its focus on the credit-availability channel of monetary policy and its effects on economic growth and price stability. By examining the sectoral allocation of credit, the study addresses a critical gap in the literature and offers insights into the mechanisms driving boom-bust cycles and potential financial crises in Nepal. Additionally, adopting the Local Projections Approach to Impulse Response Functions (LP-IRFs) enhances the robustness of the analysis, providing a novel methodological contribution to the study of credit dynamics in developing economies.

The rest of the paper is organized as follows: Section 2 presents the historical trend of private-sector credit in Nepal. Section 3 reviews existing theoretical and empirical literature on credit expansion and macroeconomic outcomes. Section 4 outlines the conceptual framework and describes the empirical methodology, including the specification of the LP-IRFs. Section 5 presents the results and discussions, while Section 6 concludes with key findings, policy implications, and recommendations for future research.

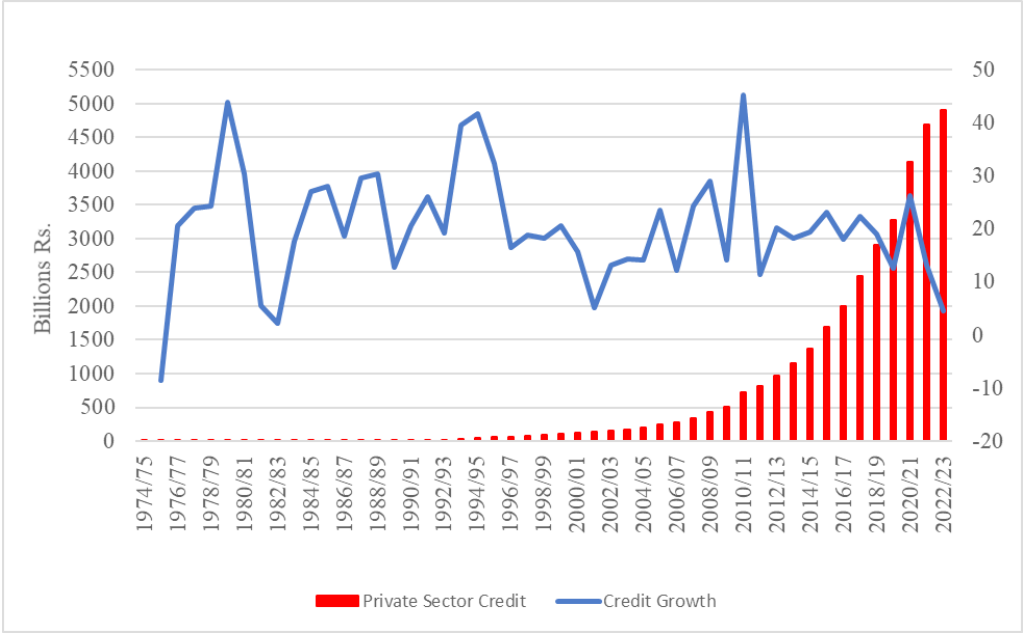
Historical Development of Private Sector Credit in Nepal

Formal banking in Nepal began with the establishment of Nepal Bank Limited, the first commercial bank in the country. Later on, the establishment of Nepal Rastra Bank (NRB) as the central bank of Nepal in 1956 and the establishment of Nepal Industrial Development Center (NIDC), Rastriya Banijya Bank (RBB), and Agriculture Development Bank (ADBL) during the 1950s and 1960s marked the significant development of the financial system and credit market in Nepal.

From the 1930s to 1977/78, Nepal's credit to the private sector was less than one billion rupees. This is due to the limited banking facilities, as only four banks were owned by the government (NRB, 2005). Considering the slow growth of credit, in 1974, NRB introduced the policy of small-sector credit, requiring the commercial banks to disburse at least 5 percent of their total lending to the small-priority sectors (Acharya, 2003). Nepal formally adopted a financial sector liberalization policy in 1984, allowing the private sector to establish commercial banks in joint ventures with foreign banks. During the 1980s, the government implemented a package of financial sector reform programs, which resulted in the growth of both the number and the amount of credit disbursed by the banks (Ozaki, 2014). As such, toward the end of 1990, the number of BFIs had reached 7, and private sector credit had reached around Rs. 14 billion.

A substantial increase in private sector credit is observed from FY 1994/95, as Nepal has implemented a range of financial sector reform programs, along with the structural adjustment program, with support from the IMF and the World Bank. In FY 1994/95 alone, credit to the private sector expanded by 42 percent, reaching Rs. 42 billion. Since then, it will continue to grow until it has reached Rs. 500 billion-plus in FY 2010/11. The significant shift in FY 2010/11 was due to data compilation, as NRB began reporting credit disbursed by development banks and finance companies, along with commercial banks' lending. Thereafter, credit growth remains moderately stable with an average annual growth rate of 20 percent until the outbreak of the COVID-19 pandemic in the FY 2019/20.

Figure 1: Historical Trend of Private Sector Credit



Source: Nepal Rastra Bank (NRB).

Later, the onset of COVID-19 brought global uncertainty towards the end of 2019, but Nepal's economy felt the impact more significantly from March 2020 onward. To combat the virus, the Nepalese government imposed various measures, including travel restrictions and a comprehensive lockdown. These actions led to business closures and heightened uncertainty, which, in turn, slowed economic activity and reduced credit demand. Consequently, credit growth declined, reaching its lowest rate of 12 percent in October 2020.

Following the reopening and gradual availability of COVID-19 vaccines, Nepal's economy began to recover. During the lockdown, the NRB implemented supportive measures, such as lowering interest rates and easing regulations, which led to excess liquidity and low credit demand (IMF, 2023). As the economy gradually recovered, credit to the private sector surged, reaching 31 percent in October 2021. The NRB responded to the economic slowdown with accommodative monetary policy measures, and credit has continued to expand, reaching Rs. 4900 billion in FY 2022/23.

However, rapid credit growth, coupled with overheating in the stock and real estate markets, increased imports, pressured the balance of payments, and depleted the foreign exchange reserves. In response, the NRB tightened

monetary policy and implemented measures to curb credit growth and alleviate external sector pressure (IMF, 2023). Additionally, a slowdown in remittance inflows created liquidity pressure, slowing credit growth in the private sector. In July 2023, credit growth to the private sector was 4 percent, the lowest in recent history. Since then, credit growth has remained sluggish despite the gradual decline in interest and excess liquidity in the banking system.

Literature Review

In this section, we provide a comprehensive review of the literature on macro-finance dynamics, credit cycles, sectoral credit allocation, credit shocks, financial crises, and macroeconomic outcomes. First, we examine the theories that establish macro-finance linkages, credit shocks, and real business cycle outcomes. Then, we discuss the empirical evidence, analyzing the relationship between credit expansions and macroeconomic effects.

Theoretical Review

The role and importance of money and credit in macroeconomics have changed substantially over the years. In the late 19th century, Modigliani and Miller (1958) discovered the irrelevance proposition that real economic and financial decisions are irrelevant to the financial structure. The credit view in economics began to gain attention in the 1980s. Bernanke (1983), among others, pioneered the augmentation of credit-related aspects of macroeconomic outcomes beyond monetary aggregates and argued that the deficiency in aggregate demand during the Great Depression and the financial disruption resulted from reduced efficient credit allocation, the subsequent rise in credit costs, and the unavailability of credit. As an alternative to the simple IS-LM model, Bernanke and Blinder (1988) developed a model of the monetary transmission mechanism and thereby showed how monetary policy works by affecting the bank assets through the banks' loans or credit, along with the bank liabilities such as deposits, also known as the financial acceleration model. This adds to the traditional Quantity Theory and Keynesian Monetary Policy Transmission channel to the real economy, thereby establishing that monetary transmission also works through the banks' credit channel (Bernanke, 1990). In this financial acceleration model, credit is primarily viewed as the propagator of shocks rather than an independent source of shocks. However, Gertler (1988) argued that there exists a long-standing school of thought in macroeconomics, dating back to Fisher and Keynes, that places strong emphasis on the characteristics of the credit market in the spread of cyclical macroeconomic oscillations. This alternative view holds that the significant increase in bankruptcies and insolvencies among borrowers, as well

as rising debt levels and other credit market indicators, are not only passive indicators of a decline in real economic outcomes but also significant factors that lower economic activity. Similarly, Minsky (1977), based on the Keynesian principle, concludes that financial instability is inherent to the capitalist system and that financial stability itself leads to financial and ultimately economic instability through endogenous credit bubbles.

Empirical Review

The existing theoretical evidence has often cited the characteristics of the credit market and financial factors in the spread of cyclical macroeconomic outcomes and the movement of the business cycle. In the same vein, Levine (2005) demonstrated the positive impact of well-functioning financial systems on economic performance and points to a positive association between various measures of financial depth, such as the size of the banking sector as measured by the private sector credit, and long-term economic growth. This relationship between the credit and macroeconomic performance holds valid for emerging market economies, where credit expansion to the private sector is systematically associated with macroeconomic expansions and real GDP growth through increased private consumption and investment (Bahadir & Gumus, 2016; Dell'Ariccia et al., 2016; Garcia-Escribano & Han, 2015; Mendoza & Terrones, 2012). In addition, the expansion of private credit, however, leads to increased inflation, real exchange rate appreciation, and the subsequent increased trade deficit through a credit-induced demand boom and increased demand for non-tradable output (Bahadir & Gumus, 2016; Dell'Ariccia et al., 2016; Mendoza & Terrones, 2012). Thus, it makes it difficult for the economy to maintain the balance between the domestic and external sectors. In the long run, there is also a trade-off between financial stability and macroeconomic performance, as periods of credit booms are often followed by crises, and such booms are more frequent.

However, recent empirical evidence has shown that an excessive rise in credit leads to financial crises and economic recessions that persist longer than normal economic slowdowns and recessions. Increases in private-sector credit at a faster pace are often, but not always, associated with subsequent economic downturns and financial turmoil (Arslan et al., 2021; Dell'Ariccia et al., 2016; Jordà et al., 2016b; Schularick & Taylor, 2012). However, the distribution of credit during an economic boom predicts whether the boom will lead to a bust. Credit flow disproportionately towards the household and non-tradable sectors predicts the boom-bust cycle and subsequent lower macroeconomic outcomes, often leading to financial crises and productivity slowdowns (Müller & Verner, 2023). Such a negative association between household credit and subsequent

economic growth is even stronger under the fixed exchange rate regimes(Mian et al., 2017). In contrast, credit flows toward tradable sectors predict stable, often higher growth in the medium run, with a low risk of financial distress. Consistent with (Bahadir & Gumus, 2016) and (Mian et al., 2020), Müller and Verner (2023) observed that a disproportionate expansion of credit toward household and non-tradable sectors produces a demand-induced boom-bust cycle, and compared to the tradable sector, these sectors contribute to increased financial crisis and instability (Dell'Ariccia et al., 2016; Jordà et al., 2016a). This indicates substantial differences in the predictability of credit expansions for future GDP growth. Expansion in the non-tradable sector credit predicts slowdowns in GDP growth, whereas expansion in tradable sector credit is associated with stable or higher growth.

In Nepal, Timsina (2014) observed the long-run positive effect of private sector credit on economic growth by applying the Johansen co-integration approach and the Error Correction Model. Similar observations are made by Paudel and Acharya (2020) using the ARDL bound test. While accounting for the sectoral allocation of credit, NRB (2022) reveals the positive impact of corporate credit on economic growth with a one or one-and-a-half-year time lag.

The theoretical and empirical review of the literature revealed that regarding the interaction between credit expansion and real economic outcomes, there exist three key perspectives. First, a strand of research demonstrates a positive association between financial development and credit expansion and economic growth, emphasizing credit's role in enhancing productive capacity. Second, another perspective shows the trade-off between private credit expansion and macroeconomic stability, noting that excessive credit expansion often precipitates financial crises and economic downturns. Third, recent studies emphasize the role of various channels of credit expansion in determining whether credit expansion will lead to boom-bust cyclical patterns or stable macroeconomic outcomes and productivity growth. Despite this, there is limited understanding of how sectoral credit allocation affects macroeconomic outcomes in Nepal, particularly regarding the allocation of credits to tradable vs. non-tradable sectors. Addressing this gap, this study analyzes how sectoral credit allocation influences the macroeconomic outcomes using the LP-IRF methodology, contributing to both the theoretical and methodological literature on macro-financial dynamics in developing economies.

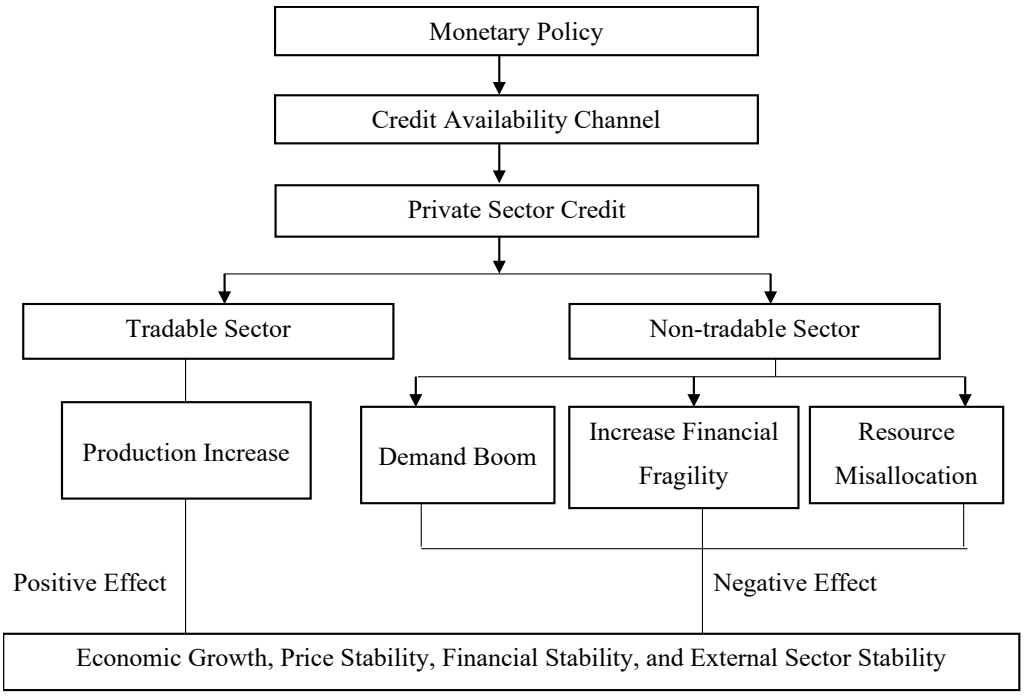
Data and Methodology

In this section, we outline the conceptual framework of the relationship between sectoral allocation of credit to different sectors of the economy and macroeconomic outcomes, the data sources and variable descriptions, the research methodology, and the model specification.

Conceptual Framework

In the Keynesian framework, the credit availability channel is considered the most powerful and direct channel of transmission of monetary impulses to the real sector of the economy, particularly in a least developed country like Nepal (Khatiwada, 1994). The existing theoretical and empirical literature has identified two potential channels: the Household Demand Channel and the Productive Capacity Channel of the effect of credit expansion on the economy (Mian et al., 2020). Understanding this distinction is crucial because the macroeconomic effects of a credit expansion can vary depending on whether it primarily boosts household demand or enhances productive capacity. This requires decomposing total private sector credit into tradable and non-tradable sectors. Where the tradable sector is associated with the productive capacity of the economy, and the non-tradable sector has a close link to household demand. This sectoral allocation of credit is crucial for understanding the interaction between credit expansion, macroeconomic outcomes, business cycle dynamics, and financial crisis. The theoretical models of credit cycles with sectoral heterogeneity identify three pathways that link sector-specific credit expansions to real economic boom-bust cycles. First, lending to household and non-tradable businesses has the potential to fuel an unsustainable demand boom that ultimately leads to a bust. Second, non-tradable sectors disproportionately contribute to the accumulation of financial instability. Third, the extension of credit to non-tradable sectors and households may result in an inefficient allocation of resources and impede overall economic efficiency (Bahadir & Gumus, 2016; Müller & Verner, 2023). Based on the literature, in this study, the total outstanding credit of the Banks and Financial Institutions (BFIs) is decomposed into two distinct sectors: Tradable and Non-tradable Sectors.

Figure 2: Conceptual Framework



Source: Authors' illustration (2024)

Data Source and Variables

This study is based on secondary data on the variables of GDP growth, inflation, private sector credit, credit allocation to the tradable sector, and the non-tradable sector. The total outstanding private credit of the BFIs is decomposed into the tradable and non-tradable sectors, which were identified following the theories of international trade and the ISIC manual of the UN. Where the tradable sector constitutes Agriculture, Forestry, and Fishing; Mining, and quarrying; Manufacturing; Machinery and Electronic Tools and Fitting; and Transportation Equipment Production and Fitting Industries. And the non-tradable sector includes the Construction, Transportation, Communication, and Public Services, Wholesale and Retail, Real Estate, Consumer Goods, and Service Industries. The quarterly time-series data are obtained from the Nepal Rastra Bank database on the Nepalese Economy. The quarterly time-series data on these variables of interest are available from 2006/07Q4 to 2023/24Q2, which covers a total of 67 quarters. Since the growth rate of quarterly real GDP is available, for this analysis, we convert the other nominal variables, such as private sector credit to real by using the CPI index. Instead of quarter-on-quarter growth rates, we

used year-on-year growth rates of the variables of interest. This is because the quarterly growth rates of time-series variables are expected to exhibit seasonality. We computed the year-on-year growth rates by taking the four-period difference of the log of each variable and then multiplying by 100.

Empirical Methodology

The objective of this study is to examine the dynamic relationship between the sectoral allocation of private-sector credit and macroeconomic outcomes in Nepal. To assess the dynamics of macroeconomic outcomes, macroeconomists rely on the Impulse Response Functions (IRFs) in stochastic models. IRFs trace out the effect of a one-time shock or innovations to an economic variable on itself and other variables in the system over a series of periods. The local projection (LP) approach to estimating impulse response functions (IRFs) in macroeconomics, introduced by Jordà (2005), is a flexible and robust method for tracing the dynamic response of variables to shocks. Unlike Vector Autoregressions (VARs), LP directly estimates the response at each horizon by running a series of regressions, making it less sensitive to model misspecification and suitable for nonlinear or state-dependent analyses. A linear LP model for estimating the IRFs h-step ahead conditions on past lags of the model variables is specified as:

$$Y_{t+h-1} = \alpha^h + \beta_1^h Y_{t-1} + \beta_2^h Y_{t-2} + \ldots \beta_p^h Y_{t-p} + u_{t+h-1}^h \ldots\ldots\ldots\ldots (1)$$

h = 1, 2, . . ., H

Where, Y_{t+h-1} is the k × 1 vector of response variables, Y_{t-1} is the k × k vector of impulse variables, α^h is the k × 1 vector of the intercept terms, β_1^h is the k × k matrix of coefficients for lag 1 and the parameter of interest as it represents the impulse response coefficients, u_{t+h-1}^h is the k × 1 vector of white noise errors.

Equation (1) shows the direct estimation of IRFs without identifying the specification of the true underlying multivariate model. However, errors of the local projections have a moving average structure, i.e., they are a VMA of order *h.* Though the forecast errors have a VMA structure, they do not affect the consistency of the IRF coefficient $\widehat{\beta_1^h}$ but affect the computation of the standard errors. As such, Jordà (2005); (Jordà, 2023) recommended estimating the IRFs using a Newey-West Heteroscedasticity and Autocorrelation-Consistent (HAC) robust estimator. Later on, Montiel Olea and Plagborg-Møller (2021) recommended estimating these IRFs with lag-augmented local projections that control for the lags of the variables in the regression and a heteroscedasticity-robust estimator to compute serial-correlation-corrected standard errors and

make the inference robust. In this study, separate regressions were run for each horizon h up to 20 quarters (5 years) for aggregate credit and 16 quarters (4 years) for sectoral credit analysis. To improve inference reliability, Lag order selection was based on information criteria AIC, and Newey-West HAC robust standard errors were applied to correct for heteroskedasticity and autocorrelation in the error terms.

To estimate the response of real GDP to innovation on private sector credit, equation (1) is augmented as:

$$y_{t+h} = \alpha^h + \sum_{i=0}^{5} \beta_i^h x_{t-i} + \sum_{i=0}^{5} \delta_i^h y_{t-i} + \epsilon_{t+h}^h \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

$h = 1, 2, \ldots 20$

Where, y_{t+h} is the real GDP growth from t to $t + h$, α^h is the intercept term, x_t is the vector of private sector credit growth, y_{t-i} is the vector of additional control variables. We choose $p=5$ based on information criteria AIC and $h=20$, β_0^h is the parameter of interest known as the impulse response functions that trace the response of real GDP growth to a change in private sector credit for the forecast horizon h. We choose a forecast horizon of five years following Mian et al. (2017), who show that credit booms typically last for 3 to 4 years.

To examine whether the sectoral allocation of credit matters for the boom-bust cycle, we developed the econometric model following Müller and Verner (2023), which examines the dynamic responses of real GDP and CPI inflation after the innovation in tradable sector and non-tradable sector credit. For this purpose, the basic LP specification in Equation (1) is augmented as:

$$y_{t+h} = \alpha^h + \sum_{i=0}^{5} \beta_{i,h}^T d_{t-i} + \sum_{i=0}^{5} \beta_{i,h}^{NT} d_{t-i} + \sum_{i=0}^{5} \delta_i^h z_{t-i} + \epsilon_{t+h}^h \ldots\ldots\ldots (3)$$

$h = 1, 2, \ldots, 16$

$$\pi_{t+h} = \alpha^h + \sum_{i=0}^{5} \beta_{i,h}^T d_{t-i} + \sum_{i=0}^{5} \beta_{i,h}^{NT} d_{t-i} + \sum_{i=0}^{5} \delta_i^h z_{t-i} + \epsilon_{t+h}^h \ldots\ldots\ldots\ldots (4)$$

$h = 1, 2, \ldots, 16$

Where, y_{t+h} is the real GDP growth and π_{t+h} is the inflation from time t to $t + h$, α^h is the intercept term, d_t is the sectoral credit growth, z_{t-i} is the vector of additional control, such as several lags of endogenous variables. The coefficients

$\beta^{T}_{0,h}$ and $\beta^{NT}_{0,h}$ are the parameters of interest that trace out the path of real GDP growth and inflation to the innovation to tradable and non-tradable credit, respectively.

Results and Discussions

In this section, we first present the descriptive statistics of the variables used in this study. Then, formally analyze and discuss the macroeconomic effects of private sector credit expansion.

Table 1: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Real GDP growth	67	3.983	5.14	-17.104	12.785
Inflation	67	7.266	2.538	2.675	12.893
Real Private Sector Credit Growth	67	10.021	7.556	-3.587	31.579
Real Tradable Sector Credit Growth	67	9.681	7.738	-4.306	24.802
Real Non-tradable Sector Credit Growth	67	13.362	9.428	-1.946	34.458

Source: NRB and the Authors' calculation

Table 1 presents the descriptive statistics of the quarterly time-series variables from FY 2006/07Q4 to FY 2023/24Q2 used in this study. The average year-on-year real GDP growth rate in Nepal for the sample period is 3.9 percent, with a minimum of negative 17 percent and a maximum of 12 percent, as measured by quarterly real GDP. This is in line with the average annual growth rate of real GDP in Nepal over the past four decades, indicating very low and slow growth in the country's output. The CPI-based inflation, on average, remained at 7.2 percent for the sample period, ranging from 2.7 percent to 12.9 percent. Inflation over this sample period is roughly equal to the average inflation in Nepal over the forty years, which is around 7.5 percent, indicating moderately higher inflation. However, the mean growth rate of the real private sector over the sample period exceeds 10 percent, indicating a period of credit booms. Although private sector credit growth has historically remained very high, in recent years, particularly from Q1 of FY 2022/23, its year-on-year quarterly growth rates have declined and remained consistently negative. Over the sample period, non-tradable sector credit growth has remained very high relative to tradable sector credit growth, with average growth rates of 13.3 percent and 9.6 percent, respectively. Similarly, the non-tradable sector credit also has a high standard deviation of 9.4 percent.

Figure 3: Impulse Response of Real GDP

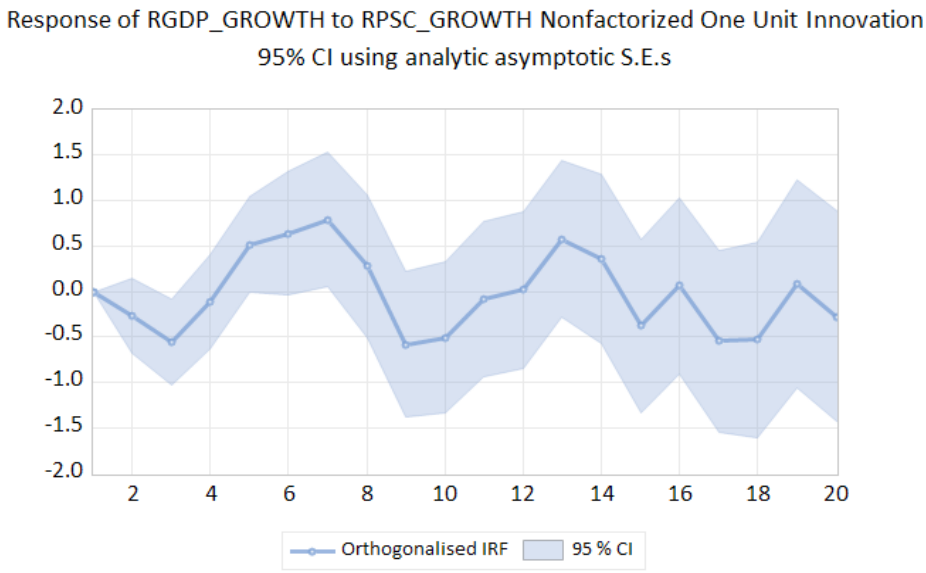
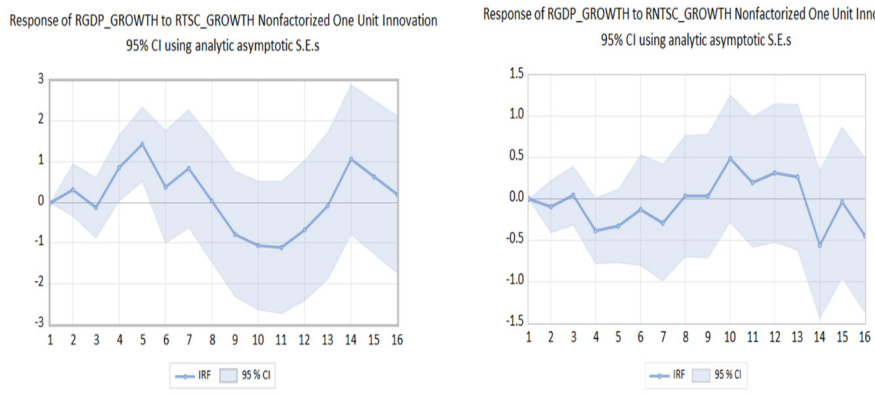


Figure 3 depicts the impulse responses of real GDP to a one-unit innovation in real private sector credit, given by the estimated coefficients β_1^h in equation (2). The results show the cyclical behavior of real GDP in response to a shock to private sector credit. This indicates that the real GDP growth rate declines initially but rises over 4 to 8 quarters, reaching a peak after 7 quarters of the shock. That means an increase in private-sector credit raises real GDP by 0.79 percentage points after 1.5 years. However, this rise in real GDP is short-lived, as it begins to decline, leaving real GDP below its long-run value. That is, one percentage point of innovation in real private sector credit predicts 0.29 percentage points lower GDP growth after five years. This indicates that a shock to private-sector credit has a positive but temporary effect on GDP and a persistent adverse effect in the medium and long run. This confirms the subsequent slowdown in growth following the credit boom, in line with previous research.

Figure 4: Impulse Response of Real GDP to Innovation Sectoral Credit

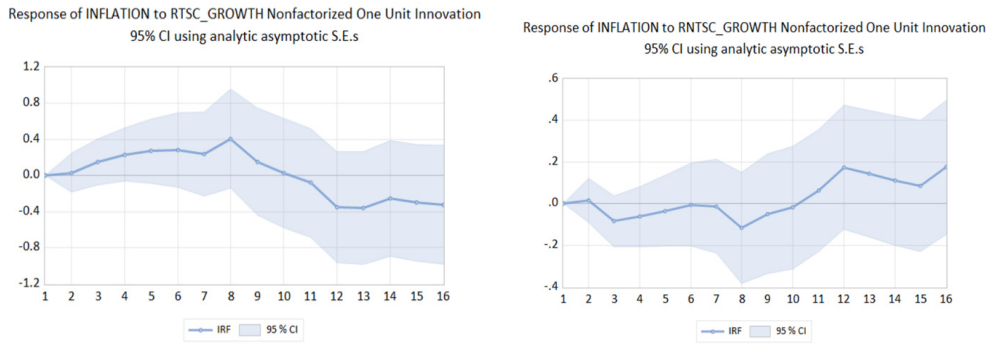


Panel (a) of Figure 4 shows the path of real GDP following innovation to tradable sector credit for 16 quarters ahead, given by $\beta_{1,h}^{T}$ and $\beta_{1,h}^{NT}$ in equation (3), following innovation to the tradable sector credit, real GDP increases immediately by about 0.84 percentage points after four quarters, reaching the peak after quarters with a rise of 1.42 percentage points and remaining positive for the next three quarters. This effect is significant for four to five quarters. Thereafter, real GDP declined, reaching a trough in the 11th quarter, with a 1.1 percentage-point drop. However, this reduction in real GDP does not persist for long, as it begins to recover after eleven quarters of the shock and becomes positive after thirteen quarters. A one percentage point increase in the tradable sector predicts 1.05 percent growth after fourteen quarters and 0.18 percent growth in the 16th quarter. That means 16 periods (quarters) after the shock to tradable-sector credit, real GDP remains above its long-run value. This shows that the expansion of credit to the tradable sector is positively associated with real economic growth in both the short and long run.

Panel (b) of Figure 4 depicts the path of real GDP following innovation to the non-tradable sector credit for the subsequent 16 quarters after the shock. In contrast to panel (a), panel (b) shows the different patterns of real GDP. It shows that following innovation to non-tradable sector credit, real GDP declines immediately by about 0.39 percentage points after four quarters and remains below the long-run value for up to eight quarters. This effect is significant for four quarters. After eight quarters, real GDP rises, reaching a peak of 0.5 percentage points in the 10th quarter. Real GDP then starts to decline again. The decline in real economic growth, as measured by real GDP, persists over several periods. In terms of value, a one percentage point increase in the non-tradable

sector predicts 0.55 percentage points lower GDP after fourteen quarters and 0.44 percentage points lower GDP after sixteen quarters of the shock to non-tradable sector credit. This indicates that the expansion of credit towards the non-tradable sector predicts a subsequent decline in real output in both the short and long runs.

Figure 5: Impulse Response of Inflation to Innovation in Sectoral Credit



Panel (a) of Figure 5 depicts the time path of inflation following innovation in tradable and non-tradable sectors' credit, based on the estimated coefficients of $\beta_{1,h}^{T}$ and $\beta_{1,h}^{NT}$ in equation (4). It shows that inflation rises initially, reaching a peak of 0.4 percentage points about eight quarters after the shock, before declining afterward. That means that an increase in real GDP from the expansion of credit towards the tradable sector leads to a rise in the domestic price level, as measured by CPI inflation. After that, the signs reverse and inflation begins to decline persistently following the sustained growth in output in the long run. Therefore, 16 quarters after the shock, inflation lies below its long-term trend.

Panel (b) of Figure 5 depicts the dynamic response of inflation following an impulse to tradable and non-tradable sectors' credit. It reflects that inflation initially declines, reaching a trough of -0.11 percentage points about eight quarters after the shock. Inflation then rises following an expansion of credit to the non-tradable sector, and sixteen quarters after the shock, it remains above its long-run value.

By comparing panel (a) and panel (b) in Figure 5, it is observed that inflation has an opposite pattern following an expansion of credit to the tradable and non-tradable sectors. It shows that credit expansion that flows disproportionately toward the tradable sector predicts lower prices of goods and services in the long run. In contrast, credit expansion that finances increased demand in the non-tradable sector predicts a higher price of goods and services in the long run.

The findings of the study suggest a cyclical relationship between the private sector credit and macroeconomic outcomes, indicating a positive but temporary effect on economic growth and a persistent negative effect in the medium and long run, a classic boom-bust phenomenon. This confirms the subsequent slowdown in growth following the credit expansion, in line with previous empirical work (Arslan et al., 2021a; Dell'Ariccia et al., 2016; Jordà et al., 2016b; Schularick & Taylor, 2012). Consistent with the theories of the credit cycle that account for the importance of sectoral heterogeneity in credit expansion, our findings show that expansion of credit to the tradable sector is positively associated with real economic growth in both the short and long run, whereas, the expansion of credit towards the non-tradable sector credit predicts the subsequent decline in real output in both the short and long run (Müller & Verner, 2023). While the study does not specifically investigate the mechanisms behind these outcomes, the results provide strong evidence of a negative association between the non-tradable sector credit and long-run economic growth, and a positive association with the price level. This suggests that the non-tradable sector credit boom boosts aggregate demand (Mian et al., 2020). This will increase the demand for both tradable and non-tradable goods and services. As tradable goods and services can be imported, non-tradable goods and services must be produced domestically. To meet the increased demand, the non-tradable sector expands, which will lead to an increase in the prices of non-tradable goods and services, appreciation of the real exchange rate, and increases in the demand for labor that will, in turn, increase the labor wage and reduce the export competitiveness of the tradable goods and services(Bahadir & Gumus, 2016; Dell'Ariccia et al., 2016). In such a situation, a negative credit shock will end in a bust and increase financial instability and the risk of a banking crisis, given the sensitivity of the non-tradable sector to changes in credit conditions and asset prices (Finck & Rudel, 2023; Müller & Verner, 2023). Thus, the results of this study underscore the role of non-tradable-sector credit expansion in propagating credit-induced boom-bust cycles in the economy and confirming the longstanding view that credit expansion to specific sectors of the economy, such as housing and real estate, is a significant factor in lowering aggregate economic activity. However, this study suggests that to achieve sustained growth and stable prices, credit should be directed towards the sector whose productivity is high and contributes to the economy's productive capacity.

Conclusion

The findings of the study reveal that rapid credit expansion predicts subsequent declines in economic growth. Notably, credit directed disproportionately toward

the non-tradable sector, such as real estate, wholesale, retail, and personal consumption, is strongly associated with lower future GDP growth and higher inflation, whereas credit directed toward the tradable sector supports both immediate and long-term economic growth while stabilizing inflation. These findings are consistent with existing international evidence, particularly studies by Müller & Verner (2023), Mian et al. (2020), and Bahadir & Gumus (2016), which suggest that credit booms concentrated in the non-tradable sector increase financial vulnerabilities and macroeconomic instability. These results reflect deep-rooted structural issues in Nepal's financial sector. The predominance of credit flows to consumption-driven and speculative sectors not only undermines sustainable growth but also amplifies systemic risks, as seen in recent episodes of financial tightening, rising non-performing loans, and pressures on foreign exchange reserves. The findings underscore the importance of addressing inefficiencies in credit allocation and strengthening the capacity of the financial system to channel credit into productive, tradable sectors that can enhance economic competitiveness and resilience.

The implications of these findings are significant for monetary policy formulation, financial regulation, and macroprudential oversight. Policymakers should prioritize measures that redirect credit from speculative, non-tradable sectors toward tradable sectors that have high potential for backward and forward linkages. Additionally, credit risk assessments, sectoral exposure limits, and counter-cyclical capital buffers should be actively managed to mitigate the risks associated with household demand-driven credit booms.

However, this study has certain limitations. First, while the decomposition of private sector credit into tradable and non-tradable sectors provides valuable insights, the analysis does not capture potential heterogeneities within these broad categories, nor does it fully account for external shocks such as remittance fluctuations, political instability, or regional trade dynamics. Second, due to data limitations, only quarterly data from FY 2006/07 onward were used, which may restrict the analysis of longer-term trends.

Future research could expand on this work by incorporating firm-level or bank-level data to examine the microeconomic foundations of sectoral credit allocation. Additionally, exploring the interplay between fiscal policy, remittance inflows, and credit booms, or analyzing the role of asset prices and real estate markets, would offer a more comprehensive understanding of financial vulnerabilities in Nepal.

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Annex

Annex 1: ADF Unit Root Test Result

	Level		First Difference	
Variables	t-stat	p-value	t-stat	p-value
rgdp_growth	-2.92	0.0001**	-3.489	0.0018**
rpsc_growth	-3.489	0.0118**	-3.489	0.0118**
rtsc_growth	-2.92	0.01424**	-2.921	0.0058**
rntsc_growth	-2.92	0.0251**	-2.921	0.0005**

** Significance at 5 % and reject the null hypothesis.

Source: Authors' Calculation

Annex 2: Lag Order Selection Equation (2)

Endogenous variables: RGDP_GROWTH INFLATION RPSC_GROWTH
Exogenous variables: C
Included observations: 58

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-489.562166	0	4775.631	16.9849	17.09148	17.02642
1	-407.786466	152.272	388.5501	14.4754	14.90169*	14.64145
2	-394.063158	24.13409	331.106	14.31252	15.05855	14.60311
3	-382.323641	19.43092	303.3426	14.21806	15.2838	14.63319
4	-366.825652	24.04860*	245.5698*	13.99399	15.37946	14.53366*
5	-361.717208	7.398435	286.7361	14.12818*	15.83337	14.79239

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Authors' Calculation

Annex 3: Lag Order Selection Equations (3) and (4)

Endogenous variables: RGDP_GROWTH INFLATION RNTSC_GROWTH RTSC_GROWTH
Exogenous variables: C
Included observations: 58

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-697.807772	0	380321.9	24.20027	24.34237	24.25562
1	-586.345618	203.7067	14167.1	20.90847	21.61897*	21.18522*
2	-570.373961	26.98659	14300.48	20.90945	22.18834	21.4076
3	-545.62639	38.40140*	10799.60*	20.60781	22.4551	21.32736
4	-528.84127	23.73069	10938.69	20.58073	22.99643	21.52169
5	-511.05541	22.6923	10995.18	20.51915*	23.50324	21.68152

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
Source: Authors' Calculation

Annex 4: IRF estimates of Equation (2) in Column 2, Equation (3) in Columns 3&4, and Equation (4) in Columns 5 & 6

Periods	RGDP	RGDP	RGDP	INFLATION	INFLATION
1	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
2	-0.267	0.300	-0.093	0.030	0.016
	(0.210)	(0.328)	(0.159)	(0.111)	(0.054)
3	-0.557	-0.134	0.043	0.146	-0.085
	(0.241)	(0.376)	(0.183)	(0.130)	(0.063)
4	-0.111	0.849**	-0.388**	0.232	-0.062
	(0.264)	(0.413)	(0.201)	(0.152)	(0.074)
5	0.516**	1.432**	-0.330	0.269	-0.034
	(0.271)	(0.465)	(0.226)	(0.180)	(0.087)
6	0.641	0.388	-0.133	0.284	-0.005
	(0.344)	(0.702)	(0.341)	(0.211)	(0.102)
7	0.792**	0.831	-0.286	0.237	-0.013
	(0.377)	(0.741)	(0.360)	(0.237)	(0.115)
8	0.277	0.041	0.038	0.407	-0.116
	(0.400)	(0.776)	(0.377)	(0.281)	(0.136)
9	-0.584	-0.784	0.037	0.151	-0.050
	(0.407)	(0.788)	(0.383)	(0.302)	(0.147)

10	-0.505	-1.063	0.494	0.026	-0.019
	(0.425)	(0.808)	(0.392)	(0.308)	(0.150)
11	-0.082	-1.119	0.204	-0.083	0.063
	(0.437)	(0.828)	(0.402)	(0.309)	(0.150)
12	0.018	-0.686	0.316	-0.351	0.175
	(0.441)	(0.886)	(0.430)	(0.312)	(0.152)
13	0.579	-0.079	0.268	-0.361	0.143
	(0.443)	(0.926)	(0.450)	(0.320)	(0.155)
14	0.358	1.058	-0.555	-0.254	0.110
	(0.474)	(0.942)	(0.458)	(0.327)	(0.159)
15	-0.380	0.622	-0.036	-0.302	0.085
	(0.486)	(0.963)	(0.468)	(0.331)	(0.161)
16	0.062	0.186	-0.445	-0.325	0.177
	(0.496)	(0.988)	(0.480)	(0.338)	(0.164)
17	-0.544				
	(0.510)				
18	-0.534				
	(0.549)				
19	0.085				
	(0.581)				
20	-0.287				
	(0.592)				

** Significant at 5 % level.
Standard errors: Analytic standard deviations in parentheses.
Source: Authors' Calculation