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Nexus Between Public Expenditure and Economic Growth in Nepal

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Abstract

The present article attempts to identify the relationship between public expenditure and economic growth in Nepal. Public expenditure is a fundamental element for the economic growth. On employing ARDL bound test on data set for the period of 1975-2016, we found long-run relationship between the public expenditure and economic growth. The bound test and error correction term clearly specify that there exists a long run relationship between government expenditure and economic growth in Nepalese economy. From the empirical study, it is found that government expenditure has significant influence on real GDP which is proxy for economic growth. The study confirms the Keynesian theory of making government expenditure to boost economic growth of Nepal.

Key words: *Economic Growth, Public Expenditure, Stationary, Satisfaction, Social Security.*

1. Introduction

Public expenditure refers to the expenses undertaken by the government authorities for the functioning of the government. It refers to the expenditure incurred by the different layers of government, that is, central government, state government and local government. It is necessary to address the common wants of the people, which is merely possible to achieve with individual or social effort. Especially public expenditure is required to create social-overhead capital, internal peace and justice and even to maintain external affairs. It is essential to increase the welfare of society as a whole.

Public expenditure is the basic need of the government for the country. So, it requires for the satisfaction of collective needs of the citizens or for promotion of economic and social welfare of the society (Lekhi, 2016). So, there is great relationship between public expenditure and development of the country.

Public expenditure as a financial mechanism provides a helping hand to the government to realize its core economic and social objectives. The traditional economist had confined the functions of the state mainly for providing protection to the people from internal rebellion and foreign aggression. It is also required for the administration of justice and provision of public works whereas modern economist conceive that public expenditure has a positive role to achieve the goal of maximum social welfare and much essential in correcting market failure and providing public goods (Kennedy, 2012).

Government expenditure is one of the important determinants of economic growth. However, the growth of economy depends on the size, spending capacity, and effective use of capital expenditure in development process. The government should focus on law and order and fair and transparent use of

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government investment avoiding corruption to acquire the expected growth of the economy (Sharma, 2012).

Regarding the concept, there always comes the argument among the scholars in relation to the relationship between government expenditure and economic growth. Some are for and some are against of this concept. Scholars; supporting the Keynesian view argues that, an increase in the portion of government expenditure boosts the economic growth whereas scholars supporting the Wagnerians view argue that, an increase in the government expenditure may retard the economic growth.

The government expenditure is required for the promotion of health, education, agriculture, transportation, communication, mining, energy, etc. This view may not be applicable through Wagnerian concept. According to this concept, to increase public expenditure, government either must increase tax rate or must use public borrowing. As we know increasing tax rate, it reduces the income tendency of the business sector and may reduce the private investment expenditure curtailing the employment rate and GDP in a row and while going for the public borrowing, it may crowd-out private investment, consequently reducing the economic growth rate.

Despite the increase in growth rate of public expenditure, lower growth rate of GDP is the most common problem faced by most of the developing countries like Nepal. The real public expenditure was Rs. 11861.6 in million in 1975 and Rs. 207469.4 in million in 2016 (Appendix A). Throughout the study period it is observed that the annual average economic growth rate is confined to 4.1 percent, with 8.79 percent as the highest growth rate ever achieved in 1984 and with less than 1 percent in 2016. This shows the volatility in the economic growth rate of Nepalese economy. The annual average growth rate of real recurrent expenditure is observed to be 9.8 percent and the annual average growth rate of real capital expenditure is subjected to be 6.74 percent, in a meaning that, the total annual growth rate of public expenditure is observed to be 7.61 percent. However, the annual average growth rate of the expenditure seems to be higher than that of the annual average growth rate of GDP, that is, increased public expenditure has not shown proportionate growth rate in GDP. As per the prevailing Keynesian theory, there must be the multiplier effect of public expenditure on economic growth, with the meaning that government injection leads to accelerate economic growth.

Despite such higher growth rate of public expenditure, Nepalese economy has not been able to achieve the consistent and higher growth rate, the resultant factor for this case may be political instability, corruption, unstable government, bad governance etc., which are blamed mostly. However, there are many empirical works showing the positive relationship between public expenditure and economic growth. In this light, the study regarding the relationship between public expenditure and economic growth for Nepalese economy is necessary. This study will empirically reinvestigate whether there exists relationship between public expenditure and economic growth, if exists then in which direction.

This study tries an empirical investigation to relate the public expenditure with economic growth by taking data of the period (1976-2015). This study tries to test Keynesian hypothesis, which advocates that public expenditure can positively affect the economic growth, along with Wagner’s hypothesis that, with rise in per capita GDP there will increase in public expenditure. The study attempts to identify and address the following research question: Is there any significant relationship between public expenditure and economic growth in Nepal?

2. Review of Literature

Attari and Javed (2013) used ARDL model to show the long and short run relationship between rate of inflation, economic growth and government expenditure on time series data of Pakistian's economy for the period of 1980-2010. It is found that there is a long run relationship between rate of inflation, economic growth and government expenditure. This study concludes that in the short run the rate of inflation have not affected the economic growth whereas government expenditure affects the economic growth and further shows unidirectional causality between rate of inflation and economic growth and economic growth and government expenditure.

Tsauraiand Odhiambo (2013) found that there is a causal relationship between government expenditure and economic growth using ARDL bound testing approach for Zimbabwe by employing time-series data from 1980 to 2011. Their study found the unidirectional causal flow from economic growth to government expenditure for both short and in the long run. However, casual flow from government expenditure to economic growth has been detected in short-run.

Rufael (2013) using ARDL bound test approach with co- integration and causality tried to investigate the long run and causal relationship between public expenditure and national income of Ethiopia for the period 1950-2007 and found that bounds test approach to co-integration indicating a long run co-integrating relationship between public expenditure and GDP. Here, Wagnerian hypothesis is supported showing the unidirectional causality running from GDP to government expenditure.

KunuandBasar (2015) in their paper used ARDL bound testing to show the long-run relationship between public expenditure and economic growth and found that there is both short- and long-run relationship between the public expenditure and economic growth in positive way in Turkish economy. This paper also suggests the prevalence of Keynesian approach.

Ogunmuyiwa (2015) with the analysis of time-series data of 38 years using Box-Jekins OLS methodology and Johansen co-integration found positive and significant impact of public expenditure on economic growth. The study on policy implication suggests investing heavily in public infrastructure for the desired growth and development of the country.

Hasnul and Gifari (2015) carried an empirical investigation to establish the casual relationship between public expenditure and economic growth in Malaysian economy. Government expenditure has been disaggregated into the government operation and development expenditure. Using OLS for 45 years' time-series data, the study found negative correlation between government expenditure and economic growth. In disaggregated form, the study further found that housing sector expenditure and development expenditure significantly contribute to a lower economic growth. Whereas, expenses on defense, health care and operating expenditure do not show any impact on the economic growth. Selim (2015) found public spending on education, health, defense, current and public investment spending having positive effect on Turkish economy by analyzing time-series data of 42 years period with validating the result with Zivot- Andreus unit root test and Pesaran bound test.

Wang, Peculea and Xu (2016) employed ARDL approach and bound test based on UCEM approach to show the relationship between public expenditure and economic growth of Romanian economy. The study further advocated that there is unidirectional long run causal relationship from government expenditure to economic growth in Romania.

IdrisandBakar (2017) used ARDL bound test to analyze the relationship between public sector spending and economic growth in Nigeria. The empirical evidence from the ARDL estimation indicates the existence of positive and long-run equilibrium relationship between economic growth and government expenditure in Nigeria. This result is consistent with the Keynesian philosophy and several empirical literatures, hence establishing a stable relationship between the variables in Nigerian economy.

Timilsina (2010) carried an empirical study using simple regression on time series data of 16 years and found that public expenditure in Nepal has been growing over years with an average growth rate of 11.56 percent on study period and positive impact of public expenditure especially on public investment to be positive with GDP.

Mainali (2012) on employing co-integration analysis and ECM to show long-run and short-run impact of government expenditure on economic growth and noticed that the share of capital expenditure is on decreasing trend mainly after 1990s but rapid increase on loan repayment and interest payment. This study supported the previous research findings in the sense that the government expenditure is growth promoting with the result of co-integration and ECM to show the positive effect of government expenditure on GDP.

Sharma (2012) found government expenditure as one of the important determinants of economic growth and stressed that growth of economy depends on the size, spending capacity and effective use of capital expenditure in the economic growth. But due to political instability, internal inability and weak governance capital expenditure is unable to influence the growth and development.

Kharel (2012) carried an empirical study to develop a macroeconomic forecasting model for a plan period 2010/11 to 2012/13 using annual data from 1992/93 to2009/10 and found that fiscal policy, particularly government capital expenditure affects economic growth positively and also crowds-in private investment.

Subedi (2013) on employing OLS for the period of 1990-2011 has found positive relationship between aggregate level of GDP and public expenditure using simple regression, where regular expenditure is highly responsive to GDP.

Gaire (2014) found the empirical results from the Johansen co-integration tests showing the long-run relationship between government and real GDP, private consumption and gross fixed capital formation. However, Granger causality test revealed that there is no causality between the government expenditure and real GDP as well as private consumption for the review period. Finally, the study stressed that Keynesian hypothesis is not valid for Nepal.

Thapa (2015) carried an empirical investigation to show the relationship between government expenditure and growth by using ARDL and co-integration test. In this study the time-series data of 37 years are taken. It is found that the trend of real capital expenditure is higher than real recurrent expenditure in initial years, but later real recurrent expenditure is larger than real capital expenditure and supports Keynesian postulate and Wagner's postulate both, that is, there is both long-run and short-run relationship between government expenditure and economic growth.

Aryal (2015) described empirical result using simple regression analysis on the time-series data of 24 years as decreasing trend of regular expenditure after 1998 and positive relationship between the aggregate level of GDP and public expenditure (total, regular and development). Among total expenditure, regular expenditure and development expenditure, GDP is found to be highly responsive to the development expenditure and lesser responsive to regular expenditure.

3. Data and Methodology

Nature and Sources of Data

The nature of this research study is descriptive and analytical. Along with empirical study is based on the annual time series data ranging from 1975 to 2016, which comprises 42 observations. The sources from which the data are taken for this study are taken from Ministry of Finance (MOF)

Model Specification

This research work aims to evaluate the relationship between the economic growth and public expenditure in Nepal. In order to meet the research objectives, this study has employed the following functional model based on the different time series literature on the expenditure growth nexus. The specified model is as follow:

$RGDP = f(RREXP, RRCXP)$ ………………….(1)

Where, RGDP, RREXP and RRCXP refer to real gross domestic product, real recurrent expenditure, and real capital expenditure respectively. The functional form explains that RGDP is dependent to or influenced by real recurrent expenditure and real capital expenditure. Following equation (1) in the form of log linear model is further extended to:

$LRGDP = \beta_o + \beta_1 LRREXP + \beta_2 LRREXP + U_t$ ……………….(2)

Where, β_o = intercept (β_o>0)

β_1 and β_2 are elasticity coefficients of real recurrent expenditure and real capital expenditure respectively and U_t is the error term. Each coefficient β_1 and β_2 are expected to be positive. It means, as the rate of recurrent and capital expenditure increases, it brings positive change in the economic growth.

Description of the Variables

The detail of the entire variables used in the formulation of equation (1) and (2) and other associated variables in the study are presented in the below:

Table 1: Variable Details

Variable	Variable Details
RGDP	Real GDP which is inflation adjusted gross domestic product (GDP) obtained dividing nominal GDP by GDP Deflator (FY 2000/01 = 100).
RREXP	Real recurrent expenditure which is defined as inflation adjusted government recurrent expenditure adjusted by CPI.
RCEXP	Real capital expenditure which is defined as inflation adjusted government capital expenditure adjusted by CPI.
CPI	Consumer price index, base year 2014/15 (i.e., FY: 2014/2015=100)
LRGDP	Logarithm of real gross domestic product.
LRREXP	Logarithm of real recurrent expenditure.
LRCEXP	Logarithm of real capital expenditure.

Econometric Tools

In this study different time series econometric tools are used.

Unit Root Test

To check the stationary of the time series data, unit root test was performed. The study has employed Augmented Dickey-Fuller (ADF) test to test the stationary (or non-stationary) of the variables. While conducting the Dickey-Fuller test, it was assumed that the error term u_t was uncorrelated. However, in case the u_t is correlated, Dickey and Fuller have developed another test, known as the Augmented Dickey-Fuller test. The ADF test here consists of estimating the following regression.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t \cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (3)$$

Where, $\varepsilon_t$is a pure white noise error term and Y_t is any variable used in this study, that is, LRGDP, LRREXP and LRCEXP. Δ indicates the first difference operator and m is the length of lag, which ensures residuals to have white noise empirically. The ADF statistic is simply the t-value of the coefficient δ in equation (6). The null hypothesis is that Y_t has a unit root, that is $H_0 : \delta = 0$ and is rejected if the calculated ADF statistic is above the critical value implying that $Y_t$has no unit root or Y_t is stationary (Bhattari, 2014).

ARDL Approach to Co-integration

ARDL models have been used to examining long-run and cointegrating relationships between variables (Pesaran and Shin, 1999).To empirically analyze the long run relationship and dynamic interaction among variables under study, the model has been estimated by using Autoregressive Distributed Lag (ARDL) approach to cointegration, developed by Pesharan and Shin (1999) and Pesaran, Shin and Smith (2001). Due to the low power and other problems associated with other methods of cointegration test, the ARDL approach to cointegration has become popular in recent years.

The ARDL co-integration approach has numerous advantages in comparison to other cointegration methods such as Engle and Granger(1987), Johansen (1988), and Johansen and Julius (1990) procedures.

If Y_t and X_t variables are cointegrated, that is, there is a long-run equilibrium relationship between them, there may be disequilibrium in the short run. Thus the error term $u_t = Y_t - \beta_0 - \beta_1 X_t$ in the regression equation $Y_t = \beta_0 + \beta_1 X_t + u_t$ is called the equilibrium error. This error term can be used to tie the short-run behavior of Y_t to its long-run value. The Error Correction Models (ECM) first used by Sargan and later popularized by Engle and Granger corrects for disequilibrium. The Granger Representation Theorem says that if two variables Y_t and X_t are cointegrated, then the relationship between the two can be expressed as Error Correction Modeling (Bhatta, 2012).

The error correction representation of ARDL equation (3) is:

$$\Delta LRGDP_t = \lambda_0 + \sum_{i=1}^{n} \lambda_{1i} \Delta LRGDP_{t-i} + \sum_{i=0}^{n} \lambda_{2i} \Delta LRREXP_{t-i} + \sum_{i=0}^{n} \lambda_{3i} \Delta LRCEXP_{t-i} + \lambda_4 ECM_{t-1} + \varepsilon_t \quad \text{.....................(5)}$$

Based on the long run coefficients, the estimation of dynamic error correction will be carried out as depicted in equation (4). Here, the coefficientsλ_{1i}, $\lambda_{2i,}$ and λ_{3i} provide the short run dynamics of the model; λ_4 is the speed of adjustment parameter which indicates the divergence/convergence towards the long run equilibrium. A positive coefficient indicates a divergence whereas negative coefficient shows convergence. The term ECM is derived as the error term from the corresponding long-run model from equations (3). ,

Null Hypothesis (H_0): $\delta_1 = \delta_2 = \delta_3 = 0$, that is, there exist no cointegration or long run relationship.

Alternative Hypothesis (H_1): $\delta_1 \neq \delta_2 \neq \delta_3 \neq 0$, that is, there exist cointegration or long run relationship.

Equation (3) of this study is unrestricted regression equation. To test the cointegration, null hypothesis is set as (Ho): δ1=δ2=δ3=0. With this our model becomes restricted so we need to drop the cointegrating variable from equation (3)

So, the restricted regression equation is obtained as,

$$\Delta LRGDP_t = \gamma_0 + \sum_{i=1}^{n} \gamma_{1i} LRGDP_{t-i} + \sum_{i=0}^{n} \gamma_{2i} LRREXP_{t-i} + \sum_{i=0}^{n} \gamma_{3i} LRCEXP_{t-i} + \varepsilon_t \quad \text{.................... (6)}$$

Pesaran, Shin and Smith (2001) provided the two sets of critical values in which lower critical bound assumes that all the variables in the ARDL model are I(0), and the upper critical bound assumes I(1). If the calculated F-statistics is greater than the appropriate upper bound critical values, the null hypothesis is rejected implying co-integration. If such statistics is below the lower bound, the null cannot be rejected, indicating the lack of co-integration. If, however, it lies within the lower and upper bounds, the results is inconclusive (Budha, 2013).

CUSUM Test

The CUSUM test (Brown, Durbin, and Evans, 1975) is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines.

The CUSUM test is based on the statistic:

$$W_t = \sum_{r=k+1}^{t} \omega_r / s \quad \text{………………………(7)}$$

for $t= k+1$,………., T, where ω is the recursive residual and s is the standard error of the regression of the recursive residuals w_t . If the β vector remains constant from period to period, $E(W_t) = 0$, but if β changes, W_t will tend to diverge from the zero mean value line. The significance of any departure from the zero line is assessed by reference to a pair of 5% significance lines, the distance between which increases with t. The 5% significance lines are found by connecting the points:

$$\left[k, \pm -0.948\ (T-k)^{1/2} \right] \quad and \quad \left[T, \pm 3 \times 0.984\ \ (T-k)^{\ 1/2} \right]$$

Movement of W_t outside the critical lines is suggestive of coefficient instability(Eviews User's Guide, 2015).

3.9.2 CUSUMSQ Test

The CUSUM of squares test (Brown, Durbin, and Evans, 1975) is based on the test statistic:

$$S_t = \left(\sum_{r=k+1}^{t} w_r^{\ 2} \right) / \left(\sum_{r=k+1}^{T} w_r^{\ 2} \right) \quad \text{…..……(8)}$$

The expected value of S_t under the hypothesis of parameter constancy is:

$$E(S_t) = (t-k)/(T-k) \quad \text{………….(9)}$$

Which goes from zero at $t = k$ to unity at $t = T$. The significance of the departure of S from its expected value is assessed by reference to a pair of parallel straight lines around the expected value.

The CUSUM of squares test provides a plot of S_t against t and the pair of 5% critical lines. As with the CUSUM test, movement outside the critical lines is suggestive of parameter of variance instability.

The cumulative sum of squares is generally within the 5% significance lines, suggesting that the residual variance is somewhat stable (E-views User's Guide, 2015).

4. Data Presentation and Discussion

Unit Root Test

The recent literature on co-integration and stationary testing provides a more rigorous framework for avoiding spurious regression while retaining long run information about the equilibrium relationship in the variables at levels. The rationale behind co-integration is that economic results are legitimate only when time series are stationary. Time series data have therefore tested to determine the degree of differencing before they achieve stationary (Odhiambo, 2013).

Now it is necessary to test the order of integration, which is a most to fulfill the purpose of this research work. In order to investigate the order of integration among the variables under study, has adopted the

Augmented Dickey-Fuller (Dickey and Fuller, 1981) test which checks if the variables are integrated of I(0) or I(1) or I(2).Table 2 presents the result of ADF unit root test.

The tools of unit root test i.e. ADF test is adopted for all the variables by making null hypothesis as 'there is presence of unit root' (i.e. presence of non-stationary) against the alternative hypothesis 'the series is stationary'. If the absolute computed value exceeds the absolute critical value, then we reject the null hypothesis and conclude that the data series is stationary and vice-versa.

Table 2: Augmented Dickey-Fuller (ADF) Test for Unit Root

Variables	Level		First Difference		Decision
	Intercept	Intercept and trend	Intercept	Intercept and trend	
LRGDP	-0.795	-1.06	-5.862*	-5.85*	I (1)
	0.809	0.925	0.000	0.000	
LRCEXP	-2.478	-2.604	-5.212*	-5.055*	I (1)
	0.128	0.28	0.0001	0.001	
LRREXP	-0.231	-3.292	-7.063*	-6.956*	I (1)
	0.926	0.081	0.000	0.000	

Note: * represents the rejection of null hypothesis at 1% level of significance.

Table1shows that the result of ADF statistics to test the null hypothesis that there is unit root (or non-stationary data) against the alternative hypothesis that there is no unit root. To detect the unit root, it is necessary to compare ADF statistics with that of test critical values of each variable. If the absolute value of ADF statistics is found greater than that of absolute critical values, then that variable is considered to have no unit root. Meaning that, the variable is stationary.

The variables LRGDP, LRREXP and RCEXP have unit root at their level but after first difference they achieved stationary (i, e., p-value < 5%). Thus the unit root test showed that no variables are integrated of order two I(2) as such, the ARDL model could be applied without any hesitation.

Co-integration Analysis

Testing the order of integration of each variable is the pre-requisite to apply the ARDL model. Only after completing this task one can proceed for testing the properties of ARDL to cointegration model. The first and foremost task is to conduct the bound testing approach with the null hypothesis that there is no long run relationship between the variables. This bound testing approach uses the standard version of F-test, which is also known as Wald test. This test helps us to identify whether all variables which are used in this study has long run relationship or not (Subedi, 2016). The computed result of bound test is presented in Table 3.

Table 3: Result of ARDL Bounds Test

ARDL Bounds Test		
Null Hypothesis: No Long Run Relationship Exist		
Test Statistic	Value	K
F-statistic	9.864205	2
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	4.19	5.06
5%	4.87	5.85
2.50%	5.79	6.59
1%	6.34	7.52

Note: The relevant critical value bounds are (with intercept and no trend, with 2 regressors). If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected.

The result of table 2 shows that the calculated F-statistics for the model is higher than upper bounds (critical value) even at 1% level of significance. So, the null hypothesis of no co-integration is rejected, implying that the long run relationship among the variables under study is existed. Further, equation (3) as presented in chapter three is estimated using Eviews – 9, selecting appropriate lag order. As the data are annual and there are only 39 observations, maximum order is set to 3 following Pesaran and Shin (1999). With this maximum lag order, the adjusted sample period for analysis becomes 1978 to 2016. According to Pesaran and Shin (1999), AIC and SBC Perform relatively well in small samples although SBC is slightly superior to AIC. However, Akaike Information Criterion has been used in this study in all cointegration equation.

Table 4: Short Run Error Correction Representation

Error Correction Representation for the Selected ARDL Model				
ARDL (3,2,3) selected based on Akaike Information Criterion				
Dependent Variable is LRGDP				
39 observations used for estimation				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LRGDP(-1))	-0.114102	0.156715	-0.72809	0.4728
D(LRGDP(-2))	-0.536439**	0.168926	-3.175583	0.0037
D(LRREXP)	-0.077666***	0.0382	-2.033128	0.052
D(LRREXP(-1))	0.078664***	0.039553	1.988799	0.0569
D(LRCEXP)	-0.010231	0.016045	-0.637649	0.5291
D(LRCEXP(-1))	0.011404	0.022633	0.503876	0.6184
D(LRCEXP(-2))	-0.041466**	0.016963	-2.44449	0.0213
D(@TREND())	0.008829	0.002388	3.697591	0.001
CointEq(-1)	-0.352054	0.093833	-3.751927	0.0008

Cointeq =LRGDP - (-0.2117*LRREXP + 0.1759*LRCEXP + 11.4125 + 0.0251*@TREND)

Note: ** denotes the significance of coefficient at 5% level of significance.

*** denotes the significance of coefficient at 10% level of significance.

Table 5: Diagnostic Tests

Diagnostic Tests				
Tests	F-Statistics	Obs* R-Squared	Prob F(1,26)	Prob. Chi- Square (1)
Serial correlation (LM Test)	0.017052	0.025561	0.8971	0.873
Heteroscedasticity (B-P-G)	F-Statistics	Obs* R- Squared	Prob F(11,27)	Prob. Chi- Square (11)
	0.661436	8.278614	0.7609	0.6881
Normality	J -B Statistics		Probability	
	2.945453		0.229299	

The error correction term is highly significant at 1% and negative which is appropriate sign for it. A coefficient of -0.352054 is the indication of the fact that approximately 35.204% of all disequilibria caused by the preceding year's shock converges back to the long- run equilibrium in the one period.

The short-run coefficients reveal that there is no strong significant relationship between the real GDP and the explanatory variables under the study. The coefficient of second lag value of LRGDP is statistically significant at 5% level of significance but have negative sign. In addition, the LRREXP and second lag of LRCEXP is also statistically significant but have negative sign. However, the coefficient of first lag value of LRREXP is positive with weak significance.

The result of ARDL (3, 2, 3) estimation on the basis of Akike Information Criterion has

R^2 = 0.99 and $\overline{R}^2$ = 0.99 is very high and almost 60% of the variables seem to be significant. The diagnostic test, it is clear that the model passes all of the tests i, e., the null hypothesis of no serial correlation, no heteroscedasticity and normality of the residuals are easily accepted at 5% level of significance

The estimated long run model of the corresponding ARDL (3,2,3) model can be written as follows:

The long-run coefficient are presented below in table 5which reveals that the coefficient of real capital expenditure (LRCEXP) is positive and statistically significant which depicts positive impact of real capital expenditure on real gross domestic product (RGDP). The coefficient of LRCEXP is 0.175902, and it explains that 1% increase in government capital expenditure leads to RGDP growth by 0.175% in the long run which is similar to Keynesian and Wagner's hypothesis of public expenditure. Further, this finding is similar to Kunu and Basar (2015) and Idris and Bakar (2017). However, the coefficient of LRREXP is almost insignificant implying no long run relationship between real GDP growth and recurrent expenditure in Nepal. It may be because of the sustained increase in general price level of consumer goods in the economy. In other words, even though the government increases recurrent expenditure (salary and wages and other daily expenses) in nominal term, it would not guarantee the rise in productive capacity of an economy if inflation is not controlled. In this aspect, recurrent expenditure may not contribute to the growth of an economy.

Table 6: Estimated Long Run Coefficients

Estimated Long Run Coefficient using ARDL Approach				
ARDL (3,2,3) selected based on Akike Information Criterion				
Dependent Variable is LRGDP				
39 observations used for estimation				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LRREXP	-0.211681	0.124897	-1.694845	0.1016
LRCEXP	0.175902	0.04917	3.577419	0.0013
C	11.412479	1.364742	8.362371	0.0000
@TREND	0.02508	0.00449	0.585261	0.0000

Note- *denotes the significance of the coefficient at 1% level of significance.

The short run dynamics of the model has been examined by an error correction model as presented in equation (5). The long run coefficients are used to generate the error correction term, which is obtained as

$$Coint\ eq = LRGDP - (-0.2117 * LRREXP + 0.1759 * LRCEXP + 11.4125 + 0.0251 @TREND)$$

Stability Tests

Finally, the stability of the long run coefficients together with the short run dynamics is examined. In doing so, Pesaran and Pesaran (1997) have been followed and the CUSUM and CUMSUMSQ tests proposed by Brown, Durbin, and Evans (1975) have been applied. These tests are applied to the residuals of the model following Pesaran and Pesaran (1997). Specifically, the CUSUM test makes use of the cumulative sum of recursive residuals based on the first set of *n* observations and is updated recursively and plotted against break points. If the plot of CUSUM statistics stays within the critical bounds of 5% level of significance level represented by a pair of straight lines drawn at the 5% level of the significance whose equations are given in Brown, Durbin, and Evans (1975), the null hypothesis that all coefficients in the error correction model are stable cannot be rejected. If either of the lines crosses, the null hypothesis of coefficient constancy can be rejected at the 5% level of significance. A similar procedure is used to carry out the CUSUMSQ test, which is based on the squared recursive residuals (Bhatta, 2012).

Figure 1: CUSUM Plots for Stability Tests

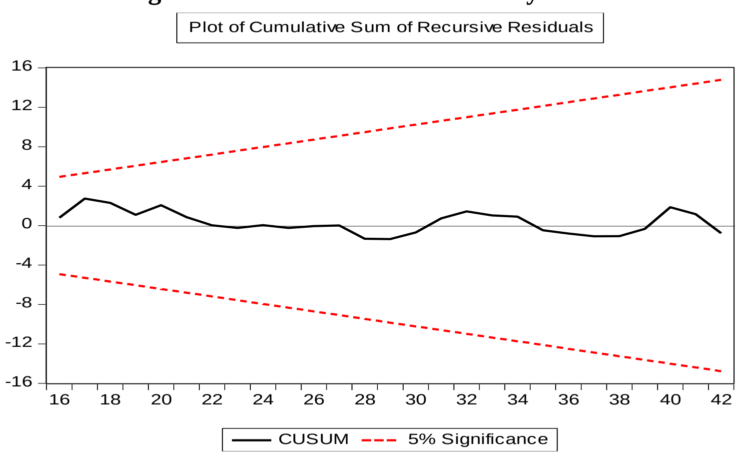

Figure 2: CUSUMSQ Plot for Stability Test

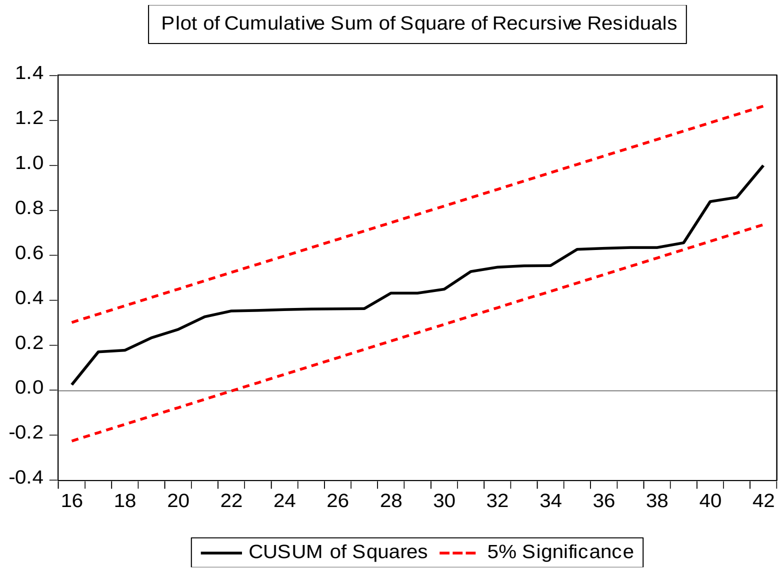

Figure 1 and Figure 2 shows that the graphical representation of the CUSUM and CUSUMSQ plots respectively applied to the model selected by the AIC criterion. Since both of the plots lie between the critical regions at 5% level of significance, the model is stable indicating no evidence of any significant structural instability.

5. Conclusion

The study observes that initially the portion of real capital expenditure is higher than real recurrent expenditure. It seems to be favorable for a developing economy. The growth rate of real recurrent expenditure is more than that of the growth of real capital expenditure, indicating that the government is spending rapidly on consumption sector, which reflects the poor performance of Nepalese economy. Using ARDL model, it is found that the public expenditure directly causes economic growth.

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APPENDIX 1

Data Processing for Study (Rs. in million)

Year	GDP	CPI	Deflator	REXP	CEXP	INF	RGDP	RREXP	RCEXP	LRGDP	LRREXP	LRCEXP	GRGDP	GRREXP	GRCEXP	RPE	GRPE
1975	16571	4.2	12.64	532	967.3		131061.8	4208.9	7652.7	11.12	9.62	9.88				11861.6	
1976	17394	4.1	12.78	658.4	1238.9	-2.4	136094.2	5151.8	9694.1	11.13	9.71	9.99	3.84	22.40	26.68	14845.9	25.159461
1977	17280	4.3	12.49	792.9	1498.3	4.9	138389.3	6348.3	11996.0	11.14	9.80	10.08	1.69	23.22	23.75	18344.3	23.564982
1978	19732	4.7	13.81	822.6	1808	9.3	142886.1	5956.6	13092.0	11.15	9.77	10.12	3.25	-6.17	9.14	19048.5	3.8390186
1979	22215	4.9	15.3	985.1	1978.8	4.3	145240.4	6438.6	12933.3	11.16	9.81	10.11	1.65	8.09	-1.21	19371.9	1.6976643
1980	23351	5.4	16.02	1067.2	2308.6	10.2	145733.9	6661.7	14410.7	11.16	9.82	10.16	0.34	3.47	11.42	21072.4	8.7782534
1981	27307	6.1	17.2	1274.9	2731.1	13.0	158747.4	7412.2	15878.5	11.20	9.87	10.20	8.93	11.27	10.19	23290.7	10.526979
1982	30988	6.7	18.62	1530.6	3726.9	9.8	166440.7	8220.2	20015.6	11.22	9.91	10.30	4.85	10.90	26.05	28235.8	21.231954
1983	33761	7.7	20.07	1903.5	4982.1	14.9	168204.0	9484.3	24823.6	11.23	9.98	10.39	1.06	15.38	24.02	34307.9	21.505185
1984	39390	8.2	21.53	2107	5163.8	6.5	182991.8	9786.3	23984.2	11.26	9.99	10.38	8.79	3.18	-3.38	33770.6	-1.5663133
1985	44441	8.5	22.73	2731.4	5488.7	3.7	195528.7	12016.7	24147.4	11.29	10.08	10.38	6.85	22.79	0.68	36164.1	7.0876767
1986	53215	9.8	25.98	3241.2	6213.1	15.3	204837.7	12475.8	23914.9	11.31	10.10	10.38	4.76	3.82	-0.96	36390.7	0.6265463
1987	61140	11.2	29.23	3784.6	7378	14.3	209152.0	12947.7	25241.2	11.32	10.11	10.40	2.11	3.78	5.55	38188.8	4.9412698
1988	73170	12.4	32.7	4279.5	9428	10.7	223903.0	13087.2	28831.8	11.35	10.12	10.46	7.05	1.08	14.23	41919.0	9.7675459
1989	85831	13.4	36.4	5142.1	13238.8	8.1	235979.0	14126.6	36370.3	11.37	10.15	10.56	5.39	7.94	26.15	50497.0	20.463336
1990	99702	14.7	40.3	5869.6	12997.5	9.7	247491.0	14564.8	32251.9	11.39	10.16	10.51	4.88	3.10	-11.32	46816.6	-7.2882633
1991	116127	16.1	44	6831.3	15979.5	9.5	263955.0	15525.7	36317.0	11.42	10.19	10.56	6.65	6.60	12.60	51842.7	10.73572
1992	144933	19.5	52.3	8698.4	16512.8	21.1	276875.0	16631.7	31573.2	11.44	10.22	10.50	4.89	7.12	-13.06	48205.0	-7.016907
1993	165350	21.2	57.7	9886.2	19413.6	8.7	286449.0	17133.8	33645.8	11.46	10.23	10.53	3.46	3.02	6.56	50779.5	5.3408974
1994	191596	23.1	62	10511	21188.2	9.0	309115.0	16953.2	34174.5	11.49	10.23	10.53	7.91	-1.05	1.57	51127.7	0.6856944
1995	209976	24.9	65.9	16612	19794.9	7.8	318407.0	25207.7	30037.8	11.50	10.40	10.48	3.01	48.69	-12.10	55245.5	8.0539086
1996	239388	26.9	71.1	18714	24980.5	8.0	336681.0	26321.2	35134.3	11.53	10.42	10.55	5.74	4.42	16.97	61455.6	11.240788
1997	269570	29.1	76.2	20728	26542.6	8.2	353586.0	27202.0	34832.8	11.55	10.43	10.54	5.02	3.35	-0.86	62034.8	0.9425045
1998	289789	31.5	79.3	23243	28943.9	8.2	365592.0	29310.5	36499.2	11.56	10.47	10.56	3.40	7.75	4.78	65809.7	6.0851884
1999	330018	35.1	86.3	31944	22992.1	11.4	382348.0	37015.3	26642.1	11.58	10.57	10.43	4.58	26.29	-27.01	63657.4	-3.2705689
2000	366251	36.3	90.3	35579	25480.7	3.4	405746.0	39401.0	28217.8	11.61	10.60	10.45	6.12	6.45	5.91	67618.8	6.223111
2001	413428	37.2	100	45837	28307.2	2.5	413428.0	45837.3	28307.2	11.62	10.66	10.45	1.89	16.34	0.32	74144.5	9.6506761
2002	430396	38.3	103.9	48864	24773.4	3.0	414092.0	47029.7	23843.5	11.62	10.67	10.38	0.16	2.60	-15.77	70873.2	-4.4120016
2003	460325	40.1	107.1	52091	22356.1	4.7	429699.0	48637.3	20874.0	11.63	10.69	10.32	3.77	3.42	-12.45	69511.3	-1.9216641
2004	500699	41.7	111.4	55552	23095.6	4.0	448654.0	49867.2	20732.1	11.65	10.70	10.32	4.41	2.53	-0.68	70599.4	1.5653193
2005	548485	43.6	118	61686	27340.8	4.6	463165.0	52276.6	23170.2	11.67	10.72	10.36	3.23	4.83	11.76	75446.8	6.8660781
2006	611118	47.1	126.2	67018	29606.6	8.0	480435.0	53104.4	23460.1	11.69	10.73	10.37	3.73	1.58	1.25	76564.5	1.4814696
2007	675859	49.8	135.4	77122	39729.9	5.7	493651.0	56958.9	29342.6	11.70	10.76	10.47	2.75	7.26	25.07	86301.6	12.717447
2008	755257	53.2	142.9	91447	53516.1	6.8	522260.0	63993.6	37450.0	11.72	10.81	10.57	5.80	12.35	27.63	101443.7	17.54559
2009	909528	59.9	165.8	127739	73088.9	12.6	542652.0	77044.0	44082.6	11.74	10.89	10.64	3.90	20.39	17.71	121126.5	19.40276
2010	1083415	65.6	189.6	186598	40509.8	9.5	565759.0	98416.5	21365.9	11.76	10.99	10.33	4.26	27.74	-51.53	119782.4	-1.1097106
2011	1248482	71.6	210.3	210168	47327.7	9.1	587534.0	99937.1	22504.9	11.77	11.00	10.35	3.85	1.55	5.33	122441.9	2.2203232
2012	1387482	71.9	224.1	243460	51390.7	0.4	614637.0	108639.0	22932.0	11.79	11.04	10.36	4.61	8.71	1.90	131571.0	7.45586
2013	1525221	77.8	237.7	247456	54598.4	8.2	637771.0	104104.1	22969.5	11.81	11.02	10.36	3.76	-4.17	0.16	127073.6	-3.4182747
2014	1758738	85.5	259.1	303532	66694.7	9.9	674227.0	117148.5	25740.9	11.83	11.07	10.41	5.72	12.53	12.07	142889.4	12.44618
2015	1899089	93.3	272.4	339278	88754.7	9.1	694269.0	124551.4	32582.5	11.84	11.10	10.51	2.97	6.32	26.58	157133.9	9.9688983
2016	1987824	100	285.9	434066	159089	7.2	694344.0	151824.4	55645.1	11.84	11.18	10.75	0.01	21.90	70.78	207469.4	32.03354

Source: A Handbook of Government Finance Statistics (2017)