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The Impact of Exchange Rate on Export in Nepal: The ARDL Bounds Test Approach

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Abstract: *The main objective of this study is to examine the potential impact of exchange rate on exports in Nepalese context by using annual time series data over the period from 1974 to 2011. This particular study incorporates real interest rate, investment and inflation rate as control variables. This study empirically investigates the impact of real exchange rate over exports in Nepal by applying the Autoregressive Distributed Lag approach (ARDL). In part of checking the unit root properties of the time series data, the variables were diagnosed with the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) test. Results obtained from the study show that exchange rate has a significant positive relationship with exports in Nepal.*

Keywords: *Export, exchange rate, Autoregressive Distribution Lag Model (ARDL), Nepal*

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I. Introduction

Trade is a basic economic concept involving the buying and selling of goods and services, with compensation paid by a buyer to a seller, or the exchange of goods or services between parties. Trade can take place within an economy between producers and consumers. International trade allows countries to expand markets for both goods and services that otherwise may not have been available to it. It is the reason why an alien consumer can pick between a Japanese, German, or American car. As a result of international trade, the market contains greater competition and therefore, more competitive prices, which brings a cheaper product home to the consumer. The increasing globalisation and the integration of the world economies into one village has created enormous opportunities for both developed and developing nations. Opportunities such as, access to advance technological innovation, mobility of real, capital and investment goods.

However, there is always the threat of moderate to extreme volatility of domestic currency more specially in developing countries, and so Nepal is no exception to that phenomena. The Nepalese rupees was introduced in 1932, replacing the previous currency, the Nepalese mohar. Its exchange rate is based on a peg set against the INR. Prior to 1994, the NPR was pegged at a rate of 1 INR per 1.45 NPR. However, since 1994 the peg has been adjusted to 1 INR per 1.60 NPR.

On the other hand, Nepalese rupees had always been flexible to the U.S. Dollar since its inception till now. There are both advantages as well as dis-advantages of currency pegging between two or more than two countries. Currency pegging can lead to easy financing of infrastructural, social, and behavioural transformation, but the true value of the currency is not reflected in the market, which may lead to serious consequences such as the Asian financial crisis of 1997.

It is argued that free floating exchange rate is a double edge sword , which although it allows for free mobility of capital and other investment instruments , the negative impact that the exchange rate variability has on exports negate the little benefits achieved through capital mobility (see Kočenda and V alachy, 2006; Choudhry, 2005). The study of the impact of exchange rate on exports thus became of outmost importance.

Nevertheless, one direct benefit of having constant rise in export is having rise in employment opportunities both locally and globally. In case of Nepal, export business plays a significant role in creating jobs for lower income class people. Nepal is best known for its Garments, Carpets, Leather products, herbs and spices, and tea worldwide.

The significance of this study can be viewed in at least two dimensions, one being that, the study may assist policy makers to implement exchange rate policies that promote exports, economic stability and relative stable currency. On the other hand, it would put exporters on vantage ground to address and avoid losses as the result of exchange rate arrangements.

The remainder of this paper is framed as follows: Section 2 presents the review of the empirical literature. Similarly, section 3 presents the model specification and the estimation technique followed by section 4 which discusses the empirical analysis of the study's results. Section 5 concludes the study and also provides policy recommendations.

II. Literature Review

Exports are incredibly important tomodern economies because they offer peoplemany more markets for their goods. One of the core functions of diplomacy and foreign policy between governments is to foster economic trade, encouraging exports and imports for the benefit of all trading parties.

According to research firm Statista, in 2017, the world's largest exporting countries (in terms of U.S. dollars) were China, the United States, Germany, Japan, and The Netherlands. China posted exports of approximately $2.3 trillion in goods, primarily electronic equipment, and machinery. The United States exported approximately $1.5 trillion, primarily capital goods. Germany's exports, which come to approximately $1.4 trillion, were dominated by motor vehicles as were Japan's, which summed approximately $698 billion. Finally, The Netherlands had exports of approximately $652 billion. Increase in output production and export lead economy is by no doubt a catalyst to the growth of the Country. Trade enhances economic growth through job creation, investments in new machinery and equipment. There are two theoretical frameworks discussed in the paper that explains the interaction between exchange rate and exports. The first framework postulate that a deprecation of domestic currency will have expansionary effect on trade. This is because a depreciated currency makes home exports relatively cheaper to foreign buyers, resulting in foreign buyers switching expenditure from their own goods and services to the cheaper imports (Appleyard, Field and Cobb, 2010: 575). This is known as the traditional approach. Contrary to the traditional approach, the second theoretical framework presuppose that currency depreciation might have a contractionary effect on output and employment, especially for less economically developed nations. The little gains that might have been achieved through devaluation in the short run, will be wiped away by inflation in the long-run.

Thorbecke and Kato (2012) investigated how exchange rate changes affect German exports using quarterly data from 1980Q1 to 2011Q4. Results from Johansen maximum likelihood and Dynamic Ordinary Least Squares (DOLS) estimation indicate that the export elasticity for the unit labour cost-deflated exchange rate equals 0.6. Results from panel DOLS estimation indicate that price elasticities are much higher for consumption goods exports than for capital goods exports and for exports to the eurozone than for exports outside of it. The results obtained suggest that consumer goods exports are more responsive to changes in exchange rate than capital goods exports.

Haseeb and Rubaniy (2014) explore the relationship among exchange rate instability and sectoral exports in case of Pakistan. Sectorial export is dependent variable and exchange rate is independent variable and GDP use as control variable. Study use ARDL technique to check the relationship among the variables. Results of the study shows negative relationship between exchange rate volatility and export of food processing machinery, grapes, meat and petroleum products but with iron and steel bars this is adjusted in long run.

Korhonen and juurikkala (2008) asses the determinants of equilibrium real exchange rates in a sample of oil dependent countries by using the annual time series data from 1975 to 2005. Study use ARDL and ECM techniques to check the short run and long run relationships among the variables. Result of the study shows price of oil has a clear statistically significant effect on real exchange rates.

Similarly, Hossein and Rahman (1995) have hypothesized that Bangladesh export supply is a function of relative prices of its exports and the capacity output of the tradable sector. They have estimated the demand and supply models of exports with annual data and found that Bangladeshi export is highly sensitive to the income growth of its trading partners and estimated that a 10% rise in a foreign income would raise the demand for Bangladeshi exports by 23%. In this article researcher shown just one side of the exchange rate that the increase in the foreign income the export of Bangladesh increased but no focus that if in case the income of the foreign people decreases, then what will happen. So, this study does not gives the exact results.

Bustaman and Jayanthakumaran (2007) investigated the long-run and short-run impacts of exchange rate volatility on Indonesia's exports of priority commodities to the United States of America over the monthly period 1997-2005. Estimates of cointegration relations are obtained using ARDL bounds testing procedure. Estimates of the short-run dynamics are obtained using an error-correction model. The results obtained shows some significant positive and negative coefficients among the range of commodities.

Aye, Gupta, Moyo and Pillay (2015) examined the impact of real effective exchange rate uncertainty on aggregate exports of South Africa for the period 1986Q4-2013Q2. Using a bivariate framework where the structural vector autoregression is modified to accommodate bivariate GARCH-in-Mean errors (GARCH-M), they found that exchange rate uncertainty has a significant and negative effect on exports in South Africa.

Nemushungwa, Gyekye and Ocran (2015) empirically investigates the impact of exchange rate volatility on South African exports using the ARDL bounds testing procedure and monthly data for the period 2000 to 2013.Furthermore; it measures real exchange rate volatility and also examines the stability of the long run coefficients and the short-run dynamics. The study results confirm that exchange rate volatility has insignificant negative long run impact on South African exports. Besides, real exchange rate has insignificant negative long-run effects on South African exports. The coefficient of error correction term for exports model, is

positive and statistically insignificant and is therefore not supportive of the validity of the long-run equilibrium relationship between the variables.

Poonyth and van Zyl (2000) evaluated the long run and short run effects of real exchange rate changes on South African agricultural exports using an ErrorCorrection Model (ECM) within thecointegratedVARmodel.Theresultssuggestthatthereisaunidirectionalcausalflowfrom exchange rate to agricultural exports. The empirical findings establish both short-run and long run relationships between real agricultural exports and the real exchange rate.

Mustafa and Nishat (2004) explore the relationship of volatility of exchange rate and export growth of Pakistan using quarterly data from 1991:3 to 2004:2. Export growth is used as dependent variable while exchange rate volatility use as independent variable. The study use Error co-integration technique to check the relationship among the variables in the model. Results of the study shows that there is negative relationship in case of major trade partner UK and USA, while in case of Pakistan and India this relationship is observed only long run not in short run.

Razin and Collins (1997) studied the real exchange rate misalignments and growth for a large sample of developed and developing countries. The paper used regression analysis to explore whether real exchange rate misalignments are related to country growth rates. Their findings were that, over-valuations lower economic growth. Moderate to high (but not very high) under valuations are associated with more rapid economic growth. The traditional theory of exchange rates supports their findings, in that, depreciations are associated with rapid growth. Conflicting results were obtained in developed countries.

From the review of empirical literature on exports and exchange rate, it is clear that the findings of studies for both developed and developing countries are conflicting. Therefore, the effect of exchange rate on exports is still a debatable issue. This study will also contribute to the ongoing debate concerning the impact of exchange rate on exports.

III. Material and Methods

The main objective of this particular study is to investigate the impact of exchange rate over export in Nepal for the period of 1974 to 2011. In this study, the endogenous variable (Y) is export while the exogenous variables are real interest rate (RIR), inflation (INF), investment (INV) and real exchange rate (USD-NPRexc). Here, real interest rate, inflation, and investment are used as control variables in the study to get the most comprehensive insight of the economic situation as possible.

The study follows De Vita and Abbott (2004), and Arize, Osang and Slottje (2000). So, the model is specified as:

$$Yt = \beta o + \beta 1 \text{ USD-NPRexct} + \beta 2 \text{ RIRt} + \beta 3 \text{ INVt} + \beta 4 \text{ INFt} + \varepsilon \quad (1)$$

To obtain elasticity coefficients and remove the effect of outliers, the variables must be transformed to logarithm. In log linear form, the function becomes:

$$Logyt = \beta o + \beta 1 log\text{USD-NPRexct} + \beta 2 \, log\text{RIRt} + \beta 3 log\text{INVt} + \beta 4 log\text{INFt} + \varepsilon t \quad (2)$$

*Yt*is the natural log of exports, *log*USD-NPRexctis the natural logarithm of real exchange rate, *log*RIR*t*is the natural logarithm of real interest rate, *log*INF*t*is the natural logarithm of inflation, and *log*INV*t*is the natural logarithm of investment. The error term (ε) is included to represents omitted variables in the specification of the model. The error term is also included to capture all errors of measurements, parameter variations, and errors of the functional approximation and sampling variability.

Data Source

This particular study is based on annualised data covering the period of 1974 to 2011. Export figures are obtained from the Observatory of Economic Complexity (oec.world). Whereas, data on real interest rate, investment, inflation and real exchange rate is obtained from FRED economic research, St.Louise and theglobaleconomy.com combined.

Data Analysis

The study uses empirical statistics for data analysis. The study also borrows data analysis techniques from TodaniMunyama (2005) and Sekantsi (2011) by applying the autoregressive distributed lag bound test procedure to determine whether there exists long run relationship between the endogenous and exogenous variables.

Unit Root Test

Taking into account the fact that the study employs a time series data, the first step to begin with, is to test for stationarity. This requires the testing of the order of integration in the data set (unit root test). A time series is said to be integrated of order I(0), and a variable that must be differenced once to become stationary is said to be integrated of order I(1). A stochastic process is said to be stationary if it's mean and variance are constant over time; and the value of the co-variance between two time periods depends only on the distance, gap or lag between the two time periods and not the actual time at which the co-variance is computed. A non-stationary time series will have a time-varying mean and/or a time-varying variance (Gujarati 2009:740-741).

Although there are various types of tests, for the purpose of this study, Augmented Dickey-Fuller (ADF) (1979) and Phillips- Perron (PP) (1988) are used for unit root tests.

Co-integrationTest

The ARDL cointegration approach was developed by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001). It has three advantages in comparison with other previous and traditional cointegration methods. Firstly, the ARDL does not need all the variables under observation to be integrated of the same order and it can be applied when the under-lying variables are integrated of order one, order zero or fractionally integrated. Secondly, the ARDL test is relatively more efficient in the case of small and finite sample data sizes. Lastly, by applying the ARDL technique, we obtain unbiased estimates of the long-run model (Harris and Sollis, 2003).

The ARDL models employed in this study can be moulded as follows:

$$Y_t = \beta_0 + \beta_1 \text{USD-NPRexc}_t + \beta_2 \text{RIR}_t + \beta_3 \text{INV}_t + \beta_4 \text{INF}_t + \varepsilon_t \quad (3)$$

$$\textit{Where: } \varepsilon_t = Y - (\beta_0 + \beta_1 \text{USD-NPRexc}_t + \beta_2 \text{RIR}_t + \beta_3 \text{INV}_t + \beta_4 \text{INF}_t) \quad (4)$$

$$\Delta Y_{t-1} = \beta_0 + \beta_1 log Y_{t-1} + \beta_2 log \text{USD-NPRexc}_{t-1} + \beta_3 log \text{RIR}_{t-1} + \beta_4 log \text{INV}_{t-1} + \beta_5 log \text{INF}_{t-1} + \sum^{p}_{i=0} \beta_i Y_{t-i} + \sum^{q}_{j=0} \beta_j \text{USD-NPRexc}_{t-j} + \sum^{r}_{k=0} \beta_k \text{RIR}_{t-k} + \sum^{s}_{l=0} \beta_l \text{INV}_{t-l} + \sum^{t}_{m=0} \beta_m \text{INF}_{t-m} + \varepsilon_t \quad (5)$$

Where Δ is defined as the first difference operator, and 't' in the equation is the time trend, Δ*Y*tis the natural log of exports, *log*USD-NPRexctis the natural logarithm of real exchange rate, *log*RIR*t*is the natural logarithm of real interest rate, *log*INF*t*is the natural logarithm of inflation, and *log*INV*t*is the natural logarithm of investment.This study also estimates the short-run export volume equation using the ARDL Error Correction Model (ECM) approach. ECM allows us to estimate the short-run relationship between exports and exchange rate. The larger the error correction coefficient, in absolute value, the faster is the economy's return to its long-run equilibrium once shocked. Estimates of the short-run dynamics are obtained using an error-correction model:

$$\Delta Y_{t-1} = \beta_0 + \beta_1 log Y_{t-1} + \beta_2 log \text{USD-NPRexc}_{t-1} + \beta_3 log \text{RIR}_{t-1} + \beta_4 log \text{INV}_{t-1} + \beta_5 log \text{INF}_{t-1} + \sum^{p}_{i=0} \beta_i Y_{t-i} + \sum^{q}_{j=0} \beta_j \text{USD-NPRexc}_{t-j} + \sum^{r}_{k=0} \beta_k \text{RIR}_{t-k} + \sum^{s}_{l=0} \beta_l \text{INV}_{t-l} + \sum^{t}_{m=0} \beta_m \text{INF}_{t-m} + \pi \text{ECM}_{t-1} + \varepsilon_t \quad (6)$$

π = the speed of adjustment parameter, and

ECM = the lag residuals that are found from the estimated co-integration model.

If π is negatively significant, then the variables tend to converge to their long run equilibrium.

IV. Result and Discussion

The summary of descriptive statistics provided in table no.1 will help us to get a proper insight of basic characteristics of the data. It serves as a preliminary analysis for evaluation of the empirical impact of exchange rate on export.

We can see that the Jarque-Bera test accepts the null hypothesis of normally distributed data for all variables. It confirms the normal distribution of both real and financial variables under consideration. Moreover,

the kurtosis for two variables; namely, Inflation, Investment, and Real interest rate exceed three, which is termed as excess kurtosis. It is an indication of fat tails in the distribution. Export and exchange rate on the other hand have kurtosis less than three. Furthermore, all the variables except from Real interest rate are positively skewed.

Table no. 1: Summary of Descriptive Statistics

	EXPORT	**INF**	**INV**	**RIR**	**USD-NPREXC**
Mean	0.751316	0.084776	0.223108	0.028979	43.10367
Median	0.605000	0.082945	0.214600	0.033500	45.66233
Maximum	1.680000	0.198063	0.382700	0.182100	77.87662
Minimum	0.070000	-0.031132	0.087600	-0.121700	10.56000
Std. Dev.	0.516915	0.048185	0.059403	0.053982	26.17977
Skewness	0.281004	0.261204	0.714626	-0.225900	0.016208
Kurtosis	1.559678	3.337540	4.146964	4.850450	1.296755
Jarque-Bera	3.784771	0.612502	5.317284	5.744790	4.594983
Probability	0.150712	0.736202	0.070043	0.056563	0.100511
Sum	28.55000	3.221501	8.478100	1.101200	1637.940
Sum Sq. Dev	9.886434	0.085905	0.130563	0.107820	25359.07
Observations	38	38	38	38	38

Source: Eviews 11, Author's computation.

Unit Root Test

We are using time series data in our analysis. There is a fundamental principle that time series data should be stationary. Before estimation we have to ensure that the data we are using in our analysis of all variables are stationary. For that purpose, the Augmented Dickey-Fuller (ADF) test and Phillips-Perron test is employed to assess the presence or absence of unit root in the variables. The result for the Augmented Dicky-Fuller test is presented in table no. 2 and the Philips Perron test is presented in table no 3.

Table no 2: Stationarity results of the Augmented Dickey-Fuller test

Augmented Dickey-Fuller				
Order of integration	**Variables**	**Intercept**	**Trend and intercept**	**None**
Level	Export P-value	-0.101339 (0.9419)	-2.422273 (0.3628)	1.791989 (0.9805)
1st difference	Export P-value	-6.777223*** (0.0000)	-6.771370*** (0.0000)	-5.963809*** (0.0000)
Level	USD-NPRexc P-value	-0.460228 (0.8878)	-1.115944 (0.9126)	2.504132 (0.9963)
1st difference	USD-NPRexc P-value	-4.959870*** (0.0003)	-4.894591*** (0.0018)	-1.399136*** (0.1476)
Level	INV P-value	-0.900314 (0.7770)	-2.285512 (0.4310)	1.727710 (0.9776)
1st difference	INV P-value	-7.702210*** (0.0000)	-7.765589*** (0.0000)	-7.090517*** (0.0000)
Level	RIR P-value	-4.141548 (0.0025)	-4.693370 (0.0030)	-3.341266 (0.0014)
1st difference	RIR P-value	-6.810083*** (0.0000)	-6.974741*** (0.0000)	-6.900264*** (0.0000)
Level	INF P-value	-5.399666 (0.0001)	-5.319067 (0.0006)	-0.231936 (0.5950)
1st difference	INF P-value	-9.915328*** (0.0000)	-9.695499*** (0.0000)	-10.06137*** (0.0000)
1%	Critical values	-3.621023	-4.226815	-2.628961
5%		-2.943427	-3.536601	-1.950117
10%		-2.610263	-3.200320	-1.611339
Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationarity at 5% and * represent stationarity variables at 10%				

Source: Eviews 11, Author's computation.

Table no. 2 shows the Augmented Dicky-Fuller results. The obtained ADF t-statistic was compared with the t-critical values. The rule of thumb for unit root test is that, if the P-value is less than 0.05(5%), then in that case we can reject the null hypothesis of series has a unit root and claim that the series is stationary. All the variables except from Real interest rate are significantly stationary at first difference at 1%, 5%, and 10% significance level.

Table no. 3: Stationarity result of the Phillips-Perron test

Phillips-Perron				
Order of integration	**Variables**	**Intercept**	**Trend and intercept**	**None**
Level	Export P-value	0.131199 (0.9640)	-2.389599 (0.3786)	2.249768 (0.9930)
1st difference	Export P-value	-6.783215*** (0.0000)	-6.828579*** (0.0000)	-5.981476*** (0.0000)
Level	USD-NPRexc P-value	-0.546668 (0.8703)	-1.580931 (0.7813)	1.642306 (0.9733)
1st difference	USD-NPRexc P-value	-5.112963*** (0.0002)	-5.050384*** (0.0012)	-4.256616*** (0.0001)
Level	INV P-value	-0.820006 (0.8016)	-2.573067 (0.2940)	2.047743 (0.9889)
1st difference	INV P-value	-7.659392*** (0.0000)	-7.816533*** (0.0000)	-6.987607*** (0.0000)
Level	RIR P-value	-4.139343 (0.0025)	-4.852222 (0.0020)	-3.293549 (0.0016)
1st difference	RIR P-value	-7.603055*** (0.0000)	-8.467805*** (0.0000)	-7.858536*** (0.0000)
Level	INF P-value	-5.427720 (0.0001)	-5.358974 (0.0005)	-2.366055 (0.0193)
1st difference	INF P-value	-12.36032*** (0.0000)	-11.93548*** (0.0000)	-12.64311*** (0.0000)
1%	Critical values	-3.621023	-4.226815	-2.628961
5%		-2.943427	-3.536601	-1.950117
10%		-2.610263	-3.200320	-1.611339
Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationarity at 5% and * represent stationarity variables at 10%				

Source: Eviews 11, Author's computation.

Table no. 3 shows the Philips Perron results. The decision rule and null hypothesis under the Philips Perron test is same as Augmented Dicky-Fuller test. In level, the test in intercept, trend and intercept and none revealed that except from Real interest rate and inflation, other variables are non-stationary. However, at the first difference, all the variables have become significantly stationary.

Co-integration

Long run co-integration test can be performed once the order of integration is established. By applying an ARDL bound test, the existence of a long-run relationship between the variables can be determined. Table no. 4 shows the ARDL bounds test results.

Table no 4:ARDL Bounds Test

Test Statistic	**Value**	**k**
F-Statistic	3.2278994	4
Critical Value Bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Eviews 11, Author's computation.

The results obtained from ARDL bounds test and the estimated F-test suggest that there is absence of long run relationship amongst the variables. The decision rule is based on the F-statistics i.e. 3.2278994, which is lower than the upper bound critical values. Thus, we cannot reject the null hypothesis of no co-integration.

Table no. 5:ARDL Co-integration test

Regressor	**Coefficient**	**Standard Error**	**T-Statistic**	**Probability**
C	-0.293132	0.114033	-2.570584	0.0152
INF	-0.602162	0.414339	-1.453309	0.1562
INV	2.155975	0.611820	3.523870	0.0013
RIR	-0.040390	0.361264	-0.111803	0.9117
USD-NPRexc	0.006880	0.002439	2.820431	0.0083
R-squared	0.966437			
Adj.R-squared	0.961023			
S.E. of regression	0.100934			

Source: Eviews 11, Author's computation.

The equation that shows the relationship between the dependent variable and independent variable along with control variables is given below:

Export = -0.293132-0.602162INF+2.155975INV-0.040390RIR+0.006880USD-NPRexc

This equation shows that investment (INV) and exchange rate (USD-NPRexc) have a positive result with export. Whereas, inflation (INF), and Real interest rate (RIR) have negative relationship with export. INV and USD-NPRexc are statistically significant while INF and RIR being statistically insignificant. The obtained result indicates that a unit increase in inflation (INF) will render a decrease of approximately 0.602162 in exports because inflation tend to erode the value of investment returns over time. Similarly, a unit increase in real interest rate (RIR) will render a decrease of approximately 0.040390 in exports because in theory it is stated that people usually prefer to make current consumption over savings and/or investment given increasing rate of inflation.

On the other hand, a unit increase in investment (INV), will increase exports by approximately 2.155975. Investment incorporates both public as well as private investment. Private sector investment means acquisition of highly efficient machinery and equipment provided with highly trained staffs, leading to higher cost-effective production. Public investment mostly means investment in public infrastructures such as roads, bridges, railways, canals, etc. Likewise, a unit increase in exchange rate (USD-NPRexc), which is a depreciation of the domestic currency against U.S. Dollar will render an increase of approximately 0.006880 in exports as Nepalese exports would be more affordable to the foreign parties.

Table no. 6: Short-run relationship and Error Correction Model results

	Coefficient	Std. Error	T-Statistic	Prob.
CointEq(-1)*	-0.556844	0.130447	-4.268725	0.0002

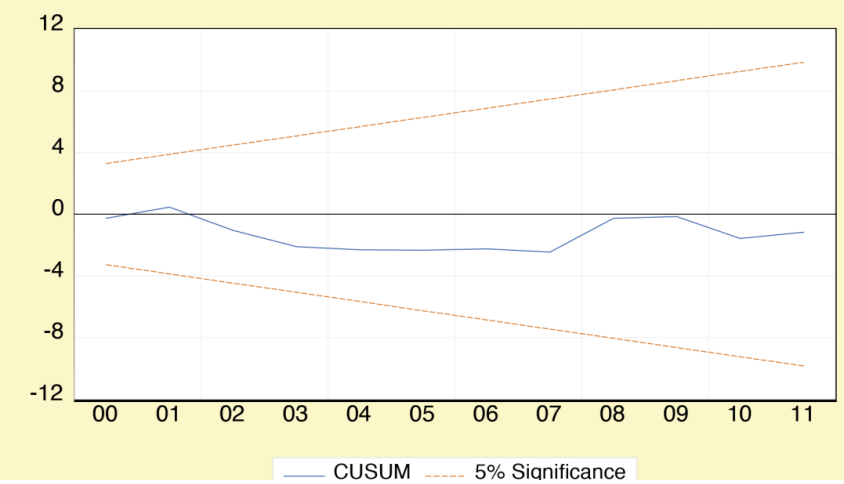
Source: Eviews 11, Author's computation.

For the short run relationship, the value of error correction term should be negative and range between zero and one. Our result presented in table no. 6 shows that the value -0.556844 is negative and lies between zero and one. Thus, confirming that there exists short run relationship between the variables under consideration.

Parameter Stability Test

Cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ), proposed by Brown, Durbin and Evans (1975). The CUSUM test uses the cumulative sum of recursive residuals based on the first set of observations and is updated recursively and plotted against break points. If the plot of CUSUM statistics stays within the critical bounds of 5 percent significance level (represented by a pair of red straight lines drawn at the 5 percent level of significance), the null hypothesis that all coefficients in the error correction model are stable cannot be rejected. If either of the lines is crossed, the null hypothesis of coefficient constancy can be rejected at the 5 percent level of significance Brown et al. (1975). A similar procedure is used to carry out the CUSUM of squares test.

Figure 1: CUSUM Test



Source: Eviews 11, Author's computation.

Chow test

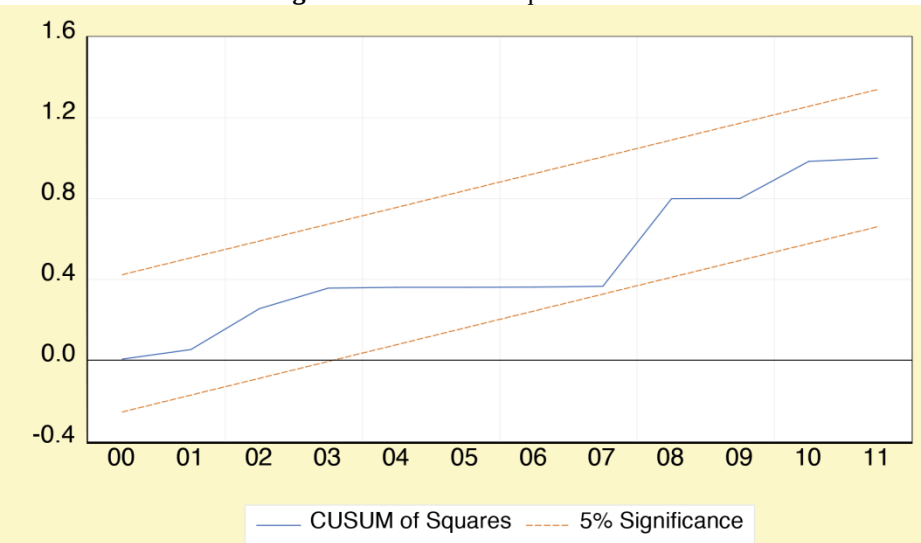
Any event does not cause a sudden shock, it is necessary to require the economic agents, the monetary and public authorities to take immediate action to reduce or eliminate the effects of that shock on the economy. By applying Chow test, we can consider year 1995 as a breakpoint because its P-value is equal to 0.0020, which is less than 0.05 (5%). Thus, the null hypothesis can be rejected. This type of structural break can be corrected by taking a dummy variable that takes zero input before the breakpoint and one as input with and after the breakpoint.

Chow Breakpoint Test: 1995
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1974-2011

F-statistic	5.064483	Prob. F(5,28)	0.0020
Log likelihood ratio	24.47779	Prob. Chi-square(5)	0.0002
Wald Statistic	25.32241	Prob. Chi-Square(5)	0.0001

Source: Eviews 11, Author's computation.

Figure 2: CUSUM of squares Test



Source: Eviews 11, Author's computation.

V. Conclusion

It has been argued by some empirical researchers that exchange rate volatility has a positive effect on the level of exports. However, while some empirical researchers have been able to argue for the negative effects of volatility to exports others have been able to argue for positive or no effects at all. Our examination has focused on the effects of exchange rate volatility to aggregate exports in case of Nepal. Study used some special econometric techniques to find out the relationship between the variables. Auto regressive distributed lag (ARDL) is used for this study to check the relationship among the variables which are under consideration. The study begun with a hypothesis that, real exchange rate significantly impact exports. The hypothesis follows the traditional approach view, which became the initial point of investigation as explained. Nepal currently has flexible exchange rate regime with the U.S. Dollar. From the empirical analysis, the study found that exchange rate has a significant positive relationship with the export.

The policy implication is that, government should avoid exchange rate misalignment at all cost. This is because exchange rate misalignment distort the markets, and the little gains achieved in the short run through undervaluation will be wiped away by inflation in the long run. The best policy to exchange rate is to leave the determination of exchange rate to market forces.

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