

Assessing Multiplier Effects of Public Expenditures on Economic Growth in Nepal: SVAR Model Analysis

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Abstract

This paper assesses the multiplier effects of public expenditures on economic growth in Nepal, covering time series data sets of public expenditures and economic growth from 1974-75 to 2018-19 by using the SVAR model. As a result of the SVAR model, the multiplier effect of public expenditure, recurrent expenditure, and capital expenditure is positive for economic growth. In the result, the multiplier effect of recurrent expenditure is found to be more promising than capital expenditure for economic growth in the short run, but in the long run, it is lower. Similarly, the multiplier coefficient value of capital expenditure is lower in the short run. This is probably due to leakages in the economy, corruption and improper management of development funds, seasonal expenditure trends, and poor management of development projects. Therefore, the government should improve the efficiency of public expenditure and the ratio of capital expenditure and private investment to improve the higher multiplier variable in the long run.

Keywords: public expenditure; economic growth; multiplier effect; SVAR; Nepal.

1. Introduction

In the 21st century, almost all economies in the world gradually follow the laissez-faire idea of liberal and modern economists like Adam Smith's book, *Wealth of Nations* (Smith, 1776) and Milton Friedman's book, *Freedom to Choose* (Friedman, 1980). In other words, the world has endorsed the idea of a market economy as the solution and system of the global economy. In the mid and late 20th century, the approach of global trade integration, which has made the world one global free market of goods, services, capital, knowledge, technology, and finance, has geared up the market economy as the main economic system as well as philosophy. In simple words, the market solves the issues of production, distribution, exchange, and resource allocation. However, the economic role of the state follows neo-liberal Keynesian Economics across different political economic philosophies' endorsers and followers through excessive public expenditures, thus expanding the huge budget deficit (Baxter & King, 1993). According to the Keynesian perspective, a positive response to household consumption to an increase in government spending is achieved by incorporating price rigidities and non-Ricardian consumers (Gal, López-Salido, & Vallés, 2007). This efficiency of public expenditure can be measured by the multiplier, which shows a percentage point change in GDP in response to an increase in government expenditure (Gupta & Verhoeven, 2001; Hamer-Adams & Wong, 2018). The logic of the theory of consumption, saving, and employment in Keynesian Economics is a multiplier effect of public expenditures on different economic activities of the national economy's economic sectors for achieving the desired effects—stability, growth, and stimulation (Gupta & Verhoeven, 2001, Popa & Codreanu, 2010, Bista, 2016, and Bista, 2021). Therefore, almost all countries have a higher rate of public expenditure to GDP ratio, particularly in capital expenditure to GDP ratio, in the world.

In Keynesian Economics, the concept of multipliers is based on the success story of recovery from the Great World Recession in 1936 and the Global Financial Crisis in 2008 (Lekhi & Singh, 2015, Bose & Bhanumurthy, 2015, Munir & Riaz, 2020, Bista, 2021). In the theoretical literature on Keynes, four multipliers are explained, such as the investment multiplier, budget multiplier, fiscal multiplier, and export trade multiplier. In the different economies and

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phases of the trade cycle, economic decisions and the behavior of the government create different multipliers, with desired or undesired results. In this context, Haavelmo (1945) argues for public spending with a multiplier as a remedy for unemployment and a driver of redistribution income in society. Pérez-Montiel (2020) broadens Haavelmo's (1945) narrow concept by discussing the dynamic multiplier of public investment and its effect on output levels. In Pérez-Montiel's (2020) estimation of government public investment dynamic multiplier effects, an empirical analysis for Spain from 1980-2016 found a positive and permanent effect on the level of GDP from the growth of public investment. One year after fiscal expansion, the dynamic fiscal multipliers of INFINV and SOCINV reach values above one, thereby confirming that government public investment expansions have Keynesian effects on the level of output. In the study, the economic effect of public financing was Adelino, Cunha, and Ferreira (2017) discovered a local income multiplier with 1.9 local income multiplier and a cost per job of USD20,000 per year when the local government increases expenditure. Besides, government spending through a deficit budget improves recovery during a recession.

Besides, the nature of public spending creates multipliers. Archibald (1967), Yoshida & Kenmochi (2011), and Yen, Ong, & Ooi (2015) have provided sector multipliers. Archibald (1967) mentioned the need for a multiplier in the regional economy in the UK. Similarly, in a two-sector model of monopolistic competition, Yoshida & Kenmochi (2011) found the growth of national income as a multiplier effect of government spending on health services in the short run but the reverse in the long run. Likewise, Yen, Ong, and Ooi (2015) found in the study, income and employment multiplier effects of the Malaysian higher education sector found larger direct and indirect income impacts of private higher education institutions (HEIS) on the private than the public, with 1.34 and 1.32 income multipliers on additional income for every initial ringgit of labor income, respectively. The private and public income and employer effects are 3.09 and 3.05, respectively. Higher education creates 1.21 workers per RM 10,000 invested.

Additionally, the effect of the multiplier depends on public spending decisions and the behavior of the government in the phase of trade cycles. For example, Batini, Eyraud, Forni, & Weber (2014) and Garry & Rivas Valdivia (2017) argue for time and accurate fiscal multiplier estimation. Because it allows policymakers to visualize the expected benefits of a change in government spending, both literatures consider this process valuable in assisting policy decisions and the design of targeted fiscal strategies (Garry & Rivas Valdivia, 2017). Likewise, Batini, Eyraud, Forni, & Weber (2014) emphasize the need to measure accurately the relationship between the two variables in order to plan and forecast the effect of policy actions. Therefore, the understanding of multipliers of public spending is relevant to measuring whether the nature and pattern of public spending are on the right course to achieve the desired effect on national output, national income, and employment level.

Whatever different political philosophies Nepal has developed over the past 70 years of planned development from the 1950s to 2021, the foundational philosophy of the Nepalese economy is neo-liberal and Keynesian models, under which the government has focused on public spending on labor-intensive public goods and services production and infrastructure development for employment generation, higher economic growth, and welfare to the people since the 1950s (Bista, 2021). This journey, there are two major reforms in the 1980s and 1990s. In the 1980s, the state-led development model could not stabilize macro-economic negative fluctuations; in the 1990s, the democratic government desired economic stimulators for economic growth miracles for economic development and welfare (Bista, 2016). Despite these reforms, the state-led development models under the Keynesian economic philosophy are consistent to date. It means a deficit budget for excessive public spending with the assumption of a positive multiplier on macro-economic variables. On this issue, none of the literature has assessed the multiplier of public spending in the national economy of Nepal, although Kharel (2012), Bhusal (2014), and Kunwar (2019) have shown that the expansion of government expenditure contributes positively to economic growth, while that by Chaudhary (2010) has proved that large government expenditure has a negative impact on economic development. Therefore, this study is relevant.

In this context, this study estimates the multiplier of public spending in the national economy of Nepal with a few queries on whether public spending will be positive for economic growth and whether the value of the multiplier is positive. Its results will be valuable to policymakers, particularly the nature and pattern of public spending on which sectors and how.

2. Objective

The board objective of the paper is to estimate the multiplier effect of public expenditure on economic growth in

Nepal. The specific objectives are:

- to estimate the multiplier effect of public expenditure on the economic growth of Nepal;
- to find out its policy implications.

3. Methods

3.1. Conceptual Framework

This idea of multiplier effect is Keynes’s basic idea in which Keynes argues autonomous government expenditure has a multiplier effect on aggregate demand and output of GDP through the growth of employment, income, and consumption (Diulo, 1983). Thus, the change in real GDP is a multiplier effect of autonomous government expenditure. Thus, the relationship between government expenditure and economic growth is shown in detail in figure 1.

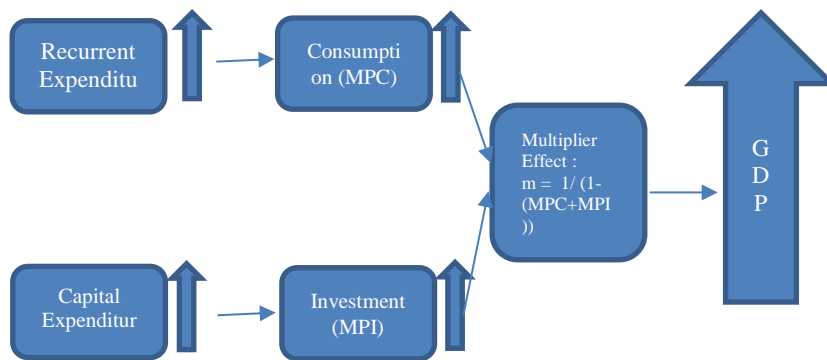


Figure 1. Framework for multiplier effect of government expenditure

In Keynes' economics, the value of the multiplier depends on marginal propensity to consume (MPC), because MPC measures how much of the income generated from employment output is destined for autonomous public expenditure.

Similarly, the remaining portion of income transfers into saving and then investment. As a result, investment is a key ingredient of autonomous public expenditure. Therefore, its effect on the income-generating process cannot be neglected. An autonomous change in the rate of investment will initiate a multiplier process of income generation (Diulo, 1983). This increased income will raise consumption, which will induce further investment through the accelerator process. Hence, if we allow for the income-generating effects of both consumption and investment expenditures, the multiplier co-efficient (m) can be written as:

$$m = \frac{1}{1 - (MPC + MPI)}$$

where:

MPC = marginal propensity to consume given by change in consumption to change in income.

MPI =marginal propensity to invest given by change in investment to change in income

To capture multiplier effect “m”, consider structural vector auto regression model (SVAR), with the set of relationships between structural shocks (e_t) and reduced from shocks (μ_t) represented by following equations:

$$\begin{aligned} e_t^{rge} &= C_{11}\mu_t^{rge} + C_{12}\mu_t^{rgdp} + C_{13}\mu_t^{rtax} \\ e_t^{rgdp} &= C_{21}\mu_t^{rge} + C_{22}\mu_t^{rgdp} + C_{23}\mu_t^{rtax} \\ e_t^{rtax} &= C_{31}\mu_t^{rge} + C_{32}\mu_t^{rgdp} + C_{33}\mu_t^{rtax} \end{aligned} \quad (1)$$

The impulse response of one unit shock of reduced from residual μ_t^{rge} on structural residual e_t^{rgdp} gives the public expenditure multiplier.

3.2. Specification of Model

In the literature of SVAR, Jain & Kumar (2013) mention the issue of *simultaneity bias* and *endogeneity* in the relationship between fiscal policy and economic growth with the solution of models incorporating instrumental variables or vector auto regression (VAR) framework to allow feedback effects. Besides, numerous studies (Sims, 1986; Blanchard, Perotti, 2002; Nafie & Atlam, 2019) have used the SVAR model on these variables.

The VAR model can be written in the reduced form equation as:

$$Y_t = C(L)Y_{t-1} + u_t \tag{2}$$

where, C(L) represent $N \times N$ matrix polynomials in lag operator L for $N \times 1$ vectors of endogenous variable (Y_t). u_t is the $N \times 1$ vector of reduced form innovations or shocks which are independent and identically distributed.

As reduced form disturbances are correlated, the reduced form has to be transformed into structural model to identify structural shocks (Nafie & Atlam, 2019). Multiplying both sides of equation (2) by matrix A yields the structural form.

$$AY_t = AC(L)Y_{t-1} + e_t \tag{3}$$

Matrix A defines the contemporaneous interrelationship between the endogenous variables. The relationship between the structural disturbances e_t and reduced form disturbance u_t is described by:

$$u_t = A^{-1}e_t \text{ or } e_t = Au_t \tag{4}$$

To identify the structural components of the error terms, enough restrictions need to be imposed. Accordingly, contemporaneous effect of only (i) increase in expenditure on GDP growth and (ii) GDP growth on tax revenue was allowed as is often expected in theory and practice (Jain and Kumar, 2013). This is shown in Matrix A which is restricted as a lower triangular matrix with ones on the main diagonal. This restriction was a way of identifying its elements to reflect the contemporaneous relationships, among the endogenous variables. After identifying the elements of A matrix, it is possible to proceed with the analysis of the dynamic response of Y_t to each shock in e_t .

Equation (3) after Cholesky ordering can be written in matrix form as,

$$\begin{bmatrix} e_t^{RGE} \\ e_t^{RGDP} \\ e_t^{RTAX} \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ C_{21} & 1 & 0 \\ 0 & C_{32} & 1 \end{pmatrix} \begin{bmatrix} \mu_t^{RGE} \\ \mu_t^{RGDP} \\ \mu_t^{RTAX} \end{bmatrix} \tag{5}$$

In this paper, the effect of RTGE, RRE and RCE on RGDP are separately studied to understand their individual impact. So above general SVAR model is segregated into three different models as per use of proxy for government expenditure (RGE). The model representations are:

Model 1: Impact of RTGE on RGDP

$$\begin{bmatrix} e_t^{RTGE} \\ e_t^{RGDP} \\ e_t^{RTAX} \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ C_{21} & 1 & 0 \\ 0 & C_{32} & 1 \end{pmatrix} \begin{bmatrix} \mu_t^{RTGE} \\ \mu_t^{RGDP} \\ \mu_t^{RTAX} \end{bmatrix} \tag{6}$$

Model 2: Impact of RRE on RGDP

$$\begin{bmatrix} e_t^{RRE} \\ e_t^{RGDP} \\ e_t^{RTAX} \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ C_{21} & 1 & 0 \\ 0 & C_{32} & 1 \end{pmatrix} \begin{bmatrix} \mu_t^{RRE} \\ \mu_t^{RGDP} \\ \mu_t^{RTAX} \end{bmatrix} \tag{7}$$

Model 3: Impact of RCE on RGDP

$$\begin{bmatrix} e_t^{RCE} \\ e_t^{RGDP} \\ e_t^{RTAX} \end{bmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ C_{21} & 1 & 0 \\ 0 & C_{32} & 1 \end{pmatrix} \begin{bmatrix} \mu_t^{RCE} \\ \mu_t^{RGDP} \\ \mu_t^{RTAX} \end{bmatrix} \tag{8}$$

3.3. Nature and Sources of Data Sets

In this quantitative research, the nature of the data set is time series. In the time series data set, the paper has employed mainly four macro variables, including real economic growth (REC), real total government expenditure (RTGE), real regular expenditure (RRE), and real capital expenditure (RCE). Their sources are mainly secondary, including Annual Government Financial Statistics, Nepal Rastra Bank, Annual Economic Survey and Budget, Ministry of Finance, Nepal and Annual Statistical Pocket Books, Central Bureau of Statistics (CBS), Nepal.

3.4. Sample Size of Time Series Data sets

In the paper, the sample size of time series data for these major economic variables is 44 years, from 1974-75 to 2018-19, although Nepal has 61 year long time series data sets from 1958 to 2019. However, time series data sets were not properly recorded and accounted for from 1958 to 1974, although in 1959, a new accounting system was initiated, which was further revised and improved in 1963. Since 1974, the government of Nepal has initiated a scientific accounting and recording system. Therefore, a time series from 1974–75 to 2018–19 was selected.

3.5. Techniques of Data Analysis

By nature, time series data sets have issues with fluctuations due to political and natural shocks, as well as policy stimulators and stabilizers. These fluctuations have significant effects on changing the dynamic behavior and relationships of macro-variables in the time series SVAR models. Therefore, the time series data sets from 1974–75 to 2018–19 are tested to understand whether the data sets are stationary or not and other cyclic fluctuations by using the unit root test.

Step I: Unit Root Test

The unit root test shows stationary. It can strongly influence its behavior and properties, e.g. the persistence of shocks will be infinite for non-stationary series (Greene, 2010). If not stationary, it indicates the problem of spurious regression, i.e., if two variables are trending over time, a regression of one on the other could have a high R^2 even if the two is unrelated. Secondly, if the variables in the regression model are not stationary, then it can be proved that the standard assumptions for asymptotic analysis will not be valid.

In other words, the usual t-ratios will not follow a t-distribution, so we cannot validly undertake the hypothesis tests about the regression parameters. Thus, before performing any kind of test or model, it is necessary to find out whether the data is stationary or not, and that can be done by using the unit root test.

Augmented Dickey-Fuller (ADF) test is used. Its ADF model unit root test is as follows.

$$\Delta y_t = a_1 + \delta y_{t-1} + \sum_{i=1}^k \beta_i \Delta y_{t-i} + u_t \quad (9)$$

The null hypothesis of ADF is $\delta=0$ against the alternative hypothesis of $\delta<0$. If null hypothesis is not rejected, the series is non-stationary whereas rejection means the series is stationary.

Step II: Vector Auto Regression (VAR) and Structural VAR

Vector auto-regression (VAR) is a stochastic process model used to capture the linear interdependencies among multiple time series (Greene, 2010). VAR models generalize the univariate autoregressive model (AR model) by allowing for more than one evolving variable. All variables in a VAR enter the model in the same way: each variable has an equation explaining its evolution based on its own lagged values, the lagged values of the other model variables, and an error term. A VAR model is a multi-equation system where all the variables are treated as endogenous. A VAR model with ‘p’ lags can be written in regression form as:

$$\begin{aligned} y_{1,t} &= c_1 + a_{1,1}^1 y_{1,t-1} + a_{1,2}^1 y_{2,t-1} + \dots + a_{1,k}^1 y_{k,t-1} + \dots + a_{1,1}^p y_{1,t-p} + a_{1,2}^p y_{2,t-p} + \dots + a_{1,k}^p y_{k,t-p} + e_{1,t} \\ y_{2,t} &= c_2 + a_{2,1}^1 y_{1,t-1} + a_{2,2}^1 y_{2,t-1} + \dots + a_{2,k}^1 y_{k,t-1} + \dots + a_{2,1}^p y_{1,t-p} + a_{2,2}^p y_{2,t-p} + \dots + a_{2,k}^p y_{k,t-p} + e_{2,t} \\ &\vdots \\ y_{k,t} &= c_k + a_{k,1}^1 y_{1,t-1} + a_{k,2}^1 y_{2,t-1} + \dots + a_{k,k}^1 y_{k,t-1} + \dots + a_{k,1}^p y_{1,t-p} + a_{k,2}^p y_{2,t-p} + \dots + a_{k,k}^p y_{k,t-p} + e_{k,t} \end{aligned}$$

Representing above equations in matrix form:

$$\begin{bmatrix} y_{1,t} \\ y_{2,t} \\ \vdots \\ y_{k,t} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_k \end{bmatrix} + \begin{bmatrix} a_{1,1}^1 & a_{1,2}^1 & \cdots & a_{1,k}^1 \\ a_{2,1}^1 & a_{2,2}^1 & \cdots & a_{2,k}^1 \\ \vdots & \vdots & \ddots & \vdots \\ a_{k,1}^1 & a_{k,2}^1 & \cdots & a_{k,k}^1 \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \\ \vdots \\ y_{k,t-1} \end{bmatrix} + \cdots + \begin{bmatrix} a_{1,1}^p & a_{1,2}^p & \cdots & a_{1,k}^p \\ a_{2,1}^p & a_{2,2}^p & \cdots & a_{2,k}^p \\ \vdots & \vdots & \ddots & \vdots \\ a_{k,1}^p & a_{k,2}^p & \cdots & a_{k,k}^p \end{bmatrix} \begin{bmatrix} y_{1,t-p} \\ y_{2,t-p} \\ \vdots \\ y_{k,t-p} \end{bmatrix} + \begin{bmatrix} e_{1,t} \\ e_{2,t} \\ \vdots \\ e_{k,t} \end{bmatrix}$$

Shortening the above matrix into vector form:

$$Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \cdots + \beta_p Y_{t-p} + u_t \tag{10}$$

where,

Y_t is the $n \times 1$ vector of time series variables ($y_{1,t}, y_{2,t}, \dots, y_{k,t}$)

α is the $n \times 1$ vector of intercepts (c_1, c_2, \dots, c_k)

β_i is the $n \times n$ matrix of co-efficient ($a_{1,1}^1, \dots, a_{k,k}^p$)

u_t is the $n \times 1$ vector of error terms ($e_{1,t}, e_{2,t}, \dots, e_{k,t}$)

The VAR model in equation (15) is reduced form VAR model. The structural form of the VAR in equation (15) can be obtained by multiplying the equation with $n \times n$ matrix A as,

$$AY_t = A\alpha + A\beta_1 Y_{t-1} + A\beta_2 Y_{t-2} + \cdots + A\beta_p Y_{t-p} + Au_t$$

which leads

$$AY_t = C_1 Y_{t-1} + C_2 Y_{t-2} + \cdots + C_p Y_{t-p} + B e_t \tag{11}$$

where, B and C are $n \times n$ matrices of coefficients. Matrix A captures contemporaneous relations among the endogenous variables and is the n -dimensional vector of the structural shocks that we want to recover. In Blanchard and Perotti (2002), the structural shocks e_t are assumed to be mutually uncorrelated, i.e., the variance-covariance matrix of the structural shocks $\sum_e = E[e_t, e_t']$ is a diagonal and fixed matrix; however, we assume the structural shocks to be standardized at 1, i.e., the variance-covariance matrix of the structural shocks is an identity matrix $E[e_t, e_t'] = 1$ The relation between the structural shocks and the reduced form residuals can be described by the AB model as follows:

$$\begin{aligned} Au_t &= Be_t \\ e_t &= B^{-1} Au_t \end{aligned}$$

which is popularly represented as,

$$e_t = Su_t \tag{12}$$

3.6. Residual Diagnostics

The estimated VAR models are tested for serial correlation using Breush-Godfrey Serial Correlation LM tests and for normality using the Jarque-Bara residual normality test. The stability of the model is checked using the inverse roots of the characteristic autoregressive polynomial. The various forms of tests are dependent upon the software E-Views.

4. Empirical Analysis

4.1. Result of Unit Root Test

Table 1 presents the result of unit root test. In column 1, there are five key variables: GRGDP, GRRE, GRCE, GRTAX and GRTGE out of which GRGDP is dependent variable and GRRE, GRCE, GRTAX and GRTGE are independent variable. In Row 1, there are five indicators: test equation, t-statistics, p-value, critical values and order of integration.

4.2. Result of Lag Length Selection

Our model consists of autoregressive element which calls for selection of appropriate lag length. Table 2 presents the result of VAR lag order selection criteria for our three different models.

Table 1. Result of Unit Root Test

S.N	Variable	Included in test equation:	t-statistics	p-value*	Critical Values			Order of Integration
					1%	5%	10%	
1	GRGDP	Intercept	-7.483775	0.0000	-3.592462	-2.931404	-2.603944	I(0)
2	GRGDP	Intercept and trend	-7.600585	0.0000	-4.186481	-3.518090	-3.189732	I(0)
3	GRRE	Intercept	-6.740219	0.0000	-3.592462	-2.931404	-2.603944	I(0)
4	GRRE	Intercept and trend	-6.729630	0.0000	-4.186481	-3.518090	-3.189732	I(0)
5	GRCE	Intercept	-5.136451	0.0001	-3.592462	-2.931404	-2.603944	I(0)
6	GRCE	Intercept and trend	-5.083820	0.0009	-4.186481	-3.518090	-3.189732	I(0)
7	GRTAX	Intercept	-6.025162	0.0000	-3.592462	-2.931404	-2.603944	I(0)
8	GRTAX	Intercept and trend	-6.144612	0.0000	-4.186481	-3.518090	-3.189732	I(0)
9	GRTGE	Intercept	-5.798639	0.0000	-3.592462	-2.931404	-2.603944	I(0)
10	GRTGE	Intercept and trend	-5.739921	0.0001	-4.186481	-3.518090	-3.189732	I(0)

* MacKinnon (1996) one-sided p values

Table 2. Result of VAR Lag Order Selection Criteria

Sample: 1975 2019						
Lag	LogL	LR	FPE	AIC	SC	HQ
Endogenous variables: GRTGE GRGDP GRTAX (Model 1)						
0	-365.628	NA	20288.34	18.4314	18.55807*	18.4772
1	-352.6495	23.36144	16661.46	18.23247	18.73914	18.41567*
2	-343.3647	15.31993	16572.86	18.21823	19.10489	18.53882
3	-331.7437	17.43148*	14854.07*	18.08718*	19.35384	18.54517
4	-323.4724	11.16624	16048.22	18.12362	19.77028	18.719
Endogenous variables: GRRE GRGDP GRTAX (Model 2)						
0	-374.9329	NA	32307.19	18.89665	19.02331*	18.94244
1	-359.5409	27.70559*	23515.76*	18.57705*	19.08371	18.76024*
2	-353.2588	10.36541	27179.85	18.71294	19.5996	19.03353
3	-350.6583	3.90076	38244.78	19.03292	20.29958	19.4909
4	-344.7514	7.974337	46504.52	19.18757	20.83423	19.78295
Endogenous variables: GRCE GRGDP GRTAX (Model 3)						
0	-400.6272	NA	116746.3	20.18136	20.30802*	20.22716
1	-385.8851	26.53563*	87784.33*	19.89426*	20.40092	20.07745*
2	-379.6995	10.20635	101952.6	20.03497	20.92164	20.35556
3	-371.9891	11.56554	111112.8	20.09946	21.36612	20.55744
4	-366.8916	6.881651	140690	20.29458	21.94124	20.88996

* 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

4.3. Result of Estimation of SVAR models

First we run reduced form VAR estimation and estimate the structural factorization for all three models. The result of SVAR model is presented in table 3.

Table 3. Result of SVAR Estimations

Model 1: GRTGE GRGDP GRTAX				
Sample (adjusted): 1980 2019				
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.24175*	0.015942	15.16472	0.0000
C(2)	-0.96832*	0.069598	-13.91297	0.0000
Model 2: GRRE GRGDP GRTAX				
Sample (adjusted): 1978 2019				
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.425763*	0.011769	36.17771	0.0000
C(2)	-1.425458*	0.049548	-28.76943	0.0000
Model 3: GRCE GRGDP GRTAX				
Sample (adjusted): 1978 2019				
	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.245816*	0.011021	22.30501	0.0000
C(2)	-1.603152*	0.063513	-25.24144	0.0000

* Significant at one percent level

5. Discussion

The study makes use of time series data sets from 1974 to 2019 for GRGDP, GRRE, GRCE, GRTAX, and GRTGE. Series data sets have dynamic behavior and nature over time because of endogenous and exogenous variables. In such behavior, data fluctuates. In this study, the query is whether time series data sets are stationary or non-stationary. In order to understand the nature and pattern of time series data sets and their order of integration, Augmented Dickey-Fuller (ADF) unit root tests are used. In this test, SPSS allowed a maximum of 9 lags, and the optimum lags were automatically selected by minimizing the Schwarz Info Criterion (SIC). Its null hypothesis for the Augmented Dickey-Fuller test is that the variable under consideration has a unit root. An alternative hypothesis is that the variable under consideration does not have a unit root.

The ADF test results provide less than 5% of the p-value for all variables. It means time-series data sets have no unit root for all variables. All variables are stationary over the 44 year period. In this way, the null hypothesis that the variable under consideration has a unit root is rejected, and the alternative hypothesis is accepted.

In the SVAR model, the selection of how many lag lengths in the model is important to select the quality of each model relative to each of the other models. Akaike information criteria (AIC) are its estimators for optimal lag length selection in these three models: 1, 2 and 3. In general, a lower AIC value is better than a higher one. In this way, in model 1, the lower AIC value is 18.08. For model 1, the optimal lag is set at 3. Similarly, in model 2, the lower AIC value is 18.57. Therefore, the optimal lag for model two is 1. Likewise, in model 3, the lower AIC value is 19.89. Therefore, the optimal lag for model two is 1.

However, on residual diagnostics, it was found that models 1 and 2 suffer from serial correlation at these lag lengths. As a result, we optimize the lag length for these two models by adding one more lag. Optimal lag length for models 1, 2, and 3 is 4, 2, and 1 respectively.

Model 1: An SVAR model between GRGDP (dependent) and independent variables such as GRTGE (C1) and GRTAX (c2) has been run to estimate SVAR. In the estimation of the SVAR result of model 1 between GRGDP and GRTGE (c1), the coefficient value of GRTGE (c1) has a positive sign, indicating a positive relationship with 0.24 values. This variable is significant because it has a 0.0 p-value. It means that in a structural disturbance of GRGDP, one unit of growth shock of total government expenditure (GRTGE) increases by 24.17 percent. It means the occurrence of a positive multiplier of total government expenditures on the economic growth of Nepal through different-scale economic output activities in the different economic sectors. Somehow, the budget allocation on regular and capital programs, the expenditure system, and the expenditure tracking system seem to be effectively performing to achieve the desired effect on national output, national income, and employment, and so on.

Similarly, GRRE is another component of GRTGE. In this model, a SVAR model between GRGDP (dependent) and independent variables such as GRRE (C1) and GRTAX (c2) has been run to estimate SVAR. In the result of the SVAR estimation of model 2 between GRGDP and GRRE (c1), the coefficient value of GRRE (c1) has a positive sign, indicating a positive relationship with 0.42 values. Likewise, in model 1, this variable is significant because of its 0.0 p-value. It means that one unit of growth shock of total government expenditure (GRRE) increases the structural disturbance of GRGDP by 42.57 percent. It means the occurrence of a positive multiplier of regular government expenditures on the economic growth of Nepal through the functional expenditures of different economic and non-economic agencies and institutions of the government, having an impact on the different economic sectors. This value is unexpected, but the growth of regular government expenditure has a positive impact on its performance and efficiency. In principle, the multiplier effect of regular expenditure on economic growth is lower. This result contradicts it. One possible reason is the growth of regular government expenditure; another is that regular government expenditure is used on capital activities.

Likewise, GRCE is a key component of GRTGE. This model-3: SVAR model between GRGDP (dependent) and independent variables such as GRCE (C1) and GRTAX (c2) has been run to estimate SVAR. As a result, the SVAR estimation of model 3 between GRGDP and GRCE (c1) and the coefficient value of GRRE (c1) also has a similar positive sign, indicating a positive relationship with 0.24 values. Likewise, in models-1 and -2, this independent variable is significant because of its 0.0 p-value. It means that in a structural disturbance of GRGDP, one unit of growth shock of total government expenditure (GRCE) increases by 24.17 percent. It means the occurrence of a positive multiplier of capital government expenditures on the economic growth of Nepal through the development activities of the different economic sectors. This value is too low, like the GRTGE. This is not a good sign for the Nepalese economy. Its primary causes are declining capital expenditure capacity and technical fallacy and error in resource allocation for development activities and project selection. Another reason is the inefficiency of the government expenditure system and processes with higher leakage. Therefore, the multiplier effect of capital expenditure is lower than regular expenditure. It indicates the weak and critical economic structure and system of the national economy of Nepal. If these issues are not settled through economic reform, the economy will be in a big crisis.

6. Conclusions

The paper estimates the multiplier effect of public expenditure (total government expenditure) on economic growth (RGDP) from a 44-year long time series database of macro-economic variables from 1974-75 to 2018-19 through the SVAR model with tests. As a result, time series data sets of macro variables are stationary. The positive values of the coefficients of SVAR estimate and multiplier values show that economic growth in Nepal responds positively to government expenditure and its components. The multiplier effect of public expenditure, recurrent expenditure, and capital expenditure is positive for economic growth. Of these three expenditures, the multiplier effect of recurrent expenditure is found to be more prominent than capital expenditure to induce economic growth against priori expectation. In the short run, the multiplier effect is promising, but in the long run, it is lower. This is probably due to leakages in the economy, corruption and improper management of development funds, seasonal expenditure trends, and poor management of development projects. Besides, although there is a positive impact of government expenditure on economic growth, the low value of the multiplier indicates the low efficiency of government expenditure. Thus, public expenditure in Nepal has a positive multiplier for economic growth with a low value multiplier. Therefore, the government should improve the efficiency of public expenditure and the ratio of capital expenditure and private investment to improve the higher multiplier variable in the long run.

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