Foreign Trade and Economic Growth of Nepal: An ARDL Approach

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Abstract

Nepal is a developing country having high degree of trade openness. Trade volume is highly increased and imports always dominated exports. Therefore, the key objective is to find out contribution of foreign trade to the economic growth of Nepal. Level data are not stationary so first difference data are used for regression analysis. Thus, ARDL technique is used for the estimation. The study shows total trade and foreign direct investment has significant determinant of Gross Domestic product that is economic growth in Nepal both in short run and long run. The Study shows foreign trade plays the significant role for the economic growth of Nepal. One percent raise in foreign trade (total trade) brings 0.62 percent raise in gross domestic production.

Keywords: economic growth, foreign trade, foreign direct investment & ARDL model

Introduction

Foreign trade refers to the exchange of goods and services between one country and region to another. Foreign trade allows greater competition and much more competitive pricing in the market. The competition brings more affordable products for the consumers. Foreign trade enables a country to enjoy the specialization according to comparative costs. So, foreign trade has a huge impact on the level of the country well beings. Moreover, foreign trade widens the market and raising productivity.

In the past several studies have been conducted to examine the relationship between foreign trades to the economic growth. The overall findings show the three is the positive relationship between foreign trade and economic growth. For example, Bhandari (2005) found exports growth leads to economic growth. Muhammad and Akanegbu (2015) establish relationship exist between international trade and economic growth.

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Sharma and Ghimire (2009) found that, openness of trade is a positive force to increase real GDP in Nepal and opening of trade has a positive effect on real GDP. In addition, a high GDP growth over the long run expands economic opportunities and improves allocate efficiency reduces distortion in relative prices, exchange rate and correct market failure. Moreover, researcher has concluded that opening to the trade leads to long-term economic growth and development in Nepal. Moreover, study conducted by Busse and Königer (2012) found that volume of exports and imports as a share of total GDP does not adequately capture the impact of trade on GDP per capita growth, trade have a positive and significant impact on growth and the expansion of trade. Similarly, Regmi (2004) founds rapidly expanding world trade turned out to be the single most important factor behind the acceleration of export growth of Nepal.

On the other hand, study conducted by Nurudeen et al. (2012) found that, trade openness has a negative effect on growth. Also, Dic (2004) found that China's rapid and sustained economic growth in the reform era has tended to be negatively correlated with its export growth and positively correlated with its import growth. In addition, Singh (2014) found that though import has a negative influence on economic growth. The volume of trade reflected by economic openness has a positive impact on the economic growth of India. Furthermore Basyal (2008) founds that marginal efficiency of the capital should be raised substantially, Prudent policies, competitive environment, infrastructural development, good governance, organizational and managerial improvements would be off paramount importance to guide into a durable double digit economic growth which Nepal also much aspires to meet the current economic challenges.

Fitzova and Zidek (2015) found that, relationships between economic growth and trade in both the Czech Republic and the Slovak Republic identified in the practical part that long-term steady state can be reached in the long run. Researcher further found that economic growth, and growing income is an incentive for growing volume of trade. Moreover, international trade has both positive and negative effects. Likewise, economic transformation of both Czech and Slovak was a crucial factor of the economic growth. In the same fashion Uddin and Khanam (2016) founds that import is negatively related with Bangladesh GDP growth. Moreover, researcher has given the recommendation to the policymakers to take the careful decision about the international trade decision when it

comes to the GDP growth. Moreover, Sandri, Alshyab and Chazo (2016) derive trade in services is positively stimulating economic performance, whereas the effect of trade in goods is more critical. Moreover, the need to strengthen and facilitate export in services, so to increase their size the economy. By the same token Boakey and Gyamfi (2017) establish that export; foreign direct investment, gross capital formation, remittance money per capita and external debt per capita have a positive relationship with economic growth. However, the current account balance and inflation rates have a negative impact of economic growth.

In a summary of literature most of the studies focus on impact of trade to the economic growth. Studies have been done all over the continent. Therefore, the purpose of the study is to assess the relationship between foreign trades on the economic growth of Nepal using Auto regressive distributive lag model.

Methodology and Data

The variables of interest in this study are: gross domestic product [GDP], foreign direct investment, volume of import and export trade, exchange rate and government expenditure. The econometrics model is derived from a production function in which the level of a country's productivity depends on Foreign Direct Investment, total value of trade, exchange rate and government expenditure. The mathematical model was based on the methodology adopted by Omoju and Adesanya (2012) for Nigeria. The technique of analysis is the ordinary least square [OLS] regression method. The dependent variable in this model is economic growth which is proxies by Gross Domestic Product. The explanatory variables include foreign trade which is measured by the sum of total import and export (Total Trade), foreign direct investment, exchange rates and government expenditure.

The model is:

$$LNGDP_t = \beta_0 + \beta_1 LNFDI_t + \beta_2 LNEX_t + \beta_3 LNTTt + \beta_4 LNGE_t + e_t \quad (1)$$

Where, $\beta_0$is the constant of the model $\beta_1, \beta_2, \beta_3$and β_4 are the coefficients of the explanatory variables, and e_t is the stochastic error term that captures the effect of other variables not included in the model. The signs of these variables are based on a priori expectation. That is, the direction of the relationship between the respective independent variables and the explained variable is according to their relationship in standard econometric theory. This study uses the ordinary least square technique. This technique emphasizes the regression and correlation analysis which helps to derive estimates of the parameters as well as determine the nature, direction and degree of the relationship between the explanatory and dependent variables. Specifically, the mode of the technique is the single equation regression model. The ordinary least square method produces the best linear unbiased estimates.

Autoregressive Distributive Lag Model

The autoregressive distributive lag (ARDL) is used to examine the short run and long run relationship between the total trades on Economic growth. In order to apply the co-integration, the first step is to determine the order of integration of each variable under study. This is because of the fact that ARDL techniques cannot be used if the order of integration of the variables is two or more. The unit root test has been employed for this purpose both at the level and difference of the variables. The lag length used for the test is determined using a model selection procedure based on the Schwarz Information Criterion. The important features of this test is that it is free from unit root pre-testing and can be applied regardless of whether variables are I (0) or I(1).In addition, it does not matter whether the explanatory variables are exogenous. An ARDL representation of equation (1) can be written as:

$$\Delta LNGDP_t = \beta_0 + \beta_1 LNGDP_{t-1} + +\beta_2 LNFDI_{t-1} + \beta_3 LNEX_{t-1} + \beta_4 LNTT_{t-1}$$

$$+\beta_5 LNGE_{t-1} + \sum_{i=1}^{p} \alpha_{1i}\, \Delta LNGDP_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i}\, \Delta LNFDI_{t-1} +$$

$$\sum_{i=0}^{q_2} \alpha_{3i}\, \Delta LNGX_{t-1}\ \sum_{i=0}^{q_3} \alpha_{4i}\, \Delta LNTT_{t-1} + \sum_{i=0}^{q_4} \alpha_{5i}\, \Delta LNGE_{t-1} + e_t$$

… (2)

$$\Delta LNFDI_t = \beta_{02} + \beta_{12} LNGDP_{a-1} + \beta_{22} LNFDI_{t-1} + \beta_{32} LNEX_{t-1}$$
$$+\beta_{42} LNTT_{t-1} + \beta_{52} LNGE_{t-1} + \sum_{i=1}^{p} \alpha_{1i} \Delta LNFDI_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LNGDP_{t-1}$$
$$+ \sum_{i=0}^{q_2} \alpha_{3i} \Delta LNEX_{t-1} + \sum_{i=0}^{q_3} \alpha_{4i} \Delta LNTT_{t-1} + \sum_{i=0}^{q_4} \alpha_{5i} \Delta LNGE_{t-1} + e_{2t} \ldots \quad (3)$$

$$\Delta LNEX_t = \beta_{03} + \beta_{13} LNGDP_{t-1} + \beta_{23} LNFDI_{t-1} + \beta_{33} LNEX_{t-1} + \hat{a}_{43} LNTT_{t-1} +$$
$$\beta_{53} LNGE_{t-1} + \sum_{i=1}^{p} \alpha_{1i} \Delta LNEX_{t-1} + \sum_{=1}^{q_1} \alpha_{2i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_2} \alpha_{3i} \Delta LNFDI_{t-1} +$$
$$\sum_{i=1}^{q_3} \alpha_{4i} \Delta LNTT_{t-1} + \sum_{i=1}^{q_4} \alpha_{5i} \Delta LNGE_{t-1} + e_{3t}$$
… (4)

$$\Delta LNTT_t = \beta_{04} + \beta_{14} LNGDP_{t-1} + \beta_{24} LNFDI_{t-1} + \beta_{34} LNEX_{t-1} + \beta_{44} LNTT_{t-1} +$$
$$\beta_{45} LNGE_{t-1} + \sum_{i=1}^{p} \alpha_{1i} \Delta LNTT_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_2} \alpha_{3i} \Delta LNFDI_{t-1} +$$
$$\sum_{i=1}^{q_3} \alpha_{4i} \Delta LNEX_{t-1} + S \sum_{i=1}^{q_4} \alpha_{5i} \Delta LNGE_{t-1} + e_{4t}$$
… (5)

$$\Delta LNGE_t = \beta_{05} + \beta_{15} LNGDP_{t-1} + \beta_{25} LNFDI_{t-1} + \beta_{35} LNEX_{t-1} + \beta_{45} LNTT_{t-1} +$$
$$\beta_{55} LNGE_{t-1} + \sum_{i=1}^{p} \alpha_{1i} \Delta LNGE_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_2} \alpha_{3i} \Delta LNFDI_{t-1} +$$
$$\sum_{i=1}^{q_3} \alpha_{4i} \Delta LNEX_{t-1} + \sum_{i=0}^{q_4} \alpha_{5i} \Delta LNTT_{t-1} + e_{5t}$$
… (6)

Where, Δ is the first difference operator, LNGDP, LNFDI, LNGE, LNTT and LNEXare the variables are selected in the study.$\beta_0$is the Flow component and $e_t$is the white noise residual. The coefficient $(\beta_{1-} \beta_5)$ represent long run relationship whereas the remaining expressions with summation sign $(\alpha_{1-} \alpha_4)$ represents short run dynamics of the model. In order to investigate the existence of the long-run relationship among the variables in the system, the bound test approach has been employed. Under this, the null hypothesis of no co-integration $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$ is tested against the alternative of co-integration $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq 0$. If the calculated F-statistics is greater than appropriate upper bound critical values, the null hypothesis rejection implying co-

integration. If such statistics is below the lower bound, the null cannot be rejected, indicating the lack of co-integration.

If we find evidence of a long-run relationship, we then estimate the error correction model (ECM), which indicates the speed of adjustment back to long-run equilibrium after a short-run disturbance. The standard ECM involves estimating the following equation (3)

$$\Delta LNGDP_t = \beta_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LNFDI_{t-1} + \sum_{i=0}^{q_2} \alpha_{3i} \Delta LNGX_{t-1} + \sum_{i=0}^{q_3} \alpha_{4i} \Delta LNTT_{t-1} + \sum_{i=0}^{q_4} \alpha_{5i} \Delta LNGE_{t-1} + \lambda EC_{t-1} + \varepsilon_t \ldots \quad (7)$$

To establish the goodness of fit of the ARDL model, diagnostic and stability tests were conducted. The diagnostic test examines the serial correlation, functional form, normality, and heteroscedasticity associated with the model. The structural stability test was conducted by employing the cumulative residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ).

Error Correction Representation of Autoregressive Distributive Lag Model

Co-integration among variables can be examined within the framework of error correction model (ECM) with co-integrated variables. Short run dynamics are captured by the individual Co-efficient of the lagged term; the error correction model (ECM) contains the information of long run causality. Significance of lagged explanatory variable depicts short run causality while a negative and statistically significant ECM is assumed to signify long run causality. The short-run co-integration (causality) is determined from the following ARDL model, for case where LNGDP is the explained variable

$$\Delta LNGDP_t = \beta_{01} + \beta_{11} LNGDP_{t-1} + + \beta_{21} LNFDI_{t-1} + \hat{a}_{31} LNEX_{t-1} + \hat{a}_{41} LNTT_{t-1} + \hat{a}_{51} LNGE_{t-1} + \sum_{i=1}^{p} \acute{a}_{1i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_1} \acute{a}_{2i} \Delta LNFDI_{t-1} + \sum_{i=0}^{q_2} \acute{a}_{3i} \Delta LNGX_{t-1} + \sum_{i=0}^{q_3} \acute{a}_{4i} \Delta LNTT_{t-1} + \sum_{i=0}^{q_4} \acute{a}_{5i} \Delta LNGE_{t-1} + \varepsilon_{1t} \ldots \quad (8)$$

$$\Delta LNTT_t = \hat{a}_{04} + \hat{a}_{14} LNGDP_{t-1} + \hat{a}_{24} LNFDI_{t-1} + \hat{a}_{34} LNEX_{t-1} + \hat{a}_{44} LNTT_{t-1} + \hat{a}_{45} LNGE_{t-1} + \sum_{i=1}^{p} \acute{a}_{1i} \Delta LNTT_{t-1} + \sum_{i=1}^{q_1} \acute{a}_{2i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_2} \acute{a}_{3i} \Delta LNFDI_{t-1} + \sum_{i=1}^{q_3} \acute{a}_{4i} \Delta LNEX_{t-1} + \sum_{i=1}^{q_4} \acute{a}_{5i} \Delta LNGE_{t-1} + e_{4t}$$

… (9)

$$\Delta LNGE_t = \hat{a}_{05} + \hat{a}_{15} LNGDP_{t-1} + \hat{a}_{25} LNFDI_{t-1} + \hat{a}_{35} LNEX_{t-1} + \hat{a}_{45} LNTT_{t-1} + \hat{a}_{55} LNGE_{t-1} + \sum_{i=1}^{p} \acute{a}_{1i} \Delta LNGE_{t-1} + \sum_{i=1}^{q_1} \acute{a}_{2i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_2} \acute{a}_{3i} \Delta LNFDI_{t-1} + \sum_{i=1}^{q_3} \acute{a}_{4i} \Delta LNEX_{t-1} + \sum_{i=0}^{q_4} \acute{a}_{5i} \Delta LNTT_{t-1} + e_{5t}$$

… (10)

Testing for Long and Short-Run Coefficients

Casual relations among variable can be explained within the framework of ECM, with co-integrated variables. While the short run dynamics are captured by the individual coefficients of the lagged terms, the error correction term (ECT) contains the information of long run causality. Significance of lagged explanatory variable depicts short run causality while a negative and statistically significant ECT is assumed to signify long run causality. The short run causality is determined from the following ARDL model.

$$\Delta LNFDI_t = \hat{a}_0 + \sum_{i=1}^{p} \acute{a}_{1i} \Delta LNFDI_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LNGDP_{t-1} + \sum_{i=0}^{q_2} \alpha_{3i} \Delta LNEX_{t-1} + \sum_{i=0}^{q_3} \alpha_{4i} \Delta LNTT_{t-1} + \sum_{i=0}^{q_4} \alpha_{5i} \Delta LNGE_{t-1} + \lambda EC_{t-1} + e_t \ldots \quad (11)$$

$$\Delta LNEX_t = \beta_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta LNEX_{t-1} + \sum_{i=1}^{q_1} \alpha_{2i} \Delta LNGDP_{t-1} + \sum_{i=1}^{q_2} \acute{a}_{3i} \Delta LNFDI_{t-1} + \sum_{i=1}^{q_3} \acute{a}_{4i} \Delta LNTT_{t-1} + \sum_{i=1}^{q_4} \acute{a}_{5i} \Delta LNGE_{t-1} + \ddot{e} EC_{t-1} + e_t \ldots \quad (12)$$

Where Δ is the difference operator, ECM representing the error-correction term derived from the long run co-integration relation from the above specified ARDL model (11,12) in each equation λ should exhibit a negative and significant sign for causality to exist in the long run. The model that was used for testing the long run relationship and coefficient is further tested with the diagnostic tests of Serial Autocorrelation, Hetroskedasticity and any model misspecifications. Once error correction models were

estimated, its task to applying the cumulative sum of residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests to assess the parametric consistency. The graphical representation of the recursive coefficients is used to judge the stability of the coefficients.

Empirical Analysis

This chapter discusses the data analysis and interpretation of the study. When data were collected from the various published sources, such as, Nepal Rastra Bank [NRB], Ministry of finance (MOF) and Ministry of industries (MOI), the data were fed in E-views for analysis and interpretation. The data used in this study consist of annual time series of GDP (Nominal prices) total trade, foreign direct investment, and exchange rate and government expenditure from the period Nepal 1990 to 2017. The GDP, total trade and exchange rate data were obtained from the NRB. Gross domestic product and total trade were in (Rs. Million) and exchange rate were in US$. Similarly, foreign direct investment and government expenditure were obtained from (Rs. Million) Economic Survey (MOF) of Nepal.

Contribution of the Foreign Trade and Economic Growth of Nepal

Contribution of foreign trade to the economic growth is presented with the help of econometric model. In the following section complete regression model is presented and analysis is given below.

Unit Root Results

Individual time series data must be stationary before running regression analysis. Otherwise, the regression results will be spurious. Therefore, it is better to determine the order of integration of the variables under the study. The unit root test is used for this purpose at level and first difference. The unit root results showed that all variables are suffered unit root at level. The test statistics clearly indicates that level form series are spurious from unit root. Thus, first difference data are employed to unit root testing. The results show that the level forms of data at first difference are completely unit root free and all series are integrated of orders one. Thus, level forms of data at first difference are

employed to empirical analysis, particularly empirical models. The unit root results are reported below Table 1

Table 1

ADF Unit Root Results

Variables	Level		Variables	First Difference	
	Intercept	Intercept &Trend		Intercept	Intercept &Trend
LNGDP	0.82(0.79)	2.04 (0.54)	D(LNGDP)	4.34(0.00)	4.11(0.01)
LNEX	2.97(0.50)	2.93(0.17)	D(LNEX)	6.03(0.00)	5.84(0.00)
LNFDI	1.49(0.52)	4.08(0.01)	D(LNFDI)	7.09(0.00)	6.96(0.00)
LNGE	1.87(0.33)	2.46(0.34)	D(LNGE)	8.00(0.00)	7.89(0.00)
LNTT	0.27(0.91)	2.76(0.22)	D(LNTT)	4.32(0.00)	4.12(0.01)

Note: Researcher own Calculations

ARDL Bounds Test for Co- integration

The unit root results reported in table 1 shows that all the series all the variables are stationary at first difference. Thus, researcher applies bounds testing approach to co-integration to test long run relationship between the variables. The appropriate lag order of variables should be determined before proceeding to the ARDL bounds to co-integration.

Table 2

VAR Lag Order Selection Criteria

Endogenous variables:	Lag	LogL	LR	FPE	AIC	SC	HQ
	0	35.29582	NA	0.005216	2.423666	2.179891	
							2.356053
LNGDP	1	56.23991	31.83501*	0.001062*	4.019193*	3.726662*	3.938057*
	2	56.40946	0.244157	0.001142	3.952757	3.611472	3.858099

Endogenous variables:	Lag	LogL	LR	FPE	AIC	SC	HQ
	0	29.41151	NA	0.008351	1.952921	1.709146	
							1.885308
LNFDI	1	41.51428	18.39620*	0.003450	2.841142	2.548612*	2.760007
	2	43.08288	2.258784	0.003316*	2.886630*	2.545345	2.791972*

Endogenous variables: LNEX	Lag	LogL	LR	FPE	AIC	SC	HQ
	0	29.41151	NA	0.008351	1.952921	1.709146	1.885308
	1	41.51428	18.39620*	0.003450	2.841142	2.548612*	2.760007
	2	43.08288	2.258784	0.003316*	2.886630*	2.545345	2.791972*
Endogenous variables: LNTT	Lag	LogL	LR	FPE	AIC	SC	HQ
	0	36.57779	NA*	0.004707*	2.526223*	2.282448*	2.458611*
	1	37.11411	0.815206	0.004905	2.489129	2.196599	2.407994
	2	37.16421	0.072147	0.005323	2.413137	2.071852	2.318479
Endogenous variables: LNGE	Lag	LogL	LR	FPE	AIC	SC	HQ
	0	29.48384	NA*	0.928946	2.758707	3.002483	2.826320
	1	27.80600	2.550317	0.883514*	2.704480	2.997010*	2.785616*
	2	26.78129	1.475585	0.886912	2.702503*	3.043788	2.797161

Note: researcher own calculations

On the basis of the variables lag values varies. The results reported in the table no 2 implies that LNGDP has one lag and LNFDI has two lags. Similarly, LNEX has two lags and LNTT has no lag and finally LNGE has two lags. The appropriateness of lag order avoids the spuriousness of ARDL bounds testing approach to co integration results.

Table 3

ARDL Results for Bound Test of Co-integration

Model Number	Dependent variable	F-statistics	I(0)	I(1)	Co-integration	What next?
2	LNGDP	1.080268	2.86	4.01	NO, Co-integration	ARDL
3	LNFDI	5.065278	2.86	4.01	YES, Co-integration	ECM
4	LNEX	4.261755	2.86	4.01	YES, Co-integration	ECM
5	LNTT	2.195436	2.86	4.01	NO,	ARD

Model Number	Dependent variable	F-statistics	I(0)	I(1)	Co-integration	What next?
		5	6	1	Co-integration	L
6	LNGE	1.70989	2.8	4.0	NO,	ARD
		2	6	1	Co-integration	L

Note. Researcher own Calculation

If the computed F-statistic exceeds the upper critical bounds value, then the H0 is rejected. If the F-statistic falls into the bounds, then the test becomes inconclusive. Lastly, if the F-statistic is below the lower critical bounds value, it implies no co-integration. The above table 3 is the result of the Bound test of co-integration when the F-statistics is below the lower bound value there is no co-integration among the variables. Similarly, when the F-statistics is greater than the upper bound value there is co-integration among the variables. In the analysis researcher found LNGDP, LNTT and LNGE that is in the model 2, 5 and 6 have no co-integration. However, variables LNFDI and LNEX, in the model 3 and 4 have long run relationship among the variables. It is because F-Statistics is lower than the upper bound value in LNGDP, LNTT and LNGE which helps to accept the null hypothesis of no long relationship. However, in the LNFDI and LNEX, the computed value of F-Statistics is greater than the upper bound value of F-Static which helps us to reject the null hypothesis of long run relationship. Therefore, researcher concludes that there is long run relationship among LNFDI and LNEX variables.

Long –Run Co-Efficient Estimation of ARDL Model

Due to the existence of co-integration relationship of the models 3 and 4 researcher estimate long- run relationship. In order to apply the co-integration, the first step is to determine the order of integration of each variable under study. This is because of the fact that ARDL techniques cannot be used if the order of integration of the variables is two or more. The unit root test has been employed for this purpose both at the level and difference of the variables. The lag length used for the test is determined using a model selection procedure based on the Schwarz Information Criterion.

Table 4

Error Correction Representation of ARDL Model Dependent variable: LNFDI

Regressor	Coefficient	t-statistics	p-value
C	0.246144	0.374271	0.7147
D(LNFDI(-1))	-0.247309	-0.778326	0.4515
D(LNFDI(-2))	-0.276068	-1.057419	0.3111
D(LNGDP(-1))	-5.578907	-0.843282	0.4156
D(LNGDP(-2))	5.792277	0.964055	0.3540
D(LNEX(-1))	0.421410	0.160817	0.8749
D(LNEX(-2))	-3.628813	-1.177229	0.2619
D(LNTT(-1))	4.026711	1.605606	0.1343
D(LNTT(-2))	-2.643254	-1.009809	0.3325
D(LNGE(-1))	0.144271	0.626973	0.5424
D(LNGE(-2))	0.046278	0.230980	0.8212
ECM (-1)	-0.453558	-1.197359	0.2543

Note. Researcher own calculation

LNFDI(-1), D(LNFDI(-1)), D(LNGDP(-1)), D(LNGDP(-2)), D(LNEX(-1)),D(LNTT(-1)), D(LNTT(-2)), D(LNGE(-1)), D(LNGE(-2)) are the short run co-efficient. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of foreign direct investment and the selected other variables like gross domestic product, government expenditure, total trade, exchange rate. The lagged ECM term included in the foreign direct investment is negative but not statistically significant. ECM (-1) is the speed of adjustment. It is 45.35%. In other word the speed of adjustment toward long-run equilibrium is 45.35percentages. Breusch-Godfrey Serial Correlation signifies these is no serial correlation between the LNFDI and regresses.

Table 5

Error Correction Representation of ARDL model, Dependent variable: LNEX

Regressor	Coefficient	t-statistics	p-value
C	0.009870	0.154984	0.8794
D(LNEX(-1))	0.176735	0.696517	0.4994
D(LNEX(-2))	-0.267614	-0.896577	0.3876
D(LNGDP(-1))	-1.029133	-1.606487	0.1341
D(LNGDP(-2))	0.765561	1.315872	0.2128
D(LNFDI(-1))	0.009063	0.294545	0.7734
D(LNFDI(-2))	-0.011155	-0.441234	0.6669

Regressor	Coefficient	t-statistics	p-value
D(LNTT(-1))	0.258379	1.063963	0.3083
D(LNTT(-2))	0.126933	0.500790	0.6256
D(LNGE(-1))	-0.001399	-0.062789	0.9510
D(LNGE(-2))	0.017923	0.923814	0.3738
ECM(-1)	0.019085	0.520314	0.6123

Note. researcher own calculation

LNEX(-1), D(LNEX(-1)), D(LNGDP(-1)), D(LNGDP(-2)), D(LNFDI(-1)), D(LNTT(-1)), D(LNGE(-1)) are the short run co-efficient. The result of ARDL bound test of co-integration showed that there is evidence of co-integrating relationship of exchange rate and the selected other variables like gross domestic product, foreign direct investment, government expenditure, total trade. The lagged ECM term included in the foreign direct investment is positive and also not statistically significant. This conform lack of evidence of long run causality between exchange rate and gross domestic product, foreign direct investment, government expenditure and total trade. Breusch-Godfrey Serial Correlation signifies these is no serial correlation between the LNFDI and regresses.

Table 6

Error correction Representation of the Selected ARDL (1, 0, 0, 0, 2) Model, Dependent variable LNGDP

Regressor	Coefficient	Standard Error	t-Ratio	p-value
D(LNFDI)	0.003861	0.011762	0.328276	0.7467
D(LNEX)	-0.085738	0.085607	-1.001532	0.3306
D(LNTT)	0.296070	0.080598	3.673412	0.0019
D(LNGE)	-0.000834	0.008011	-0.104067	0.9183
D(LNGE(-1))	0.010685	0.008576	1.245917	0.2297
CointEq(-1)	-0.270142	0.078437	-3.444070	0.0031

Table 6 contains the results of error correction representation of the selected ARDL model. Coefficient of the variables with D sign shows the short run elasticity. Results represent that in the short run LNTT is the most significant factor (with the largest coefficient and largest t-ratio of gross domestic production. The 0.29 value of coefficient of D (LNTT) reveals that one percent increase in LNTT brings about 0.29 percentage increase in Gross Domestic product. Similarly, the coefficient of DLNFDI) is 0.003 indicates that one percent change in FDI results to change in 0.003 percent increase

in gross domestic product. However, Exchange rate and government expenditure has the negative effect on Gross domestic product in short run. The coefficient of FDI and GE is 0.085738 and 0.000834 respectively. The coefficient of error correction term (-0.270) is significant at one percent level. Highly significant negative sign of the error correction term reinforces the existence of long run relationship among the variables. Moreover, the speed of adjustment from previous year's disequilibrium in Gross domestic product added to current year's equilibrium is 27 %.

Table 7

Long –Run Coefficients of ARDL (1, 0, 0, 0, 2) Model, Dependent variable LNGDP

Regressor	Coefficient	Standard Error	t-Ratio	p-value
Constant	2.128705	0.569263	3.739405	0.0016
LNFDI	0.014294	0.043871	0.325808	0.7485
LNEX	-0.317382	0.342734	-0.926031	0.3674
LNTT	1.095981	0.107343	10.210126	0.0000
LNGE	-0.070458	0.034692	-2.030971	0.0582

Note. Researcher own calculation

Table 7 reveals that total trade is the most significant factor of economic growth in Nepal. The effect of LNTT on LNGDP is significant at one percent level of significance. The coefficient (0.014) of LNFDI shows that one percent increase in LNFDI leads to 0.014 percent increase in gross domestic product in the long run. The coefficient exchange rate is (-0.317) shows that 1 % increase in LNEX leads to 0.317% decrease in gross domestic production the long run at five percent level of significant. Similarly, government expenditure however does not affect economic growth significantly even with unexpected negative sign. In other word the co-efficient (-0.070) of LNGE shows that one percent increase in LNGE leads to decrease 0.070 % in gross domestic product. The result presented in this paper signifies the importance of total trade and foreign direct investment on gross domestic product.

Stability test

In the final stage of ARDL model the stability of the long-run coefficients is examined by plotting in graphical representation of CUSUM and CUSUM square are shown in figure 1, 2 for foreign direct investment model four in long run OLS model. Similarly, ARDL

model the stability of the long-run coefficients is examined by plotting in graphical representation of CUSUM and CUSUM square are shown in figure 3 ,4 for exchange rate model five in the long run OLS model. The graphical presentation of CUSUM and CUSUM of Squares test is presented below.

Figure 1

Plot of Cumulative sum of Recursive Residuals (LNFDI)

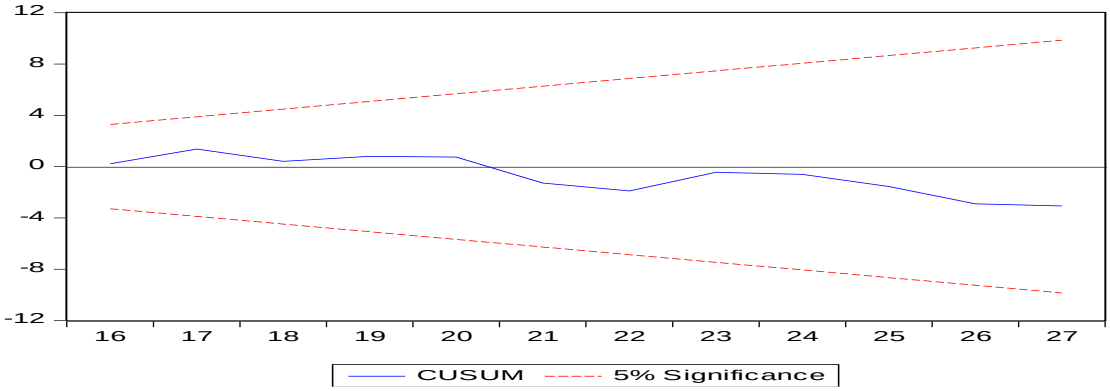

Figure 1 shows the plot of CUSUM statistics for LNFDI within the critical lines at the 5% significance level. The plot of CUSUM lie within the critical limit implying the stability of the model 4 as well as stability of foreign direct investment on economic growth. Thus, foreign direct investment on the economic growth is stable.

Figure 2

Plot of Cumulative Sum of Squares Recursive Residuals (LNFDI)

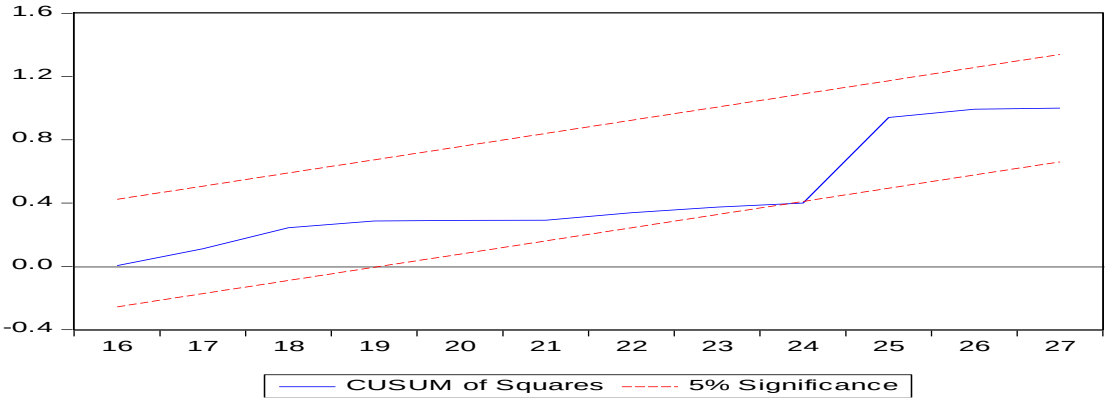

Figure 2 shows the plot of CUSUMSQ statistics for LNFDI within the critical lines at 5% significant level. The plot of CUSUMESQ lie within the critical limit implying the stability of the model 4 as well as stability of the foreign direct investment on economic growth. Thus, foreign direct investment on the economic growth is stable.

Figure 3

Plot of Cumulative Sum of Recursive Residuals (LNEX)

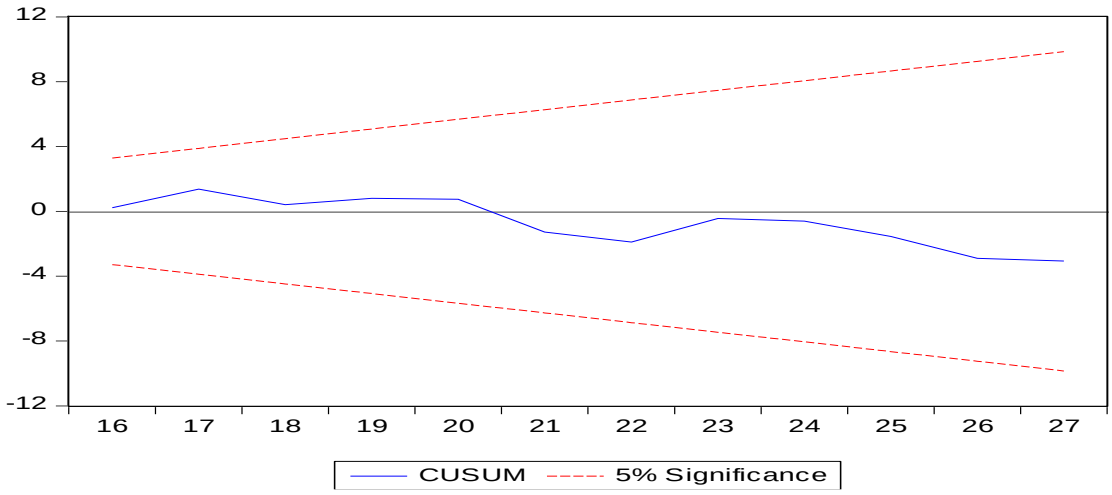

Figure 3 shows the plot of CUSUM statistics for LNEX within the critical lines at the 5% significance level. The plot of CUSUM lie within the critical limit implying the stability of the model 5 as well as stability of exchange rate on economic growth. Thus, exchange rate on the economic growth is stable.

Figure 4

Plot of Cumulative Sum of Squares Recursive Residuals (LNEX)

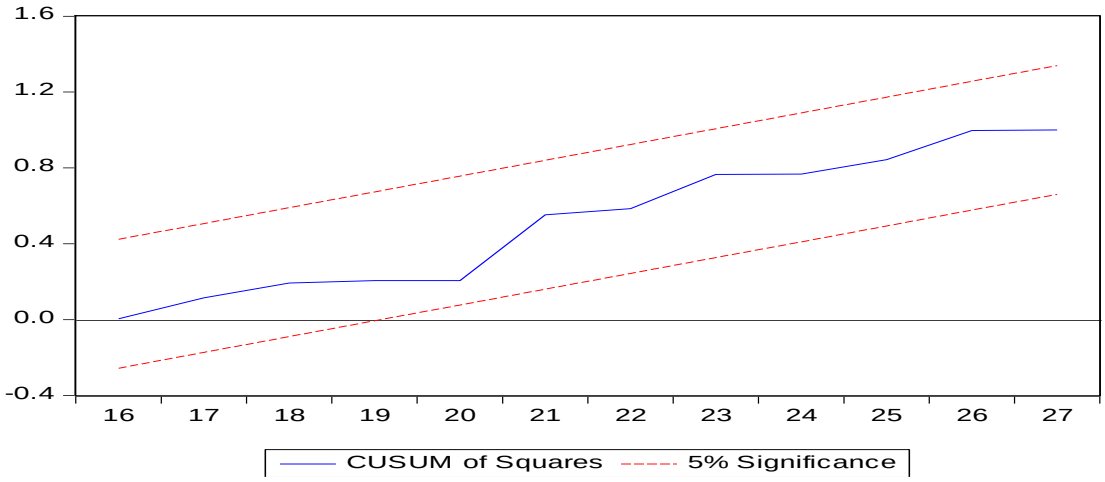

Figure 4 shows the plot of CUSUMSQ statistics for LNEX within the critical lines at the 5% significance level. The plot of CUSUMSQ lie within the critical limit implying the stability of the model 5 as well as stability of the government expenditure on economic growth. Thus, exchange rate on the economic growth is stable. Since, both

the plots remain within critical bounds at 5 % level of significance, researcher concludes that the model is structurally stable.

Regression Analysis

In order to examine the effects of foreign direct investment, total trade, government expenditure, exchange rate gross and domestic product, it is necessary torun OLS regression model with dependent variable gross domestic product (LNGDP) and independent variables, total trade (LNTT) and foreign direct investment (LNFDI), exchange rate (LNEX), government expenditure (LNGE). The regression result of the model is presented below.

Table 8

Regression Results LNGDP as Dependent Variable

Constant and Coefficients	Coefficients	Standard Error of Coefficients	t-statistics	P-value
Constant	1.954682	0.280029	6.980293	0.0000
LNEX	-0.444357	0.170531	2.605723	0.0161
LNFDI	-0.026324	0.031476	0.836317	0.4120
LNGE	-0.008769	0.017900	0.489857	0.6291
LNTT	1.102360	0.069446	15.87365	0.0000
R^2 = 0.99		DW =1.04N = 27		
Adjusted R^2 = 0.99		F=68.58 Probability of F statistics =0.0000		

Note: Researcher Own Calculations

The independent variables LNGDP, LNEX, LNFDI and LNTT as well as constant terms are statistically significant at 5 level of significant. LNFDI is significant at 10 percent level and LNGE is statistically insignificant. The value F-test is very high and its p value is zero indicates that model has good fit. The value of adjusted R squared is 0.99 shows that 99 percent dependent variable is explained by independent variables.

The coefficient of LNEXis-0.444 and depicts that one percent increase in exchange rate causes decrease in GDP by 0.444 percent. The coefficient is negative and significant meaning that change exchange rate with US dollar has adverse effect on GDP.

However, general devaluation has positive impact on domestic economy when export and import elasticity greater than one. During the study period Nepalese currency is devaluated with USA dollar. It has adverse effect on GDP it is because the imports and exports elasticity of Nepalese trade is less than one. The coefficient of LNFDI is -0.026 and depicts that one percentage increase FDI causes decrease GDP by one percent. The coefficient is negative indicates that foreign direct investment doesn't boost up GDP of Nepal. The coefficient of LNTT is 1.10 and depicts that one percent increase in total trade of Nepalese economy causes increase in GDP by 1.10 percent. Coefficient is positive and significant statically. This confirms that increase in trade boost up GDP in Nepal.

The coefficient of LNGE is 0.008 and depicts that one percent increase in government expenditure causes increase in GDP by 0.008 percent. The coefficient is negative. The coefficient of LNGDP is 1.95 has significant role current GDP. This variable is used to remove the serial autocorrelation among the error's terms. The value of DW test is 2.34 which is near to 2 indicates that there is no autocorrelation among the error terms.

Conclusion

This study aimed to investigate the role of foreign trade in economic growth of Nepal for the period 1990/91 to 2016/17. Researcher considers four variables Foreign Direct investment, Exchange Rate, Total Trade and Government expenditure as the determinants of Economic growth of Nepal. Researcher used ARDL Approach to co-integration and error correction representation of the ARDL model. According to the result of this study, total trade and foreign direct investment is the most significant determinant of Gross Domestic product that is economic growth in Nepal both in short run and long run. However, exchange rate and government expenditure play the negative role in the economic development of Nepal. Foreign trade has become crucial for economic development of every country. The variables trade, foreign investment, foreign aid has significant positive role in Nepalese economy. However, exchange rate has adverse effects. The finding of the study suggests foreign trade plays the significant role

for the economic growth of Nepal. One percent raise in foreign trade (total trade) brings 0.62 percent raise in gross domestic production. Thus, government should focus on growth enhancing policies.

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