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Does Fiscal Deficit Cause Economic Growth? Evidence from Nepal

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Abstract

The fiscal deficit soared tremendously after Nepal endorsed economic liberalization aftermath of the 1990s democracy. The purpose of the paper is to investigate the effects of fiscal deficit in the economic growth of Nepal. Data from 1980 to 2019 were used to estimate the short- and long-run causal relations of fiscal deficit proxied by total government expenditure minus total government revenue as a percent of gross domestic product (GDP) and growth rate of real GDP as a proxy of economic growth along with other control variables. The autoregressive distributed lag (ARDL) error correction regression and vector error correction model (VECM) Granger causality have employed to meet the purpose of the study. The study reveals that there is short-run statistically significant negative relationship between Nepal's economic growth and the fiscal deficit of the previous year. However, both domestic and foreign loan and economic growth have positive and significant relations in short run. In contrast, the results reveal that there is positive but not significant relationship between the fiscal deficit and the economic growth of Nepal in long run. The Granger causality suggests that fiscal deficit does not Granger cause the economic growth of Nepal. However, economic growth does Granger causes the fiscal deficit in Nepal. Thus, the growth-driven fiscal deficit will be more effective in the economy of Nepal. Based on stylized facts, it will be necessary to redirect deficit financing into productive channels in order to enhance the sustainable economic growth.

Keywords: fiscal deficit, economic growth, ARDL, Granger causality

JEL Classification: C32, E62, H20, H50, H61, H62, O40

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Introduction

The supporters of the *laissez-faire* economy including French physiocrats, Smith, Mill, Marshall, Jevons, Walras, Bawerk, and Pigou were provided lots of space for government in the economy. Keynes (1936) advocated that 1930s depression can be addressed by deficit finance and he triggered the ground for government in the economy. After World War II, government roles in the economy are crucially prolonged. Moreover, the development needs of post-colonial countries had promoted to finance deficit to be an independent nation. However, Blinder and Solow (1973) stated that prior to Keynes, it was widely accepted that taxes and the government could only transfer resources from the private to the public sectors; they had no control over the overall levels of employment and spending in the economy.

The fiscal deficit occurs when the government spends more money than it takes in from taxes and other sources in any given year (Stiglitz & Rosengard, 2015). The net borrowings of public authorities on all accounts including for a budgetary deficit work by encouraging investment, while the other does so by encouraging propensity to consumption (Keynes, 1936). Musgrave and Musgrave (1989) state that deficit financing tends to increase the budget even though it may occasionally be necessary for stabilization purposes. It is associated with higher inflation, lower savings ratios, and lower growth rates when government deficits are financed through inflationary finance, financial repression, and excessive foreign borrowing (Fry, 1977). Hansen (1941) advocates that war deficit finance stimulates economic growth and the development of credit institutions.

On the contrary, the money demand rises as the deficit widens, which raises interest rates and discourages investment and thereby slower growth. However, government borrowing for deficit finance can put a burden on future generations by increasing the cost of repaying the debt and by discouraging investment, which will lower future output and wages (Stiglitz and Rosengard, 2015). Deficit spending is usually applied when trying to bridge a depression that is raised to stimulate effective demand as a result of which production and employment are generated (Philips, 1957). Thus, the fiscal deficit is an ongoing debate in the economy of the world. After the 1980s, the economic liberalization was endorsed thereby increased deficit finance in Nepal. Aftermath of 1990s democracy, fiscal deficit was tremendously increased because of development ambitions of the people. Nepal as well as the rest of the economies of the world adopt the fiscal deficit to meet the development needs of their context. Since there is limited literature on fiscal deficit in Nepal, it is so crucial to examine its effectiveness.

Research Problems

Nepal has a long antiquity to finance deficit. Through the first five-years development plan of Nepal, deficit financing with internal and external debt was taken to fill the resource gap. On this ground, this study attempts to explore whether there is any causal relationship

between fiscal deficit and economic growth of Nepal. Thus, there is one question arose that 'does fiscal deficit cause economic growth of Nepal'?

Research Objectives

The study has two-fold objectives. They are (1) to investigate the short-run and long-run relationship between fiscal deficit and economic growth and (2) to examine the causal relations of deficit finance in the economic growth of Nepal.

Research Limitations

The small 39-year data set used in this study spans the years 2080 through 2019. The ARDL and causality models are applied to estimate the presumed relationships including some macroeconomic variables due to the easy availability of data and wording limitation of this paper. Therefore, more observations and variables can be used to conduct further research. Moreover, compartive studies with different economies are possible.

The rest of the paper is divided into four sub-sections. The second section covers the brief literature review. The next section deals with methods and materials underpinning the research. Additionally, remaining of the two sections include the results and discussion as well as conclusion and implication respectively.

Brief Literature Review

Theoretically, classical and neo-classical schools didn't believe in excessive deficit financing in the economy. However, Keynesian school clearly advocates in favour of deficit financing to accelerate economic growth. Barro (1989) stated that the Ricardian equivalence hypothesis believes budget deficit is not very significant effect on economic growth, but the Neo-classical economist believes the fiscal deficit has an unfavorable impact on economic growth. Moreover, the Keynesian views that the fiscal deficit has a beneficial effect on economic growth. Empirical studies show the mixed of the results. Barro (1990) investigated the relationship between government spending in GDP and per capita real GDP growth using an endogenous growth model. He reported that public services as input of production may play a role in determining government finances and economic growth.

Kadel (2021) used ARDL-ECM for 30 years of data to analyze the relationship between Nepal's budget deficit and economic growth and discovered a long-term relationship between the two. Likewise, real GDP is significantly impacted by the budget deficit. However, based on an unrestricted VAR model that captures Multivariate Granger Causality between the variables, the study of Upadhyaya and Pun (2022) used data from 1978 to 2020. The analysis's findings indicate that there is no clear link between Nepal's public debt, the major sources of deficit finance, and the country's economic growth.

Based on data from 1980 to 2017, the findings with VECM and Granger causality demonstrated that there is a long-term relationship between the fiscal deficit and real GDP in

the Malaysian economy as well as a fiscal deficit Granger cause or information flow to real GDP **(**Bhari, Lau, Aslam, and Yip, 2020). The study by Adam and Bevan (2005) observed the relationship between growth and fiscal deficits for a group of 45 developing countries between 1970 and 1999. They discovered that a fiscal deficit may promote growth through restricted seigniorage, hamper growth through domestic debt, and work against growth through external debt.

In a cross-sectional study, debt-financed increases in government spending slow growth in developing nations and tax-financed increases boost it, whereas debt-financed increases government spending have no effect on growth in developed nations and lower it (Miller and Russek, 1997). Likewise, another cross-sectional study concluded that while the budget deficits of LDCs have usually increased over the past two decades, there is currently little to no proof that these deficits have retarded GDP growth rates (Nelson and Singh, 1994).

Taylor, Proano, Carvalho, and Barbosa (2012) investigated the effects of the primary fiscal deficit on economic growth with VAR which was reported that the more spending and less taxation can positively influenced on the growth of economy of the USA. The rising Asian economy, Bangladesh, adopted deficit budget since 1972 and the recent study with VECM and Granger causality by Alam, Sadekin, Islam, and Moudud-Ul-Huq (2022) conclude that the government domestic debt (GDD) and government external debt (GEXD) affect positively economic growth (RGDP). In a similar vein, the findings of this study, such as those of Navaratnam and Mayandy (2016), showed that the fiscal deficit has a negative influence on economic growth in all of the South Asian nations included in this study, with the exception of Nepal, where the results showed a positive impact. Additionally, some literature also confirmed that the fiscal deficit is positively influenced the economic growth (Aslam, 2016; Kryeziu and Hoxha, 2021).

In the contrary, some econometric estimates that examined the deficit financing and economic growth of different economies including Ghana (Nkrumah, Orkoh, and Owusu, 2016), Vietnam (Van and Sudhipongpracha, 2015; Tung, 2018), Ethiopia (Emana, 2021), Zimbabwe (Nyathi and Chivasa, 2021), India (Sharma and Mittal, 2019; Mohanty, 2020), Bangladesh (Rana and Wahid, 2017), Malaysia (Tan, 2006), Pakistan (Iqbal and Ghani, 2017), and Saudi Arabia (Ghali, 1997) reported that fiscal deficit has a long-term, significantly negative impact on economic growth. The fiscal deficit cannot trigger the economic growth of these countries. Thapa (2005) suggested that the resources of developing nations are drained by excessive deficits and high borrowing costs to cover such deficits. Borrowing and its service both involve liquidity. As a result, both of these transactions are carried out in a way that ensures the country concerned is always in a comfortable position with regard to liquidity.

The reviewed literatures exhibit the positive and negative effects of deficit finance in growth. Likewise, deficit financing and its effects on economic growth of Nepal haven't been adequately researched, though. To some extent, this paper has attempted to fill the gap.

Research Methods and Materials

With time series data from the positive growth period 2080 to 2019, the autoregressive distributed lag (ARDL) model and VECM Granger causality are used to examine whether the fiscal deficit can cause economic growth. To this, economic growth rate has taken as dependent and fiscal deficit has taken as explanatory variable and rest of the variables—trade openness, inflation, official exchange rate, gross capital formation, foreign loan, and domestic loan have considered as the control variables for the statistical robustness of the analysis. Based on secondary data, this paper is quantitative in nature. Data has been gathered from the World Development Indicators (WDI) of the World Bank and the Nepal Rastra Bank (NRB). In this paper, all the variables are expressed as natural logarithms. A detailed description of the variables is presented in the following table.

Table 1

Details of Variables of Interest

Variables	Proxies	Measurements	Source
RGDP	Economic growth rate	% change in real GDP	NRB
FD	Fiscal deficit	Expenditure minus revenue as % of GDP	NRB
TO	Trade openness	Total trade as % of GDP	NRB
INF	Inflation	GDP deflator (annual %)	WDI
OER	Official exchange rate	LCU per US$, period average	WDI
GCF	Gross capital formation	% of GDP	WDI
FL	Foreign loan	% of GDP	NRB
DL	Domestic loan	% of GDP	NRB

Note. RGDP = real gross domestic product, NRB = Nepal Rastra Bank, WDI = world development indicators, LCU = local currency units.

ARDL can reveal short- and long-run dynamics and causality between variables of interest when data are stationary without integration of order 2. Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979) and Phillips-Perron (PP) unit root test (Phillips and Perron, 1988) are employed to confirm the stationarity of the series. PP tests ignore any serial correlation in the test regression, while ADF tests use parametric autoregressions to approximate the ARMA structure of the errors. The ADF and PP test of regression can be expressed as follows:

ADF test: $\Delta Y_t = \beta' D_t + \xi Y_{t-1} + \sum_{i=1}^{k} \Omega_i \Delta Y_{t-i} + \varepsilon_t$

Where, Y_t is time series, D_t is deterministic terms such as constant, trend, etc. or $\beta_0 + \beta_1 t$, k is lagged terms, ε_t is error term. In ADF test, t-statistics for $\xi = 0$ using for testing the series with null hypothesis of not stationary or has a unit root. The same hypothesis is applied to PP test with the test with regression as

PP test: $\Delta Y_t = \beta' D_t + \xi Y_{t-1} + \varepsilon_t$

To fulfil the objective of the study, the estimated general log linear model can be stated as:

$RGDP_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 TO_t + \alpha_3 INF_t + \alpha_4 OER_t + \alpha_5 GCF_t + \alpha_6 FL_t + \alpha_7 DL_t + \varepsilon_t$

The ARDL model is employed after the test of stationarity of data sets. As shown in Pesaran et al. (2001), the ARDL model can be expressed as follows:

$$\Delta Y_t = \phi_0 + \sum_{i=1}^{p} \phi_i \Delta Y_{t-i} + \sum_{i=1}^{q} \phi_j \Delta X_{t-i} + \delta_i Y_{t-i} + \delta_j X_{t-i} + \varepsilon_t$$

This model is composed both short run and long run parameters. The parameters ϕ_i and ϕ_j are the short run and δ_i and δ_j are long run coefficients. Similarly, Y_t is the time series of dependent variable and X_t is the time series of explanatory and control variables. Likewise, ε_t is the white noise. Similarly, p and q are the lagged criteria for the dependent variable and regressors respectively.

In this paper, we estimate the ARDL error correction model (ECM) to confirm long-run cointegration by employing bound tests. The ARDL error correction model can be expressed as

$$\Delta Y_t = \phi_0 + \sum_{i=1}^{p} \phi_i \Delta Y_{t-i} + \sum_{i=1}^{q} \phi_j \Delta X_{t-i} + \xi ECT_{t-i} + \varepsilon_t$$

Here, ECT_{t-I} is the error correction term. The negative and statistically significant ECT coefficient, ξ explains that the disequilibrium over time will cause the dependent variables and independent variables to converge back to equilibrium.

This paper is also estimated the VECM Granger causal relationship between variables of interest. The Granger (1969) proposed the model and the pair regression equations can be expressed as follows:

$$Y_t = \sum_{j=1}^{n} \xi_j Y_{t-j} + \sum_{i=1}^{n} \phi_i X_{t-i} + u_{1t}$$

and, $$X_t = \sum_{j=1}^{n} \alpha_j X_{t-j} + \sum_{i=1}^{n} \beta_i Y_{t-i} + u_{2t}$$

Based on these coefficients, the unidirectional, bidirectional or no causality between variables with the past of itself can be estimated. Here we assumed that the disturbances u_{1t} and u_{2t} are uncorrelated.

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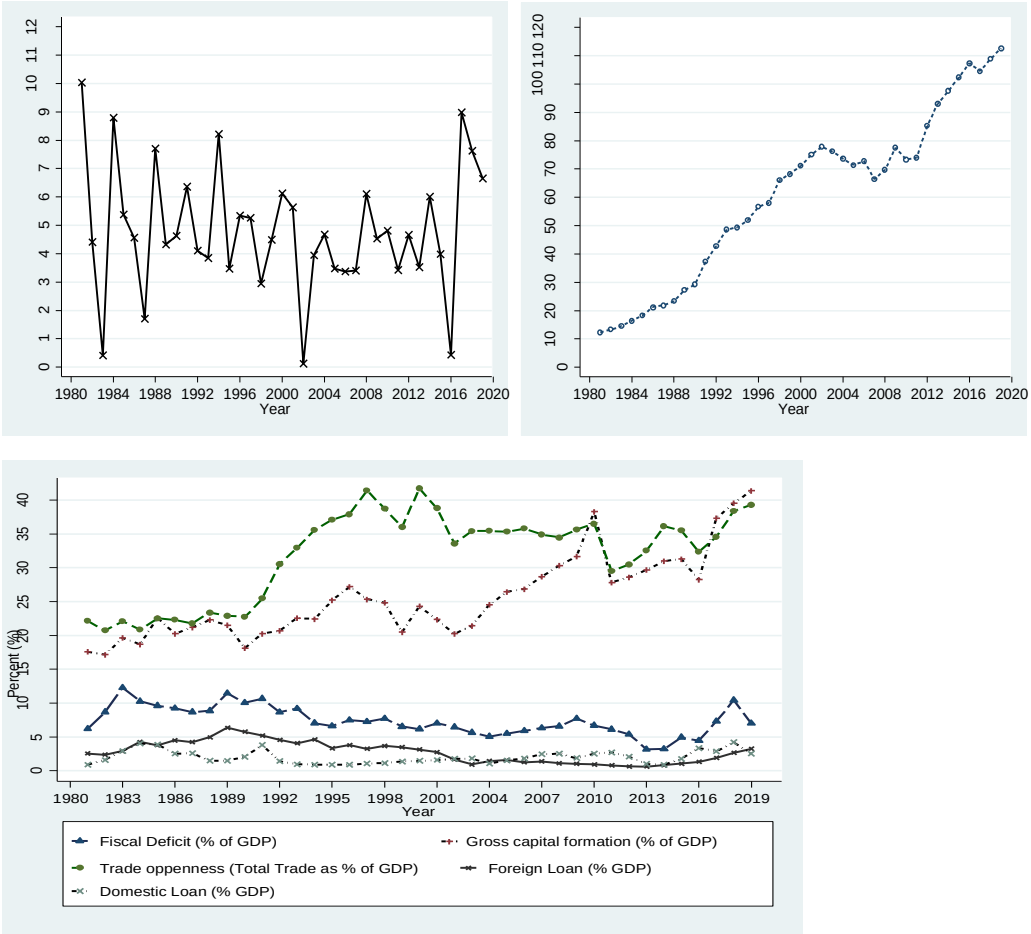
Results and Discussion

Trends of Variables under Study

Nepal's fiscal deficit is getting each year larger. Different political turmoil, state reconstruction, and the consequent rise in populace development demands make an argument to finance the deficit in Nepal. Plots of time series data from the previous 39 years display patterns in a number of variables under study, including gross domestic product (GDP) growth, the official exchange rate, the fiscal deficit, gross capital formation, trade openness, foreign loan, and domestic loan.

Figure 1

Plots of the Variables of Interest from 1980 to 2019



Nepal's economic growth has irregular patterns. In Nepal, there is no steady trend of growth. The growth rate was approximately 10% in 1981, but because of political unrest and natural disasters, it was gradually declining and was almost zero in 1983, 2002, and 2016. The official exchange rate of Nepal with the US dollar is generally increasing. As a percentage of GDP, the budget deficit was continuously declined but recently, it started to rise. As a percentage of GDP, domestic and international loans were similarly trending sideways and have no any changed considerably. Although it is very variable, gross capital formation as a percentage of GDP is rising. Up until the year 2000, trade openness as a percentage of GDP rose then it was rising.

Correlation Matrix

The correlation coefficient is a common way to assess how two random variables are associated (Wooldridge, 2016). Table 1 reports the correlation among variables of interest.

Table 1

Correlation Matrix of Variables of Interest

	RGDP	FD	GCF	INF	OER	TO	FL	DL
RGDP	1.000							
FD	0.063	1.000						
GCF	0.167	-0.392	1.000					
INF	0.054	0.347	-0.172	1.000				
OER	-0.046	-0.619	0.764	-0.383	1.000			
TO	0.051	-0.512	0.641	-0.467	0.878	1.000		
FL	0.150	0.761	-0.522	0.146	-0.576	-0.377	1.000	
DL	-0.131	0.397	0.156	0.205	-0.091	-0.336	-0.013	1.000

Note. RGDP = Economic growth rate, FD = Fiscal deficit, TO = Trade openness, INF = Inflation, OER = Official exchange rate, GCF = Gross capital formation, FL = Foreign loan, DL = Domestic loan

A positive correlation between FD and RGDP, GCF and RGDP, TO and RGDP, and FL and RGDP is seen in Table 1. OER and RGDP are negatively correlated with one another, as are DL and RGDP. The association between the regressors for TO and OER is strong, however it is less than 0.9. There is insufficient evidence of multicollinearity among the explanatory variables in the correlation's overall results.

Unit Root Results

To confirm the stationarity of the time series, the ADF and PP unit root tests are employed. In this paper, the ARDL model has been applied to examine the short and long-run relationship between fiscal deficit and economic growth of Nepal with some other control variables. The variables with the mixed order of integration at level, I(0) and at first difference, I(1) allow to employ the ARDL. The Table 2 and Table 3 show the results of ADF and PP unit root tests.

Table 2

Results of PP Unit Root Tests

	At Level							
	RGDP	FD	GCF	INF	OER	TO	FL	DL
Constant	-7.5980*	-2.3231	-0.8004	-3.5729**	-3.1133**	-1.4034	-1.2630	-3.0830**
Constant & Trend	-7.4254*	-3.4249***	-3.4071***	-3.8774**	-1.5255	-1.5402	-1.4096	-3.0382
Without Constant & Trend	-2.5623**	-0.2337	2.8408	-0.6603	2.8156	1.0831	-0.7051	-1.3316
	At First Difference							
	RGDP	FD	GCF	INF	OER	TO	FL	DL
Constant	-25.3848*	-5.7331*	-8.4303*	-16.1913*	-4.3578*	-5.9680*	-4.7484*	-8.9522*
Constant & Trend	-27.4739*	-5.6613*	-8.3696*	-15.7271*	-5.0887*	-5.9603*	-4.7033	-9.2211*
Without Constant & Trend	-25.8605*	-5.8380*	-7.8551*	-14.0528*	-2.8744*	-5.7755*	-4.8041*	-9.1326*

Note. (*)Significant at the 1%; (**)Significant at the 5%; and (***) Significant at the 10%

Table 3

Results of ADF Unit Root Tests

	At Level							
	RGDP	FD	GCF	INF	OER	TO	FL	DL
Constant	-7.1210*	-0.8057	1.0156	-3.6347*	-3.5066**	-4.5618*	-1.2362	-3.4492**
Constant & Trend	-7.0086*	-4.6998*	-0.9361	-3.9189**	-1.5116	-3.7708**	-0.8313	-3.4000***
Without Constant & Trend	-0.2524	-1.8587***	3.4284	-0.7469	2.1295	1.0831	-0.6348	-1.4002
	At First Difference							
	RGDP	FD	GCF	INF	OER	TO	FL	DL
Constant	-5.1025*	-3.7332*	-1.6791	-8.9405*	-4.1851*	-5.0150*	-4.6673*	-5.1930*
Constant & Trend	-6.8660*	-4.0579**	-1.7994	-8.8374*	-5.0308*	-5.0304*	-4.62818*	-5.2975*
Without Constant & Trend	-7.0989*	-4.4887*	-0.6925	-9.0493*	-1.5354	-5.7806*	-4.7294*	-5.3003*

Note. (*)Significant at the 1%; (**)Significant at the 5%; (***) Significant at the 10%.

The results of ADF and PP unit root tests report that the variables of interest of this study are stationary at mix order of integration. According to PP test results, all the variables are integrated I(0) except TO and FL which are integrated I(1). All variables have no evidence of unit root except GFC and FL at level. The unit root test results confirm that all the data series are stationary with mixed order of integration and none of them are at integrated I(2) which allows us to run ARDL.

Optimal Lag Selection

The optimum lags are required in order to apply the ARDL bound test for cointegration. The optimal lags are chosen based on many criteria in order to ensure the acceptance and robustness of ARDL analysis. Table 4 presents the VAR lag order selection criteria.

Table 4

VAR Lag Order Selection Criteria

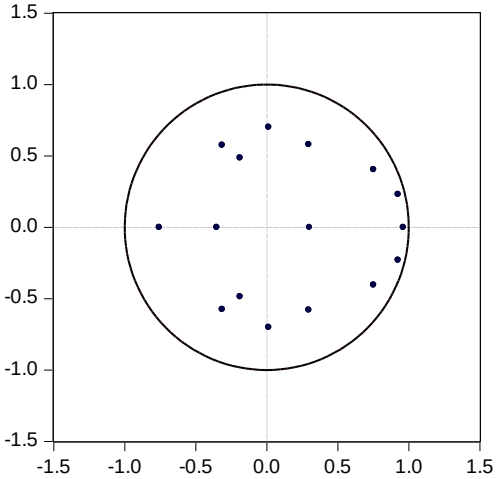
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-63.63130	NA	6.63e-09	3.871962	4.220269	3.994757
1	131.9243	295.9760	5.86e-12	-3.239149	-0.104390*	-2.133999
2	218.4435	93.53432*	2.90e-12*	-4.456405*	1.464807	-2.368901*

Note. * indicates lag order selected by the criterion. LR = sequential modified LR test statistic, FPE = Final prediction error, AIC = Akaike information criterion, SC = Schwarz information criterion, HQ = Hannan-Quinn information criterion

Table 4 demonstrates the VAR based lag order selection criteria. Most of the criteria including LR, FPE, AIC, and HQ indicate 2 as the optimal lags. SC criteria suggests that one is the optimal lag. Thus, the study has adopted lag 2 as the optimal lag as suggested by most of the criteria.

Figure 2

VAR Polynomial Graph with Optimal lag Selection Criteria



The optimal lag selection criteria with VAR polynomial graph of Figure 2 also supports the lag 2 is optimal for the model. All the dots are encircled in inverse roots of AR characteristic polynomial that confirms the lag 2 is optimal for statistical robustness and potential outcome of the ARDL model.

ARDL Bound Test for Cointegration

ARDL bound test for cointegration was proposed by Pesaran et al. (2001) which is apply to know the cointegration between variables of interest. The bound test confirms the long-run relationship is exist or not. The study used lag 2 as optimal lag to apply bound test. The estimated model for the analysis is ARDL(2, 2, 1, 0, 0, 1, 1, 0). The estimated results of ARDL long run form and bound test are illustrated in the Table 5.

Table 5

ARDL Long Run Form and Bounds Test Results

Test Statistic	Value	Significant	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	10.58757	10%	2.03	3.13
K	7	5%	2.32	3.5
		2.5%	2.6	3.84
		1%	2.96	4.26

Table 5 presents the F-statistic and critical values with null hypothesis there is no levels or long-run relationship. Table shows the value of F-statistic is 10.58757 which is greater than the critical values of upper bound, I(1) and lower bound, I(0) at all the significant levels and it fails to accept the null hypothesis. The result of bound test reveals that there is long run relationship between target and explanatory and control variables. It is also concluded that there is cointegration between economic growth and fiscal deficit. Thus, the selected ARDL (2, 2, 1, 0, 0, 1, 1, 0) model can be fruitful to estimate the long run association between fiscal deficit and economic growth of Nepal.

Short-run Dynamics: Error Correction Regression

The error correction form of ARDL model estimates the short and long-run dynamics between the variables of interest. The short-run dynamics is determined by the error correction regression with optimal lags. The selected model ARDL(2, 2, 1, 0, 0, 1, 1, 0) is employed to determine the magnitude of the short-run relationship between proxy variables under the study.

Table 6

ARDL Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta RGDP_{t-1}$	0.248268	0.100648	2.466702	0.0219
ΔFD_t	0.199905	0.454897	0.439450	0.6646
ΔFD_{t-1}	-2.855717	0.464808	-6.143869	0.0000
ΔGCF_t	-1.980249	1.076998	-1.838674	0.0795
ΔTO_t	7.402001	1.497707	4.942223	0.0001
ΔFL_t	1.141829	0.401459	2.844197	0.0094
ECT_{t-1}	-1.714785	0.162285	-10.56649	0.0000
C	-15.55419	1.467888	-10.59630	0.0000
R^2	0.879730			
Adjusted R^2	0.855676	Durbin-Watson stat		2.257109
F-statistic	30.30345	Prob (F-statistic)		0.000000

Table 6 demonstrates the short-run dynamics of ARDL error correction regression. The value of R^2 (= 88 percent) and adjusted R^2 (= 86 percent) have evident that the ARDL error correction model is statistically fitted. The significant F-statistic (= 30.30345) at 1 percent level of significance also reveals that the dependent variable, economic growth proxied as real GDP

growth can be explained by the fiscal deficit with other regressors. The table also reports that the negative and statistically significant at 1 percent level of significance error correction term (ECT_{t-1}) or cointegration equation confirms that any previous year disequilibrium or shocks in regressors can be speedily adjusted in long-run. ECT_{t-1} is -1.714785 which implies that the equilibrium rate converges to 171% per year when shocks or disequilibrium occur in the short run. The short-run dynamics with error correction form can be formulated as

$$\Delta RGDP_t = -15.55419 + 0.248268\Delta RGDP_{t-1} + 0.199905\Delta FD_t - 2.855717\Delta FD_{t-1} - 1.980249\Delta GCF_t + 7.402001\Delta TO_t + 1.141829\Delta FL_t - 1.714785ECT_{t-1}$$

Pervious year's economic growth ($RGDP_{t-1}$) itself, previous year's fiscal deficit (FD_{t-1}), current year's gross capital formation (GCF_t), current year's trade openness (TD_t), current year's foreign loan (FL_t) are statistically significant. The results also report that 1 percent increase in the pervious year's $RGDP_{t-1}$ would help to rise the current year RGDP by 0.248 percent. Meanwhile, current year's FD_t is positively influenced the $RGDP_t$ but not statistically significant. However, 1 percent rise in previous year's FD_{t-1} declines the $RGDP_t$ by 2.855717 percent. Similarly, 1 percent increase in GCF_t would help to down the $RGPD_t$ by 1.980249. Trade openness has positive with RGDP. When 1 percent rise in TO_t can rise the $RGDP_t$ by 7.40 percent. Current year's $RGDP_t$ will be rose by 1.14 percent when there is 1 percent increase in FL_t. Thus, the short-run dynamics confirms that the foreign and domestic loan, which are the major sources of budget deficit, and previous year fiscal deficit have positive and significant relation with economic growth of Nepal.

Long-run Dynamics: Level Equation

The bound test for cointegration provides proof that Nepal's fiscal deficit and economic growth are cointegrated. It confirms that there is level relationship between them. Now, the estimated model ARDL (2, 2, 1, 0, 0, 1, 1, 0) is employed to determine the magnitude of the long- run relationship between proxy variables under the study. The estimated outcomes of levels equation are presented the Table 7.

Table 7

Levels Equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD	0.794836	0.681740	1.165894	0.2561
GCF	1.895089	0.619260	3.060246	0.0057
INF	0.010759	0.187181	0.057478	0.9547
OER	-0.392461	0.342625	-1.145452	0.2643
TO	1.185500	0.824113	1.438516	0.1644
FL	0.120132	0.223330	0.537912	0.5960
DL	0.174359	0.234584	0.743270	0.4652
C	-9.070638	2.617409	-3.465502	0.0022

Table 7 reports the long run coefficient of ARDL regression with dependent variable—RGDP and regressors—FD, GFC, INF, OER, TO, FL, and DL. The estimated model is presented in the following function.

$$RGDP = -9.070638 + 0.794836FD + 1.895089GFC + 0.010759INF - 0.392461OER + 1.185500TO + 0.120132FL + 0.174359DL$$

The results reveal that there is no significant relationship between the fiscal deficit (FD) and the economic growth (RGDP) of Nepal. All other variables including inflation (INF), official exchange rate (OER), trade openness (TO), foreign loan (FL), and domestic loan (DL) are not significant. Only gross capital formation (GFC), is statistically significant with RGDP. The results also report that when 1 percent rise in FD leads to 0.79 percent rise in RGDP. Moreover, 1 percent rise in GCF, INF, TO, FL, and DL would cause to increase in RGDP by 1.90, 0.01, 1.19, 0.12, and 0.17 percent respectively. However, there is negative relationship between OER and RGDP. When 1 percent hike in OER would cut the RGDP by 0.39 percent. The restult suggests that fiscal deficit is helpful to increase economic growth while it is used to increase the capital formation.

Residual and Stability Diagnostic

To the statistically robustness and model fit, different residual and stability tests—normality, serial correlation, autocorrelation, heteroskedasticity, cumulative sum of recursive residuals (CUSUM), and cumulative sum of squares of recursive residuals (CUSUMSQ) are employed. The results of residual and stability diagnostic are presented in the Table 8, Figure 3, and Figure 4.

Table 8

Results of Various Residual and Stability Diagnostic Tests

Residual and Stability Diagnostic Test	Observed R^2	Prob. χ^2	Hypothesis
Breusch-Godfrey Serial Correlation LM Test	2.6657	0.2637	No serial correlation
Heteroskedasticity Test: Breusch-Pagan-Godfrey	21.568	0.0879	No heteroskedasticity (at 5 % level of significance)
Normality Test (Jarque-Bera)	0.0477	0.9764	Residuals are normally distributed

Table 8 shows that none of the diagnostic test results are significant at the 5% level. Breusch-Godfrey test for serial correlation supports the conclusion that there is no serial correlation. Meanwhile, the Breusch-Pagan-Godfrey for heteroskedasticity test statistic is not significant at 5 percent level of significance which confirms that there is neither heteroskedasticity nor autocorrelation. Statistically significant Jarque-Bera statistic reveals that the residuals are normally distributed. These tests confirm that the estimated ARDL (2, 2, 1, 0, 0, 1, 1, 0) model is statistically robust and well-fitted. It is passed with all diagnostic tests.

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Figure 3

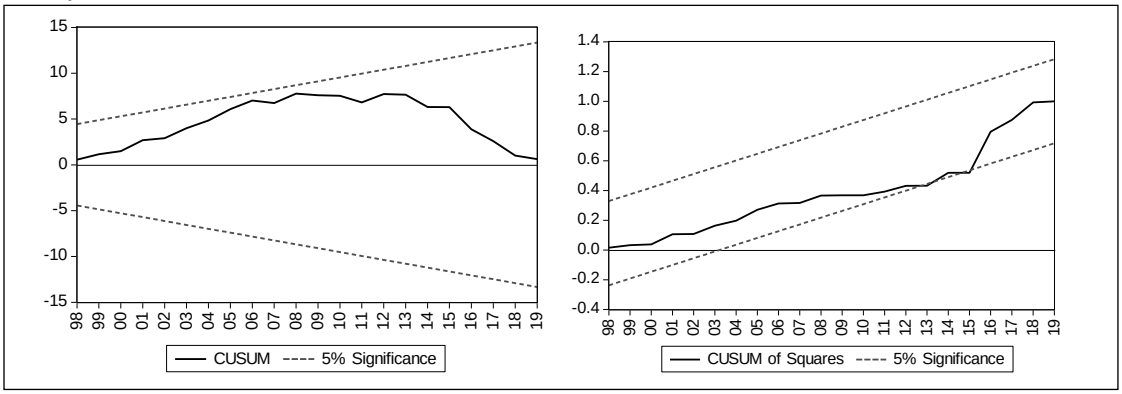
Correlogram of Residuals

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.163	-0.163	1.0636	0.302
		2	0.042	0.016	1.1366	0.566
		3	-0.125	-0.119	1.8046	0.614
		4	-0.098	-0.143	2.2233	0.695
		5	0.178	0.152	3.6555	0.600
		6	-0.128	-0.095	4.4214	0.620
		7	0.082	0.014	4.7461	0.691
		8	-0.283	-0.254	8.7175	0.367
		9	0.086	0.020	9.0945	0.429
		10	-0.053	-0.085	9.2470	0.509
		11	0.014	-0.032	9.2579	0.598
		12	-0.066	-0.165	9.5126	0.659
		13	-0.316	-0.325	15.528	0.276
		14	0.198	0.014	17.985	0.207
		15	0.018	0.051	18.006	0.262
		16	0.123	-0.064	19.037	0.267

The correlogram of residuals, with Q-statistic probability corrected for 2 dynamic regressors, is shown in Figure 3. At 1, 5, or even 10%, none of the Q-statistic values are significant. It is further noted that the dotted line's bounds are likewise shared by the boxes of partial correlation and autocorrelation. As a result, partial correlation and autocorrelation are absent in the selected ARDL model. Thus, the model under study is free from partial correlation and autocorrelation.

Figure 4

Plot of CUSUM and CUSUMSQ



The plot of CUSUM indicates that the cumulative sum of recursive residuals lies between the 5 percent critical boundaries. However, the plot of CUSUMSQ is almost within the critical boundaries and there was little instability in year 2013 to 2015. It is only a temporary deviation, as the plot of CUSUMSQ is returning towards the critical bands. As a result, the ARDL error correction parameters have accurate estimation and are stable, allowing for the determination of the short- and long-term relationship between Nepal's fiscal deficit and economic growth.

Table 9

VECM Granger Causality Test

Regressand	ΔRGDP	ΔFD	ΔGCF	ΔINF	ΔOER	ΔTO	ΔFL	ΔDL
ΔRGDP	-	7.3651**	1.8484	1.1411	0.6663	0.3575	10.0208*	5.0376***
ΔFD	3.0278	-	1.2313	9.0318**	0.8470	0.1667	0.3429	2.1258
ΔGCF	2.9502	1.9750	-	11.1364*	1.3364	0.0293	4.6913***	0.3029
ΔINF	0.6486	4.6836***	3.1147	-	0.3776	0.7068	12.0397*	0.2335
ΔOER	2.5061	14.4038*	1.1700	2.9143	-	1.6164	3.3886	5.5403***
ΔTO	2.1039	4.7135***	1.3665	1.9538	0.7043	-	9.7338*	0.5061
ΔFL	2.2214	18.2300*	1.2645	0.3265	1.5565	1.0194	-	4.4582
ΔDL	3.7953	4.3248	1.2325	1.6743	1.1145	0.4663	2.8157	-
All	3.7953	40.2920*	11.0751	24.1580**	6.7467	7.3090	35.6358*	20.2693

Note. (*) Significant at the 1%; (**) Significant at the 5%; (***) Significant at the 10%.

Table 9 reports the chi-square statistics of VECM Granger causality/block exogeneity Wald tests. The result confirms that all the regressors—FD, GCF, INF, OER, TO, FL, and DL do not Granger cause the RGDP. It means that there is no information flow from fiscal deficit to economic growth of Nepal. On the contrary, RGDP, INF, TO, and combined chi-square statistic Granger cause the FD. Similarly, FD, GCF, and combined of all variables Granger cause the INF. Likewise RGDP, GCF, INF, TO, and combined of all variables Granger casue the FL. Lastly, RGDP, and OER Granger cause the DL. The overall Granger causality suggests that none of the explanatory variables Granger cause the dependent variable. Thus, fiscal deficit does not Granger cause the economic growth of Nepal. However economic growth does Granger causes the fiscal deficit in Nepal. Similarly, economic growth Granger causes foreign and domestic loans which are the major sources to finance the deficit.

Conclusion and Implication

As a capital expenditure, the government of Nepal has used budget deficit to finance development projects. With the data from 2080 to 2019, this study used the ARDL error correction model and VECM Granger causality to examine the impacts of the fiscal deficit on the economic growth of Nepal. Deficit financing is a tool for boosting the economy and bridging the gap between available resources and the nation's objectives for development. The

results demonstrated a positive correlation between the fiscal deficit and economic growth. Economic growth and the fiscal deficit are cointegrated, according to the results of the bound test. According to ARDL error correction regression, there are short-term, statistically significant negative relationships between Nepal's economic growth and the fiscal deficit of the previous year. However, both domestic and foreign loan and economic growth have positive and significant relationships in short run. It suggests that financing a debt deficit has a beneficial impact on economic growth, but the total fiscal deficit has a short-term negative impact on growth. On the other hand, the results reveal that there is a positive but not significant relationship between the fiscal deficit and the economic growth of Nepal in long run. In long-run, only gross capital formation is statistically significant with growth. Thus, fiscal deficit is helpful to increase economic growth while it is used to increase the capital formation in long-run. The overall Granger causality suggests that fiscal deficit does not Granger cause the economic growth of Nepal. However, economic growth does Granger causes the fiscal deficit in Nepal. Similarly, economic growth Granger causes the foreign and domestic loans. Thus, the growth-driven fiscal deficit will be more effective in the economy of Nepal. Based on stylized facts, it will be necessary to redirect deficit financing into productive channels in order to enhance the economy. It is also needed to be cautious about the growth game or development in the economy of Nepal.

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