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Determinants of Loanable Funds in Nepal's Banking System: Long-run Relations and Short-run Interactions

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Abstract: This paper investigates the long-run relationships and short-run dynamics between loanable funds and their key determinants in Nepal's banking system. Utilising monthly data from January 2021 to December 2024, the study employs the Johansen Cointegration Test and the Autoregressive Distributed Lag (ARDL) model to examine these interactions. The findings reveal that government expenditure and the balance of payments exert a strong and statistically significant influence on the availability of loanable funds in the long run, while consumption expenditure and planned industrial investment have relatively weaker effects. Inflation appears to have no significant impact on loanable funds in either the short or long run. In the short term, the central bank's open market operations and the capital base of banking and financial institutions (BFIs) play a critical role in shaping loanable fund flows. Additionally, the study finds that changes in all variables—including past values of loanable funds—significantly affect current-month loanable fund levels. The Error Correction Mechanism (ECM) indicates that deviations from the long-run equilibrium are corrected at an average monthly rate of approximately 8 per cent. Overall, the empirical results and model diagnostics confirm that the ARDL approach effectively captures both the long-run relationships and short-run adjustments between loanable funds and their major determinants within Nepal's banking sector.

Keywords: Loanable Funds, Banking System of Nepal

JEL Classification: E32, E44 and E52

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1. INTRODUCTION

Background

Nepal's financial system, which comprises the banking and non-banking financial institutions, is maturing progressively to mobilise savings and channel the investment needs of a growing economy. The non-banking financial system, including both capital and debt markets, is relatively small and gradually developing, but is not able to serve all of the investment requirements of the economy. The banking system, comprising Banks and Financial Institutions (BFIs), is moderately large and sound and has been playing a leading role in mobilising the loanable funds and bridging the investment gaps of the economy.

In this paper, the loanable funds represent the amount of funds readily available in the banking system to offer new credits. This amount of loanable funds can be obtained by deducting the uses of funds from the sources of funds after meeting all regulatory reserve requirements of the central bank, i.e. Nepal Rastra Bank (NRB). This can be derived as follows:

$$LF = SF - UF \quad (1)$$

LF=total loanable funds available with the BFIs

SF=sources of loanable funds of the banking system

UF=uses of loanable funds of the banking system

$$\text{Or, } LF_t = DP_t + CF_t - (CR_t + RRR_t + V_t) \quad (2)$$

DP_t = total deposits cum liabilities of BFIs

CF_t = total capital funds of BFIs

CR_t = total credits of BFIs

RRR_t = amount kept for regulatory reserve requirements

V_t = voluntory reserve for day-to-day of operations of BFIs

Equation (2) gives the fundamental equation of loanable funds. Actual value of all of the components (except V_t) listed on the right-hand side of the equation (2) can be obtained from the NRB. NRB's monetary policy defines the ratio of RRR, which is 20 per cent of the sources of funds (SF) since long, i.e. $RRR = 0.2\ (DP_t + CF_t)$. However, there is no uniform rule about the voluntary reserves (V_t) that BFIs should hold with them to ensure smooth daily operation.

One of the working papers of the IMF by Gray (2011) highlights the importance of voluntary reserves for the smooth operation of BFIs, especially to prevent a shortage of funding liquidity during the withdrawal of deposits in large volumes. Findings of the paper reveal that 121 central banks have given freedom to the BFIs to maintain the voluntary reserve as per their requirements. The central bank survey of 121 countries finds that there were some mandatory provisions for voluntary reserves in the past. Latest reports of the IMF show that the BFIs that were given freedom about voluntary reserves were keeping—on average—about 1.5 per cent of total deposits as funding liquidity.

In the case of Nepal, voluntary reserve was mandatory till 2002, where BFIs had to keep 2 per cent of their total domestic deposits as cash in a vault. It was the monetary policy of 2003/04 that lifted the provision out and made BFIs accountable for managing the minimum voluntary reserve requirements as per their balance sheet condition (Nepal Rastra Bank, 2020). Looking at the trend after that policy departure, it is found that Nepali BFIs have been holding 1 to 2 per cent of their total deposits as cash in vaults. Therefore, considering the national and international evidence it is assumed that the Nepali banking system holds about 1.5 per cent of total deposits as voluntary reserve in addition of the RRR. This gives the actual size of loanable funds as follows:

$$LF_t = (DP_t + CF_t) - CR_t - 0.2(DP_t + CF_t) - 0.015(DP_t)$$

Or,
$$LF_t = (1 - 0.2)SF_t - CR_t - 0.015(DP_t) \quad (3)$$

$$(\because DP_t + CF_t = SF_t)$$

As per NRB rule, BFIs are not allowed to disburse credits more than 80 per cent of the sources of funds ($DP_t + CF_t$). Thus, the proportion of total outstanding credits (CR_t) to the total SF gives the actual Credit to Capital cum Deposit (CCD) ratio of the banking system for a particular period of time. Therefore, the actual amount of loanable funds available in the banking system is defined as:

$$LF_t = (0.8\text{-}CCD_t)\ SF_t - 0.015(DP_t) \quad (4)$$

Equation (4) gives the actual size of loanable funds for a particular period of time. The first component $(0.8\text{-}CCD_t)SF_t$ indicates the excess reserve of the banking system, whereas the second (0.015^*D_t) gives the level of voluntary

reserve BFIs hold for day-to-day operations. Thus, the actual size of loanable funds can be defined as the gap between excess reserves and the voluntary reserve of the banking system.

Problem and Objectives

A sound banking system helps mobilise funds efficiently, making capital more productive and creating jobs for sustainable economic growth. Hemchandra (2003) was of thought that the key role of the banking system is to reduce risks and vulnerability of low-income countries while increasing the accessibility of basic services to disadvantaged groups, which in turn helps reduce poverty. In this line, the banking system of Nepal was gradually becoming competitive, inclusive and expanding its outreach to the mass population. NRB (2009) reveals that the banking system of Nepal has been performing a crucial role in raising the funds and channelling the same for productive investment.

Despite such an impressive role the Nepali banking system was playing to fuel the productive capacity of the economy, the BFIs of the system found themselves struggling to maintain the balance between demand for and supply of loanable funds in the aftermath of the COVID-19 pandemic. As the pandemic has significantly impacted Nepal's economy and livelihoods, leading to a notable disturbance in the aggregate demand and major macroeconomic variables. This has reflected in the banking system, creating disequilibrium between the demand for and supply of loanable funds.

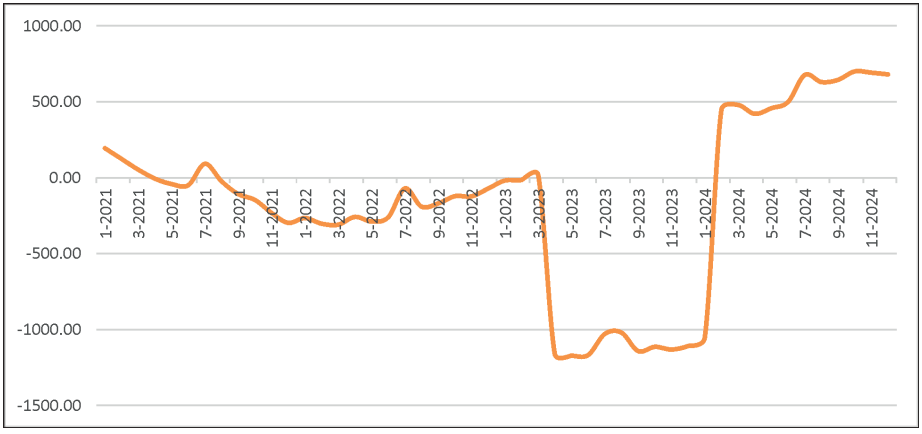

Figure 1: Post-COVID-19 Scenario of Loanable Funds Available in the Banking System of Nepal (Rs. Billion)

It has been observed many times that the banking system was facing a shortage of loanable funds to issue fresh loans, i.e. excess demand over supply. On the other hand, it is quite visible in the latest months that the central bank has been mopping up the surplus liquidity from the banking system to prevent interest rate instability; still, there is an excess supply over the demand (Figure 1). The banking system was facing a severe shortage of loanable funds at a time when there was high demand for loans in the markets. This results in frequent changes in the interbank rates, making the market interest rates volatile and fueling the unpredictable investment climate for the private sector. The unpredictability of interest rates has created a tough time for businesses to envisage their position in the market while various other players are looking into the opportunities.

In this context, the main objective of this paper is to examine the determinants of loanable funds in the banking system of Nepal and help minimise the risks of demand-supply mismatch and interest rate instability. Other specific objectives are the following:

1. To identify the factors that have significant contributions to determine the demand for loanable funds in the banking system of Nepal.
2. To identify the factors that have significant contributions to determine the supply of loanable funds in the banking system of Nepal.
3. To contribute to the knowledge domain of financial economics with respect to the loanable funds for policy suggestions.

Scope and Organisation

This paper aims to generate evidence that the BFIs—operating under the Intermediation of Loanable Funds (ILF) model of banking—can learn and benefit by adopting research and forecasting strategies within their business model. The scope of this paper is confined to the funds mobilised through 'A', 'B' and 'C' class financial institutions under the regulatory jurisdiction of NRB. Therefore, the term 'loanable funds' represents the amount of money readily available with these BFIs to give fresh credits to the clients after meeting all the regulatory reserve requirements set by the central bank.

This paper employs the Keynesian Macroeconomic Framework to identify the aggregate factors affecting the loanable funds and uses monthly time series

data of the selected variables collected from the secondary sources. The sample period starts from January 2021 and ends in December 2024, covering 48 observations over 4 years. The organisation of this paper has five sections. The next section is the review of literature, followed by the methodology used in the study and data analysis. Section four covers the results and discussion, followed by findings and conclusion in section five.

Review of Literature

During the pandemic, governments have enacted mitigation measures to reduce the spread of COVID-19, especially the social distancing, national quarantines, and the shutdown of markets and non-essential businesses. Such disturbances to the economic activities have had a large shock to the business and household sectors due to obstacles in supply chains, cash flow shortages, revenue shortfall and hit the livelihood. The banking system, which was expected to play a key role in absorbing the shock by supplying much-needed liquidity funding to businesses and households, was also badly affected due to the pandemic (Acharya & Steffen, 2020).

There are other studies that provide valuable insights into the multifaceted effects of the COVID-19 pandemic on the banking industry and interest rates, highlighting challenges and responses within the financial sector. World Bank's policy paper by Demirguc-Kunt et al. (2020) analyses the performance of banks with respect to stock prices, flow of funds and the policy responses during the crisis. The results suggest that the crisis and the countercyclical lending role that banks are expected to play have put banking systems under significant stress, with bank stocks underperforming their domestic markets and other non-bank financial firms. The effectiveness of policy interventions, especially the liquidity support, borrower assistance and monetary easing, was mixed to moderate the adverse impact of the crisis. The paper suggests that borrower assistance and macro-prudential measures to be utilised cautiously during the crisis since the banks and firms that are already undercapitalised and/or operate in countries with little fiscal space need to be carefully monitored as the pandemic further deteriorates their vulnerability.

A study by Delmolo et al. (2024) offers valuable insights into how BFIs managed loanable funds and addressed balance sheet mismatches during the COVID-19 pandemic, highlighting the challenges and strategies employed

to maintain financial stability. This study examines how far the COVID-19-related economic slowdown affected the performance of Micro Finance Institutions (MFI) and their clients in least developed countries like Ethiopia. For the period between 2018 and 2021, the study identified the association between the loan repayment performance of borrowers using a binary logistic regression model. Results reveal that borrowers' personal characteristics, loan repayment period, loan size, and religious beliefs have had a significant bearing on determining the loan repayment. The study suggests that the regulator and the MFIs should offer facilities to help borrowers cope with economic slowdowns due to crises like COVID-19. It also recommends interest subsidy and loan restructuring to enhance the overall performance of the borrowers, preventing them being defaulting.

Another study by (Marcu, 2021) analysed the dynamics of loanable funds and balance sheet mismatches in the banking system, particularly in the context of the COVID-19 pandemic. This paper tries to explore banking strategies implemented during complex crises, with a focus on the economic consequences of the COVID-19 pandemic in comparison to the financial crisis of 2008-2009. It reveals that the banking system has always been at the centre of the crises, both in 2008 and in the 1930s. However, in the previous crises, BFIs were considered as part of the problem, but this time they are perceived as part of the solution, highlighting the role of BFIs in the coronavirus crisis and the strategies adopted by banks influence the whole economy, an unfolding new experience for the world economy during the pandemic.

Under the unprecedented circumstances of the COVID-19 pandemic, central banks and governments enacted a wide range of policy interventions. While some measures were aimed at reducing the sharp tightening of financial conditions in the short term, others sought to support the flow of credit to firms, either by directed lending schemes or by relaxing BFIs to use the capital buffers (Yi-Wei, 2020). This paper highlights that the BFIs were found to play an important countercyclical role to support the real sector; these actions also have a series of implications for the future resilience of the banking sector and interest rate stability. The author argues that the banking sector can carry out an economic stimulus given restructuring authority for all credit or financing without requiring restrictions on the credit ceiling, especially for MSMEs and informal workers in Taiwan. It suggests that such inbuilt economic stimulus

capacity of BFIs needs to be enhanced through prudential monetary and macro policies by low interest rates and a stable exchange rate.

Another paper by Dekar et al. (2024) opines that the banking system was the crucial player for liquidity support in the Bhutanese economy during the COVID-19 pandemic, especially to prevent potential shortages in funding. Using panel data from 2018-2022, this paper used Random effects generalised least squares (GLS) regression, focusing on profitability indicators of BFIs. The empirical results suggest that Bhutanese BFIs were resilient and were not significantly affected by COVID-19. Prudential measures for such resilience were provisions of domestic currency liquidity through broadened access to central bank refinancing, an extended collateral framework, proactive Open Market Operations (OMO) and injection of foreign currency liquidity through swap agreements between central banks.

It is well recognised that BFIs use short-term liabilities of depositors while making long-term loans to borrowers, a primary reason for cause demand-supply mismatch of loanable funds (Hanh, 2015). Howrey and Hymans (1978) postulate that the current position of loanable funds with BFIs is highly dependent on the past behaviours that influence the decision to acquire external funds and accept deposits from the public, as well as lending such funds to the borrowers. In the aftermath of the pandemic, the ground for making decisions changes, thus impacting the position of loanable funds, which in turn helps create horizontal inequality among the BFIs, fueling systemic risks in the whole financial system (Diamond & Rajan, 2009).

Similarly, Koray et al (2016) investigated the role of Regulatory Reserve Requirements (RRR) on the position of loanable funds and lending capacity of BFIs in Turkey. Findings of the study suggest that the money injected through OMO of the central bank and public deposits may be considered as close substitutes of the BFIs' source of loanable funds, in general; however, the eventual impact of RRR on bank position of loanable funds and on the overall economy may be different in the context of a crisis.

As far as the role of financial intermediaries is concerned in determining the position of loanable funds (Woodford, 2010) argue that neither public deposits nor equity capital of BFIs are the major determinants of banks' funding liquidity. Looking at the bank level data of the USA—for the period of financial crisis—the study reveals that the funds with long-term commitments,

such as corporate bonds, serve as a stable source of loanable funds for both interest rate stability and avoiding balance sheet mismatch of BFIs. In the case of Ghana, Amoah, et al. (2018) examined the macroeconomic determinants of the lending capacity of credit unions and found that the internal factors of credit unions were more significant in determining the lending capacity, i.e. position of loanable funds with them.

With reference to the banking system of Bosnia and Herzegovina, Hasanovi & Latic (2017) tried to examine the determinants of banks' funding liquidity for the period 2006 to 2015. The dynamic panel analysis of the generalised method of moments (GMM) reveals that the loanable funds (excess liquidity) are the outcome of the interaction between both internal and external factors. Results indicate that the BFIs with adequate funding liquidity are less likely to experience liquidity issues even during the aftermath of the pandemic. The study also flags that more reliance on public deposits may be riskier for the BFIs to prevent balance sheet mismatch and interest rate stability.

Some studies at the regional level provide significant implications for the monetary authority to pay close attention while using policy measures for financial stability in the banking system. In the case of Pakistan, for the period of 2005 up to 2014, (Ahmad & Rasool, 2017) estimated the determinants of banks' liquidity. According to the study, along with the bank-specific variables, the loanable funds of commercial banks depend on both the domestic and international socio-economic factors.

In the case of Nepal, Timsina (2017) examined the determinants of lending behaviours of commercial banks using time series data for the period 1975-2014. The results show that the GDP and liquidity ratio of banks have the greatest impacts on determining the bank lending, the demand side of loanable funds, in Nepal. Whereas (Bhattarai, 2019) tried to establish the determinants of lending operations among commercial banks in Nepal using panel data for the period of 2012-2017 of the selected ten commercial banks. Estimated results show that liquidity ratio, interest rate spread, inflation and exchange rate were significant in determining lending volume of commercial banks, again, the demand side of loanable funds. The positive effects of exchange rate and inflation, respectively, imply the influence of international and domestic markets in determining the banks' lending behaviours. Likewise, the negative sign of the interest rate spread implies that the cost of borrowing

has a significant bearing on determining loan demand in the banking system of Nepal.

In the meantime, Gaire (2023) tries to examine both the demand and supply sides of loanable funds while assessing the performance of the VECM model to forecast the amount of loanable funds in the banking system of Nepal. With rigorous analysis of monthly data of 14 years, starting from July 2007 to June 2021, results reveal that the supply side factors (government expenditure and BoP) dominate over the demand side factors (industrial investment and consumption) while determining the amount of loanable funds in the banking system of Nepal. According to the forecast performance indicators, the selected VECM model was capable enough in explaining the variations of the determinants that bring changes in the monthly amount of loanable funds.

Looking at the literature, it is noticed that these are limited studies to capture both the demand and supply side determinants of loanable funds in Nepal. At the same time, almost all of the studies were for the pre-pandemic period of COVID-19. Amid such a situation, this paper, focusing on both demand and supply side factors for the period of the post-pandemic scenario, would make a significant contribution in the field of financial economics in general and Nepal's banking system in particular.

2. METHODOLOGY

This paper follows a quantitative research design, which is a blend of statistical methods and econometric models and has complementary strengths but no overlapping weaknesses (Malhotra & Dash, 2016). Under this design, carefully chosen models with identified variables have been estimated using multivariate time series methods. Testing of defined hypotheses was an integral part of the analysis and interpretation of results while drawing conclusions.

Data and Variables

The study covers 48 months of 4 years from January 2021 to December 2024. The variables being used in this study are the following:

Net OMO (O_t): This is a policy variable (the degree of NRB's policy intervention). Net amount is obtained by subtracting the total amount of money mopped up from the markets from the total money injected into the markets.

Capital Funds of BFIs (CF_t): The sum total of BFI's paid-up capital and reserve funds.

Inflation Rate (π_t): Monthly percentage change in the Consumer Price Index (CPI).

Interest Rate (R_t): Monthly weighted average of interbank rates.

Government Expenditure (G_t): Sum of the total monthly expenditures of the federal government.

Balance of Payments (BP_t): Net foreign receipts of the economy at the end of the month.

Planned Investment (PI_t): A proxy of investment demand of the industrial sector (total investment proposed by the industries during registration at the Department of Industry).

Consumption Demand (C_t): A proxy of consumption demand (total VAT collection ÷ 13%).

Monthly data of all the variables have been collected from the various reports of NRB and the Industrial Management Information System (IMIS) of the Department of Industry.

Model Specification

This paper uses the balance sheet approach to build the loanable funds model of the Nepali banking system. The fundamental equation of the balance sheet ensures that the total assets of the BFIs is the summation of liabilities and share capital (equity) for the given period of time.

$$\text{Assets} = \text{Liabilities} + \text{Equity} \tag{5}$$

Both sides of equation (5) have been disaggregated in the model balance sheet (Table 1) below:

Table 1: A representative Balance Sheet of BFIs in Nepal

Assets	Liabilities and Equity
Loans and Investment (Total Credits)-C	Deposits (total deposit liabilities)-D
Regulatory Reserves (CRR+SLR+...)-R	Capital Funds (Equity)-CF
Excess Reserves (Loanable Funds)-LF	Debt Funds (Bond/Debenture)-B
Interbank Lending (short-term assets)-I	Interbank Borrowing (short-term funds)-I
Claim to Central Bank (R-REPO+…)-N	Owe to Central Bank (REPO+SLF+RF+…)-M

Source: Gaire Hom N. (2023)

Equation (5) and Table (1) provide the building blocks for the models to be examined in this paper. According to equation (5) the both sides of table 1 must be in equilibrium, i.e.

$$C + R + LF + I + N = D + CF + B + I + M \quad (6)$$

The interbank lending of one bank is the interbank borrowing of the others, i.e. $I - I = 0$. Similarly, regulatory reserve requirements (R) are exogenously determined by NRB, and the ratio remains almost constant in the long run. i.e. the rate of change of $\bar{R}$ will be insignificant (*i.e.* ≈ 0) in the very short interval of time, a month. At the same time, the debt funds (B) mobilised by BFIs via debentures are very less in the Nepali banking system, assumed as zero, i.e. $B \approx 0$. This gives the following loanable funds model for examination.

$$LF = D + CF - CR + (M - N)$$

Or,
$$LF_t = D_t + CF_t - CR_t + O_t \quad (7)$$

Where;

LF_t = Loanable funds available in the banking system at the end of the month

D_t = Total Deposits with the BFIs (supply function)

CF_t = Total Capital Funds of BFIs (share equity)

CR_t = Outstanding Credits of the BFIs (demand function)

O_t = Net money injection through OMO (policy factor)

In order to examine the impact of disaggregated variables on the loanable funds, the demand (Credits) and supply (Deposits) functions have been categorically defined as:

$$\textbf{Demand Function } (\boldsymbol{CR_t}) = \boldsymbol{C_t + PI_t + \pi_t + R_t} \quad (8)$$

Where,

CR_t = Total outstanding credits at the end of the month

C_t = Total Consumption Expenditures (consumption demand)

PI_t = Planned Investment of the Industrial sector (Investment demand)

π_t = Percentage change in Consumer Price Index (Inflation rate)

R_t = Interest Rate (weighted average interbank rate)

$$\text{Supply Function } (D_t) = G_t + BP_t + R_t \quad (9)$$

Where: D_t = Total Deposits with the BFIs at the end of the month

G_t = Total Government Expenditure of the month

BP_t = Balance of Payments at the end of the month

R_t = Interest Rate (weighted average interbank rate)

The final model of loanable funds (equation 10) to be examined in this paper has been obtained by substituting the demand function (equation 8) and supply function (equation 9) in equation (7).

$$LF_t = G_t - C_t - PI_t + BP_t - \pi_t + O_t + CF_t \quad (10)$$

The specified model has been systematically examined with advanced tools of time series econometrics. Results obtained in the due process of examination have been assessed with respect to the established principles and key performance indicators to ensure reliability and validity. The signs of independent variables have been given as it is as per the theoretical expectation of the demand and supply function, and are subject to validation by test results.

4. RESULTS AND DISCUSSION

Correlation Coefficients

In order to check the problem of multicollinearity in the model, Carl Pearson's correlation coefficients have been computed and presented in Table 2. As indicated by the coefficients, it is confirmed that there is no possibility of multicollinearity among the independent variables, and thus moved on to the next step of examination.

Table 2: Carl Pearson's Correlation Coefficients

	BOP	*CF*	*CN*	*GE*	*INF*	*INT*	*LF*	*OMO*	*PI*
BOP	1.00								
CF	-0.05	1.00							
CN	0.04	-0.09	1.00						
GE	0.25	-0.03	0.43	1.00					
INF	-0.05	0.12	-0.21	-0.01	1.00				
INT	-0.05	0.23	-0.26	0.03	0.75	1.00			
LF	-0.03	-0.05	0.14	0.04	-0.39	-0.29	1.00		
OMO	0.34	0.05	-0.11	0.07	0.31	0.50	-0.53	1.00	
PI	0.06	0.05	-0.01	-0.01	0.33	0.36	-0.08	0.33	1.00

Source: Author's estimation with Eviews

Unit Root Test

The usual assumption in statistics is that there is a stationary property in time series data, i.e. independent and identically distributed (IID) with a mean. However, most of the economic and financial time series data follow a trending behaviour in the long run and seasonality in the short run. With these two components, a time series becomes non-stationary, presence of a unit root. Thus, it is required to check the unit root of the series before proceeding with the analysis. The unit root of the variables incorporated in the model has been examined with the help of the Augmented Dicky Fuller (ADF).

Table 3: ADF Unit Root Test Results

Variables	*Intercept*				*Trend and Intercept*			
	Level		*First difference*		*Level*		*First difference*	
	t-stat	*p-value*	*t-stat*	*p-value*	*t-stat*	*p-value*	*t-stat*	*p-value*
LF	-1.4750	0.5374	-5.1247	0.0000	-1.5872	0.7831	-6.5722	0.0000
PI	-5.2369	0.0000			-5.3956	0.0003		
INF	-1.9858	0.2919	-6.6650	0.0000	-1.6227	0.7688	-7.0357	0.0000
CF	-6.8804	0.0000			-6.8109	0.0000		
OMO	1.0385	0.9963	-2.2498	0.1926	0.1556	0.9969	-5.7166	0.0001
BOP	-7.2139	0.0000			-7.1347	0.0000		
GE	-10.302	0.0000			-10.364	0.0000		
CN	-5.1990	0.0001			-5.1499	0.0006		

Source: Author's estimation with Eviews

Table 3 indicates that the variables included in the estimation model are mixed stationary in nature. The ADF coefficients and the corresponding *P* – values confirm that the variables LF, INF and OMO are stationary at the first difference, i.e. level *I*(1) whereas the rest are stationary at the level *I*(0).

Cointegration Test

Next step for mixed stationary time series is the cointegration test, which requires identifying the number of optimal lags to be used in estimation. The simple VAR model has been estimated, and a lag of one month (t-1) has been selected as indicated Akaike Information Criterion (AIC). Based on the identified lag (1), Johansen cointegration test has been performed with Eviews. Results of both *Trace* statistics and *Maximum Eigenvalue* statistics indicate that

there is at least one cointegrating equation among the variables included in the model (Table 4).

Table 4: Johansen Cointegration Test Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		*Trace*	*0.05*	
No. of CE(s)	*Eigenvalue*	*Statistic*	*Critical Value*	*Prob.***
None *	0.821286	198.0526	159.5297	0.0001
At most 1	0.565863	120.5639	125.6154	0.0976
At most 2	0.484883	83.01618	95.75366	0.2710
At most 3	0.412696	53.16489	69.81889	0.4979
At most 4	0.299585	29.21536	47.85613	0.7580
At most 5	0.184524	13.19168	29.79707	0.8827
At most 6	0.078187	4.012409	15.49471	0.9026
At most 7	0.007722	0.348823	3.841465	0.5548
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		*Max-Eigen*	*0.05*	
No. of CE(s)	*Eigenvalue*	*Statistic*	*Critical Value*	*Prob.***
None *	0.821286	77.48865	52.36261	0.0000
At most 1	0.565863	37.54773	46.23142	0.3110
At most 2	0.484883	29.85128	40.07757	0.4336
At most 3	0.412696	23.94954	33.87687	0.4592
At most 4	0.299585	16.02367	27.58434	0.6638
At most 5	0.184524	9.179274	21.13162	0.8177
At most 6	0.078187	3.663587	14.26460	0.8930
At most 7	0.007722	0.348823	3.841465	0.5548
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's estimation with Eviews

Besides this, Johansen cointegration test also estimates the long-run and short-run relationships between variables. The long-run estimates are called Beta relations, while the short-run estimates are Alpha relations. The Beta coefficients indicate that the GE, CN and BOP significantly contribute to bringing positive change in loanable funds in the long run. In the meantime, CF significantly contributes to bringing negative change in the loanable funds. The rest of the variables were found to be statistically insignificant in influencing loanable funds in the long run. The signs of the Beta coefficients reported by Eviews have been reversed while interpreting (Table 5).

Table 5: Johansen Cointegrating Relations of the Loanable Funds Model

Variables	*Long-run (Beta) relations*			*Variables*	*Short-run (Alpha) relations*		
	Coefficients	*SE*	*t-stat*		*Coefficients*	*SE*	*t-stat*
LF	1.0000			D(LF)	-0.074	-0.027	2.729*
GE	-0.0261	-0.0070	3.7233*	D(GE)	19.864	-6.365	-3.121*
INF	14.0259	-85.5825	-0.1639	D(INF)	0.000	0.000	-0.005
CF	0.0112	-0.0021	-5.4309*	D(CF)	-20.019	-16.409	1.220
CN	-0.0184	-0.0104	1.7661**	D(CN)	5.027	-3.084	-1.630
BOP	-0.0125	-0.0033	3.7782*	D(BOP)	24.416	-10.993	-2.221**
OMO	0.0003	-0.0002	-1.2917	D(OMO)	108.766	-65.321	-1.665***
PI	-0.0227	-0.0206	1.0997	D(PI)	1.374	-1.456	-0.944

*Indicates significant at 1% level, ** indicates at 5% level & *** indicates at 10% level.
Source: Author's estimation with Eviews

The Alpha (short-run) coefficients indicate that the last month's change in the LF itself, GE, BOP and OMO are found to be significant to disturb the long-run equilibrium path of loanable funds.

ARDL Model

Once we confirmed that the variables included in the model are mixed-stationary and the Johansen cointegration test indicates the possibility of a long-run cointegrating relationship next step is to examine the ARDL model to confirm the long-run relationship and short-run dynamics among the variables. The model to be examined with the ARDL method is given below:

$$If_t = \alpha + \beta_1 GE_t + \beta_2 INF + \beta_3 CF + \beta_4 CN_t + \beta_5 PI_t + \beta_6 OMO_t + \beta_7 BOP_t + e_t \quad (11)$$

The optimal lags selected for this model are four, and the model seems to be a good fit since the residual diagnosis confirmed that the error terms are white noise, IID, as none of the null hypotheses for homoscedasticity, no serial correlation, no ARCH effect and normality can be rejected at the 5 per cent level (Table 6).

Table 6: ARDL Residual Diagnostic Results

Test Name	*Null (H_0)*	*Test-Stat*	*P-value*	*Decision*
Breusch-Godfrey test	No serial correlation at up to 4 lags	F (1.6429)	0.1426	H_0 accepted at 5% significance level
Jarque-Bera Normality test	Error terms are normally distributed	JB (0.0647)	0.9682	H_0 accepted at 5% significance level

Test Name	*Null (H_0)*	*Test-Stat*	*P-value*	*Decision*
Breusch-Pagan-Godfrey test	Homoscedasticity (no heteroscedasticity)	F (1.3789)	0.1588	H_0 accepted at 5% significance level.
Heteroscedasticity test	No presence of ARCH effect	F (0.7129)	0.7330	

Source: Author's estimation with Eviews

Based on the indications of summary statistics of model selection criteria (AIC), ARDL (3,4,1,4,1,3,4,4) has been selected for examination of the long-run relationship and short-run dynamics among the variables. The selected model is presented in the following equation.

$$LF_t = \alpha_1 + \alpha_2 T + \beta_1 \sum_{i=1}^{3} LF_{t-i} + \beta_2 \sum_{i=0}^{4} GE_{t-i} + \beta_3 \sum_{i=0}^{1} INF_{t-i} + \beta_4 \sum_{i=0}^{4} CF_{t-i} + \beta_5 \sum_{i=0}^{1} CN_{t-i} + \beta_6 \sum_{i=0}^{3} PI_{t-i} + \beta_7 \sum_{i=0}^{4} OMO_{t-i} + \beta_8 \sum_{i=0}^{4} BOP_{t-i} + e_t$$

Long-run Relationships

The selected ARDL model confirms that there is a long-run relationship among the variables included in the model. It is confirmed from the Bound test that the null hypothesis of no long-run relationships is rejected at the 5 per cent level of significance. This reconfirms—in addition to the Johansen cointegration test—the long-run relationships among the variables (Table 7).

Table 7: ARDL Bounds Test Results

F-statistics	Lower Bound I(0) Value		Upper Bound I(1) Value	
	5% Significance	10% Significance	5% Significance	10% Significance
6.210375	2.17	1.92	3.21	2.89
H_0 for F-stat	No levels (long run) relationships		Decision	H_0 rejected at 5%

Source: Author's estimation with Eviews

The ARDL long run results confirm that the loanable funds available in the Nepali banking system mainly depend on the consumption demand (CN), government expenditure (GE) and balance of payments (BOP). Whereas, capital funds (CF), inflation (INF), planned investment (PI) and net amount of open market operation (OMO) were found to be statistically insignificant

to determine the loanable funds in the long run. Looking at the sign, CN, PI, and OMO have negative relationships in the long run, while GE, BOP, CF and INF have positive relationships with the loanable funds.

Short-run Interactions

The ARDL error correction equation examines the short-run interactions between the dependent variable and regressors included in the model. The results presented below (Table 8) indicate that the short-run interactions among the variables seem to be stronger than the long-run equilibrium relationships in determining the loanable funds. Results show the change in previous months of LF itself (except LF (-1)), and GE hurts the current month's LF, whereas the same month's change in GE has a positive impact, but not statistically significant. INF has no significant contribution to determining LF in the short run, while recent changes in CF contribute to bringing positive change in LF.

It is found that the current month's change in CN significantly contributes to bringing positive change in LF, whereas the same month's change in PI has no significant contribution, but the previous month's changes contribute to bringing negative change in LF in the short run. Change in net OMO both in current and previous months is found to be significantly contributing to positive changes in LF, whereas similar changes in BOP are found to have negative impacts on LF in the short run. The error correction coefficient reported in the last row of the table indicates that any deviation in the equilibrium path of LF due to recent changes in regressors gets corrected at a monthly average rate of about 8 per cent.

Table 8: ARDL Bounds Test Results

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
D(LF(-1))	**0.148208**	**0.100990**	**1.467555**	**0.1679**
D(LF(-2))	-0.745884	0.118804	-6.278293	0.0000
D(GE)	0.000774	0.000482	1.606332	0.1342
D(GE(-1))	-0.007855	0.001068	-7.355093	0.0000
D(GE(-2))	-0.005015	0.000805	-6.226513	0.0000
D(GE(-3))	-0.002345	0.000504	-4.652998	0.0006
D(INF)	**-30.88212**	**27.09590**	**-1.139734**	**0.2766**
D(CF)	-0.001983	0.000196	-10.11231	0.0000
D(CF(-1))	0.003825	0.000467	8.197683	0.0000
D(CF(-2))	0.001832	0.000345	5.306798	0.0002

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
D(CF(-3))	0.001458	0.000260	5.616812	0.0001
D(CN)	0.002779	0.001186	2.343824	0.0371
D(PI)	1.03E-06	0.001749	0.000591	0.9995
D(PI(-1))	-0.009877	0.001974	-5.003886	0.0003
D(PI(-2))	-0.004341	0.001710	-2.538048	0.0260
D(OMO)	0.000299	6.22E-05	4.804928	0.0004
D(OMO(-1))	0.000477	7.74E-05	6.160520	0.0000
D(OMO(-2))	0.000297	6.86E-05	4.331043	0.0010
D(OMO(-3))	0.000391	6.79E-05	5.755553	0.0001
D(BOP)	-0.001811	0.000346	-5.235785	0.0002
D(BOP(-1))	-0.003029	0.000480	-6.305326	0.0000
D(BOP(-2))	-0.002841	0.000443	-6.408397	0.0000
D(BOP(-3))	-0.002631	0.000369	-7.135463	0.0000
Coint-Eqn(-1)*	-0.082347	0.008532	-9.651716	0.0000
R-squared	0.910584	Mean dependent var		15.60362
Adjusted R-squared	0.807757	S.D. dependent var		298.9609
S.E. of regression	131.0811	Akaike info criterion		12.89196
Sum squared resid	343645.2	Schwarz criterion		13.86516
Log likelihood	-259.6232	Hannan-Quinn criterion.		13.25287
Durbin-Watson stat	2.032905			
* p-value incompatible with t-Bounds distribution.				

Source: Author's estimation with Eviews

Stability of Parameters

The Cumulative Sum of Recursive Residual (CUSUM) and squared CUSUM tests (Figure 2) indicate, the residuals are within the defined range of ± 5 per cent significance. Therefore, the results as a whole are found to be satisfactory to use in real-life forecasting and decision-making.

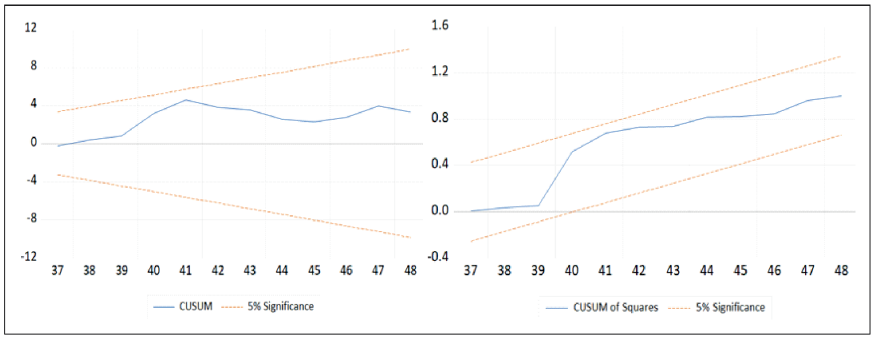

Figure 2: CUSUM Plots for Parameter Stability Test

5. FINDINGS AND CONCLUSION

Following the systematic process of econometric analysis, this paper identifies the factors that have a significant contribution to the determination of Loanable Funds in the banking system of Nepal. First of all, it is found that the monthly amount of Loanable Funds available in the banking system exhibits similar behaviour to that of the pre-pandemic scenario. Similar observations have been found about the major variables that bear a significant contribution to determining the loanable funds.

Government expenditures (GE) and net foreign inflows (BOP) were found to be the most effective factors determining the Loanable Funds in the long run, followed by consumption expenditures (CN) on domestic and imported items found to be another major determinant. Inflation (INF) and planned industrial investment (PI) were found to be the weaker factors in determining the Loanable Funds in the long run.

The short-run interaction between the Loanable Funds vis-à-vis net money injected by the NRB via OMO and capital funds of BFIs appeared to be significant, especially in maintaining the required amount of funding liquidity in the banking system. It is to be noted that the recent changes in all of the variables have some degree of significant influence in determining the amount of the current month's Loanable Funds.

Findings of this paper provide evidence on the topic of contemporary significance for evidence-based policy making, both at the government and corporate levels. Most importantly, the results of the empirical exercise provide a pertinent message for the major stakeholders of the Nepali banking system and also set the benchmark for future research in the broad spectrum of financial forecasting within the banking system of Nepal. Still, this paper has defined a scope, and there are scopes for more specific studies in the future.

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Annexure: Time Series Data Used for Analysis (Figure in NPR. Million, whereas INF & INT are in Per cent)*

Date	*LF*	*CR*	*D*	*CF*	*OMO*	*CN*	*PI*	*INF*	*INT*	*GE*	*BOP*
1-2021	193.56	139893.00	93112.00	102.00	-52167.10	192951.54	3270.00	0.51	0.14	97544.00	124917.3
2-2021	123.09	83830.00	14843.00	-3249.00	-38904.20	194218.46	9720.00	-0.58	0.25	83442.70	97364.1
3-2021	52.47	112207.00	46207.00	-949.00	-17763.06	188922.31	35900.00	0.07	0.55	70166.10	68009.7
4-2021	-6.53	166992.00	119988.0	10682.00	42344.13	236461.64	21300.00	0.73	3.49	116273.90	42536.7
5-2021	-42.22	43871.00	9097.00	-871.00	123955.77	193542.18	6940.00	0.80	4.60	129892.30	7754.0
6-2021	-49.75	39946.00	36015.00	3429.64	104610.41	158057.91	1880.00	0.43	2.14	94510.30	-15147.4
7-2021	90.99	66072.00	229793.00	1136.33	303782.45	234687.22	8330.00	0.86	4.79	261772.70	1226.7
8-2021	-24.38	49300.00	-73417.00	9195.02	-4450.00	199808.46	6935.22	4.35	2.18	9791.20	-38745.3
9-2021	-108.42	131622.00	52867.00	62045.00	366740.00	184388.46	1875.75	3.49	4.68	66717.20	-56059.2
10-2021	-146.53	141452.00	114824.00	-4017.00	585881.57	196019.23	8328.80	4.24	4.95	154353.60	7097.2
11-2021	-232.38	59101.00	-29712.00	1611.34	788665.60	209046.92	26351.98	6.04	4.96	52448.40	-62668.5
12-2021	-297.78	73529.00	9023.00	-7787.47	924220.80	207726.92	25428.44	7.11	4.97	95966.40	-44633.1
1-2022	-266.07	51086.00	92000.00	-4784.53	645899.51	199910.77	68924.89	5.65	4.77	107459.90	-54246.6
2-2022	-303.24	12921.00	-26942.00	-29.22	719085.26	181121.54	10661.25	6.24	4.80	95398.90	-4368.9
3-2022	-310.03	28685.00	24332.00	-1333.67	984721.47	187701.54	19253.55	7.14	6.56	81456.60	-10741
4-2022	-258.55	18276.00	77500.00	-82.59	1171956.10	219883.08	23118.87	7.28	7.00	114041.70	-6027.6
5-2022	-288.46	3328.00	-29530.00	599.57	1159927.49	195234.62	26450.44	7.87	7.00	113731.60	-21851.5
6-2022	-261.18	5798.00	36751.00	158.91	1179447.20	205562.31	21740.49	8.56	7.00	114803.90	19567.5
7-2022	-70.99	-35490.00	171887.00	4698.64	1120315.00	231127.69	40285.64	8.08	7.01	256180.90	20314.2
8-2022	-191.06	9472.00	-122885.0	80130.78	864087.00	191643.85	29299.89	8.26	8.05	21383.30	232603.4
9-2022	-169.72	28528.00	55402.00	-1559.42	915937.50	154973.08	10167.87	8.64	8.50	103329.10	-1138
10-2022	-121.98	24248.00	79989.00	-6425.53	575063.80	166401.54	36171.61	8.50	8.51	148702.60	33327.2
11-2022	-123.38	11226.00	10916.00	-476.89	478018.00	154079.23	39099.49	8.08	8.50	70268.50	7603.8
12-2022	-71.94	7935.00	65982.00	-14550.54	174642.80	161731.54	40228.31	7.38	8.00	84200.50	25831.9
1-2023	-19.14	48447.00	112487.00	-6596.00	91706.20	182287.69	9576.94	7.26	7.53	132196.60	46281.5
2-2023	-15.56	19011.00	25110.00	1953.48	42535.60	165386.92	20708.42	7.88	5.29	95046.20	36398.4

3-2023	18.35	-7989.00	28799.00	1285.75	550290.80	179786.15	6559.28	7.44	7.18	112275.30	13464.5
4-2023	-1161.65	1221971.20	46633.21	702075.22	751803.40	198793.08	24526.11	7.76	7.01	120278.70	32268.9
5-2023	-1172.22	20486.47	11020.15	10350.64	500132.70	188668.46	8686.34	7.41	7.00	143688.30	35214.1
6-2023	-1168.48	65824.15	77291.23	37722.64	303938.30	203870.00	5207.85	6.83	6.69	136384.80	15407
7-2023	-1029.36	39933.80	198944.12	-17256.56	161530.10	257239.23	21749.20	7.44	3.14	211445.90	60923.3
8-2023	-1020.48	-44477.53	-39544.80	-4932.73	145895.63	183594.62	18234.07	7.52	5.87	34134.10	-252922.5
9-2023	-1142.39	115112.61	-7559.62	85238.58	92499.17	160196.15	12037.56	8.19	5.88	77912.40	20705.7
10-2023	-1114.23	121290.95	166057.99	-9195.97	1100.01	187693.08	9162.11	7.50	2.26	160389.70	45459.3
11-2023	-1131.96	14236.35	-3885.30	35534.35	51220.00	140303.85	20857.50	5.38	3.47	71439.70	48044.2
12-2023	-1108.90	75130.00	109106.00	-599755.7	-127250.01	215540.00	14168.65	4.95	2.06	105091.90	63478.5
1-2024	-1054.98	48095.00	113347.40	4763.39	36090.78	201496.15	5021.70	5.26	2.86	111384.10	62932.2
2-2024	447.27	-1442707.0	66164.60	19685.91	-227493.00	180224.62	12791.66	5.01	3.04	116164.70	24202.1
3-2024	478.64	698.00	35629.00	1560.40	-569299.98	198119.23	13250.17	4.82	2.92	96802.50	29831.5
4-2024	420.32	36442.00	-24309.00	13742.60	-168950.00	210895.38	13807.74	4.61	3.10	98756.50	37709.6
5-2024	457.24	-13914.00	25556.00	605.40	-561150.00	203669.23	12914.55	4.40	2.88	234480.90	27375.4
6-2024	498.82	22890.00	71639.00	865.20	-573500.00	239706.92	13266.90	4.17	2.95	48986.10	33031.7
7-2024	676.10	34221.00	235001.00	1225.80	-1968000.0	266641.54	13938.48	3.57	2.99	196357.80	76820.2
8-2024	629.63	2471.00	-48884.00	71341.50	-4476450.0	202622.31	4125.25	4.09	2.99	37874.70	-461591.4
9-2024	644.06	58419.00	80942.00	-5300.80	-2218700.0	183301.54	13272.21	3.86	3.00	90207.40	60874.3
10-2024	699.60	64355.00	133216.00	12618.70	-1138250.0	191682.31	11376.52	4.82	3.00	199036.20	83215.1
11-2024	691.29	-7133.00	-17165.00	4133.80	-2942550.0	182083.08	12399.28	5.60	2.91	81108.50	20844.3
12-2024	680.03	44030.00	36411.00	-4691.10	-1668350.0	202972.31	11694.43	6.05	3.00	133090.30	19508.4

* LF= Loanable Funds; CR=Credits; D=Deposits; CF=Capital Funds of BFIs; OMO=Net money injected via Open Market Operations; CN=Consumption Expenditures; PI=Planned Investment of Industrial Sector; INF=Inflation Rate; INT=Interbank Rate; GE=Government Expenditures; and BOP=Balance of Payment Position

Note: All the amounts are flows, i.e. net of the respective months