

MACROECONOMIC DETERMINANTS OF EXCHANGE RATE VOLATILITY: A CASE OF NEPAL

- Suresh Pari

Abstract

The main objectives of this research are to investigate various macroeconomic variables leading to critical variations in the exchange rate of a currency in Nepal, which includes Inflation rate, Interest rate, FDI, current account balance, trade and GDP, its impact on exchange rate against USD by using annual time series data throughout 199/96 to 2019/20. These variables have been taken as independent variables and the exchange rate is taken as dependent variables. This study is primarily quantitative in its approach and it follows a descriptive and analytical approach. The finding of this study is FDI, current account deficit, trade deficit, and GDP have a strong positive correlation with the exchange rate, and the inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal. the exchange rate volatility of Nepal in the run is impacted by the inflation rate, FDI, and GDP. Likewise, FDI and GDP, in the long run, affect the exchange rate of Nepal.

Keywords: Exchange Rate, FDI, GDP, Inflation rate, Interest rate, Exchange Rate Volatility, International trade.

I. Introduction

The exchange rate is the value of a country's currency against other currencies (Krugman & Obstfeld, 2006) and it is important for all countries. Exchange rates provide links between local and international markets for goods, services, and various financial assets. It is an important macroeconomic variable that is used as a parameter to determine global competitiveness, it is considered an indicator to measure the attractiveness of any currency in any country, with a negative relationship between said competitiveness. For this reason, the lower the value of this indicator in any country, the greater the competitiveness of that country's currency. Similarly, Volatility is defined as "instability", whether it appears in asset prices, option prices, portfolio optimization, or risk management. This fluctuation provides a huge basis for economic decision-making. Exchange rate fluctuations describe the uncertainty of international commodity and financial asset transactions. If a country's exports exceed imports, the demand for its currency rises and consequently, it has a positive impact on the exchange rate (Verma, 2016).

The exchange rate plays a vital role in international trade. However, the exchange rate is very important in this era of globalization, considering that any country trades internationally, because lower exchange rates make exports cheaper, while higher exchange rates make them more expensive, and vice versa. The appreciation of the currency has a greater impact on foreign trade. The exchange rate also has a greater impact on the profitability of companies with FDI (foreign direct investment). The exchange rate can also considerably increase the risks and uncertainties in the case of foreign investment. Therefore, the exchange rate has a more important factor to discuss. In this research, try use to verify the determinants that can affect the exchange rate of Nepal.

The understanding and addressing exchange rate determinants in this study provides help and clarity. We are considering developing a solid exchange policy to achieve desirable economic growth. Investors in economies with high foreign exchange risk and high-risk avoidance never invest in such economies, allowing investors to invest in economies with stable exchange rates.

To raise the economic exchange rate, we need to focus on the determinants for that purpose. Therefore, the exchange rate is influenced by the inflation rate, interest rates, GDP growth rate, foreign direct investment, trade, and the current account of a particular country. These types of research help to government, macroeconomic policymakers, and other researchers know about how the exchange rate impact on macroeconomics variables of our country Nepal.

II. Literature review

In 1973, the floating exchange rate was applied to most developing countries based on a fixed exchange rate. Through this change in the exchange rate system, most researchers investigated how this factor affects the economy.

Mirchandani (2013), Analysis of Macroeconomic Determinants of Exchange Rate Volatility in India. The objectives of the study are to investigate the impact of various macroeconomic variables on the volatility of the foreign exchange rate. The research is based on secondary data, to compile the report with some variables twenty years of annual data for the period of 1991 to 2010 were collected. The relationship between the Exchange rate and Macroeconomic variables such as interest rate, Balance of trade, Inflation rate, Foreign Direct Investment, GDP, etc. have been analyzed with the help of the statistical tool. He concluded that review the probable reasons for the depreciation of the Rupee and analyze different macroeconomic determinants that have an impact on the volatility of the exchange rate and their extent of correlation. The study found that high inflation leads to an appreciation of the exchange rate of a currency, a high-interest rate results in depreciation in the exchange rate of the currency, and the exchange rate has a positive correlation with GDP growth rate & current account balance.

Hossain (2013) studied exchange rates and economic growth in Bangladesh's econometric analysis. This study examines the impact of exchange rate and export to GDP in Bangladesh using the time series data from 1981-2013. The Ordinary Least Square (OLS) method is used to estimate the model. The results show that there is a positive relationship between exchange rate, export, and GDP. The value of R^2 is 98.8%. This indicates that about 98.8% of the total variation in the GDP is explained by the exchange rate and export in Bangladesh. The results are statistically significant at a 5% level of significance. This study suggests increasing exchange rate and export to increase economic growth in Bangladesh.

Danmola (2013) study the impact of exchange rate volatility on the macroeconomic variables in Nigeria. The study analyses the impact of exchange rate volatility on Macroeconomic variables with the help of the Correlation Matrix, Ordinary Least Square (OLS), and Granger Causality test. He used econometric models are based on simple regression equations. The findings of the study show that exchange rate volatility has a positive influence on Gross Domestic Product, Foreign Direct Investment, and Trade Openness, but with a negative influence on the inflationary rate in the country.

Chowdhury's (2014) study has been conducted to analyze the determinants of exchange rates in Bangladesh's economy from 1990 to 2011 using a simple single equation linear regression model (SELRM). The inflation rate, GDP growth rate, interest rate, and current account balance is used as an explanatory variable. These are the most important determinants of the exchange rate, which have a major impact on the exchange rate. He concluded includes that inflation rate, GDP growth rate, interest rate, and current account balance have a positive impact on the exchange rate and the major role played by GDP.

Paudel (2015) studies Exchange rate policy and export performance in a landlocked developing country: The case of Nepal. The objectives of this are to examine the implications of Nepal's exchange rate policy for its export performance over the period 1980–2010. We first document Nepal's long-standing currency peg against the Indian rupee and that Nepal's real exchange rate appreciated substantially from the late 1990s. We then employ a gravity modeling approach to confirm that this real exchange rate appreciation has adversely affected Nepal's exports, especially to third-country markets. Nepal's exchange rate-related export competitiveness trap motivates to reconsider the current peg.

Ramasamy (2015), the study Influence of Macroeconomic Variables on Exchange Rates. This study investigates nine important macroeconomic variables' relationship and their influence on exchange rates. under this study 15-year data (2001-2015). The regression modeling technique is widely applied to estimate coefficients for independent variables, test hypotheses, and evaluate the importance of each independent variable in the model. He found that interest rate, BOP, and inflation rates are positively related to the exchange rate.

Wadud (2017) examines the macroeconomic determinants of economic growth of the World Bank's newly categorized lower-middle-income countries. In specific, the study tries to find out the relationship between the key macroeconomic indicators namely foreign direct investment, current account balance, exports of goods and services, imports of goods and services, government total investment, inflation, total population, unemployment rate, life expectancy at birth, total remittances received and economic growth among lower-middle-income countries. This study employs the panel data analysis that allows the unobservable heterogeneity for each observation contained in the sample to be removed and multicollinearity among independent variables to be alleviated. The data for this analysis used the cross-sectional and time-series data (strongly balanced panel data) for 45 countries during the period from 1991 to 2016. He found that import performance and inflation are found insignificant while FDI, interest rate, and unemployment rate are found highly insignificant.

Barguelli (2018) examines the impact of exchange rate volatility on economic growth. An empirical investigation based on a sample of 45 developing and emerging countries throughout 1985~2015 is conducted using the difference and system generalized method of moments estimators. Findings suggest that the generalized autoregressive conditional heteroskedasticity-based measure of nominal and real exchange rate volatility hurts economic growth. Also, the effect of exchange rate volatility depends on the exchange rate regimes and financial openness, that is, volatility is more harmful when countries adopt flexible exchange rate regimes and financial openness.

Khan's (2019) studies investigate the effect of macroeconomic variables on the exchange rate USD/CYN using yearly time series data for China's economy from 1980 to 2017. ARDL bounds test approach for cointegration is applied to test the long-run relation between the dependent and the independent variables. The results of long-run ARDL indicate that gross domestic product growth and trade openness have a positive effect on the exchange rate USD/CNY while interest and inflation rates hurt the exchange rate.

Antwi & Issah (2020) The study examined the effect of macroeconomic variables on the exchange rate in Ghana using a multivariate modeling technique of the Vector Autoregression (VAR) and focusing on the impact of broad money supply (M2), lending rate, inflation, and real GDP on the exchange rate, for 76 quarterly observations period of 2000–2019, in Ghana and to examine their effectiveness in managing the exchange rate in Ghana. The study used only secondary sources of data from the Bank of Ghana, World Development Indicators,

and the Ghana Statistical Service. He found that the real GDP granger causes an exchange rate in Ghana. However, inflation, money supply, and lending rate do not granger cause exchange rate in Ghana but they affect exchange rate indirectly.

III. Methodology

This study has used descriptive inferential research designs. The descriptive design helps to describe the phenomenon, Inferential statistics allow using samples to generalize the populations from which samples are drawn. It is used to assess the strengths of the relationship between the independent variables and the dependent variables. This study has used correlation, Unit root test ARDL model is suggested to test the relationship between dependent and independent variables. The sample of this study consists of 25 years of annual time series data of Nepal as the macroeconomic determinants of the exchange rate in the Nepalese economy covering the period from 1995/96 to 2019/20 AD. This study has been based on secondary data which has been collected from various sources like the MOF, NRB, and world bank data set. The data is analyzed using Statistical Packages for Social Scientists (SPSS) software, Software for Statistics and Data Science (STATA), and Micro Soft- Excel.

The Model

Autoregressive Distributed Lag (ARDL) bounds testing approach is used to investigate the long and the short-run relationship between dependent and independent variables of the study. Since the nature of our data is based on time series distribution these data suffer from the problem of autocorrelation and trends therefore linear regression model can't produce a valid result. In such a situation the following ARDL model is suggested to test the relationship between dependent and independent variables. Following are the bound test cointegrations models.

$$\begin{aligned} \Delta EXR_t = & \beta_0 + \beta_1 \sum_{t=i}^p \Delta EXR_{t-1} + \beta_2 \sum_{t=i}^p \Delta Inf_{t-1} + \beta_3 \sum_{t=i}^p \Delta INT_{t-1} + \beta_4 \sum_{t=1}^p \Delta FDI_{t-1} \\ & + \beta_5 \sum_{t=i}^p \Delta CA_{t-1} \\ & + \beta_6 \sum_{t=i}^p \Delta TD_{t-1} + \beta_7 \sum_{t=i}^p \Delta GDP_{t-1} + \lambda_1 EX_{t-i} + \lambda_2 Inf_{t-i} + \lambda_3 INT_{t-i} \\ & - i + \lambda_4 FDI_{t-i} + \lambda_5 CA_{t-i} + \lambda_6 TD_{t-i} + \lambda_7 GDP_{t-i} + e_t \end{aligned}$$

IV. Results and discussion

Descriptive analysis

Table 8.1 provides a summary of the sample descriptive statistics. This summary of descriptive analysis is macroeconomic determinants of exchange rate volatility a case Nepal. The exchange rate is the dependent variable of this study and the exchange rate of the Nepalese rupee (NPR) against the US dollar was measured used to calculate the exchange rate. The minimum value of the exchange rate NPR is 54.96 per US dollar and the maximum value of NPR is 116.01 with an average value of NPR is 80.89 per dollar. There is the fluctuation of the exchange rate is measured by the standard deviation over the past 25 years. The standard deviation of the exchange rate is 17.64 per us dollar. This fluctuation is relatively smaller.

Inflation is the independent variable and describes the rate at which the price level continues to rise overall or at which the prices for goods and services rise regularly with low purchasing power. Inflation affects the distribution of income. The increase in price volatility leads to high inflation. The inflation rate is measured by the consumer price index (CPI) of Nepal. The minimum value of the inflation rate is 2.27 in CPI per year and the maximum value of inflation is 11.24 in CPI per year with an average value is 6.74 per year. There is the fluctuation of the inflation rate is measured by the standard deviation over the past 25 years. The standard deviation of inflation is 2.89.

Similarly, interest rate another independent that influences the movement of the exchange rate was the differential of interest or difference in interest rates between the main countries. The interest rate is measured by the weighted average interest lending rate of commercial banks in Nepal which is published by the NRB. The minimum value of interest rate is 8.92 percent per year and the maximum value is 16.15 percent per year with an average value is 11.29 percent per year. There is the fluctuation of interest rate is measured by the standard deviation over the past 25 years. The standard deviation of the interest rate is 1.76 percent per year.

The FDI is the independent variable in this study. The exchange rate volatility can also influence the level of development of the countries through its effects on direct foreign investment entries. It is measured by in this study ten-million-unit NPR amount data converted into log formula. The minimum value of FDI is 0.00 because the FDI is 199/00 and 2002/03 AD, FDI inflow in Nepal is zero, and the maximum value is 3.29 with an average value is 2.05. The fluctuation of FDI is measured by a standard deviation the value of standard deviation is 0.95, which is the smaller fluctuation of FDI in Nepal.

Likewise, the current account balance deficit is the independent variable in this study. The current account formula of the Balance of Payment measures the import and export of goods and services and is calculated as the sum of the trade balance, net income, and current transfers. It is measured by in this study ten-million-unit NPR amount data converted into log formula. The minimum value of the current account balance deficit is 1.37 and the maximum value is 4.42 per year with an average value of the current account balance is 3.34 per year. The fluctuation of the current account balance is measured by standard deviation and the value of standard deviation is 0.66 over the past 25-years, which is a very small fluctuation in the current account deficit in Nepal.

The trade deficit is another independent variable in this study. The import and export directly as well as indirectly influence the country's exchange rate. The relationship shows that the trade deficit of Nepal is determined by the price level of Nepal and the exchange rate of NPR with US dollars. The trade deficit is measured by the export more import of country trade. The minimum value of the trade deficit is 1.53 and the maximum value is 4.45 with an average value of trade deficit is 3.37. The trade fluctuation is measured by the standard deviation and the value of the standard deviation is 0.63 over the past 25-years.

Similarly, GDP is the independent variable in this research, Changes in the GDP reveal changes in economic growth and can directly impact the relative value of a country's currency. It is measured by in this study ten-million-unit NPR amount data converted into log formula. The minimum value of GDP is 4.40 and the maximum value of GDP is 5.58 with an average value is 4.96. the GDP fluctuation is measured by standard deviation, the value of standard deviation value is 0.37. This fluctuation is relatively smaller

Table 8.1
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Exchange rate (USD/Rs)	25	54.96	116.01	80.89	17.64
Inflation (CPI by Year %)	25	2.27	11.24	6.74	2.89
Interest rate (Lending Rate per Annum)	25	8.92	16.15	11.29	1.76
Foreign direct investment	25	.00	3.29	2.05	.95
Current account balance deficit	25	1.37	4.42	3.34	.66
Trade deficit	25	1.53	4.45	3.37	.63
GDP	25	4.40	5.58	4.96	.37

Correlation Analysis

Table 8.2 shows that the exchange rate has been a positive significant correlation with foreign direct investment (+.653). The current account balance deficit has been a is the significant relationship with the exchange rate (+.567) and the trade deficit has been a positive significant correlation with the exchange rate by .0648. The exchange rate also has positive significance with the GDP of Nepal, the remaining other variables have been no correlation between the exchange rate of Nepalese rupees i.e., inflation (CPI), and interest rate. This result shows that the exchange rate significant positive correlation with foreign direct investment (FDI), Current account balance (CAB)/deficit, trade deficit, and GDP. It means that all mentioned variable is a strong positive correlation with the exchange rate. The inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal.

The result data show that the inflation rate is an insignificant correlation with the exchange rate, lending interest rate, foreign direct investment, current account balance deficit, trade deficit, and GDP of Nepal. It means that the inflation rate has is no significant correlation with the macroeconomic variables of Nepal.

The lending interest of the commercial bank of Nepal is an insignificant correlation with the exchange rate, foreign direct investment, current account balance deficit, and the trade deficit. This result shows that the interest rate is a negatively significant correlation with GDP (. -500). The correlation found that the interest rate is an only negative significant correlation with GDP and another remaining study variable is an insignificant correlation.

Foreign direct investment has been a positive significant correlation with the exchange rate by (+.652), the current account balance deficit has been a positive significant correlation with FDI by (+.474). FDI also has been a positive significant correlation with trade deficit by (+.542) and GDP has been also a positive significant correlation with FDI by (+.763). Foreign direct investment is an insignificant correlation with inflation and interest rate.

The current account balance deficit has been a positive significant correlation with the exchange rate by (+.567). similarly, FID is significant with the current account balance deficit by (+.474)

and the trade deficit has a highly positive significant correlation with the current account balance (+.989). The GDP has also a positive significance with the current account balance by (. +606). In another hand, the inflation rate and interest rate are insignificantly correlated with the current account balance. This relationship found that the current account balance deficit has been a significant correlation with the exchange rate, FDI, CAB deficit, trade deficit, GDP, and the insignificant correlation with inflation and interest rate.

Likewise, the trade deficit has been a positive significant correlation with the exchange rate by (+.648) and trade deficit and FDI is a significant correlation by (+.542). similarly, the current account balance deficit is a highly significant correlation with the trade deficit by (+.989) and GDP has also a positive correlation with the trade deficit by (+.689). The result shows that the exchange rate, FDI, CAB deficit, and GDP have been significantly correlated with the trade deficit and the interest and inflation rates of Nepal insignificant correlation with the trade deficit.

The GDP has been positive and highly significantly correlated with the exchange rate by (+.911) and the lending interest rate is positively significant with the GDP of Nepal. Similarly, the FDI has positive significance with GDP by (+.763). likewise, the GDP of Nepal has positive a significant correlation with the current account balance deficit by (+.606), and the GDP has also a positive and significant correlation with the trade deficit by (+.689). This correlation shows that the exchange rate, lending interest rate, FDI, current account balance deficit, and the trade deficit has been positive and significantly correlated with the GDP growth. The inflation rate is no significant correlation with the GDP of Nepal.

Table 8.2 Pearson Correlation Coefficient between macroeconomic determinants variable and the exchange rate

	Exchange rate	Inflation rate	Interest rate	FDI	CAB deficit	Trade deficit	GDP
Exchange rate	1	-.017	-.395	.652**	.567**	.648**	.911**
Inflation rate	-.017	1	-.018	.316	-.152	-.128	-.126
Interest rate	-.395	-.018	1	-.105	-.075	-.100	-.500*
FDI	.652**	.316	-.105	1	.474*	.542**	.763**
CAB deficit	.567**	-.152	-.075	.474*	1	.989**	.606**
Trade deficit	.648**	-.128	-.100	.542**	.989**	1	.689**
GDP	.911**	.128	-.500*	.763**	.606**	.689**	1
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).							

Unit root test

Table 8.3 Indicates the results of the Unit Root test for checking the stochastic properties of the data are assessed based on the series of each variable through Augmented Dickey-Fuller and Phillips-Perron tests. Results indicate that inflation and interest rate are stationary at level with ADF unit root test, also the interest rate is stationary at level with PP while the remaining

variables are non-stationary at the level. All the time series variables stationarity is again checked at the first difference with both ADF and PP. The result of the first difference indicates that all variables are stationary. Thus, it indicates that the order of integration is a mixture of I (0) and I (1), making it valid to use the Autoregressive distributed lag (ARDL) bound test approach.

Table 8.3. Unit root test

Variables	ADF		PP	
	Intercept	Trend & intercept	Intercept	Trend & intercept
Level				
EX	0.097	-1.18	0.129	-1.25
Inflation	-3.32	-3.29	-3.30	-3.26
Interest	-3.21	-2.85 ^a	-3.37 ^a	2.85
FDI	-1.65	-3.12	-1.48	-3.00
Current balance	-3.30 ^c	-5.03	-3.29	-5.15
Trade	-2.81	-4.88	-2.76	-5.02
GDP	0.88 ^a	-1.72	-4.67	-1.81
First difference				
EXR	-4.67 ^c	-4.66 ^c	-7.99 ^c	-4.66 ^c
Inflation	-7.10 ^c	-6.92 ^c	-3.75 ^c	-7.75 ^c
Interest	-3.49 ^c	-3.48 ^c	-6.19 ^c	-3.23 ^c
FDI	-5.81 ^c	-5.80 ^c	-8.19 ^c	-6.34 ^c
Current balance	-6.98 ^c	-6.80 ^c	-8.30 ^c	-8.085 ^c
Trade	6.90 ^c	-6.74 ^c	-8.05 ^c	-7.86 ^c
GDP	-3.76 ^c	-3.84 ^a	-3.75 ^b	3.82 ^b

^{a,b} and ^c shows 1, 5, and 10% level of significance respectively

ARDL Bounding Test

While conducting a bounding test for the long-run cointegration of the exchange rate and another independent variable. The result found that based on table 4.2.5 the long-run relationship of the study variable since the lower value (I-O) at 5% level is less than for F- statistics value and f-statistics value is greater than the upper bound critical value, so the long-run cointegration of variable is accepted, it is shown in the table.

Table 8.4 ARDL Bounding Test

	Lower bound	Upper bound
F-test	Critical value (5%)	Critical value (5%)
6.624	2.45	3.61
t-test		
-2.91	-2.86	-4.38
<i>H0: no level relationship</i> <i>Accept if $f < \text{critical value I (0)}$</i> <i>Reject if $f > \text{critical value I (1)}$</i>		

ARDL Short Run Approach

Table 8.5 indicates the results of the short-run ARDL approach. Exchange rate NPR/ USD is used as the dependent variable. The past exchange has a positive effect on the current period exchange rate, in the short-run, the increase in the past exchange rate increases by .963 times of the year and the result is significant at 5%. Inflation is the independent variable in this study. The inflation rate has a positive impact on the exchange rate as per our prior hypothesis. In our short-run model, the inflation rate coefficient is 0.46 at the level and it is significant at 5 %. So, the hypothesis is accepted.

The interest rate hurts the exchange rate as per our prior hypothesis. The Short-run ARDL results of interest rate coefficient is - 0.094 at the level and it is insignificant at 5 %. So, the hypothesis is accepted. Similarly, FDI is a positive impact on the exchange rate as per our prior hypothesis. The result shows the FDI coefficient is 0.019 at the level and significant at 5%. So, the hypothesis is accepted. The current account balance is a positive impact on exchange as per our prior hypothesis. As per the ARDL short-run approach results shows the current account coefficient is -1.274 at the level and insignificant at 5%. So, the hypothesis is not accepted.

Likewise, the trade deficit has a positive impact on the exchange rate as per our prior hypothesis. The result ARDL short run approach shows the trade deficit coefficient is 1.530 at the level and insignificant. So, the hypothesis is not accepted. The GDP is a positive impact on the exchange rate in our prior hypothesis.

In our short-run model, the coefficient is 4.226 at the level and significant. So, the hypothesis is accepted. As our ARDL short-run model R-square indicates 97.47% variation in exchange rates is explained by the independent variables of the study. AIC and SIC values show that the model fits for analysis.

Table 8.5 ARDL Short Run Approach

Variables	Coefficient	Std. Error	t-statistics	Prob.
Exchange rate	.963	.215	4.48	.046
Inflation	.0462	.009	4.81	.041
Interest	-.094	.002	3.47	.065
FDI	.019	.037	-3.22	.004
Current account	-1.274	.396	-3.23	.084
Trade	1.530	.464	3.29	.081
GDP	4.226	1.62	2.62	.048
R-squared	.9747			
Adjusted R-squared	.9747			
F-statistics	43.40			
Prob (F-statistics)	.0028			

ARDL Long Run Approach

Table 8.6 indicates the results of the long-run ARDL approach. Exchange rate NPR/ USD is used as the dependent variable and inflation rate, interest rate, FDI, current account deficit, the trade deficit is used as independent variables in this study. The past exchange has a positive effect on the current period exchange rate, in the short-run, the increase in past exchange rate increases by

.922 times of the year and the result is significant at 5%. Inflation is the independent variable in this study. The inflation rate has a positive impact on the exchange rate as per our prior hypothesis. In our short-run model, the inflation rate coefficient is 0.615 at the level and it is insignificant at 5%. So, the hypothesis is not accepted. A high rate of inflation minimalizes the effectiveness of a country in the international market.

The interest rate hurts the exchange rate as per our prior hypothesis. The Short-run ARDL results of interest rate coefficient are - 0.094 at the level and it is insignificant at 5%. So, the hypothesis is accepted. Interest rate results indicated that the decrease in the NPR value is caused by the high-interest rate in the economy. Results of the interest rate are in line with the results of previous researchers. Khan and Qayyum (2011) stated that the interest rate has negatively and statistically non-significant affect exchange rates in Pakistan. Iqbal et al. (2012) revealed that GDP and interest rates hurt exchange rates in Pakistan. Similarly, FDI is a positive impact on the exchange rate as per our prior hypothesis. The result shows the FDI coefficient is 0.062 at the level and significant at 5%. So, the hypothesis is accepted.

The current account balance is a positive impact on exchange as per our prior hypothesis. As per the ARDL short-run approach results shows the current account coefficient is 1.094 at the level and insignificant at 5%. So, the hypothesis is not accepted. Likewise, the trade deficit has a positive impact on exchange rate as per our prior hypothesis. The result ARDL short-run approach shows the trade deficit coefficient is (-1.530) at the level and insignificant. So, the hypothesis is not accepted. Long run coefficient of trade openness indicates negative and statistically non-significant to determine exchange rates. Raza and Afshan (2017) investigated elements of the exchange rate in Pakistan by using time series data from 1972 to 2013. They used the autoregressive distributed lag bound testing cointegration approach, the Johansen and Juselius cointegration approach for checking the long-run relationship among the study variables.

The result of long-run cointegration shows that terms of trade and trade openness have a significant and negative effect on exchange. The GDP is a positive impact on the exchange rate in our prior hypothesis. In our short-run model, the coefficient is -8.603 at the level and significant. So, hypothesis is accepted. Our results of gross domestic product growth are consistent with Azid et al. (2005) and Mirchandani (2013) while contradicting with results of Harberger (2003). Mirchandani (2013) investigated the association between GDP and exchange rates in India and pointed out a significant positive relationship between India's economic growth with the exchange rate. Azid et al. (2005) stated that volatility in economic growth affects the exchange rate positively and significantly; the government applies non-consistent exchange rate policies in the economy. Harberger (2003) stated that economic growth and exchange rate have no relationship and economic growth non-significantly affects exchange rates. As our ARDL long-run model R-square indicates 97.80% variation in exchange rates is explained by the independent variables of the study. AIC and BSIC values show that the model fits for analysis.

Table 8.6 ARDL long Run Approach

Variables	Coefficient	Std. Error	t-statistics	Prob.
Exchange rate	.922	.28	2.81	.0490
Inflation	.615	.07	2.01	.067
Interest	-.016	.012	-1.32	.018
FDI	.062	.0422	1.49	.004
Current account	1.0911	.39	2.77	.073

Trade	-1.034	.433	-2.38	.081
GDP	-8.603	1.382	-4.24	.000
R-squared	.9780			
Adjusted R-squared	.7581			

V. Finding

The following are the major finding from the statistical analysis:

- I. The FDI, current account deficit, trade deficit, and GDP have a strong positive correlation with the exchange rate. Similarly, the inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal.
- II. The ARDL short-run model indicates that the inflation rate, FDI, and GDP are significant at 5% and the interest rate, current account, and the trade deficit are insignificant at 5% as per our prior hypothesis. The R-square indicates 97.47% variation in exchange rates is explained by the independent variables of the study.
- III. ARDL long-run model indicate that the FDI and GDP are significant at 5% with the exchange rate and current account balance, trade deficit, and interest rate is in insignificant at 5% with dependent variables, 97.80% variation in exchange rates is explained by the independent variables of the study.

VI. Conclusion

The study concludes that the FDI, current account deficit, trade deficit, and GDP have a strong positive correlation with the exchange rate, and the inflation rate (CPI) and interest rate are insignificantly correlated with the exchange rate of Nepal. FDI and GDP, in the long run, affect the exchange rate of Nepal. The policymakers of the Nepal government should motivate its government to assign such monetary and fiscal policies that cause the less volatile and productive exchange rate for Nepal to manage sustainable economic growth for a long time with its trading partners.

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