MONETARY EXPANSION AND ECONOMIC GROWTH IN NEPAL: A VECM APPROACH

Gyan Mani Adhikari[1]
Achyut Gnawali[2]
Binod Joshi[3]
[1]Associate Professor, Central Department of Management; Tribhuvan University
[2]Professor,Tribhuvan University
[3]Associate Professor, Center for International Relations
suntoshchhetri47@gmail.com

ABSTRACT

Modeling the relationship between money supply and national output has been one of the main controversial issues of interest for economists, researchers, and policymakers, over the past few years.. Economies worldwide aim to achieve a high output growth rate and stability in the general price level. There are debates between Keynesian and monetarists about the relationship direction between money supply and output. Monetarists argue that changes in the amount of money lead to unexpected changes in nominal income because of money stability. In contrast, Friedman assumes that it is the most stable function. The paper aims to analyze the process of money supply determination in Nepal and to analyze the short-run and long-run relation between money supply and economic growth in Nepal, using time series data, spanning from 1975 to 2023. The econometric model used in this study has been developed based on the quantity theory of money model, but the model is modified to accommodate other independent variables that influence economic growth. The study reveals that the money multiplier in Nepal is constant and also affected by the cash reserve ratio, indicating that the monetary policy variables can influence the money supply in the case of Nepal. Engle-Granger cointegration results reveal that there exists a long-run relationship between real GDP with broad money supply (M2) and narrow money supply (M1) at a 1 percent level of significance and with gross fixed capital formation (GFCF) at a 5 percent level of significance, but the results show that there is no any long-run relationship between real GDP and government capital expenditure. The VCEM results show that NGDP as a dependent variable was observed to be statistically significant with broad money supply (M2), at a 10 percent level of significance, implying the existence of long-run causality was observed from broad money supply to real GDP.

Keywords: Money Supply, Economic Growth, Money Multiplier, Cointegration, Causality

INTRODUCTION

There is developing revenue in cash supply and its relationship to Gross domestic product. Throughout recent years, demonstrating the connection between cash supply and pay levels has been one of the super disputable issues of revenue for financial analysts, scientists, and strategy producers. To maintain price stability and a high rate of output growth, economies around the world strive. Financial strategy is the control of the cash supply with the target of influencing macroeconomic results like Gross domestic product development, expansion, joblessness, and trade rates. In many nations, the central bank is in charge of setting monetary policy. Therefore, monetary policy is a crucial instrument for promoting economic growth and preserving economic stability. Monetarists, on the other hand, believe that inflation will be primarily affected by an increase in the money supply rather than output or GDP. In the past ten years, the worldwide monetary emergency was noticed. It was possibly found when the emergency, transformed into a worldwide financial downturn that impacted created and non-industrial nations. Although, the monetary in many non-industrial nations results of these roundabout impacts were just about as extreme as the immediate impacts were on evolved nations (Abel et. al., 2008).

The rise in the money supply-to-GDP ratio indicates that more money is available in the economy or that there is more liquid money there, which opens up more opportunities for investment and growth. Expanded open doors for venture then lead to monetary development. It might likewise be characterized as the cycle that prompts improvement in the quality, amount, and productivity of the administrations presented by monetary go-betweens (Adesoye, 2012).

The monetary base, as well as M1 and M2, are two of the most common standard measures of the money supply. The money-related base characterizes the amount of cash available for use and hold adjusts (stores held by banks and other vault establishments like miniature supporting foundations in a given country. M1 is characterized as the amount of money held by people in general and exchange stores at the safe establishments), monetary foundations which get their assets for the most part through stores from the general population, like business banks, reserve funds, and advances affiliations, reserve funds associations and credit associations (Jamie, 2005).

Money supply is required for funding the financial development of an economy (Fisher and Seater, 1993). Financial development is connected with the cash interest which might emerge because of expansion in genuine Gross domestic product or expansion in a money-related peculiarity in an economy (Bullard, 1999). There are two schools of consideration concerning the effect of cash supply on Gross domestic product and value (Creeks, 2002). According to Sims (1992), one school of thought holds that the money supply has an effect not only on price but also on GDP. On the other hand, another school of thought holds that the money supply only affects price. It isn't the money-related factor that adds to the development. However, an increase in the money supply is necessary to finance the increased real GDP and monetary phenomenon; otherwise, growth may shrink. There are contrasting writings, contemplations, and views concerning cash supply, genuine Gross domestic product, and cost level (Boucher and Flynn, 1996). Thus this paper attempts to make sense of the connection between Money supply and Gross domestic product development with regards to Nepal.

METHODOLOGY

The econometric model used in this study has been developed based on the quantity theory of money model, but the model is modified to accommodate other independent variables that influence economic growth. Previous researchers used the variables that have been selected and included in the model commonly. Therefore, numerous studies have been done for both developed and developing countries. These studies have used almost similar variables in their analysis.

The model of this study is an off short of Solow's (1956) model of economic growth According to Solow's model, output is a function of labor (L) and capital (K), with constant returns to scale. The rate of capital accumulation in the long run is higher than that of the short run, the marginal efficiency of capital approaches zero and the growth rate is subsequently determined by technical progress and growth in the labor force.

$GDP = AKi\ \alpha Li\ 1-\alpha$ …….(1)

Where GDP = real GDP A = total factor productivity K = Capital Stock L = Labour α = elasticity of capital with respect to output. The model assumes that each productive unit will use the same level of capital and labor with the following aggregate production function:

$GDP = AK\alpha\ L\beta$ ……..(2)

In other to achieve the objective of this study, which is to investigate the effect of money supply on economic growth in Nepal for the period of 1975 to 2023, the following model in equation (5), will be adopted. Thus, the implicit functional model of this study is stated below:

$RGDP = f$ (M2, GFCF, TEXP)…… (3)

Where: RGDP = real gross domestic product, M2 = broad money supply, GFCF = gross fixed capital formation and TEXP = total exports,

Taking natural log on both sides:

lnRGDP = β0 +β1lnM2+ β2lnGFCF + β3lnTEXP + et …….. (4)

RESULTS AND DISCUSSION

Test of Stationary

Before testing for cointegration, the econometric methodology needs to check out for the stationarity for each time series, considering that most time-series data are non-stationary, i.e. they tend to exhibit a deterministic and/or stochastic trend. A series is expected to be stationary if the mean and variance are time-invariant. At this point, we test the stationary of the variables used to proceed to the cointegration test through the Engle-Granger cointegration procedure, whereas before this application the theoretical background of the used unit root test is summarized.

From the aforementioned empirical results, it becomes clear that a very important component of econometric analysis is the application of unit root tests, to examine if there is stationarity in first differences I(1) in the applied variables. Unfortunately, the majority of unit root tests are considered insufficient and it is likely to lead to controversial conclusions, given their limited power. For this reason, it is usual to apply various econometric unit root tests, of which the most important is the Augmented Dickey-Fuller (ADF test).

In this test, the null hypothesis presents the existence of unit root (a = 0), against the alternative hypothesis of the existence of stationarity (a<0). A test statistic is calculated using the conventional t-ratio for the given significance level and the critical value is calculated by exacting MacKinnon critical values for the Dickey-Fuller test.

The following tables present the unit root tests through the ADF method for all the variables used, with trends in levels and first differences.

The null and alternative hypotheses for the tests may be written as H0: a=0 and H1: a<0.

So under the null hypothesis, there is a unit root, while under the alternative one, there is no unit root

Table 1. ADF Unit Root tests results of all the variables under study

Variable	Level	First Difference	Order of integration
LNGDP	-0.224859	-6.800285***	I(1)
LM2	-1.306854	-4.977349***	I(1)
LM1	-1.578179	-6.164045***	I(1)
LGFCF	-5.12821	-6.763074***	I(1)
LEXPORT	-1.1542960	-5.011526***	I(1)

*** significant at 1% level

Interpreting our results and comparing the exported values with the corresponding critical values for ADF for a significance level of 1%, and p-values for 0.01, we outline that the existence of unit root at level is accepted in all cases. Thus, the variables of our research are not stationary in level. Instead, performing the same test in the first differences we observe that our data are stationary at the significance level of a = 1%. So we can conclude that our variables are I (1) expect total population.

Lag Length Selection

A test of optimal lag length normally comes before the Granger causality test, cointegration, and VECM since the estimated findings depend on the number of lags involved. Therefore, before estimating the models and performing the typical Granger causality test, we need to ascertain the maximum lag length. In this study, the sequential modified LR test statistic (LR), Final Prediction Error (FPE), Akaike Information Criteria (AIC), Schwarz Information Criterion (SC) and the Hannan-Quinn Information Criterion (HQ), which are given automatically by E-Views 10 software package to specify the maximum number of lags are

employed. Therefore, as Table 2 reveals from lag length selection analysis lag length of 1 is optimal for series at a level in all of the above-mentioned criteria.

Table 2. Optimal lag length selection

Endogenous Variables: LRGDP, LNGDP, LM1 and LM2						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	119.0930	NA	6.28e-08	-5.231498	-5.069299	-5.171347
1	334.3875	381.6585*	7.34e-12*	-14.29034*	-13.47934*	-13.98958*
2	345.2850	17.33692	9.44e-12	-14.05841	-12.59862	-13.51705
3	359.7800	20.42487	1.06e-11	-13.99000	-11.88141	-13.20804
4	366.1682	7.840035	1.81e-11	-13.55310	-10.79572	-12.53053

Source: Author's calculation using E-Views 10.

*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: Hanna-Quinn Information Criterion

Engle-Granger Cointegration test

The Engle-Granger cointegration test is based on the simple idea that if there is a cointegration relationship, the OLS estimates of the regression $Y_t = a + bX_t + e_t$ are reasonable so the residuals $e_t = Y_{t-a} - bX_t$should be I (0). So an ADF test in the residuals for the regression below should show that there is no unit root. The regression tested is the following:

Table 3. OLS results between LRGDP and LM2, LTEXP, LEAP, LGFCF.

Dependent Variable: LRGDP				
Variables	Coefficient	Std. error	t- statistic	Probability
LEAP	0.621686**	0.279317	2.225738	0.0313
LGFCF	0.137338***	0.044537	3.083685	0.0036
LM2	0.159074**	0.071970	2.210283	0.0325
LTEXP	-0.109314**	0.052965	-2.063914	0.0451
C	8.395188***	0.324871	25.84161	0.0000

Source: Author's calculation using E-Views 10.

***,** significant at 1% level and 5% level

Table 4 shows the OLS result between LRGDP and other variables and the coefficients are the log run coefficients. To find the cointegration among the variables the stationary test of the residuals is performed using the ADF test as shown in the following table.

Table 4. E-G cointegration test results

	t-Statistic	Prob.
Augmented Dickey-Fuller test statistic	-3.919685***	0.0039

Source: Author's calculation using E-Views 10.

*** significant at 1% level

From the table 5, as it is noticed, the residuals appear to be I(0). Thus, the null hypothesis of nonstationary for a significance level of 1% is rejected. This result indicates that real GDP and the variables are integrated and thus there is a long-term, or equilibrium relationship between them. So the VECM between RGDP and M2 is performed in the next section.

VECM Test Results

Since the cointegration test confirmed the existence of a long-run relationship among the variables, the vector error correction model helps to estimate the short-run relationship and the speed of adjustment towards long-run equilibrium.

Table 5. VECM causality results

DLRGDP and DLM2				
ECt-1	-0.456444***	0.103219	-4.422092	0.0000
DLRGDPt-1	-0.082825	0.127208	-0.651100	0.5168
DLM2t-1	-0.009924	0.062278	-0.159354	0.8738
C	0.047401	0.011693	4.053789	0.0001
DLM2 and DLRGDP				
ECt-1	-0.065622	0.090554	-0.724671	0.4708
DLM2t-1	0.268472	0.171542	1.565051	0.1216
DLRGDPt-1	0.001893	0.171060	0.011066	0.9912
C	-0.058639	0.350295	-0.167399	0.8675

Source: Author's calculation using E-Views 10.

*** denotes the significance of the p-value at 1%

Based on the results of VECM from Table 7, the error correction term in the RGDP equation is significant at a 1 percent level and has a negative sign, implying that there exists a long-run relationship running from broad money supply and economic growth to RGDP. Its relative value (-0.456444) shows that, the rate of convergence to the equilibrium state per year. More clearly, the speed of adjustment of any disequilibrium toward long-run equilibrium is that about 44.88 percent of the disequilibrium in RGDP is adjusted each year. The degree of adjustment mechanism is quite powerful. The coefficient of error correction term with broad money supply as a dependent variable has been observed to be statistically significant at a 1 percent level, indicating that there exists a strong short-run relationship running from real GDP to broad money supply.

On the contrary broad money supply (M2), as a dependent variable, is statistically insignificant with Real GDP. Therefore, Table 7 shows a uni-directional Granger causal relationship from broad money supply (M2) to real GDP in the short run.

Granger Causality Test Results

To determine the causal relationship between GDP and the money supply, the Granger causality test is used in this instance. The test is connected to the first differenced variables since it is determined that all of the variables are I (1). The following results relate to the relationships between the variables:

Table 6. Pair-wise Granger Causality between LRGDP with LM1 and LM2.

Dependent variable	Independent Variable	lags	F stat	Remarks
LRGDP	LM1	1	18.9460***	M1□RGDP
LM1	LRGDP	1	1.11811	No causality
LRGDP	LM2	1	17.4837***	M2□RGDP
LM2	LRGDP	1	0.59234	No Causality

Source: Author's calculation using E-Views 10

***, ** rejection of null hypothesis at 1 percent and 5 percent level of significance.

Granger causality test result presented in Table 8 reveals both narrow money supply (M1) and broad money supply (M2) Granger causes real GDP that the null hypothesis money supply does not Granger cause real GDP is rejected at 1 percent level but real GDP does not granger cause narrow money supply (M1) as well as broad money supply (M2). Therefore, this result indicates that causality runs from a narrow money supply as well as a broad money supply to real GDP in the short run. The result implies that money supply growth has valuable information in forecasting the values of inflation in the short run.

The findings of this study align with previous research that explored the relationship between money supply, price levels, and economic growth in Nepal. Consistent with studies by Mahara (2020) and Gnawali (2019), this research demonstrates that both narrow money (M1) and broad money (M2) exert a unidirectional causal influence on real GDP in the short run. Mahara's work identified a significant long-term positive relationship between broad money and economic growth, while Gnawali highlighted bidirectional causality between broad money and GDP. Similarly, the present study's VECM results reveal a robust long-run equilibrium relationship, with the error correction term (-0.456444) indicating

that nearly 45% of disequilibrium in real GDP is corrected annually. This suggests that money supply plays a crucial role in fostering economic growth in Nepal, particularly in the short run, and reinforces the importance of monetary policy in ensuring macroeconomic stability.

The study also confirms that monetary expansion, especially broad money, has significant implications for economic growth without strong evidence of reverse causality from GDP to money supply. This observation is consistent with Gyanwaly (2012), who noted that money supply is an endogenous factor influencing inflation and income in Nepal. Moreover, Acharya (2019) and Kunwar et al. (2023) emphasized the role of money supply in shaping inflation dynamics. While Acharya found that narrow money supply influences price levels in the long run, Kunwar et al. highlighted the positive relationship between inflation, as measured by the Consumer Price Index (CPI), and economic growth. These findings suggest that inflationary pressures in Nepal may be more responsive to changes in M1 than M2, making the careful management of narrow money supply critical to maintaining price stability and promoting growth.

The policy implications are clear: Nepal Rastra Bank must adopt a balanced approach to monetary expansion that supports sustainable economic growth while controlling inflation. The observed causality from money supply to GDP highlights the importance of proactive monetary policies rather than relying on endogenous adjustments within the economy. Broad money supply, in particular, should be prioritized, as it supports investment and credit growth while being less inflationary than narrow money. Additionally, the significance of the error correction term in the VECM underscores the economy's ability to adjust to monetary policy shocks, making timely interventions crucial for achieving long-term growth objectives. Overall, this study emphasizes the importance of a steady and well-regulated increase in the money supply to enhance economic performance in Nepal while ensuring macroeconomic stability.

CONCLUSIONS

The main goal of this study was to investigate the short-run and long-run causal relationship between the money supply and GDP in Nepal. The study found that there is a bidirectional long-run casualty between the RGDP and RM1 as well as the RGDP and RM2. Therefore, it is to be concluded that in the long-run the real money supply causes the real income, and real income also reciprocates the real money supply (without causing it in the short-run) in Nepal. In other words, the money supply causes the income in the long run with a strong feedback effect. In this study, it is found that both real money supply causes the real income of the nation and real income also causes both real money supply in the long run. So, this paper suggests that policymakers have to maintain an appropriate growth rate of money supply in the real term to achieve a certain level of real income growth. Monetary authorities could achieve the economic growth goal by providing cash balances without leading to inflation, this could happen if NRB controls the demand for money and directs the money supply to meet the needs of the demand for cash balances, This will be done under the complete independence of the authority of the Central Bank in making decision far away for government intervention.

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