NRB Working Paper No. 43

March 2018

Impact of Exchange Rate on Trade Deficit and Foreign Exchange Reserve in Nepal: An Empirical Analysis#

Deepak Adhikari *

ABSTRACT

This paper explores the impact of exchange rate on trade deficit and foreign exchange reserve in Nepal. These are essential variables for external sector stability. Ordinary least squares (OLS) method is applied by making data stationary. Empirical results show that one percentage point depreciation of the Nepalese rupee (NPR) with respect to US dollar results in an increase in reserve by 0.82 percentage points and decline in trade deficit by 6.75 percentage point. Considering the volatility and fragility in the Nepalese external sector, the government and central bank could use the exchange rate policy to some extent to correct trade deficit and maintain adequate foreign exchange reserve for strengthening external sector.

JEL Classification: E49, F31

Key Words: Exchange Rate, Trade Deficit, Foreign Exchange Reserve.

I owe my gratitude to Prof. Dr. Surendra Sundararajan, The Maharaja Sayajirao University of Baroda, Dr. Prakash Kumar Shrestha, Director, Nepal Rastra Bank and Mr. Suman Neupane, Deputy Director, Nepal Rastra Bank for their valuable comments and suggestions in the preparation of this paper.

* Assistant Director, Nepal Rastra Bank. Email: deepak@nrb.org.np

I. INTRODUCTION

Exchange rate is a key variable in the international trade. It is the price of domestic currency in relation to foreign currency, i.e., it is the price at which domestic currency is converted into foreign currency or vice versa (Gillis, et.al., 1996). Exchange rates are fixed, floating or there may arise any variation between the two. In a fixed exchange rate regime, price of domestic currency in terms of foreign currency could be lowered or increased as per the objective of foreign exchange management through devaluation or revaluation respectively. In a floating exchange rate regime, the price of domestic currency in terms of foreign currency could be lowered or increased through depreciation or appreciation, which is being affected by the market fundamentals rather than as an objective of foreign exchange policy. So, the terms revaluation/devaluation are used in the case where exchange rate regime is fixed while the terms appreciation/depreciation are used in the case where exchange rate is floating.

Overvalued exchange rate can promote trade deficit while under-valued exchange rate can foster trade surplus. Thus, countries employ the exchange rate as a strategic policy variable to improve trade balance, especially in emerging and developing economies that focus on export-led growth where the under-valuation is maintained for promoting exports to bring about positive effects on the trade balance. In other words, it is expected that the devaluation decreases the demand for imports and increases the demand for exports; leading to a net improvement in trade balance provided the fulfillment of Marshall-Lerner's condition.

Trade deficit is linked with the foreign exchange reserves. A higher trade deficit lowers the foreign exchange reserves. A holding of foreign exchange reserve is essential for external transaction to those countries whose currencies are not reserve currency. Hence, maintaining the certain level of foreign exchange reserve is a policy objective for countries with non-reserve currency.

Foreign exchange reserves are liquid foreign assets available to the central bank to intervene in the foreign exchange market to support its monetary and foreign exchange policies. According to IMF (2004), reserve assets consist of those external assets that are readily available to and controlled by monetary authorities for direct financing of payments imbalances, for indirectly regulating the magnitude of such imbalances through intervention in exchange markets to affect the currency exchange rate, and/or for other purposes. According to Nugee (2000), and Sundararajan (2015), foreign exchange reserves serve as an important policy tool for exchange rate management, external debt management and monetary policy management. If conducted properly, openly and successfully, it will greatly strengthen the macroeconomic management. However, poor management of the reserves may put exchange rate policy at risk which could cause severe economic damage and financial loss on the assets themselves.

Nepal has been following a pegged exchange rate system with Indian rupee (INR) with periodic exchange rate corrections through revaluation or devaluation in the past. Nepal adopted different kind of exchange rate system for convertible currencies. In line with the economic liberalisation policy followed since the mid-1980s, Nepal introduced current account convertibility in 1993, effectively pegging the Nepalese rupee (NPR) with INR at NPR 160 for INR 100, at the rate which was also set in 1960 when exchange rate with INR was pegged for the first time. Since 1993, exchange rate of NPR with other convertible currencies has been market-determined in line with the exchange rate of INR with convertible currencies.

Given the open border and size of economic transactions, adoption of the pegged exchange rate regime with INR has yielded some benefits by performing anchoring and helping to maintain price stability. However, pegging the exchange rate for a long time at the same rate could erode the competitiveness of Nepalese economy. This is reflected in the ever growing trade deficit with India, which has undermined the sustainability of the peg in border areas because of a lack of adequate supply of INR to meet the demand in cash form especially for informal transactions.

The ever widening trade deficit is an undeniable fact of the Nepalese economy. Along with export capacity, international competitiveness in terms of quality export items, frictionless channels of delivery, real exchange rate, price stability, GDP and interest rate are also crucial determinants of trade balance. In the world of quota-free trade and ever decreasing tariff barriers, maintaining an appropriate exchange rate to reduce the widening gap between import and export is important (Adhikari, 2017).

In this context, this paper quantitatively evaluates the effect of exchange rate on overall trade deficit and foreign exchange reserve in the Nepalese context. To explore the determinants of trade deficit, three variables (price, exchange rate with US dollar and real GDP) have been chosen.

The paper is organized as follow. Section 2 presents the review of literature, followed by methodology in section 3. The fourth section describes the data and sample period. Section 5 discusses the empirical results. Finally, Section 6 concludes the paper.

II. REVIEW OF LITERATURE

The exchange rate is one of the most persistent prices in the economy, perhaps affecting more transactions than any other single price. To change it, especially by the large amounts sometimes required, means changing the relative wealth of influential segments of the population. Not only are the relative prices of imports raised, but in order to prevent domestic prices from rising as much as the currency is devalued, wages and other incomes must be restrained by government policy. Especially the urban workers, middle-class professionals,

civil servants, the upper classes and others whose consumption depends substantially on imports tend to resist devaluation. For these reasons, governments have resisted devaluation, and when they have undertaken it, have often devalued by two little in the face of growing demand and continued inflation. Hence, there was a tendency for exchange rates to remain overvalued in the developing world (Gillis, et.al., 1996).

Some developing economies, however, devalued their currencies to rectify their worsening trade deficit by improving export growth. For example, Williams (2006) and some other economists claim that China and Japan engaged for many years in a programme of buying massive volume of US dollar (USD) in order to keep the Chinese Yuan (CNY)/USD or Japanese Yen (JPY)/USD exchange rate lower, so as to make their exports more competitive in the United States market (p. 7). The results from the empirical study in Malaysia indicated that long-run relationship existed between trade balance and exchange rate, and that depreciation improved the trade balance (Ng, Har and Tan, 2008). To remain competitive in world markets, many developing countries with high inflation rates made steep devaluations to reverse changes in real exchange rates (Shoup, 1998)

According to Piana (2001), a faster GDP growth than that of trade partners usually results in trade deficit, since imports are elastic to GDP (they rise more than proportionally). Currency real exchange rate can be very important: possibly due to a fixed exchange rate and a higher inflation rate than that of commercial partners. An overvaluation of the domestic currency can lead to deep trade deficits on most products and with most countries. A sharp devaluation can dramatically improve all these relationships.

Wai-mum, Yuen-ling & Geoi-Mei (2008) investigated the real exchange rate and trade balance relationship in Malaysia for a period between 1955 and 2006. Their empirical study showed that there is an existence of long run relationship between trade balance and exchange rate. Irhan, Alachan and Korap (2011) analyzed the determinants of the Turkish trade balance and indicated that real exchange rate depreciations improved the trade balance. Furthermore Saadullar & Ismail (2012) analyzed a dynamic panel data analysis on the determinants of trade balance of Bangladesh for about 26 years with variables like real GDP, relative GNI, real exchange rate and import weighted index and discovered that import weighted index is significant in both short run and long run while other remaining variables were significant only in short run.

Sugema (2005) investigated the determinants of trade balance and adjustment to the crisis in Indonesia. His results suggested that trade balance would improve due to the devaluation through an increase in exports and a decline in imports. Since the elasticity of import with respect to real exchange rate was higher than that of export then trade balance improvement would come from the import compression. Further, Shao (2008) investigated Exchange Rate Changes and Trade Balance in Case of Japan by using time-series data for 26 years. He

indicated three long-run relationships among five macro variables: trade balance, domestic income, foreign income, net foreign assets and real exchange rate. He found the final effect of the exchange rate changes on trade balance is undetermined. According to him, although appreciation can reduce trade surplus in the short run, in a longer horizon, there is no stable relationship. The positive sign of the relation is not guaranteed in this case, and appreciation is not surely able to correct the trade imbalance between countries.

As regards the determinants of the supply of foreign exchange reserve accumulation, the European Central Bank (2006) concludes that, in most countries, this is explained by three fundamental factors: (i) a desire to self-insure against financial crises (virtually all emerging market economies share this motivation, although it is expected to lose weight as accumulation progresses; (ii) the pursuit, at least during certain periods (e.g. following a financial crisis), of export-led growth by a number of Asian economies, supported by exchange rates anchored de jure or de facto to the US dollar; (iii) The combined effect of a number of features related to the financial structure of several emerging market economies, including underdeveloped domestic financial systems and dollarisation of foreign assets in certain net creditor Asian economies. Hence, reserves may have been accumulated in order to weather potential turbulence in currency markets and/or shocks to the balance of payments. Even today in Asia, external risk mitigation considerations still continue to be one of the reasons for reserve accumulation. Unilateral reserve build-up may also have been one way to pursue greater independence from potential recourse to conditional IMF financing. Emerging market economies have been providing the rest of the world, and especially the United States, with net resources in the form of current account surpluses. This implies that a significant excess of domestic savings over investment has, as a rule, been a characteristic shared by all major reserve accumulators (including Japan). Another factor that may have produced resistance to exchange rate appreciation and, hence, supported reserve accumulation is the high degree of trade openness (90 percent on average in Asia).

Exchange rate is guided by the objective of external sector stability which requires the maintaining the adequate foreign exchange reserves. Change in reserve is also linked to exchange rate policy through different channels. First could be through impacting trade deficit as discussed above. Second channel could be influencing the remittance and capital inflows.

By using OLS, Engle-Granger co-integration test and FM-OLS based on the monthly data for the period 2006-2015, Pant & Budha (2016) found that depreciation of Nepalese currency has a positive impact on remittance inflows. They also observed the tendency of Nepalese migrant workers to take advantage of favourable exchange rate by sending back more remittance at the depreciated nominal exchange rates. Obviously, inflows of remittance increases foreign exchange reserves.

There is a continual deficit in Nepal's international trade, two-thirds of which occurs with India. Nepal remains dependent on a relatively small basket of exports and a few destination markets (Maskay & Thapa, 2000; Manandhar 2001). Nepal had devalued the peg rate with the INR four times up to 1993, with an intention of export promotion, ultimately targeting to reduce the trade deficit particularly with India. But the results were never encouraging, as all of the devaluations could not improve the trade deficit for a sustained period (NRB, 2016b).

Chaulagain (2015) examined whether the devaluation of NPR could be taken as the policy tool for improving the trade deficit with the rest of the world economies. He also observed the relation between the nominal effective exchange rate (NEER) and the real effective exchange rate (REER) with trade balance. Contrary to conventional thinking, he found that there was no room for improving Nepal's trade deficit through currency devaluation (pp. 18-26). So, the nominal depreciation of the exchange rate could not be an effective tool to improve Nepalese trade imbalance. As observed by him, devaluations are occasional events, which may lag macroeconomic changes, implying that infrequent one-time events may not provide the needed boost to exports. Further, there could be other obstacles, e.g., inadequacy of power availability, inadequate shipping and transportation infrastructure and bottlenecks and unsupportive government policies, which could significantly choke the expected spike in exports consequent to devaluation. In this context of conflicting empirical findings, this study examines the impact of exchange rate on trade deficit and foreign exchange reserve.

III. METHODOLOGY

The objective of the study is to examine the impact of exchange rate on trade deficit and foreign exchange reserve in Nepal. In this regard, the conceptual relationship of exchange rate as variable of interest for analysis and other variables that can affect trade deficit and foreign exchange reserve are represented in the following functional form:

$$\text{Trade Deficit:} \quad TD = f(CPI\_N, EX\_AV, RGDP) \qquad \ldots\ldots\ldots (1)$$

$$\text{Foreign Exchange Reserve:} \quad RESERVE = f(RGDP, EX\_AV) \qquad \ldots\ldots\ldots (2)$$

Where,

TD stands for Trade Deficit, CPI_N for CPI of Nepal, EX_AV for average exchange rate of NPR with US$, RESERVE for foreign exchange reserve and RGDP for real gross domestic product (GDP).

With reference to equations (1) and (2), it is recognized that there exists the dimension of simultaneity, which may be inevitable perhaps, when postulating relationships involving macroeconomic variables. Admittedly also, the concern about multicollinearity between the independent variables is also valid.

The estimating methodology is based on ordinary least squares (OLS) model. The estimating equation is shown schematically presented as below:

$$Y_t = \alpha_i + \sum_{j=0}^{p} \beta_j X_t + \lambda D + \varepsilon_t \quad \ldots\ldots\ldots (3)$$

Where, Y_t is the dependent variable, X_t is the set of independent variables, D is the dummy variable applied to capture significant events. The α_i is a constant term or intercept, β_j represents coefficients of independent variables, λ is a coefficient of dummy variable, ε_t is the error term. As shown in equation (1) and (2), two separate multivariate analyses have been conducted to analyze the impact of exchange rate and other variables on trade deficit and foreign exchange reserves of Nepal.

The equations are estimated using annual time series data. As described in the functional forms, the impact is examined using the ordinary least squares (OLS) method by converting non-stationary time series data into stationary data.

IV. DATA AND SAMPLE PERIOD

The impact of exchange rate on trade deficit and foreign exchange reserve has been examined for the period of FY 1974/75 to 2014/15 and the data have been obtained from Quarterly Economic Bulletin published by Nepal Rastra Bank (NRB) and International Financial Statistics (IFS) of International Monetary Fund (IMF). The variables used in the analysis are Consumer Price Index [CPI] of Nepal (CPI_N), Trade Deficit (TD) of Nepal, foreign exchange reserve (RESERVE), Real GDP of Nepal (RGDP) and average exchange rate (period average) of the Nepalese rupee with US dollar (XR_AV), in terms of NPR, all being annual figures. Further, as the trade deficit is nominal terms, it was correspondingly decided to use the average exchange rate and the CPI_N among the predictor variables. The data used in this empirical analysis are presented in Appendix-1.

V. EMPIRICAL RESULTS

Empirical work begins by examining unit root test for identifying time series properties of the selected data. Secondly, the empirical relationship of nominal exchange rate with foreign exchange reserve is examined. Thirdly, the empirical relationship of nominal exchange rate with trade deficit is examined.

5.1 Unit Root Test

The time series data usually have the property of non-stationarity, which can be identified by using an econometric test, i.e., the unit root test. The regression equations estimated with the non-stationary data may be spurious. To identify the problem of non-stationarity, Augmented Dicky-Fuller (ADF) test has been applied. To verify whether the variables integrated of order zero I(0) or I(1), the tests of stationarity are performed on CPI_N, trade deficit

(Trade_Deficit) of Nepal, real gross domestic of Nepal (RGDP), average exchange rate of the USD (XR_AV) and foreign exchange reserve (RESERVE) using ADF test. The ADF test statistic is applied to check the order of integration of time series, i.e., whether they follow the unit root process.

Table 1: Unit Root Test

Name	**Variable**	**ADF - Test Statistics**	
		Level	**First Difference**
CPI of Nepal	CPI_N	-0.3523	-4.712*
Trade Deficit of Nepal	Trade_Deficit	-0.4099	-5.7388*
Real GDP	RGDP	0.4062	-7.9654*
Exchange Rate Average USD	XR_AV	-1.3046	-4.8211*
Foreign Exchange Reserve	Reserve	0.2097	-5.3132*

Note: Lag Selection criterion is SIC, LAG=2

* significant at 1 percent level of significance

Source: Author's computation using E-views 7.1.

As shown in Table 1, the ADF test statistic suggests that the time series of CPI_N, Trade_Deficit, RGDP and XR_AV show existence of a unit root when these series are tested with ADF test. However, first differenced of these do not show the unit root when these variables are tested with all the three cases at the 1 percent level of significance. Therefore, the ADF test suggests that the time series of variables applied for analysis are integrated of order one, I(1). Thus, the series can be used for ordinary least square estimate with the first difference.

5.2 Foreign Exchange Reserve and Exchange Rate

The impact of nominal exchange rate on foreign exchange reserve is presented in the equation (4), which shows that significant positive association between dependent and independent variables. It seems that growth rate of foreign exchange reserve of Nepal is significantly influenced by the change in exchange rate of Nepalese rupee with US dollar and economic growth rate.

$$\text{Dlog(RESERVE)} = 0.032 + 0.823\,\text{DLOG(XR\_AV)} + 2.730\,\text{DLOG(RGDP)} - 0.602\,\text{DUM84} \quad \ldots\ldots\ldots (4)$$

t-statistics (0.524) (- 2.110)** (2.161)** (4.569)*

$R^2 = 0.397$ F = 7.92* Durbin-Watson (DW) = 2.33 No. of Obs. = 40

Breusch-Godfrey Serial Correlation LM = 3.36 (Probability = 0.186)

(* significant at 1 percent level of significance and ** significant at 5 percent.)

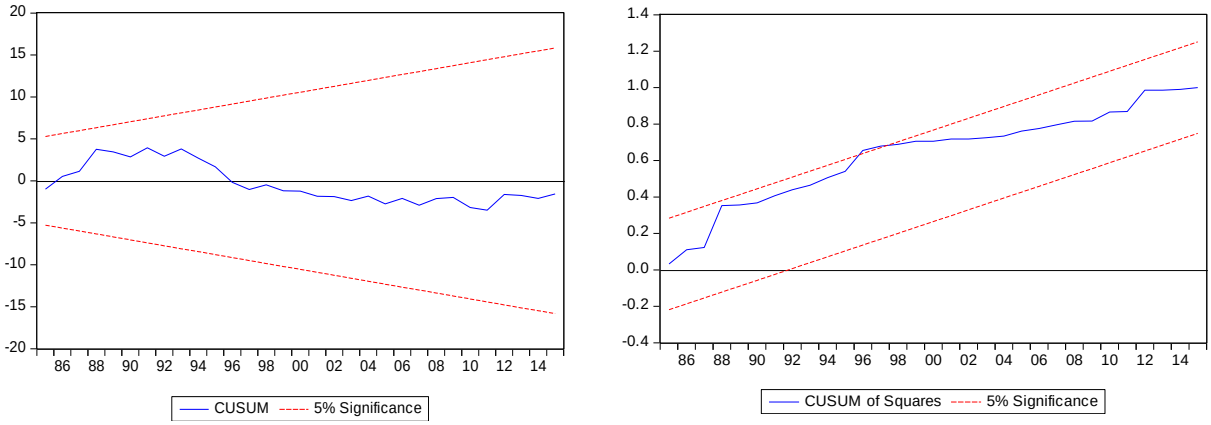
The t-statistics of estimated equation shows that the coefficients of average nominal exchange rate for USD and real GDP are significant at 5 percent level. The dummy (DUM84) is to capture the effect of exceptional case of external sector crisis and the time when the liberalization started.

The result shows that one percentage point depreciation in average exchange rate of Nepalese rupees against US dollar increases the foreign exchange reserve by 0.82 percentage point. Similarly, a percentage point increase in real GDP increases reserve by 2.7 percentage point.

Dignostic tests of the estiated equation are presented below the estimated equation. The diagnostic tests are run on the equation of reserve to diagnose its fitness (Jarque-Bera 0.47, Probability 0.79); it fails to reject the null hypothesis that series are normally distributed. The test statistics of Breusch-Godfrey serial correlation LM test shows LM as 3.36 with P-value of 0.1876. The hypothesis that there is no serial correlation in residual series cannot be rejected at the degree of freedom 2 and at 10 percent level of significance. Thus, it can be concluded that there is no serial correlation in residual series. Moreover, the LM value to test the heteroskedasticity at 2.785 (Probability =0. 426) shows that we failed to reject the null hypothesis of homoskedasticity. It depicts the evidence of homoskedasticity.

Figure 1

CUSUM and CUSUM of Squares Test for Equation (4)



The cumulative sum control chart (CUSUM) tests, a sequential analysis technique for monitoring change detection, reflects the parameters are stable; however, CUSUM of Squares test show slightly outside from the boundary of 5 percent level of significance in the stability (see Figure 1).

5.3 Trade Deficit and Exchange Rate

The empirical relationship of nominal exchange rate with trade deficit of Nepal has been examined in equation (5). The relationship shows that the trade deficit of Nepal is determined by the price level of Nepal and exchange rate of NPR with the USD. The equation is given below, where all other statistics, residual analysis and robustness of the equation are shown.

DLOG(TD) = 0.084 + 2.518 DLOG(CPI_N)- 0.753 DLOG(XR_AV)-
t-statistics (-2.033)** (6.104)* (-3.488)*

1.621 DLOG(RGDP)+ 0.28DUM94 – 0.35 DUM98_99 ……. (5)
(- 2.380)** (2.914)* (-5.302)*

R2 = 0.689 F = 15.06* Durbin-Watson (DW) = 2.47 No. of Obs. = 40

Breusch-Godfrey Serial Correlation LM = 3.828 (Probability = 0.148)

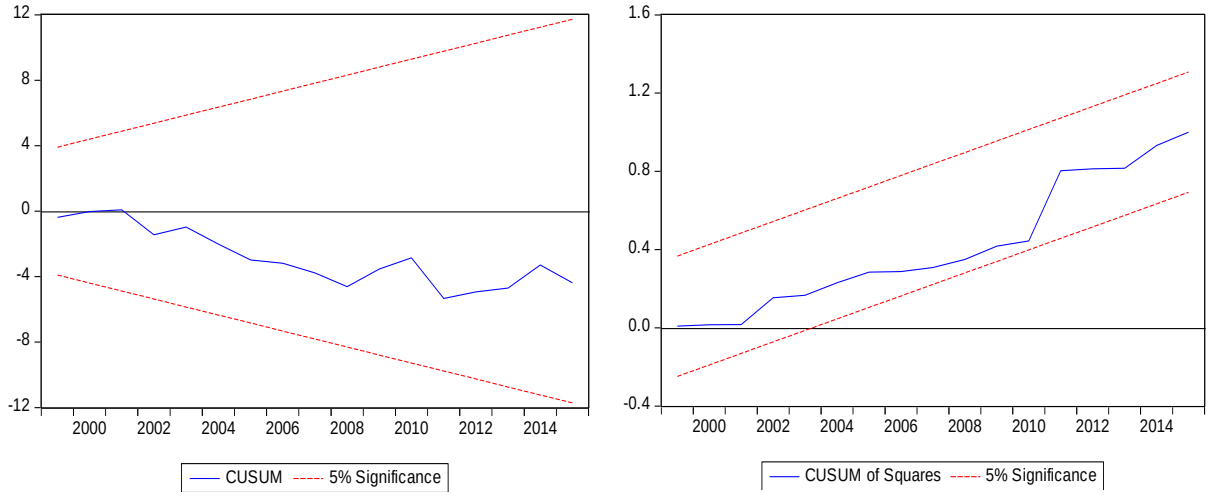
(* significant at 1 percent level of significance and ** significant at 5 percent.)

The coefficients in the equation (5) depict that a 1 percentage point depreciation in NPR with USD improves the trade deficit of Nepal by 0.75 percentage point. Similarly, the increase in real GDP improves the trade deficit, may be through export and substitution of import; a 1 percentage point increase in real GDP decreases the trade deficit by 1.62 percentage points. However, the increase in consumer price increases the trade deficit of Nepal, where a 1 percentage point increase in consumer price increases trade deficit by 2.5 percentage point.

The t-statistics of estimated equation shows that the coefficients of CPI and average nominal exchange rate of USD are significant at 1 percent level of significance while real GDP is significant at 5 percent level of significance. The dummy variable, DUM94, applied for 1994 to capture the effect of introducing current account convertibility which is significant at 1 percent level. Similarly, the dummy DUM98_99 is used to neutralize the effect of outlier or abrupt change in trade deficit during 1998 and 1999.

The diagnostic tests are run on the equation to ascertain its robustness (Jarque-Bera is 0.245, Probability 0.88); it fails to reject the null hypothesis that series are normally distributed. The test statistics of Breusch-Godfrey serial correlation LM test shows, LM = 3.828 and Probability = 0.148. The hypothesis that there is no serial correlation in residual series cannot be rejected at 2 degrees of freedom and at 10 percent level of significance. Thus, it can be concluded that there is no serial correlation in residual series. Moreover, the LM value to test the heteroskedasticity at 4.755 (Probability=0. 447) shows that we failed to reject null hypothesis of homoskedasticity. The null hypothesis of homoskedasticity cannot be rejected so there is no heteroskedasticity. Therefore, it shows the evidence of homoskedasticity. The CUSUM test and CUSUM of squares test as shown in Figure 2 reflect that the parameters are stable in the equation (5).

Figure 2
CUSUM Test and CUSUM of Squares Test for Equation (5)



VI. CONCLUSION

The paper describes the empirical relationship of exchange rate with foreign exchange reserve and trade deficit in Nepal. The model is estimated by using ordinary least squares estimates, where the data are made stationary after the unit root test. The two equations, foreign exchange reserve equation and trade deficit equation, are estimated to identify the impact of the nominal exchange rate of Nepalese rupee with US dollar. Both the equation passed the diagnostic checks. The results show that a 1 percentage point depreciation of the Nepalese rupee results in an increase in reserve by 0.82 percentage points and decline in trade deficit by 0.75 percentage points.

The major impact of the changes is captured by the dummy variables both in the foreign exchange reserve equation and the trade deficit equation. Both equations show that the exchange rate depreciation can improve trade deficit and foreign exchange reserve of Nepal while the domestic price level plays a major role in increasing deficit. Moreover, the price stability could reduce the trade deficit besides making it sustainable. However, there are many outliers in the Nepalese economy as the country remained in a long period of turmoil and transition. Thus, the result of the study should be applied cautiously for policy purpose because relationships examined are only of short-term nature and with limited variables.

However, empirical results suggest that maintaining Nepalese rupees undervalued with US dollar can improve trade deficit and increase foreign exchange reserves. Because of pegging with Indian currency, Nepalese rupees sometime appreciate in line with Indian currency. This situation could be counterproductive for improving trade deficit and increasing foreign exchange reserves for Nepal.

REFERENCES

Adhikari, D. 2017. "Foreign Exchange Management of Nepal: Review and Way Forward". *Journal of the Institute of Chartered Accountants of Nepal,* December 2017, Vol.20, No 2. Kathmandu: The Institute of Chartered Accountants of Nepal. pp. 81-89

Chaulagai, M.K. 2015. "Testing the j-Curve Hypothesis: A Case of Nepal". *NRB* E*conomic Review.* April, 2015. Vol.27, N0.1. Kathmandu: Nepal Rastra Bank. pp. 17-27

ECB, 2006. "Possible Drivers for the Reserve Accumulation", *European Central Bank Occasional* Paper No. 43, February 2006, pp.12-14

Gillis, M; Perkins, D.H.; Roemer M; and D.R. Snodgrass 1996. "*Economics of Development".* New York: W.W. Norton & Company. pp. 476 & 516

IMF, 2004. "*Guidelines for Foreign Exchange Reserve Management"*. Washington, D.C.: International Monetary Fund. pp. 1-2

IMF, 2013. "*Revised Guidelines for Foreign Exchange Reserve Management"*. Washington, D.C.: International Monetary Fund. pp. 2-3

Irhan, H.B.; Alachan, N.D. and L. Korap, 2011. "An Empirical Model for the Turkish Trade Balance: New Evidence from ARDL Bounds Testing Analyses". Turkey: Istanbul University, Department of Economics, Econometrics and Statistics, Vol. 14: pp. 38-61

Sugema, I. (2005). "*The Determinants of Trade Balance and Adjustment to the Crisis in Indonesia".* Australia: University of Adelaide, Centre for International Economic Studies.

Manandhar, K. B., 2001. "Reserve Management and Intervention Strategy". *Issues in Exchange Rate Management* (Papers and Proceedings of the SAARCFINANCE Seminar held on 12-14 Feb 2001 in Kathmandu). Kathmandu: Nepal Rastra Bank. pp. 68-69

Maskay, N. M. & N. B. Thapa, 2000. "The Evolution of Nepal's Exchange Rate Policy with India during the Twentieth Century". *Economic Journal of Development Issues. 1(1),* (Jan-Jun 2000). Kathmandu: The Department of Economics, Patan Multiple Campus, Tribhuvan University. pp. 48-52

NRB, 2018. "Foreign Exchange Investment Guidelines 2009" (including 12th amendment). Kathmandu: Nepal Rastra Bank (unpublished).

NRB, 2016a. *Quarterly Economic Bulletin*, Vol. 50, No. 4, mid-July, 2016 and various past issues, Kathmandu: Nepal Rastra Bank, Research Department, Table No. 66, 78 and 85 (pp. 93, 105 & 118).

NRB, 2016b. "*Current Macroeconomic and Financial Situation of Nepal-based on annual data of 2015/16".* Annex Table No. 15. Kathmandu: Nepal Rastra Bank.

Ng, Yuen-Ling, Har, Wai-Mun and Geoi-Mei Tan, 2008. "Real Exchange Rate and Trade Balance Relationship: An Empirical Study on Malaysia." *International Journal of Business and Management.* p.1 & 4.

Nugee, J. 2000. "Foreign Exchange Reserve Management". *Handbooks in Central Banking*, No 19. London: Centre for Banking Studies, Bank of England. p. 5

Pant, B. and B.B. Budha, 2016. "Remittances and Exchange Rate Linkages: Experience of Nepal". *NRB Working Paper*, July, 2016, Number 33. Kathmandu: Nepal Rastra Bank. p. 1 & 15

Saadullar k.J., M. zakir and M Ismail H. 2012. "Determinants of Trade Balance of Bangladesh: A Dynamic Panel Data Analysis". *Bangladesh Development Studies* Vol. XXXV, June 2012, No. 2

Sarif, M. N. and A.Y.S. Ali, 2016. "Determinants of Trade Balance in Somalia: Regression Analysis using Time Series Data". *Journal of Economics and Sustainable Development*, Vol.7, No.12, 2016. pp. 63-64

Shoup, G., 1998. "*The International Guide to Foreign Currency Management"*. Chicago: Glenlake Publishing Company, Ltd. p. 49.

Sundararajan, S. 2015. "*On the Reserve Bank of India's Exchange Rate Policy"*. SIES Journal of Applied Finance and Accounting, Vol. 2, Issue 1, 2015. Mumbai: SIES College of Management Studies. pp. 20-41

Thapa, N. B. 2002. "An Econometric Analysis of the Impact of Real Effective Exchange Rate on Economic Activities in Nepal". *Economic Review*, Occasional Paper, April 2002, Number 14. Kathmandu: Nepal Rastra Bank.

Williams, M. V. 2006. "Foreign Exchange Reserves - How much is Enough?" Text of the Twentieth Adlith Brown Memorial Lecture delivered by Dr. Marion V. Williams, Governor of the Central Bank of the Bahamas at the Central Bank of the Bahamas, Nassau, on 2nd November 2005. *BIS Review*, No. 1, 2006. Basle: Bank for International Settlements.

APPENDIX 1

Database Used in Empirical Analysis

Amount in Million US

FY	CPI_N	RESERVE	RGDP	TD	XR_AV
1974/75	11.2	1134.2	143079.6	925.0	10.6
1975/76	11.2	1498.2	148042.0	795.9	12.2
1976/77	11.4	1809.3	149537.7	843.3	12.5
1977/78	12.7	1673.0	154214.8	1423.4	12.3
1978/79	13.2	2139.1	157500.0	1587.9	12.0
1979/80	14.4	2223.3	155131.2	2329.6	12.0
1980/81	16.4	2285.9	170692.7	2819.5	12.0
1981/82	18.1	3050.9	178222.8	3438.8	13.0
1982/83	20.6	2349.7	178949.0	5182.0	13.9
1983/84	21.9	2006.2	194692.1	4810.4	15.5
1984/85	22.8	1346.4	205170.2	5001.5	17.9
1985/86	26.4	2128.6	214537.7	6263.2	19.9
1986/87	30.0	2795.8	218184.3	7913.8	21.7
1987/88	33.2	5594.1	234977.2	9755.1	22.2
1988/89	36.0	6837.1	239500.5	12068.4	25.6
1989/90	39.5	8979.4	255847.4	13168.7	28.6
1990/91	43.3	15390.0	272235.0	15839.0	32.0
1991/92	52.4	20182.2	285012.8	18233.5	42.7
1992/93	57.1	28647.9	294040.1	21939.1	45.7
1993/94	62.2	35261.3	319727.3	32277.4	49.3
1994/95	67.0	35423.0	330290.8	46040.3	49.9
1995/96	72.4	34231.2	347921.1	54573.4	55.2
1996/97	78.3	36909.8	366223.1	70916.9	57.0
1997/98	84.8	48393.1	376956.1	61488.5	62.0
1998/99	94.4	54138.6	393948.6	51849.0	68.0
1999/00	97.7	66647.8	417985.9	58682.2	69.1
2000/01	100.0	76143.6	441518.7	60028.1	73.8
2001/02	102.9	81794.6	442048.1	60444.2	76.9
2002/03	107.8	88043.0	459489.1	74421.5	77.8
2003/04	112.1	109076.8	481004.0	82366.4	73.8
2004/05	117.2	105444.2	497739.0	90767.9	72.1
2005/06	126.5	133130.0	514486.0	113546.2	72.3
2006/07	134.6	130213.9	532038.2	135311.5	70.5
2007/08	145.0	170314.2	564516.9	162671.2	65.0
2008/09	164.2	227849.7	590107.2	216772.1	76.9
2009/10	181.4	215006.1	618529.1	313511.2	74.5
2010/11	198.9	225052.1	639694.1	331837.0	72.3
2011/12	215.4	392044.7	670279.4	387406.7	81.0
2012/13	236.7	473791.1	697954.2	479822.8	88.0
2013/14	258.2	593753.0	739754.4	622374.3	98.3
2014/15	276.8	726683.9	759914.7	689365.0	99.5

Source: Quarterly Economic Bulletin, NRB