THE ECONOMIC JOURNAL OF NEPAL, Vol. 46, No. 3 & 4, July-December, 2023 (Issue No. 160) © CEDECON-TU
DOI: https://doi.org/10.3126/ejon.v46i3-4.73399

Budget Deficit and Economic Growth in Nepal: ARDL Bound Test Analysis

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Abstract

Using budget deficit to grow real gross domestic product (RGDP) is an issue of perpetual economic debate with different theoretical traditions reaching divergent conclusions. Nepal has always had a budget deficit in its modern history, and the role of this deficit in the economy has not been adequately studied. This paper studies how the budget deficit affected economic growth in both short and long periods using the ARDL approach to the bound test. The paper shows that budget deficit positively impacts RGDP in the short-run, i.e., crowding-in effect as described by Keynesian tradition, but has no effect in the long-term supporting the Ricardian equivalence hypothesis. Further, the results show that exports are largely detached from the long-run RGDP despite having a role in short-run economic performance. Private gross capital formation is also important in short and long horizons.

Keywords: E*conomic growth, Budget deficit, Current expenditure, Private capital formation, ARDL approach*
JEL Codes: *O42; H60; H50; E22; C22*

Introduction

Before the Keynesian revolution in the aftermath of the Great Depression of the 1930s, the Smithian invisible hand was in all vogue. The government was at its best by not intervening in the economy. The government, then, had operated substantially in the interest of the Crown and aristocracy (Mitchell et al., 2019). Since the Keynesian revolution, which marked the beginning of deficit budgeting, it has been a divisive issue and has hogged the attention of economists

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throughout the ages. There are alternative views on the relationship between budget deficit and economic growth. The paper can find theoretical explanations for proponents and opponents of budget deficit-led economic growth.

A country runs a budget deficit by cutting taxes, raising expenditures, or both at a given period. It can increase aggregate demand via deficit expenditure, encouraging firms to use more of their existing capacity. In the long term, the economy may be in equilibrium with a higher level of national saving, investment, and economic growth, i.e., crowding-in effect (Bernheim, 1989). It can stimulate the economy in both the short run and long run. Alternatively, the deficit budget can cause a decline in private investment via the crowding-out effect and trade deficit through the interest rate channel, potentially leading to a twin deficit.

The capital inflow induced by increased interest rates following public borrowing may be insufficient to offset private investment, leading to perverse effects on living standards in the economy (Ball & Mankiw, 1995). Deficit financing creates inflationary pressure on the economy (Hudson, 2011). If the time lag between the injections of created money; the completion of development projects is long; and the extra demand for goods is not matched by additional output, inflationary pressure will develop in the economy.

If private saving rises by the same amount as a fall in public saving, there is no net change in national saving and no further adjustment, i.e., Ricardian equivalence. An increase in private savings that is less than the public deficit with infinitely elastic capital inflow will keep both domestic investment and constant output (Gale & Orszag, 2003). However, as the interest rate does not change thanks to perfectly elastic capital inflow, the nation is required to borrow from abroad, which must be paid back in the future. The currency appreciation by capital inflow will lead to a trade deficit and a decrease in future national income. If there is no capital inflow, the deficit will decrease private investment and thereby decrease GDP, but it will not affect the exchange rate. There are three opposing views on budget deficit and economic growth. Theoretically, it can reach an impasse. It must rely on empirical methods to see that how budget deficit impacts economic growth.

Nepal has been running a fiscal deficit in all years of the past half-century (MoF, 2000), and both government expenditure and public debt as a share of GDP have been steadily ticking upward in recent years (MoF, 2018). The impact of COVID-19 on the economy and lackluster growth afterward have made Nepal's ambition of graduating to developing country status by 2026 (UN, 2021), which is more challenging. The consequences of a bad foreign reserve position, as demonstrated by the 2022 Sri Lankan crisis, have decreased the appetite among Nepalese political mandarins to leverage foreign debt to finance infrastructure development.

Nepal also experienced a foreign exchange reserve scare in 2022 and curtailed imports of cars, alcohol, and other goods deemed luxurious (MoCIT, 2022). This

means the future of deficit financing in Nepal will likely involve more domestic borrowing than foreign borrowing, leading to competition between private borrowers and the state. In this context, the budget deficit must be examined if it has contributed positively to economic growth since literature suggests the possibility of positive, negative, and neutral effects of budget deficit on economic growth. There is very little published literature on the impacts of deficit budgeting on the economic growth of Nepal. This study hopes to fulfill that research gap by using an ARDL approach to bound co-integration test model to study the role of budget deficit on short-run and long-run growth of the Nepalese economy.

The study is organized in various sections like a detailed theoretical and empirical review of literature in section 2, data and methodology in section 3, results followed by a discussion and conclusion in sections 4, 5, and 6 respectively.

Review of Literature

Theoretical Review

There are three schools of thought on the impact of budget deficits on the economy (Bernheim, 1989). The Keynesian school (Keynes, 1937) advocates using budget deficit counter-cyclically to smoothen the business cycle since government expenditure is an essential component of aggregate demand (Brown-Collier & Collier, 1995). The budget deficit has an expansionary effect on the economy as it increases the production capacity of the economy, which makes private investors optimistic about the future, and they invest more, thus leading to crowding in effect in the economy (Castles & Dowrick, 1990; Saleh & Harvie, 2005). According to Eisner (1989) increased aggregate demand changes the profitability of private investment and leads to a higher level of investment at any given interest rate. Thus, a deficit stimulates aggregate saving and investment even though it raises interest rates. In Eisner's view, increased consumption is supplied from otherwise unutilized resources. Many traditional Keynesians argue that deficits need not crowd out private investment. Government investment does not upset private investment; instead, it encourages private investment, thereby stabilizing the economy (Kregel, 1985).

In the neo-classical paradigm, the budget deficit increases current consumption as individuals shift taxes to the future generation. Increased consumption leads to a decline in saving and an increase in interest rates, which results in a decline in the private sector investment, thereby inverse impact of the deficit on economic growth (Bernheim, 1989; Fischer & Easterly, 1990; Marshall, 2009). From the Ricardian equivalence perspective, if the economic agents are rational, they will understand that the increased deficit entails future taxes whose present value equals the value of the deficit. Thus, these agents will act as if the deficits do not exist, which means consumers and investors will ignore the stimulus (Seater, 1993). Increasing government expenditure does not have any effects on the

economy (Barro, 1979). The reduction in government savings is offset by an increase in private savings that leads to unchanged national savings. In this view, the government bonds are not net wealth and thereby remaining unchanged the aggregate demand and constant national income so that the government debt is completely unimportant (Ricciuti, 2003).

Empirical Review

Empirical works have reported various types of relations between budget deficit and economic growth, such as positive relation (Keynesian), negative relation (Neo-classical), and neutral (Ricardian equivalence). Aslam (2016) and Larbi (2012) use the Johansen co-integration procedure to show a positive relation between budget deficit and economic growth in the case of Sri Lanka and Ghana, respectively. Further, Eminer (2015), Oluwole et al. (2020), Sabr et al. (2021), and Yusuff and Abolaji (2020) report a positive relation between them using the ARDL approach. Studies utilizing panel datasets like Cinar et al. (2014) and Molocwa et al. (2018) also have described a positive association between budget deficit and economic growth. However, several empirical literatures show the inverse relationship between budget deficit and economic growth especially in Adeoye (2006), Akoto (2020), Awe and Funlayo (2014), Emana (2021), Haider et al. (2016), Hussain and Haque (2017), Rana and Wahid (2017), and Tung (2018) by employing wide array of approaches like Johnson co-integration, ARDL, and OLS. Besides, Ahmad (2013), Dao and Bui (2016), Ghali (1997), and Nelson and Singh (1994) identified that budget deficits do not impact economic growth.

Data and Methodology

Theoretical Framework

The theoretical root of the impact of budget deficit on economic growth resembles the Classical, Ricardian, and Keynesian perspectives. The study used the Keynesian school of economic thought to build a model that shows the relationship between them. They argue that the budget deficit is a key weapon of short-term economic growth and stability by boosting aggregate demand (Armstrong, 2019). The purpose of the deficit budget is to smooth the consumption and investment expenditures that generate more persistent economic development over the business cycle (Kirchgssner, 2014). Despite the theoretical debate, the study proposes testing the Keynesian hypothesis of the impact of budget deficit on economic growth following the Keynesian income and output determination model (Sapiro, 1982; Hudson, 2011) i.e. $\mathbf{Y = C + I + G + NX.}$ **Or** $\mathbf{Y = AD.}$ In this analysis, income (Y) is gross domestic product, which is the sum of aggregate spending on private sector investment (I), government expenditure (G), and total exports (X).

Variables Selection and Data Source

The model uses the expenditure approach to explain the real GDP growth. The independent variable is the real GDP in the producer's price, deflated using the GDP deflator. Explanatory variables are budget deficit, private capital formation, recurrent expenditure, exports, and working-age population. The working-age population is the proxy for the consumption expenditure, whereas budget deficit and recurrent expenditures form the government term. The private investment is the proxy investment term in canonical C + I + G + (X - M) formulation of GDP. The government budget deficit is highly correlated with the government fixed investment. So, the study opted to remove it from the regression equation. The following table summarizes all the relevant variable series and their sources. The data series of the variables are from the fiscal year of 1974/75 A.D. to 2019/20 A.D., converting into a natural log (Appendix - I)

Table 1: List of Variables Used under Study

Code	Variables	Sources	Units
RGDP	Real gross domestic product	Nepal Rastra Bank	NRs. Million
GBD	Government budget deficit	Ministry of Finance	NRs. Million
GPCF	Gross private capital formation	Nepal Rastra Bank	NRs. Million
GRE	Government recurrent expenditure	Nepal Rastra Bank	NRs. Million
EXP	Exports	Nepal Rastra Bank	NRs. Million
WAP	Working-age population	U.N. D. P.	Thousands

Source: Authors' illustration, 2022.

Model Specification

Different econometric models are used to establish the relationship between time series variables. However, in time series analysis, the selection of appropriate models depends on the nature of the data. OLS and VAR models are applicable only for stationary time series, i.e., series must be integrated order zero (Brooks, 2014). If the series is made stationary, either by first or second-order differencing, the study loses long-term information contained in the series, and further issues of under-differencing and over-differencing problem may arise (Maddala & Kim, 1998). Further treating non-stationary time series as stationary is spurious and gives a non-sensical result (Granger & Newbold, 1974). The solution to this problem, as most time series are non-stationary, is Engle and Granger's two-step co-integration tests, the limitation being that all variables must be first-order integrations (Das, 2019).

Johansen and Juselius (1990) further developed a co-integration model, which is based on maximum likelihood methods but is inappropriate when applied to a smaller sample size (Maddala & Kim, 1998). Even 100 observations are not sufficient to detect the true co-integration rank if a stationary root is close to unity (Toda, 1994). By relaxing some limitations in the co-integration model,

Pesaran et al. (2001) introduced the Autoregressive Distribution Lag (ARDL) approach to co-integration. This approach to co-integration or bound procedure for a long-run relationship is applicable irrespective of whether the underlying variables are integrated with an order of zero I (0), one I (1), or a combination of both. But it is not applicable when the variable is integrated with order two i.e., I (2) (Nkoro & Uko, 2016). Additionally, ARDL is reliable for a small sample size (Narayan, 2004). The simple ARDL (1,1,1) model discussed in (Hendry et al., 1984) is -

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \beta_1 x_t + \beta_2 x_{t-1} + \varepsilon_t \cdot \ldots\ldots\ldots\ldots\ldots (1)$$

Where, $\varepsilon_t \sim iid(0, \sigma^2)$, y_t, is dependent variable, and x_t is explanatory variable. Further α and β are coefficients of respective variables. ARDL model for lag order (p, q), i.e., ARDL$(p, q_1 \ldots q_k)$ is given as -

$$y_t = \alpha_0 + \sum_{i=1}^{p} \theta_i y_{t-i} + \sum_{j=1}^{k} \sum_{i=0}^{q_j} \beta_j x_{jt-i} + \varepsilon_t \ldots\ldots\ldots\ldots (2)$$

Where, p is lag length for dependent variable and q is lag length for independent variables such that $p \geq 1$. The coefficients of respective variables are θ_i and β_i. In Pesaran et al. (2001), ARDL (p, q) approach to co-integration is given as

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \sum_{i=0}^{q} \beta_i \Delta x_{t-i} + \gamma_1 y_{t-1} + \gamma_2 x_{t-1} + \varepsilon_t, \ldots (3)$$

Where, Υ_1 and Υ_2 are coefficients of respective variable depicting long run relationship. The long-run relationship is that the variables converge to some long-term values and are no longer changing dramatically (Brooks, 2014). Hence, in the long-run equilibrium, the system is stable implying that the states of the system remain constant over a period of time and there is no tendency for change i.e. $y_t = y_{t-1}; x_t = x_{t-1} = x_t$.

Step for ARDL Co-integration Approach

Choosing the Appropriate Lag Length for the ARDL Model

Optimum lag length selection for each of the underlying variables in the ARDL model through model order selection criteria like Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) allows for Gaussian error terms, i.e., standard normal error terms that do not suffer from non-normality, autocorrelation, and heteroskedasticity.

$$AIC = -ln(\sigma_p^2) + \frac{2k}{n} \ldots\ldots\ldots\ldots (4)$$

$$SBC = \ln(\sigma_p^2) + \frac{[kln(n)]}{n} \ldots\ldots\ldots (5)$$

Where, σ_p^2 is maximum likelihood estimator $[(n-k-1)^{-1} \sum_{i=k}^{n} \varepsilon_i^2]$. The lag model with the smallest AIC or SBC estimates is used to select a lag length for the ARDL model among competing models.

Existence of Long-run Relationship of the Underlying Variables

To establish a long-run relationship between underlying variables, one has to compute bound F-statistics (bound test for co-integration) of the joint null hypothesis that the coefficient of the lagged variable $(\gamma_1 y_{t-1}, \gamma_2 x_{t-1_t})$ are zero, i.e., there is no long-run relationship between underlying variables. In equation 3, the following joint hypothesis is considered to identify the long-run relationship among underlying variables.

$H_0: \gamma_1 = \gamma_2 = 0$: Long run relationship does not exist (Eq^n: 3).

$H_1: \gamma_1 \neq 0 \cup \gamma_2 \neq 0$: Long run relationship does exist (Eq^n: 3).

This hypothesis testing is dissimilar to regular F-test as the ARDL framework has a non-standard distribution that depends on: (a) a mix of I(0) and I(1) independent variables, (b) a number of independent variables, and (c) the inclusion of intercept and trend term in the model. Narayan (2004); Pesaran et al. (2001) give the two set of critical values:

Lower critical bound: All variables are I (0), which shows no co-integration among the underlying variables.

Upper critical bound: All variables are I (1), which shows co-integration among underlying variables.

If the F-statistic falls between the lower and upper bounds, it indicates an inconclusive result requiring additional information.

ARDL Model into Error Correction Model

Under satisfactory F-bound test results, it is possible to write the long-run equilibrium relationship as a linear combination of the non-stationary variables in a simple OLS framework as:

$$y_t = \alpha_0 + \beta_1 x_t + \varepsilon_t \quad \ldots\ldots\ldots (6)$$

An error correction term captures the convergence of the model towards equilibrium that is defined as:

$$ECT_{t-1} = y_{t-1} - \widehat{\alpha_0} - \widehat{\beta_1} x_{t-1}, \ldots\ldots\ldots\ldots (7)$$

Where, $\widehat{\alpha_0}$ and $\widehat{\beta_1}$ are estimated from equation (6). In a model that is moving towards equilibrium in the long run, the difference between independent and dependent variables (ECT_{t-1}) decreases. The short-run dynamics are estimated from equation (3) by replacing the lagged variables y_{t-1} and x_{t-1} with the error-correction term ECT_{t-1} as:

$$\Delta y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \theta_i \Delta y_{t-i} + \sum_{i=0}^{q} \beta_i \Delta x_{t-i} + \lambda\, ECT_{t-1} + \varepsilon_t \ldots..(8)$$

If λ is statistically significant and negative in equation (8), then the model converges to the equilibrium. The magnitude of λ provides the speed of adjustment. For instance, if λ = - 0.5, then Y will return to long run equilibrium after a shock in X at a speed of 50 percent per annum. Using this framework, the ARDL model of the study is as given.

$$\ln(RGDP)_t = \alpha_0 + \sum_{i=0}^{p} b_i \Delta \ln(GBD)_{t-i} + \sum_{i=0}^{q} c_i \Delta \ln(GPCF)_{t-i} + \sum_{i=0}^{r} d_i \Delta \ln(GRE)_{t-i} + \sum_{i=0}^{s} e_i \Delta \ln(EXP)_{t-i} + \sum_{i=0}^{t} f_i \Delta \ln(WAP)_{t-i} + \gamma_1 \ln(GBD)_{t-1} + \gamma_2 \ln(GPCF)_{t-1} + \gamma_3 \ln(GRE)_{t-1} + \gamma_4 \ln(EXP)_{t-i} + \gamma_5 \ln(WAP)_{t-i} + \varepsilon_t \quad (9)$$

The coefficient b_i, c_i, d_i, e_i and f_i are short-run coefficients, whereas, $\gamma_1, \gamma_2, \gamma_3, \gamma_4$, and γ_5 are long-run coefficients embodying long-run relationship. Similarly, the error correction specification is:

$$\Delta \ln(RGDP)_t = \alpha_0 + \sum_{i=0}^{p} b_i \Delta \ln(GBD)_{t-i} + \sum_{i=0}^{q} c_i \Delta \ln(GPCF)_{t-i} + \sum_{i=0}^{r} d_i \Delta \ln(GRE)_{t-i} + \sum_{i=0}^{s} e_i \Delta \ln(EXP)_{t-i} + \sum_{i=0}^{t} f_i \Delta \ln(WAP)_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad \ldots. (10)$$

Diagnostic Test

The validity and statistical robustness are checked by testing for stability, serial correlation, heteroscedasticity, miss speciation, and normality in the residuals.

Data Analysis and Results

Preliminary Results and Diagnostic Tests

No model variables at the level when only using intercept are stationary, i.e., mean and variance changes over time. In contrast, these variables are stationary when transformed to the first difference. In addition, if the trend is included to intercept, gross private capital formation and real GDP are stationary at level value (Table 2). Like intercept, all variables are first difference stationary when adding trend with intercept. The non-stationarity of level variables precludes the use of OLS. Additionally, the combination of level stationary and non-stationary variables when taking trend and intercept demonstrates the necessity of using ARDL over Johansen and Juselius (1990).

Table 2: Unit Root Test Using Augmented Dickey-Fuller Test

Intercepts				
Variables	**Level**		**First Difference**	
	T-Stat	**P-value**	**T-stat**	**P-value**
ln RGDP	- 0.251	0.973	- 4.424***	0.001
ln GBD	- 1.594	0.476	- 6.543***	0.000
ln GPCF	- 0.096	0.962	- 7.604***	0.000
ln GRE	- 0.230	0.926	- 6.798***	0.000
ln EXP	- 1.513	0.518	- 5.591***	0.000
ln WAP	- 1.141	0.690	- 2.669*	0.087
Trend and Intercepts				
ln RGDP	- 3.480**	0.053	- 4.311***	0.007
ln GBD	- 2.889	0.175	- 6.483***	0.000
ln GPCF	- 3.563**	0.044	- 7.591***	0.000
ln GRE	- 3.176	0.102	- 6.717***	0.000
ln EXP	- 0.659	0.970	- 5.667***	0.000
ln WAP	- 2.141	0.507	- 4.400*	0.065

Source: Authors' calculation, 2022.

Note: ***, **, and * denote significance at 99%, 95% and 90% confidence intervals.

Lag selection via AIC favors two degrees of lag, whereas SBC favors one degree of lag for model variables (Table 3). Asghar and Abid (2007) prefer SBC to select lag for larger datasets but are inconclusive when datasets have regime shifts or shocks. The study follows Liu (2009) and uses SBC-selected lags for subsequent analysis.

Table 3: Lag Selection Criterion Using VAR

Lag	AIC	SBC
o	- 6.3049	- 6.11138
1	- 15.1527	- 14.1850*
2	- 15.6552*	- 13.9132

Source: Authors' calculation, 2022.

Note: *Indicate lag order selected by the criterion

AIC: Akaike Information Criterion; SBC: Schwarz Bayesian Criterion

The f-statistic of the bound test is 8.505, which is greater than the value of the upper bound at all critical cutoffs, indicating rejection of the null hypothesis that there is no co-integration (Table 4). This result reflects that a long-run relationship exists among the underlying variables.

Table 4: Bound Test under ARDL

F-statistic	Presence of Co-integration*	
8.505	Yes	
Critical Value	**Lower Bound I (0)**	**Upper Bound I (1)**
1%	3.674	5.019
5%	2.694	3.829
10%	2.276	2.297
Dependent variable: RGDP; Independent variables: GBD, GPCF, GRE, EXP, WAP No. of Obs.: 46 years, Optimum Lag length (1,1,0,1,1,0) using SBC		

Source: Authors' calculation, 2022.

As all variables are first-order integrated with a long-run relationship between them, the study applied the ARDL model to study short and long-run relationships. The overall model (Table 5) does not suffer from serial autocorrelation, heteroscedasticity, non-normality of residuals, instability, and regression specification error (Table 6). There is a high degree of model fit, i.e., R^2 = 0.999, which is typical in a time-series study.

Table 5: ARDL Model Using SBC Selected Lags

Variables	Coefficients	Std. Error	t-statistic	P-value
$RGDP_{t-1}$	0.3180**	0.135	2.339	0.025
GBD	0.0184*	0.009	1.900	0.065
GBD_{t-1}	-0.017*	0.0093	- 1.828	0.076
GRE	0.0742**	0.032	2.313	0.026
GRE_{t-1}	0.0435	0.032	1.352	0.184
EXP	0.1848***	0.0155	4.119	0.000
EXP_{t-1}	- 0.0637***	0.0167	- 3.8167	0.000
GPCF	0.0619**	0.0245	2.5270	0.016
WAP	0.3129*	0.1629	1.9204	0.063
Constant	1.9424***	0.7029	2.7631	0.009
Dependent variable: RGDP; Observations: 46 years, R^2 = 0.999 and D-W statistic = 2.052;				

Source: Authors' calculation, 2022.
Note: ***, **, and * denote significance at 99%, 95% and 90% confidence intervals.

Table 6: Diagnostic Tests

Types of Tests	Test Statistic	p-value	Presence
Serial autocorrelation	Breush-Goldfrey LM test	χ^2 = 3.422 (0.180)	No
Heteroscedasticity	Breusch-Pagan test	χ^2 = 7.526 (0.582)	No
Normality of residual	Jarque-Bera test	JB = 0.281 (0.868)	Yes
Test for stability	CUSUM & CUSUMSQ	Figure 1	Yes
Regression specification error	Ramsey's RESET	F = 0.548 (0.586)	No

Source: Authors' calculation, 2022.

Long Run and Short Run Relationship

Gross private capital formation, government recurrent expenditure, and working-age population are significant in the long run at 99 percent, 99 percent, and 90 percent confidence intervals, respectively (Table 7). Government budget deficit and exports are not statistically significant predictors of real GDP. On average, 1 percent growth in the working-age population causes 0.46 percent growth in real GDP, whereas 1 percent growth in gross private capital formation induces 0.17 percent growth in real GDP.

Table 7: Long-Run Coefficients

Regressors	Coefficients	Std. Error	t-statistic	p-value
GBD	0.0021	0.0088	0.2379	0.8134
GPCF	0.1728***	0.0304	2.9901	0.0051
GRE	0.1728***	0.0271	6.3867	0.0000
EXP	0.0002	0.0127	0.0177	0.9859
WAP	0.4590*	0.2303	1.9927	0.0541
Dependent variable: RGDP, No. of Obs.: 46 years , R^2= 0.999 and D-W statistic = 2.052;				

Source: Authors' calculation, 2022.

Note: ***, **, and * denote significance at 99%, 95% and 90% confidence intervals.

In the short run, gross domestic product (GDP), government recurrent expenditure (GRE), and exports (EXP) are positively related to real GDP. Ceteris paribus, 1 percent export growth increases real GDP by 0.06 percent. The coefficient of error term ECM_{t-1} is between negative one and zero and significant at a 99 percent confidence interval, exhibiting the existence of a stable long-run relationship (Table 8). The short-run disequilibrium converges to long-run equilibrium at 68 percent per annum speed. The model coefficients of the presented model are stable as the stability parameter falls within the bounds (Figure 1).

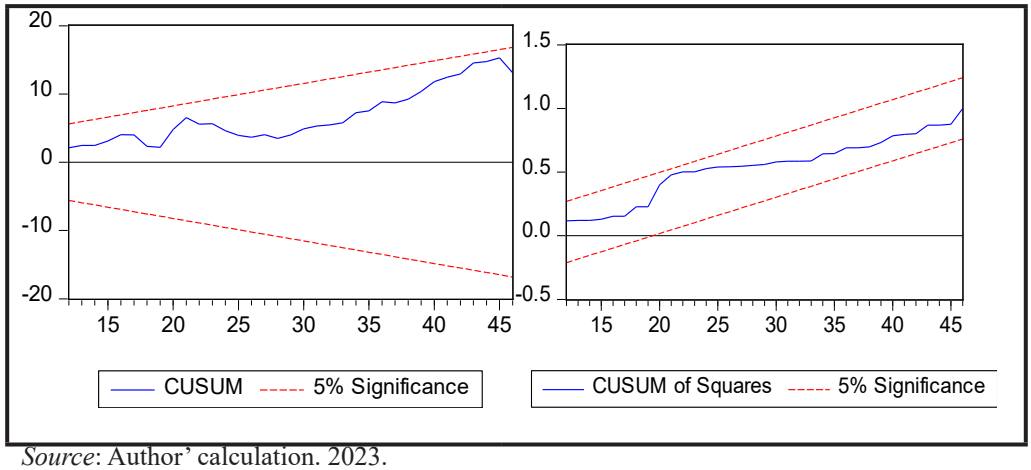
Table 8: Error Correction Model

Regressors	Coefficients	Std. Error	t-statistic	p-value
ΔGBD	0.0184**	0.0080	2.3111	0.027
ΔGRE	0.0743***	0.0185	4.0073	0.000
ΔEXP	0.0639***	0.0131	4.8775	0.000
ECM_{t-1}	- 0.6819***	0.0816	8.3510	0.000
Dependent variable: RGDP; Obs.: 46 years R^2 = 0.631; Adj. R^2 = 0.604; D-W statistic = 2.052				

Source: Authors' calculation, 2022.

Note: ***, **, and * denote significance at 99%, 95% and 90% confidence intervals.

Figure 1: Stability Test (CUSUM & CUSUMQ)



Source: Author' calculation. 2023.

Discussion

The results of the ARDL bound-test model indicate that government budget deficit (GBD) has a short-term positive effect on real GDP, supporting the Keynesian channel (Armstrong, 2019). Specifically, 1 percent increase in GBD leads to a 0.018 percent increase in real GDP. However, GBD does not seem to affect economic growth in the long run, supporting the Ricardian equivalence hypothesis. Dao and Bui (2016), Ghali (1997), and Nelson and Singh (1994) reported similar results as the findings of the study, where there is no significant long term relationship between GBD and economic growth. Other studies have also reported positive effects on the impact of GBD on economic growth in the short run, but they have mixed results in the long run, reporting either negative or positive effects (Emana, 2021; Oluwole et al., 2020). The study found that different countries show varying impacts of budget deficits on economic growth.

The results of the study also show that government recurrent expenditures (GRE) have a positive relationship with real GDP in both the short and long run, which is consistent with previous research of Dudzeviit et al. (2018). Additionally, the findings of the study also suggest that gross private capital formation is positively related to real GDP; this result is aligned with empirical studies by Kalu and Onyinye (2015) and Khan and Reinhart (1990), while the role of exports is relatively small in the long-run growth of real GDP. This is likely because the exports of Nepal primarily consist of agricultural products and handicrafts (NRB, 2022) which have limited technological spillover and backward and forward linkages.

The study suggests that GBD can stimulate short-term growth, but it is not a feasible long-term strategy. Instead, policymakers should focus on using GBD in areas with greater economic growth potential, technological improvement, and sectoral reorganization in the longer term. Additionally, diversifying exports to create more technological spillover to the local economy is essential for sustaining long-term growth.

Conclusion

In the context of Nepal, ARDL bound-test model results support the Keynesian channel in the short-run effect of government budget deficit on real GDP. On the other hand, the budget deficit does not seem to play a role in real GDP in the long term, which also supports the Ricardian equivalence hypothesis. Overreliance on budget deficits in current use can be counterproductive for Nepal in the long run. However, Nepal has fiscal space to increase GBD with 40.5 percent debt-to-GDP ratio. So, the government needs to channel the funds into technology building and sectoral growth to promote long-term growth. Exports play a positive role in the short run but not in the long run, reflecting a weak linkage of exports to the rest of the economy in the extended horizon. Similarly, gross private capital formation plays a positive and statistically significant role in real GDP.

References

Adeoye, T. (2006). *Fiscal Policy and Growth of the Nigerian Economy: An Empirical Perspective*. Nigerian Institute of Social and Economic Research.

Ahmad, N. (2013). The role of budget deficit in the economic growth of Pakistan. *Global Journal of Management and Business Research*, *13 (5)*.

Akoto, D. (2020). Deficit financing in Ghana and its impact on the economy. *Journal of Finance and Economics*, *8* (1), 6-12.

Armstrong, P. (2019). Keynes's view of deficits and functional finance: A modern monetary theory perspective. *International Review of Applied Economics*, *33* (2), 241-253.

Asghar, Z., & Abid, I. (2007). *Performance of lag length selection criteria in three different situations. (*MPRA Paper 40042). University of Library of Munich, Germany.

Aslam, A. L. (2016). Budget deficit and economic growth in Sri Lanka: An econometric dynamic analysis. *World Scientific News*, *46*, 176-188.

Awe, A. A., & Funlayo, A. K. (2014). The short and long-run implications of budget deficit on economic growth in Nigeria (1980-2011). *Canadian Social Science*, *10* (5), 201-205.

Ball, L., & Mankiw, N. G. (1995). What do budget deficits do? *Working Paper*: 5263. http://www.nber.org/papers/w5263.

Barro, R. J. (1979). On the determination of the public debt. *Journal of Political Economy*, *87* (5) Part-1, 940-971. https://doi.org/10.1086/260807.

Bernheim, B. D. (1989). A neo-classical perspective on budget deficits. *Journal of Economic Perspectives*, *3* (2), 55-72. https://www.aeaweb.org/articles?id=10.1257/jep.3.2.55.

Brooks, C. (2014). *Introductory Econometrics for Finance,* (3rd edition), Camebridge. United Kingdom: Cambridge University Press.

Brown-Collier, E. K., & Collier, B. E. (1995). What Keynes really said about deficit spending. *Journal of Post Keynesian Economics*, *17* (3), 341-355. https://doi.org/10.1080/01603477. 1995. 11490034.

Castles, F. G., & Dowrick, S. (1990). The impact of government spending levels on medium-term economic growth in the OECD, 1960-85. *Journal of Theoretical Politics*, *2* (2), 173 - 204.

Cinar, M., Erouglu, I., & Demirel, B. (2014). Examining the role of budget deficit policies in economic growth from a Keynesian perspective. *International Journal of Economics and Finance*, *6* (10), 191-200.

Dao, B., & Bui, T. (2016). Budget deficit and economic growth prediction in the case of Vietnam. *Available at SSRN 2816710*.

Das, P. (2019). *Econometrics of Theory and Practice: Analysis of Cross Section, Time Series, and Panel Data with Stata 15.1*. Singapore: Springer Nature Singapore Ptv. Ltd.

Dudzeviit, G., Imelyt, A., & Liuvaitien, A. (2018). Government expenditure and economic growth in the European Union countries. *International Journal of Social Economics*, *45*(2), 372-386.

Eisner, R. (1989). Budget deficits: Rhetoric and reality. *Journal of Economic Perspectives*, *3* (2), 73-93. https://www.aeaweb.org/articles?id=10.1257/jep.3.2.73.

Emana, D. (2021). Relationship between budget deficit and economic growth: Evidence from Ethiopia. *Applied Journal of Economics, Management and Social Sciences*, *2* (2), 10-15.

Eminer, F. (2015). The impact of budget deficit on economic growth in North Cyprus. *The 2015 WEI International Academic Conference Proceedings.* Vienna, Austria.

Fischer, S., & Easterly, W. (1990). The economics of the government budget constraint. *The World Bank Research Observer*, *5* (2), 127-142. https://doi.org/10.1093/wbro/5.2.127.

Gale, W. G., & Orszag, P. R. (2003). Economic effects of sustained budget deficits. *National Tax Journal*, *56* (3), 463-485. https://doi.org/10.17310/ntj.2003.3.02.

Ghali, K. H. (1997). Government spending and economic growth in Saudi Arabia. *Journal of Economic Development*, *22* (2), 165-172.

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, *2* (2), 111-120.

Haider, A. S., Shaon, S. F., & Kabir, M. R. (2016). Impact of budget deficit on growth: An empirical case study on Bangladesh. Retrived from ResearchGate.

Hendry, D. F., Pagan, A. R., & Sargan, J. D. (1984). Dynamic specification. *Handbook of Econometrics*, *Vol. 2*, 1023-1100.

Hudson, M. (2011). How economic theory came to ignore the role of debt. R*eal-world Economics Review*, *57* (6), 2-24.

Hussain, M. E., & Haque, M. (2017). Fiscal deficit and its impact on economic growth: Evidence from Bangladesh. *Economies*, *5* (4). https://www.mdpi.com/2227-7099/5/4/37.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration - with appucations to the demand for money. *Oxford Bulletin of Economics and Statistics*, *52* (2), 169-210.

Kalu, C. U., & Onyinye, M. O. (2015). Domestic private investment and economic growth in Nigeria: Issues and further consideration. *International Journal of Academic Research in Business and Social Sciences*, *5* (2), 302-313.

Keynes, J. M. (1937). The general theory of employment. *The Quarterly Journal of Economics*, *51* (2), 209-223.

Khan, M. S., & Reinhart, C. M. (1990). Private investment and economic growth in developing countries. *World Development*, *18* (1), 19-27.

Kirchgssner, G. (2014). On the political economy of public deficits and debt. *German Economic Review*, *15* (1), 116-130.

Kregel, J. A. (1985). Budget deficits, stabilisation policy, and liquidity preference: Keynes's post-war policy proposals. In F. Vicarelli (Ed.), *Keynes's Relevance Today* (pp. 28-50). Palgrave Macmillan UK. https://doi.org/10.1007/978-1-349-17834-63.

Larbi, D. A. (2012). The long term impact of budget deficits on economic growth in Ghana. *Journal of Business Research*, *6* (1-2), 62-74.

Liu, Y. (2009). Exploring the relationship between urbanization and energy consumption in China using ARDL (Autoregressive distributed lag) and FDM (Factor decomposition model). *Energy*, *34* (11), 1846-1854.

Maddala, G. S., & Kim, I.-M. (1998). *Unit Roots, Cointegration, and Structural Change*. Cambridge University Press, United Kingdom: Cambridge University Press.

Marshall, A. (2009). *Principles of Economics: Unabridged 8th edition*. Cosimo, Inc.

Mitchell, W., Wray, L. R., & Watts, M. (2019). *Macroeconomics*. Macmillan International Higher Education. Red Globe Press.

MoCIT (2022). *Nepal Gazette*, Ministry for Communications and Information Technology, Government of Nepal, Kathmandu.

MoF (2000). *Economic Survey - 2000/2001*, Ministry of Finance, Government of Nepal, Kathmandu.

MoF (2018). *Economic Survey - 2018/19*. Ministry of Finance, Government of Nepal, Kathmandu.

Molocwa, G. A., Khamfula, Y., & Cheteni, P. (2018). Budget deficits, investment and economic growth: A panel cointegration approach. *Investment Management and Financial Innovations*, *15* (3), 182-189.

Narayan, P. (2004). *Reformulating critical values for the bounds F-statistics approach to cointegration: An application to the tourism demand model for Fiji. (*Working Paper no. 02/04), Monash University, Australia.

Nelson, M. A., & Singh, R. D. (1994). The deficit-growth connection: Some recent evidence from developing countries. *Economic Development and Cultural Change*, *43* (1), 167-191.

Nkoro, E., & Uko, A. K. (2016). Autoregressive distributed lag (ARDL) cointegration technique: Application and interpretation. *Journal of Statistical and Econometric Methods*, *5* (4), 63-91.

NRB (2022). *Current Macroeconomic and Financial Situation*, Nepal Rastra Bank, Kathmandu, https://www.nrb.org.np/category/current-macroeconomic-situation/?

Oluwole, F., Solawon, M., & Odueke, H. (2020). An analysis of budget deficit and inflation on economic development in Nigeria. *IOSR Journal of Economics and Finance (IOSR-JEF)*, *11*, 16-23.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16* (3), 289-326. https://onlinelibrary.wiley.com/doi/abs/10.1002/jae.616

Rana, E. A., & Wahid, A. N. M. (2017). Fiscal deficit and economic growth in Bangladesh: A time-series analysis. *The American Economist*, *62* (1), 31-42.

Ricciuti, R. (2003). Assessing ricardian equivalence. *Journal of Economic Surveys*, *17* (1), 55-78.

Sabr, S., Ahmed, Y., & Khan, T. (2021). Government budget deficit and economic growth: Evidence from Iraq 1980-2018. *Arabian Magazine for Administration*, *41*(1), 389-404.

Saleh, A. S., & Harvie, C. (2005). The budget deficit and economic performance: A survey. *The Singapore Economic Review*, *50* (02), 211-243.

Sapiro, E. (1982). *Macroeconomics Analysis*. F. K. Publications, New Delhi: Galgotia Publication Pvt.Ltd.

Seater, J. J. (1993). Ricardian equivalence. *Journal of Economic Literature*, *31* (1), 142-190. http://www.jstor.org/stable/2728152.

Toda, H. Y. (1994). Finite sample properties of likelihood ratio tests for co-integrating ranks when linear trends are present. *The Review of Economics and Statistics*, *76* (1), 66-79. http://www.jstor.org/stable/2109827.

Tung, L. T. (2018). The effect of fiscal deficit on economic growth in an emerging economy: Evidence from Vietnam. *Journal of International Studies*, *11* (3).

United Nation (2021). *Report of the Economic and Social Council*. https://www.un.org/ldcportal/content/nepal-graduation-status

Yusuff, S. A., & Abolaji, A. (2020). The impact of budget deficit on economic growth in an emerging market: An application of the ARDL technique. *Asian Development Policy Review*, *8* (4), 351-361.

Appendix I: Log Value of the Variables under Study

Fiscal Years	Log(RGDP)	log(GBD)	Log(GPCF)	Log(GRE)	Log(EXP)	Log(WAP
1974/75	5.5435	2.3502	4.5592	2.7259	2.9492	3.8897
1975/76	5.5583	2.6451	4.5758	2.8184	3.0740	3.8993
1976/77	5.5626	2.7827	4.6018	2.8992	3.0662	3.9078
1977/78	5.5760	2.8162	4.6195	2.9152	3.0196	3.9166
1978/79	5.5852	2.7948	4.5659	2.9934	3.1129	3.9256
1979/80	5.5786	2.9074	4.5557	3.0282	3.0609	3.9348
1980/81	5.6201	2.9154	4.5776	3.1055	3.2065	3.9444
1981/82	5.6389	3.2284	4.6216	3.1849	3.1736	3.9529
1982/83	5.6406	3.4848	4.6727	3.2796	3.0538	3.9619
1983/84	5.6772	3.4989	4.6580	3.3237	3.2314	3.9713
1984/85	5.7000	3.5508	4.7919	3.4364	3.4378	3.9808
1985/86	5.7194	3.5998	4.7154	3.5107	3.4883	3.9904
1986/87	5.7267	3.6287	4.7726	3.5780	3.4759	3.9988
1987/88	5.7589	3.6756	4.7723	3.6314	3.6143	4.0074
1988/89	5.7773	3.9318	4.7555	3.7111	3.6228	4.0165
1989/90	5.7970	3.9246	4.7383	3.7686	3.7123	4.0262
1990/91	5.8238	4.0275	4.8924	3.8345	3.8685	4.0368
1991/92	5.8413	4.0516	4.9442	3.9394	4.1369	4.0487
1992/93	5.8577	4.0776	5.0302	3.9950	4.2372	4.0615
1993/94	5.8920	4.0653	5.0497	4.0216	4.2854	4.0747
1994/95	5.906795	4.0231	5.0884	4.2204	4.2465	4.0879
1995/96	5.9294	4.1406	5.1183	4.2722	4.2984	4.1007
1996/97	5.9516	4.1572	5.1207	4.3166	4.3548	4.1114
1997/98	5.9642	4.2499	5.1174	4.3663	4.4395	4.1216
1998/99	5.9833	4.2551	5.0660	4.5044	4.5524	4.1313
1999/00	6.0091	4.2473	5.1009	4.5512	4.6974	4.1408
2000/01	6.0328	4.3836	5.2119	4.6612	4.7455	4.1503
2001/02	6.0334	4.3606	5.2312	4.6889	4.6716	4.1594
2002/03	6.0502	4.2158	5.2789	4.7168	4.6984	4.1683
2003/04	6.0700	4.1994	5.3144	4.7447	4.7317	4.1771
2004/05	6.0849	4.2564	5.3159	4.7902	4.7687	4.1857
2005/06	6.0993	4.3941	5.3556	4.8262	4.7798	4.1941
2006/07	6.1138	4.4784	5.3614	4.8872	4.7737	4.2040
2007/08	6.1395	4.5238	5.3908	4.9612	4.7728	4.2133
2008/09	6.1588	4.6973	5.3860	5.1063	4.8306	4.2212
2009/10	6.1793	4.6149	5.4274	5.2709	4.7841	4.2293
2010/11	6.1929	4.6957	5.3771	5.3226	4.8085	4.2357
2011/12	6.2127	4.7308	5.4180	5.3864	4.8708	4.2394
2012/13	6.2278	4.4254	5.4929	5.3935	4.8860	4.2424
2013/14	6.2531	4.4677	5.5222	5.4822	4.9637	4.2456
2014/15	6.2701	4.9102	5.6146	5.5306	4.9310	4.249
2015/16	6.2719	4.8822	5.5284	5.5694	4.8458	4.2554
2016/17	6.3093	5.2849	5.5659	5.7148	4.8636	4.2662
2017/18	6.3412	5.5068	5.6938	5.8432	4.9104	4.2783
2018/19	6.3692	5.3943	5.7754	5.8552	4.9873	4.2913
2019/20	6.3600	5.3547	5.7380	5.8945	4.9899	4.3043

Source: Author's Calculation.