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Government Capital Expenditure and Economic Growth in Nepal

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Abstract

This paper explores the short-run and long-run causal relationship between government expenditure, labor force, gross investment, aggregate consumption, and economic growth of Nepal. The gross domestic product (Y), capital expenditure (K), population (L), gross investment (GI), and aggregate consumption (CO) have been used to find the causal relationship between government expenditure, and economic growth. The ARDL cointegration technique confirms a long-run association among the variables. The study revealed that capital expenditure, labor force participation, gross investment, and aggregate consumption all are the long-run driver of the economic growth of Nepal. These findings tell that efficient and timely allocation and use of capital expenditure, expansion of public as well private investment, and increased aggregate consumption matters for economic growth. The study also shows the existence of unidirectional causation from capital expenditure to growth and bidirectional relationship between other variables. The findings support Keynesian thought of government expenditure and economic growth. The regulatory and policymakers should focus on expansionary fiscal policy to stimulate capital formation, efficient productive investment, boost effective demand, and enhance long-run economic growth in Nepal.

Keywords: *Employee Engagement, Compensation Package, Training Development, Work Environment, Nepal*

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Introduction

A Government involvement through its spending in the economy is the important instrument of budgetary policy. The economists now stand that the presence of expenditure of the government is one of the essentials in the matter of overcoming recession as well as promoting and accelerating economic growth. In developing countries, government expenditure along with taxation and borrowing must play a very important role in accelerating economic expansion (Ahuja, 2016).

Simply government expenditure means the value of all goods and services that are provided by the public sector expecting to accelerate economic growth and development with the ultimate aim of transforming the nation into an industrialized economy as well as raising the standard of living of the people. By changing the volume and direction of spending on different sectors and activities, it affects employment and output level in the economy. Broadly, government expenditure is classified into recurrent and capital expenditure. The expenditure which the government must make repeatedly almost on the same heading year after year including payment for wages, salaries, interest, loan maintenance, defense expense, government consumption, etc. is recurrent or regular expenditure. The capital expenditures are allocated for development works. The government expenditure on capital projects such as roads, bridges, dams, electricity, education, health, etc. is capital expenditure or development expenditure (Obinna, 2003, Okoro, 2013). Thus, government expenditure is one of the powerful instruments in the hand of the government through which it can achieve the objectives of development.

According to Ahuja (2016), there are several peculiar features of a developing country that necessitates the increasing public expenditure for rapid economic growth. There is the availability of vast and diverse resources in developing countries, but they are lying underutilized. Such countries have the weak infrastructure, lack of technical know-how,

their population is increasing, and above all, they have a deficiency of capital. They are caught up in a vicious cycle of poverty. To overcome these handicaps, an appropriate budgetary policy is called up.

Similarly, for developing economies, capital formation has strategic importance for development and overcoming capital deficiency. A higher ratio of saving to national income is so necessary. The state must implement an appropriate instrument of budgetary policy. Government investment especially in those sectors of the economy where the private investments are not easily attracted, for example, development of power resources, means of transport and communication, basic heavy industries, education, and research is needed. Such investments are very often for the foundations of rapid economic advance.

Regarding the relationship between government expenditure and economic growth, there are different thoughts and ideas from different economists and thinkers. Therefore, it is imperative to see the nexus between the spending of government and economic growth in developing and least developed countries, keeping a crucial question is whether public expenditure increases the long-run steady growth of the economy, in the mind. The general view is that public expenditure, notably on physical infrastructure or human capital, can be growth-enhancing although the financing of such expenditures can be growth-retarding, for example, because of disincentive effects associated with taxation (Kweka and Morrissey, 2000).

Nepal has been practicing expansionary fiscal policy for a long time. The most important objective of Nepalese fiscal policy is to attain significant economic growth. In Nepal, public expenditure has remained the most important tool for fiscal policy.

Before 1951, there was no formal government expenditure process in Nepal. During the Rana regime (1847-1951), their main intention was to keep the people out of the scenes of

the country's fiscal position. All types of financial authorities were centralized Government expenditure was presented every fiscal year only after the political changes in 1951. Until 1959, the government expenditure was published in the Nepal Raj Patra (the government gazette) and since 1959 it was presented to a legislative body. After the First Five-Year Plan was introduced in 1955-56, the government expenditure was divided into two parts as regular and development expenditure. With four major objectives (to direct development programs by eliminating existing anomalies and by making them more realistic and productive, as well as overseeing their consistency for directly benefiting deprived community; to rationalize the role of private sector and facilities provided by the government; to minimize increasing hardship faced by common people, and to start a process of repaying the accumulated financial liabilities of the government) finance minister started to present government expenditure in a speech since July 13, 1990 (Mainali, 2012).

After that many social and political changes have occurred in the country and that has brought a sharp increase in government spending. However, the GDP growth rate has yielded an average growth of around four percent per annum only. Therefore, the effectiveness of fiscal policies in Nepal has been reported unsatisfactory. The part of the capital expenditure in the budget has fallen far below the expected level which is the central matter of concern as the low level of capital expenditure adversely hits the development activities (Chaudhary, 2010). According to Shrestha (2004), decades of Nepalese planning exercise and development efforts with increasing government expenditure has been the question for its contribution to economic growth. Therefore, the study of the relationship between government expenditure and economic growth is worthy enough.

The study so explores the long-run association between real public expenditure and real GDP, employing data over the period 1975-2019. Real GDP has been used as a proxy for

economic growth. The arrangement of the rest of the study is as follows. Section 2 presents the theoretical and empirical review of earlier studies to review the theoretical backgrounds and empirical evidence on government expenditure and economic growth. Section 3 describes the model and data used. In Section 4, empirical results on government expenditure and economic growth for Nepal are provided and analyzed. Finally, Section 5 describes the conclusion of the study.

Literature Review

Theoretical Review

The classical economists-based budget on the assumption of full employment and laissez-fair. They believed that a deficit budget may increase the net unproductive debt upon the government and the nation. The essence of the classical theory of budget is balancing revenue and expenditure. However, the 20th-century economists like J.M Keynes and his followers believed that the policy of a balanced budget may not always be suitable for the economy. For example, when the economy is in depression, the government should involve itself in the economic activities through a deficit spending plan. Similarly, if high inflation is caused by excessive aggregate demand for goods and services, the government should reduce its expenditure programs (Romanus, 2015).

Wagner's law developed by Adolph Wagner shows a functional cause and effect relationship between the growth of an economy and relative growth of public spending. According to the theory, as the economy develops over time, the activities, and functions of government increase (Lamarthina & Zaghini, 2011). Precisely, Wagner's law viewed public expenditure as a behavioral variable that positively responds to the dictates of a growing economy. The hypothesis found a positive relationship between government

spending and income as well as a unidirectional causality running from economic growth spending to government expenditure (Muthui et al., 2013).

Peacock and Wiseman (1961) as part of their pivotal study explain the time path of the growth of government in democratic countries (Rowley & Tollison, 1994). The main claim is that public expenditure does not increase smoothly and continuously but in an erratic fashion (Chaudhary and Acharya, 2018).

Findings by Musgrave (1969) and Rostow (1971) formed the fundamental basis of most developmental models of public expenditure-economic growth nexus. These models spelled out that in the early stages of economic growth and development, public sector investment is very high. The public sector provides the social and economic infrastructures, such as roads, electricity, transport system, sanitation system, law and order, education and health, and human capital investment. These infrastructural overheads are very vital to trigger the economy to take-off into the stage of maturity of development. Once the economy reaches the maturity stage, the mixture of public expenditures will move from expenditures on infrastructure to increase expenditures on education, health, and welfare services. Thus, more from capital expenditures to recurrent expenditures in the economy. In the period of high mass consumption, expenditure on income maintenance programs and programs established to redistribute welfare will increase significantly relative to other items of public expenditure and relative to Gross National Product (Mthethwa, 1998).

Colin Clark's hypothesis also called the central limit hypothesis has come with another argument about expenditure-growth nexus. Clark (1854) concluded that when the share of the government sector exceeds 25 percent of total national economic activities in the economy, inflation takes place even in the balanced budget. Clark assumed that 25 percent is the central limit of the total economic activity of a nation (Ahuja, 2016).

In 1956, Robert. M. Solow (1987) developed the Solow Growth Model which is broadly referred to as the Neoclassical Growth model because the model employed a mix of both the orthodox classical and Keynesian formulations. According to the model, the growth of national income or output is depending on the combination of Physical resources encompassing natural and capital resources and human resources encompassing labor and entrepreneurial ability. According to the model, an economy's capacity to grow will depend on what is left from the total level of current savings and what is left from the level of current savings depends on the level of population growth or labor force growth which needs to be sustained by the level of resources saved. In applying this model to Less Developed Countries, for example, Solow stressed that domestic investment through government (recurrent and capital), private expenditures, foreign investments (FDI), and the rate of capital accumulation would have a similar effect as raising domestic savings, which enhances the level of capital per worker and therefore GDP per head. The capacity to grow therefore depends on the ability to save through government and private expenditures on investment. As the government increases its expenditure, it increases production in the economy, and this increases the income of economic agents who then allocate part of their income to savings for further investment (Asomani, 2019).

However, the assumption of an exogenously determined growth rate of technology was not satisfied by Romer (1990). As a result, he further established models that endogenize a country's technology and that model was known as the Endogenous Growth model. Besides, many growth economists argue that the idea of treating technologies as nonrival and non-excludable goods in the neo-classical model is not appropriate. They argue that it is indefensible to assume a constant common growth rate of technology in cross-country regressions. The levels and growth rates of technologies should differ across economies.

Empirical Review

Chang et al., (2004) studied the long-run relationship between government expenditure and GDP for the period 1951-1996 using the time series data for seven industrialized countries and three developing countries including South Africa. Granger causality test results found no causal relationship between income and government expenditure for South Africa and hence concluded that Wagner's law did not hold in South Africa.

Akpan (2005) used a disaggregated method to verify the components and concluded that there was no significant association between most components of government expenditure and economic growth in Nigeria.

The study of Bose et al. (2007) examined the growth effects of government expenditure for a panel of 30 developing countries over the 1970s and 1980s with a particular focus on disaggregated government expenditures. The study showed a significant positive association of government capital expenditure with GDP, but current expenditure showed an insignificant association. They also found a positive relationship between government investment in education and economic growth. Further, their finding noticed a negative effect of tax revenue on economic growth.

Komain and Brahmasrene (2007) investigated the relationship between government expenditure and economic growth in Thailand by assigning the Granger causality test. The study illustrated a significant positive effect of government spending on economic growth.

Liu et al., (2008) analyzed the causal relationship between GDP and public expenditure for the US data during the period 1947- 2002. The causality results showed that total government expenditure caused the growth of GDP while the growth of GDP did not cause expansion of government expenditure. The estimation results also indicated that public

expenditure raised the US economic growth, hence concluded that the Keynesian hypothesis exerts more influence than Wagner's law in the US.

Nurudeen and Usman (2010) scrutinized the nexus between government expenditure and economic growth of Nigeria, applying the ordinary least square method accompanied by a co-integration and error correction model. The results revealed that government total capital expenditure, total recurrent expenditures, and government expenditure on education being a negative effect on economic growth. On the contrary, rising government expenditure on transport and communication, and health caused an increase in economic growth. They concluded the importance of government investment in transport and communication to reduce business costs and increase the profitability of firms, and the importance of investment in health and education for the development of capable manpower.

Alshahrani and Alsadiq (2014) examined the relationship between economic growth and government spending in Saudi Arabia. The study used Johanson co-integration technique to see the long-run relationship and used VECM to check the short-run relationship between the variables. It employed annual data over the period 1969-2010. They found that private domestic and public investments, as well as health care expenditure, stimulate growth in the long-run, openness to trade and spending in the housing sector can also boost short-run production.

Adu and Ackah (2015) investigated government expenditure and economic growth nexus in Ghana by using the ARDL model with annual data spanning from 1970 to 2010. The study concluded that government capital expenditure has a significant negative impact on economic growth, but recurrent expenditure has a positive effect on economic growth in both the long-run and short-run periods. They, however, suggested a fiscal discipline and

efficiency in the disbursement of capital expenditure to trigger positive benefits in the future.

Anning et al., (2017) on the causal nexus between government spending and economic growth in Ghana using time series data from 1980 to 2015, and the ARDL bounds testing approach to co-integration and Vector Error Correction Model (VECM). The study depicted evidence of co-integration for the existence of a long-run relationship between the dependent and independent variables. Using the Granger causality test, it also concluded on causal independence between government spending and economic growth. Hence government spending has a causal effect on economic growth in Ghana. It further stressed that government spending that is channeled into more efficient use in the building of infrastructural development that is self-liquidating could enhance more economic activities in the short run and lead to growth in the long run in Ghana.

Regmi (2007) researched to investigate the impact of fiscal policy on economic growth in Nepal applying an endogenous growth model with some slight adjustment. The study found a negative effect of all the fiscal policy variables including distortionary taxes, productive expenditure, non-tax revenues, private investment, and budget deficit on economic growth. The study concluded that the inefficiency correlated with the use of public funds as being the cause of the significant negative effect of productive investment in economic growth. Kharel (2012) formed a macroeconomic forecasting model concentrating on fiscal policy and economic growth in Nepal. The empirical evidence indicated that fiscal policy, particularly governments' capital expenditure affects economic growth positively and crowds-in private investment. The positive effect of fiscal policy on economic growth and the crowd-out effect of public investment on private investment are the main findings of his study.

Mainali (2010) investigated the relationship of government expenditure with GDP. The finding of this research supports the findings of the earlier researcher in the sense that the government expenditure is growth-promoting. However, there is not a satisfactory contribution of government expenditure to GDP. The cointegration relationship of GDP has appeared with recurrent expenditure, gross investment, and labor force. The error correction model also showed that the increase in recurrent expenditure and gross investment cause positively to GDP even in the short run.

Chaudhary and Acharya (2018) analyzed the causal relationship between government expenditure and the real interest rate on the economic growth of Nepal for the time 1975 to 2015. The study applied ARDL cointegration techniques and yielded a long-run as well as the short-run association between variables under consideration. The study further confirmed that there is bidirectional causality between government expenditure and real income over the study period.

Research Methodology

Variables and Data Sources

Annual time-series data of 45 years from 1975 to 2019 is used in the study. The data are collected from the Nepal Rastra Bank (NRB), the central bank of Nepal, and the Ministry of Finance (MoF), the Government of Nepal. The nominal form of the variables is converted into the real term by dividing the value of the GDP deflator at constant prices of the base year 2001.

Gross domestic product (GDP) is the most important measure to calculate a country's economic performance. It is the total market value of all currently produced final goods and services produced by all producing units within the geographical borderline of a

country during a given period, generally in one-year. Real gross domestic product is an inflation-adjusted measure that reflects the value of all goods and services produced by an economy each year and is often referred to as constant-price or inflation-corrected GDP. Capital expenditure is the payment with either cash or credit to purchase long term physical or fixed assets of the government. Capital expenditure brings on social and economic development of the country through the expenditure made on providing education, health, recreation, public utilities to the community. This type of expenditure facilitates to substantially enhance the capacity of a long-term asset and to raise the national income. Gross investment means aggregate investment. It includes private investment, public investment, and change in stock. Total consumption includes both private consumption and public consumption. The total population is taken as a proxy of the labor force in the study.

Table-1: Description of Variables

S.N.	Notation	Variable	Unit	Source
1	Y	Real Gross Domestic Product (2001=100)	In Rs million	Current Macroeconomic and Financial Situation-2019/20, NRB
2	K	Real Capital Expenditure	In Rs million	Macroeconomics Dashboard, MoF
3	GI	Real Gross Investment	In Rs million	Macroeconomics Dashboard, MoF

4	CO	Real Total Consumption	In Rs million	Macroeconomics Dashboard, MoF
5	L	Labour Force	Number in Million	Current Macroeconomic and Financial Situation-2019/20, NRB

Model Specification

The model represents a well-constructed functional relationship between explained and explanatory variables. The study deems real gross domestic product (Y) as a dependent variable, and capital expenditure in real term (K), gross investment in real term (GI), total consumption in real term (CO), and labor force (L) are considered as explanatory variables. Following the aggregate production function of the Solow growth model and Asomani et al., (2019) the aggregate production function can be expressed as.

$$Y_t = A_t L_t^{\beta_1} K_t^{\beta_2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

In equation (1) Y_t signifies the aggregate output of the economy (real GDP) at the time (t). L_t represents the stock of labor measured as the Labour Force, which is the total population in the study, while K_t is the capital input is measured as an amount of capital expenditure at the time (t). β_1 and β_2 represent the coefficients of elasticity of labor and capital inputs. The variable 'A_t' represents the Total Factor Productivity (TFP) which accounts for other factors apart from labor and capital that causes production to increase. Thus, it is a vector of other independent variables

that theoretically and empirically have effects on the dependent variable. The TPF function can be written as.

$A = f(GI, CO) = GI_t^{\beta_3} CO_t^{\beta_4}$ ……. (2)

Substitution equation (2) into equation (1) we obtain equation (3), and which can be expressed as.

$Y_t = L_t^{\beta_1} K_t^{\beta_2} GI_t^{\beta_3} CO_t^{\beta_4}$ ……..….. (3)

Taking the natural log of the variables of equation (3) and making an econometric form of the equation gives the following expression.

$LnY_t = \beta_0 + \beta_1 Ln\, L_t + \beta_2 Ln\, K_t + \beta_3 LnGI_t + \beta_4 Ln\, CO_t + \varepsilon_t$….. (4)

Where the β_i are the slopes of the variables and i = 1,2,3,4 and ε is the residual term. Equation (4) provides the operational econometric model which expresses real GDP being explained by government expenditure variable and other macroeconomic variables. The coefficients are supposed to have a positive sign indicating an increase in the values of L, K, GI and CO lead to an increase in the amount of RGDP.

ARDL Approach to Cointegration

Where The ARDL model developed by Pesaran and Shin (1999) and Pesaran et al., (2001) is one of the widely used and most appropriate approaches to examine the causal relationship between the underlying variables regardless of whether the variables are integrated of order zero (I_0), one (I_1) or mutually integrated.

Using the ARDL approach to cointegration has several benefits in comparison to other cointegration methods such as Engle-Granger (1987), Johansen (1988), and Johansen and Julius (1990) procedures (Shah and Bhusal, 2017). This technique is also considered a statistically more significant approach to ascertain the cointegrating relation in a small sample size too.

The ARDL version of equation (4) is expressed as below.

$$\Delta LnY_t = \beta_0 + \sum_{j=1}^{p} b_j \, \Delta LnY_{t-j} + \sum_{j=0}^{q} c_j \, \Delta LnL_{t-j} + \sum_{j=0}^{r} d_j \, \Delta LnK_{t-j} + \sum_{j=0}^{s} e_j \, \Delta LnGI_{t-j} + \sum_{j=0}^{t} f_j \, \Delta LnCO_{t-j} + \gamma_1 LnY_{t-1} + \gamma_2 LnL_{t-1} + \gamma_3 LnK_{t-1} + \gamma_4 LnGI_{t-1} + \gamma_5 LnCO_{t-1} + \varepsilon_t \quad \ldots (5)$$

Where 'Δ' stands for the first difference operator. b_j, c_j, d_j, e_j and f_j signify the short-run parameters whereas, $\gamma_1, \gamma_2, \gamma_3, \gamma_4$ and γ_5 represent the long-run parameters. Similarly, ε_t represents the residual in the model.

To test whether the long-run equilibrium relationship occurs between preferred variables, the bounds test for cointegration is carried out as proposed by Pesaran and Shin (1999). The hypotheses to test the long-run relationship are.

Null Hypothesis (H_0): $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = 0$; No cointegration exists.

Alternative Hypothesis (H_1): $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq 0$; Cointegration exists.

If the result obtained from the bound test confirms cointegration then there is a long-term relationship among the variables. For this, F-statistics is compared with the critical values provided by Pesaran et al., (2001). If the calculated F-statistics is higher than the appropriate upper bound of the critical values, then the null hypothesis of no cointegration

is rejected, if it is lower than the appropriate lower bound, the null hypothesis cannot be rejected, and if it lies within the lower and upper bounds, the results is inconclusive.

Causality test

For the direction of causality among variables, a simple pairwise Granger causality test is applied in the study. Engle and Granger (1987) state that if two variables are stationary in order one and co-integrated, then either the first variable granger causes the second variable or the second variable granger causes the first variable. So, the Granger causality test is made to examine any possible causal relationship among the variables of the estimated model. The equations for the short-run causality test are illustrated below.

$$X_t = \propto_0 + \sum_{i=0}^{p} \propto_i X_{t-i} + \sum_{i=0}^{p} \beta_i Y_{t-i} + \varepsilon_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

$$Y_t = \delta_0 + \sum_{i=0}^{p} \delta_i X_{t-i} + \sum_{i=0}^{p} \gamma_i Y_{t-i} + \varepsilon_{2t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

The null hypothesis of the test states that there is no causal relationship between the variables.

Results and Discussion

A The empirical result shows that there is cointegration between government capital expenditure, labor force, gross investment, and total consumption of Nepal.

Unit Root Tests Results

To evade the phenomenon of spurious regression, it is imperative to find out if a time-series is stationary or not. Generally, the time series becomes stationary after the integration of order I (1) or order I (2) if it not stationary at level I (0). If the variables are stationary, we can further proceed with the econometric analysis. The bounds test can be applied regardless of whether the underlying variables are stationary at the level I (0), at the first difference I (1), or a combination of both. Tables 2 and 3 display the results of the Augmented Dickey-Fuller (ADF) tests, the Philips-Perron (PP) tests, and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests of the variables.

Table-2: Unit Root Test Results at Level

Variable	Tests with Constant			Tests with Constant and Trend		
	ADF	PP	KPSS	ADF	PP	KPSS
LnY	0.9636	1.2297	0.8584	-3.1825	-3.1376	0.1004
LnL	-2.0497	-6.1063*	0.8563	-0.7850	-0.3416	0.2197
LnK	-1.9897	-1.9897	0.5417	-2.2851	-2.4019	0.1333
LnGI	0.6962	2.1998	0.8594	-2.4706	-2.3670	0.1511
LnCO	-0.2104	0.0335	0.8522	-4.1588	-4.0674**	0.1812

Source: Author's calculation

Note: ***significance at 10%; ** significant at 5%; and * significant at 1% level of significance

Table-3: Unit Root Test Results at First Difference

Variable	Tests with Constant			Tests with Constant and Trend		
	ADF	PP	KPSS	ADF	PP	KPSS
LnY	-7.4697*	-7.6085*	0.2035*	-7.6005*	-7.6999*	0.1100*
LnL	-1.2301	-1.2244	0.7217	-2.2927	-2.3586	0.0740*
LnK	-5.7256*	-5.7108*	0.1360*	-5.6557*	-5.6400*	0.1250
LnGI	-8.2540*	-8.5206*	0.3251*	-8.4340*	-9.1821*	0.1697*
LnCO	-8.3750*	-9.8863*	0.1711*	-8.2710*	-9.7501**	0.1693

Source: Author's calculation

Note: ***significance at 10%; ** significant at 5%; and * significant at 1% level of significance

The underlying variables except for population as the proxy of the labor force are non-stationary at the level as shown by the table-2 and table-3 shows all the variables are stationary after first differencing, that is, the variables are integrated of order zero as well as order one. Since variables are not ordered more than one and having a mixture of order zero and order one, the ARDL model can be used.

Cointegration Result

The table-4 shows the bound test result regarding the cointegration relationship between variables of the model.

Table-4: Result of Bound Test

Model	Equation	Calculated F-statistics
A	LnY/ LnL, LnK, LnGI, LnCO,	10.553484*

*Note: The relevant critical value bounds are obtained from Pesaran, Shin, and Smith (2001). These values are 3.13-4.04 at 90%, 3.41-4.36 at 95% and 3.96-4.95 at 99% significance level. * denotes that the F-statistics falls above the 99% upper bound.*

Source: Author's Calculation

The bound test result presented in the table-4 approves that the calculated F-statistics 10.5534 lies outside the upper bound critical value 6.423 at a 1 percent level of significance. This confirms the rejection of the null hypothesis of no cointegration. So, there is a long-term relationship between the chosen variables.

ARDL Regression Results and Interpretation

After confirmation of the existence of the long-term relationship between variables, the long-run and short-run coefficients for equation (5) were estimated using the ARDL model. The following tables show the long-run and short-run relationships among variables with the help of the ARDL model based on the AIC criterion.

Table-5: Long Run Coefficients; ARDL (3,0,1,2,0); Dependent Variable is LnY

Regressors	Coefficient	Std. Error	t-Statistic	Prob.
LnL	1.045206	0.23556	4.4370	0.0001*
LnK	0.056789	0.02430	2.3361	0.0261**
LnGI	0.217570	0.03488	6.2363	0.0000*
LnCO	0.217755	0.12220	1.7819	0.0846***
C	3.9394	0.70943	5.5530	0.000*

*Note: *, ** and ** indicate that the statistics are significant at 1%, 5%, and 10% level of significance*

Table-5 demonstrates the long-run coefficients from the selected ARDL model. The coefficient of all the explanatory variables as expected are positive and statistically significant. The coefficients of the labor force and capital expenditure are 1.0452 and 0.05678 indicates that with a one percent increase in the labor force and capital expenditure, real GDP on an average increase by 1.0452 and 0.05678 percent, respectively. Peering at the size of coefficients, the effect of the labor force on real GDP is higher than that of capital expenditure. This proves that the Nepalese economy is characterized more by the labor-intensive technique of production and less capital-intensive method. The work of Mainali (2010), Chaudhary and Acharya (2018) also supported this long-term relationship between government expenditure and the real GDP of Nepal. This finding is consistent with the Keynesian's theory.

Looking at the coefficient of gross investment and consumption, they also positively contributed to real growth as expected and statistically significant at 1 percent and 5 percent level of significance, respectively. These findings reveal that increase in capital expenditure by the government will increase employment opportunities, utilize resources, and thereby economic growth. Similarly, the investment made by the public as well as private sectors also helps to affect real variables, living standards of people by offering employment opportunities, helping them to fulfill their wants and thereby boosting the economy. Due to increasing capital expenditure, investment, and participation of the labor force, aggregate demand of the people increases, and that has a multiplier effect on the economy. The findings also support the working of Keynesian investment multiplier in the case of the Nepalese economy. This is reflected by the positive and significant long-run coefficient of investment and consumption.

Table-6: Short Run Coefficients; ARDL (3,0,1,2,0); Dependent Variable is ΔLnY

Regressors	Coefficient	Std. Error	t-Statistic	Prob.
Δ LnY(-1)	-0.444361	0.083365	-5.3302	0.0000*
Δ LnY (-2)	-0.457354	0.090227	-5.0689	0.0000*
Δ LnL	0.47811	0.15530	3.0787	0.004*
Δ LnK	-0.006759	0.009759	-0.6925	0.4937
Δ LnGI	0.056443	0.014821	3.8081	0.0006*
Δ LnGI (-1)	0.033971	0.017018	1.9961	0.0548**
Δ LnCO	0.099607	0.055829	1.7842	0.084***
C	1.802006	0.226420	7.958692	0.0000*
ECM (-1) *	-0.457429	0.059263	-7.718555	0.0000*
R^2= 0.779 Adj. R^2= 0.708 F=20.63 (P-value 0.0000) D-W= 2.10				

Source: Author's calculation

*Note: ** significant at 5%; and * significant at 1% level of significance*

The table-6 shows the short-run coefficient of the variables used in the model. All the coefficients except capital expenditure shown in the table exhibit a positive and statistically significant short-run effect on real income. The coefficient of capital expenditure in the short run is negative but statistically insignificant. A negative effect of capital expenditure in growth may be attributed to inefficiency tied with the use of public funds. The ineffective use of productive funds and having rent-seeking behavior are among the most serious issues in the least developed countries like Nepal and due to these reasons, the contribution of capital expenditure seems negative in many developing and least-developed countries. This statement is supported by the findings of Regmi (2007), Adewara and Oloni (2012), and Ojnugwa and Abdul (2015).

Like the long-run relation, an increase in the labor force, gross investment, and consumption lead to economic growth in the short-run as well. An increase in population, gross investment, and total consumption increases the effective demand in the economy and ultimately leads to economic expansion as suggested by Keynesian theory.

The value of the error correction term ECM (-1) is -0.457 with a 1 percent level of significance. The negative and statistically highly significant value of the error correction term also reconfirms that there is a strong long-term relationship between variables and the model is convergent towards equilibrium. Furthermore, it also shows the speed of adjustment towards the previous year's disequilibrium to the current years. The result conveys that the adjustment speed is 45.7 percent per annum. Likewise, the higher value of R-squared and the probability of F-statistic validates that the short-run model is significant.

Table-7: Information of Diagnostic Tests Result of ARDL output

Test Statistics	LM Version	F Version
A: Serial Correlation	CHSQ (1): 0.4984 [0.484]	F (1, 30): 0.3603 [0.553]
B: Functional Form	CHSQ (1): 0.4803 [0.488]	F (1, 30): 0.3708 [0.560]
C: Normality	CHSQ (2): 0.8277 [0.661]	Not applicable
D: Heteroscedasticity	CHSQ (1): 0.1383 [0.710]	F (1, 40): 0.1321 [0.718]

Source: Author's calculation

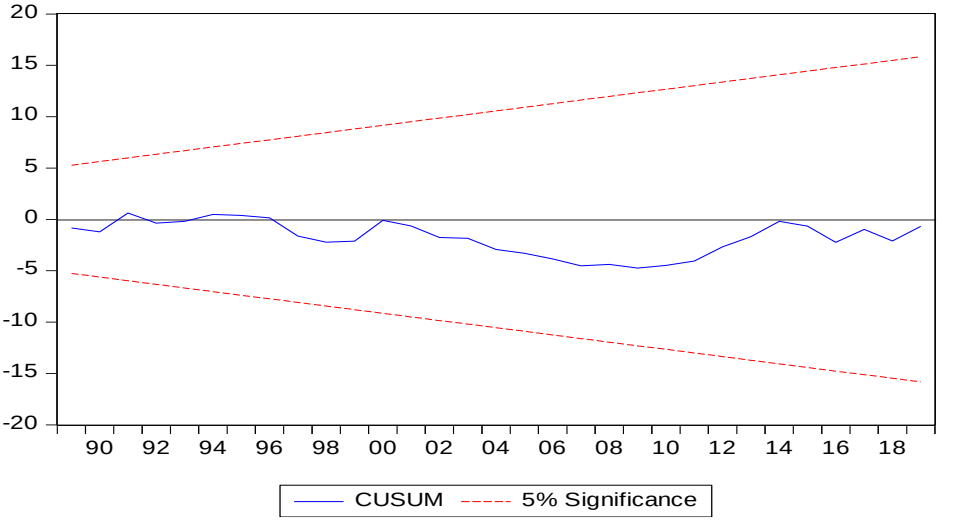
Note: A: Lagrange multiplier test of residual serial correlation; B: Ramsey's RESET test using the square of the fitted values; C: Based on a test of skewness and kurtosis of residuals; D: Based on the regression of squared residuals on squared fitted values.

The diagnostic tests indicate that the model permits all the tests. The null hypothesis of the normality of residuals, no first-order serial correlation, no heteroscedasticity, and no misspecification of functional form are accepted as both LM and F version exhibits the p-values more than the 5 percent level. This means the model is free from serial correlation, heteroscedasticity, functional form misspecification, and the issue of normality.

Stability Test of the ARDL Model

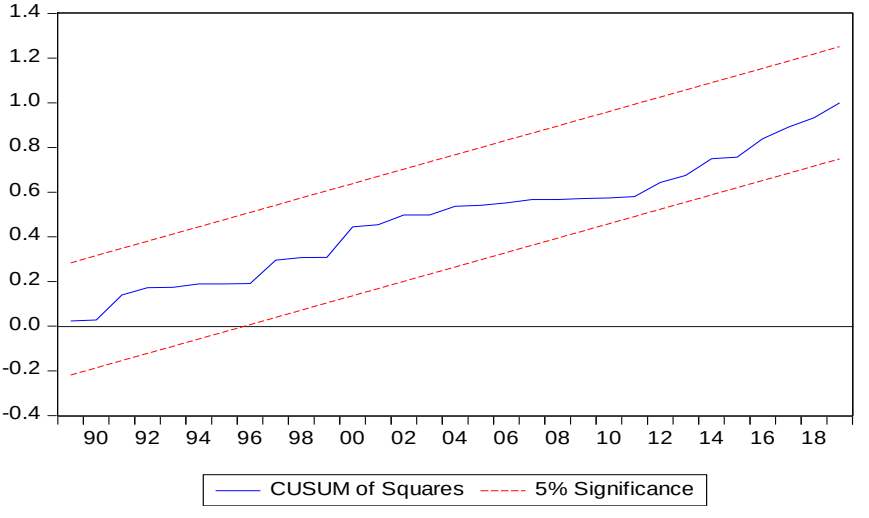
To test the reliability of the parameters of the estimated model, a stability test is useful. The cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) statistics are used to measure the structural stability in the model. The null hypothesis for the stability test is that the parameters are stable. The value of the sequence outside the range of 5 % significance rejects the null hypothesis and indicates a structural change in the model over time. CUSUM measures the systematic change in the parameter over time and a quick change in the parameter is measured by CUSUMSQ. The following figure shows the results of the CUSUM and CUSUMSQ test of the estimated ARDL model.

Figure-1: Plot of CUSUM Test



Source: Author's calculation

Figure-2: Plot of CUSUMSQ Test



Source: Author's calculation

The figure-1 and 2 show that the plots of CUSUM and CUSUMSQ lines lie within the 5 percent critical bounds and prove that the model is stable and robust.

Granger Causality Test Result

The following table shows the result of the Granger causality test of the variables.

Table-8: Results of Granger Causality Tests

Sample: 1975-2019 Lags: 1			
Null Hypothesis	**F-Statistic**	**Prob.**	**Decision**
LnK does not Granger Cause LnY	6.9550	**0.0118****	Rejected
LnY does not Granger Cause LnK	1.0871	0.3032	Accepted
LnGI does not Granger Cause LnY	4.0427	**0.0510*****	Rejected
LnY does not Granger Cause LnGI	3.7105	**0.0610*****	Rejected
LnCO does not Granger Cause LnY	2.9826	**0.0917*****	Rejected
LnY does not Granger Cause LnCO	8.6561	**0.0053***	Rejected

Source: Author's calculation

*Note: ** significant at 5%; and * significant at 1% level of significance*

The results presented in table 8 show that there is unidirectional causality from real capital expenditure to real GDP, and bidirectional causality between real GDP and gross investment, and between real GDP and consumption in Nepal.

Conclusion and Suggestions

The paper examines the causal relationship between government expenditure and economic growth in Nepal by using the time series data of 1975 to 2019. The study employs the ARDL cointegration approach to investigate the associations. The empirical results show that there is the existence of a long-term relationship between government expenditure and economic growth. Specifically, there is a long-term significant positive relationship between real GDP as a dependent variable and capital expenditure, labor force, gross investment, and aggregate consumption as independent variables. The positive effect of capital expenditure on long-term economic growth could be assigned to the fact

that most capital expenditures enter the capital and productive schemes that having greater public benefits than their private benefits. In the short run, there is a significant positive relationship between real GDP and labor force, gross investment, and total consumption. However, there is a negative effect of capital expenditure in the short run but statistically insignificant. The negative effect of capital expenditure on economic growth may be attributed to inefficient use and allocation of productive public funds and delayed entry of capital expenditure scheme into mainstream production.

The study also concludes that there is the existence of the bidirectional causal relationship between gross investment and economic growth, total consumption and economic growth, and unidirectional causality from capital expenditure to the growth in the short run. These findings of the study suggest that the Ministry of Finance should be encouraged to increase spending on capital expenditure to broaden and enhance the growth of the economy. Furthermore, capital expenditure must use efficiently and come into mainstream production within time. Similarly, an increase in gross investment, consumption, and labor force participation will create new and innovative opportunities, utilize idle resources, create employment opportunities, induce further investment, and ultimately increase the GDP. Therefore, expansionary fiscal policy, along with policies related to enhancing skill development and training program for the labor force, investment from the private as well as the public sector, and sustained consumption are needed to revisit for long-term real growth of the economy of Nepal.

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